## Q1

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Extend the outer boundaries to get the corners of outer boundary.

This new image formed in stored as wembley\_corners.jpg in output folder. Note that all the coordinates referred hereafter are with respect to wembley\_corners.jpg file and not the original wembley.jpeg.

Find the homography matrix using the points to map the coordinates of outer boundary to an imaginary plane with coordinates to be the distance in yards:

(30, 371) - (0, 18) (337, 271) - (0, 0) (878, 323) - (44, 0) (831, 553) - (44, 18)

Homography matrix hence obtained is:

 $\begin{pmatrix} 0.000769943767210617 & 0.00236372736533829 & -0.900041165556824 \\ -0.000175535686156667 & 0.00182624627327294 & -0.435757213821539 \\ 0.00000182250199699356 & 0.0000505176750096942 & -0.00565706121197567 \end{pmatrix}$ 

Use this homography matrix to find the mapping of corners of inner boundary.

a1 = (750, 505) bottom-right corner

a2 = (821, 327) top-right corner

a3 = (357, 420) centre of bottom boundary

Length will be twice of distance between a1 and a3 and breadth will be distance between a1 and a2.

Results obtained:

Length: 36.75 yards Breadth: 15.32 yards