CONSTRUCTION OF 400Mts TRACK

- Find out the total area required for a 400Mts track by using the following formula.

  Total area =Total length x Total width
  Total length =Straight + 2CDR +(No. of lanes X width of the lane)+2Extra space.
  Total width=2CDR + (No. of lanes X width of the lane)+2Extra space.

- RDR(Running Distance Radius) is the imaginary line through which the athlete is supposed to run, for example if the straight is 80m, the distance to be covered in the two curves is 240m.

- The two curves forms a circle and the circumference of the circle is $2\pi r = 240m$, r = 240 / 2 * 7 / 22 = 38.18m.
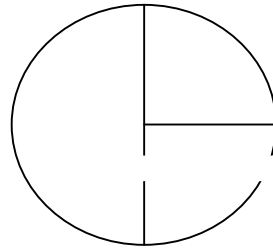

- CDR (Curb Distance Radius) is the actual line used for marking. Since the athlete has to run the race without touching the inner line at the same time he should not run the distance more, for that the CDR is used for marking. CDR=RDR - 20cm) for non- standard track, CDR=RDR-30cm for standard track =38.18-30 = 37.88

For example if the straight is 80Mts,width of the lane is 1.22 and extra space is 1Mts, then the required length =175.52m and required width =95.52Mts Total area required =16765.67m^2

(From 2004-2005 onwards the width of the lane is 1.22 ± 1cm)

Based on the required length and width located the center point in the ground. In a irregular field first we have to mark a rectangular maximum space as ABCD as shown in the first figure.

LAY OUT OF 400m TRACK
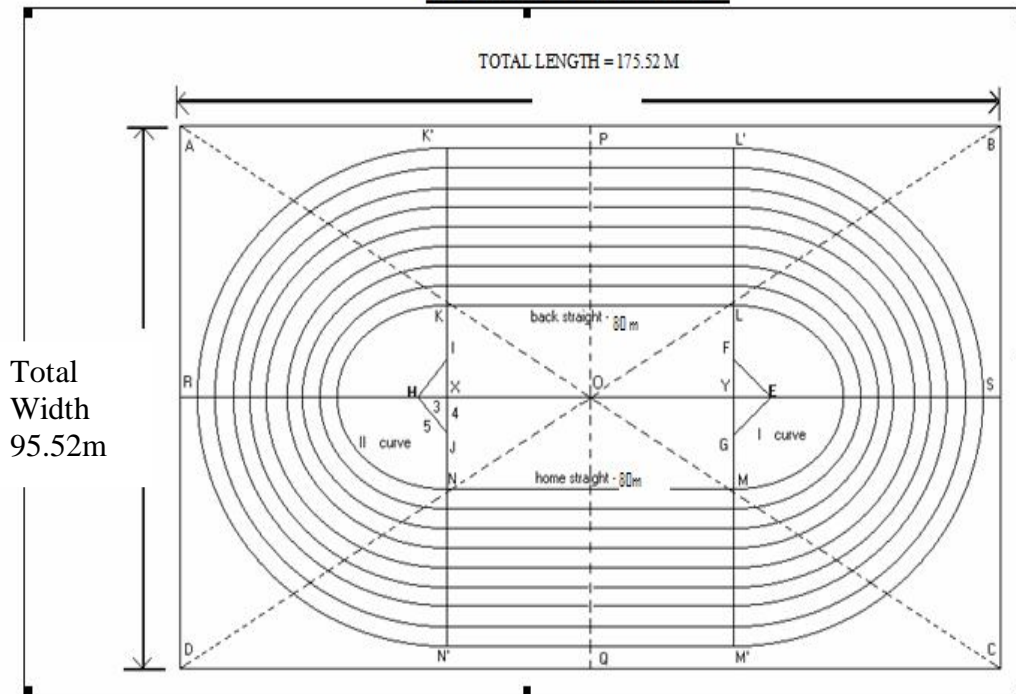
(From 2004-2005 onwards the width of the lane is 1.22 ± 1cm)

