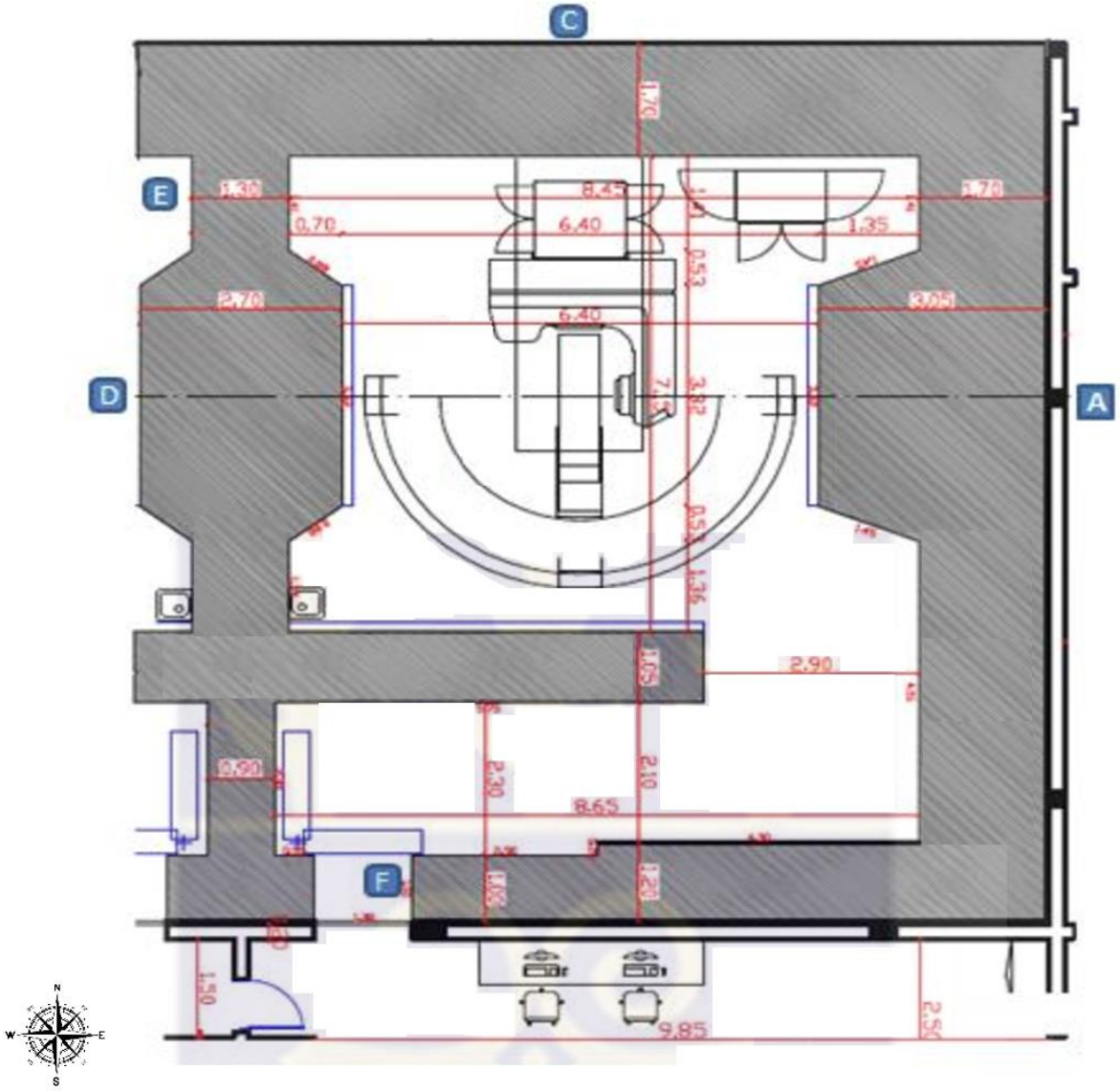
Day 3, Exercise 5 – Shielding Worksheet

Equations from IAEA Report 47, "Radiation Protection in the Design of Radiotherapy Facilities"
Figure from: Dine, B.N. "Evaluation of Shielding Design for a Linear Accelerator (LINAC) Facility." (2017)



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Figure from: Dine, B.N. "Evaluation of Shielding Design for a Linear Accelerator (LINAC) Facility." (2017)

For the facility shown in the diagram, determine if the shielding is sufficient based on weekly dose rates at points C and D considering the following information:

The facility treats an average of 20 patients daily

The average dose per patient is 2Gy at isocenter

The typical QA load is 20Gy per week

Assume just 6MV is used

Assume that all barriers are irradiated equally

Point D is their CT simulator vault

Point C is near a walkway for staff only to enter and exit the building

For 6MeV

The TVL for concrete is 343mm for the primary beam and 279mm for the secondary beam

The scatter fraction 'a' for patient scatter calculations is 7.27e-4 - assume F = 400cm2 field

The scatter fraction alpha for wall scatter fractions at a 45 degree reflection angle is 4.76e-3

PRIMARY BARRIERS

$$B = \frac{P(d+\mathrm{SAD})^2}{WUT}$$

$$\text{No. of TVLs} = \log_{10}\left(\frac{1}{B}\right)$$

Leakage radiation

$$B_L = \frac{1000 P d_s^{\,2}}{WT}$$

Scattered radiation

$$B_p = \frac{P d_{\mathrm{sca}}^2 d_{\mathrm{sec}}^2}{aWT(F/400)}$$