- Take the center point of AB and CD (half of AB and CD) & mark the points P&Q.
- Take the center of BC & AD and mark the points as R & S and peg the nails at R&S.
- Now tie the steel wire from P to Q and R to S .
- Where both the thread bisects each other i.e. at O is the field center (draw the diagonals from AC&BD it meet at O)
- Remove the steel wire and nails from P&Q and retain the steel wire between R&S. peck nail at the field center O.
- Now take XY the straight on the either side of O (OX&OY) 40m on either side if it's a 80m straight.
- Peg a nail at X&Y so that OX=40m, OY=40m then by using Pythagoras theorem ((3,4,5),(6,8,10),(9,12,15),(12,16,20)….) construct the right angles at the point XY
- Measure three meters from Y and peg a nail at E so that YE=3m, from Y take 4m as radius draw an arc on either side of Y, take 5m as radius from the point E, draw an arc on either side of Y, so that it interacts at point FG. Now EYF &EYG are the right angles.
- Extended the line YF &YG to the maximum, the same method should be followed to construct a right angle at the point X.
- Measure 37.88m(CDR) towards the XI & XJ from the point X and also measure 37.88M towards YF & YG from the point Y, and mark them as K, L, M and N.
  (XK = XN = XL = YM =37.88M (CDR))

- Then join KLMN, it gives the inner rectangle of the track, check the right angles at each corners by using Pythagoras theorem.
- Fix the steel wire at X and extended it to the XK^1.
- XK = 37.88M m, from K measure 1.22m and mark it with gum tape for 8 lanes (1.22m, 2.44m, 3.66m, 4.88m, 7.00m.8.22m, 9.44m, 10.66m)

(From 2004-2005 onwards the width of the lane is 1.22 ± 1cm)

- A person who is holding the extreme end of steel wire should move uniformly about 2ft. a time, by giving uniform tension to the wire.
- Each time a dot of the marking power should be marked by 8 person on each mark of the gum tape on the wire.
- Half curve should be marked from the point K. The remaining half curve should be marked from the point N. The same method should be followed to mark the other curve from the point Y.
- Dots should be joined and the curves are to be joined by the straights, we can mark the track and get the lanes. The width of the line should not be more than 5cm.

STAGGER :-

It is excess distance covered by the runners from 2nd lane to 8th lane, on their running path in one lap, when compared to the distance covered by the first lane runner on his running path in one lap.

The formula to find out the stagger for standard track = [(W * (N-1))-0.10] * 2π

And for non standard track = W * (N-1) * 2π

(W=Width of Lane, N= Lane Number).

(From 2004-2005 onwards the width of the lane is 1.22 ± 1cm)
For example for a 400m track with 1.22m as width of lane, for lane II = (W * (N-1) * 2π.= (1.22 *(2- 1)-.10 * 2* 22/7 = 7.O4m. Like this, find out for the other lanes.
If an athlete (2nd –8th lane) runs on his own lane for one curve, we have to give half stagger, for two curves full stagger and for three curves one and half stagger must be given (maximum - one and half stagger)

DIAGONAL EXCESS-

Break line

C

A

Back Straight   B
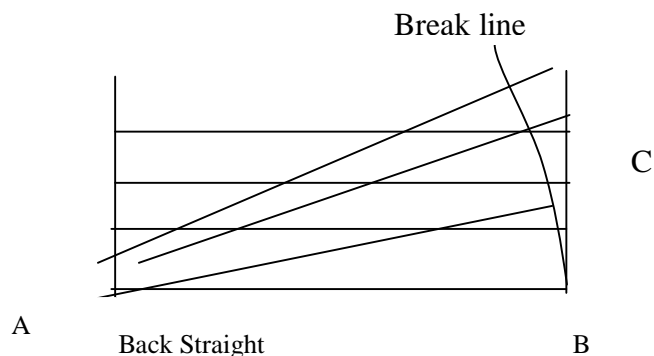
The excess distance to be run while running diagonally, it depends on the lane width and length of the straight. The formula to find out DE=AC – AB
(AB= Straight (80m) BC= Width of the previous lane
$AC=\sqrt{AB^2+BC^2}$

For example for 2nd lane $AC=\sqrt{80^2+1.22^2}$ = 80.0093
DE= 80-80.01= 0.01 m like that find out for other lanes

Starting point for the following events in 400m track
200=Half stagger, 400m, 4x100m,= Full stagger
4x400m = one and half stagger + DE (the first athlete (2nd –8th lane) has to run two curves on the same lane after that second athlete can cut in to first lane by using DE at the break line in back straight.)

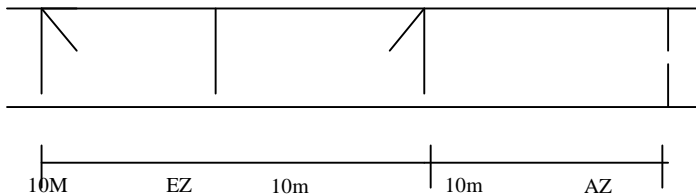4X100m RELAY   I-VIII LANE (scratch line)
   I Exchange   At the 100m point
   II Exchange   At the 200m point
   III Exchange   At the 300m point

4X 400m RELAY   I –VIII LANE (scratch line)
  I,II,III,Exchange   Common zone.

Note:-
Advance Zone is only for 4x 100m
Scratch line is center point of the Exchange zone

10M   EZ   10m   10m   AZ

CO:

(The stating point for 800,1500,3000,5000,and 10000m)

Formula = 1/No of lanes x Total curve distance.

For example for a 400m track width 80m as straight.
= 1/8 x 240 =30 m.
Use this distance as radius to mark the arc start.
The starting point for 800m, , m and 10000m is at the first curve and for 3000m 5000 at the second curve.
 For 1500m at the start of back straight (i.e.80 +20= 100 from the end of back straight).

FIG:A : Setting out plan and dimensions of the 400 m standard track (In Meters)

FIG: B -Shape and Dimension of 400m Standard track (Radius 36.5m) (In Meters)

Layout of the 400m Standard Track (As per IAAF)

The 400m Standard Track has the advantages of a simple construction, straight and curved sections of almost equal length and uniform bends which are most suitable to the running rhythm of athletes. Furthermore, the area inside the track is large enough to accommodate all throwing events and also a standard football pitch (68m x 105m). The 400m Standard Track comprises 2 semicircles, each with a radius of **36.50m**, which are joined by two straights, each **84.39m** in length (Figure B). This diagram indicates the inside edge of the track which must have a kerb, that should be coloured white, with a height of 0.05m to 0.065m and a width of 0.05m to 0.25m. The inner edge of the track is 398.116m in length (36.50m x 2 x π + 84.39m x 2) where π = 3.1416. This length for the inner edge gives a length of 400.001m (36.8m x 2 x π + 84.39m x 2) for the theoretical line of running (measurement line) at a distance of 0.30m from the kerb. The inside lane (lane 1) will, therefore, have a length of 400.001m along its theoretical line of running. The length of each of the other lanes is measured along a theoretical line of running 0.20m from the outer edge of the adjacent inside lane (Figure A). All lanes have a width of 1.22m ± 0.01m. The 400m Standard Track has 8, 6 or occasionally 4 lanes but the last is not used for international running competition. On occasion in the World Cup in Athletics there are 9 teams requiring 9 oval lanes. This is the maximum number of oval lanes that should be provided at a facility as otherwise there is too much advantage gained by the athlete in the outside lane in a 200m race over the athlete in the inside lane. Further the outside lane could infringe the World Record rule that states the record should be made on a track, the radius of the outside lane of which shall not exceed 50m. It is permissible to have any number of sprint lanes on the straights.

COMPILED BY:
Dr. S. Thirumalai Kumar
M.P.Ed.,M.Sc.,(Psy),M.Sc.,(Yoga), M.Phil., PGDCA., PGD.A.S.P.E.S., Ph.D.
Associate Professor, Head i/c & Sports Secretary
Department of Physical Education, **TNPESU**
Email: drstkpe@gmail.com   Mobile: 9841019670