

From Example in Lecture:

required $A_s = 4.87 \text{ in}^2$

Try: $(5) \#9 = 5 \text{ in}^2$
 no. rebars bars

$\#9 \rightarrow A = 1 \text{ in}^2$
 $D = 1.128 \text{ in}$



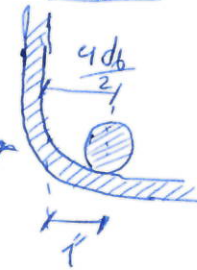
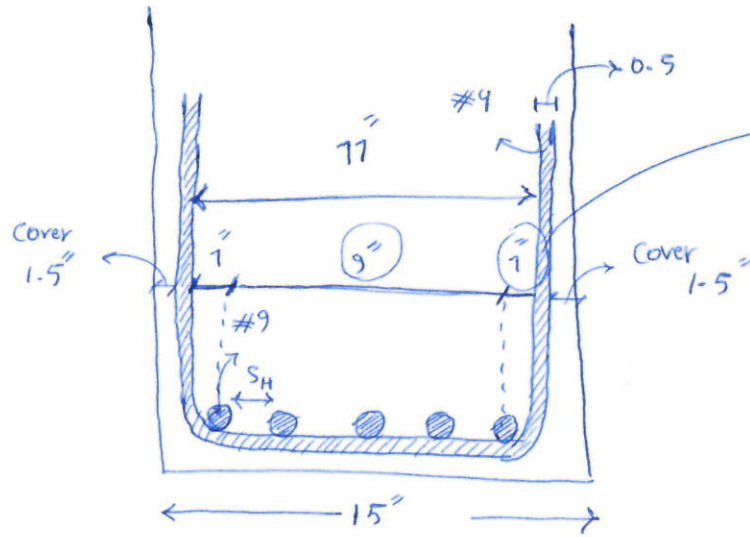
$\#9 \rightarrow A =$
 $D = 0.5 \text{ in (Diameter)}$

step 2:

based on the Table 25.3.2

$$\frac{4 \times 0.5}{2} = 1''$$

stirrup #4

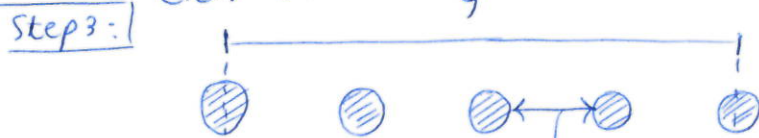


beam width

Step 1: $15'' - 2(1.5 + 0.5) = 17''$ clear distance between stirrups legs

Step 2: $17'' - \text{bending diameter} = 17'' - 2(1'') = 9''$

clear distances within bars:



$$\frac{9'' - 4(1.128)}{4} = 1.122$$

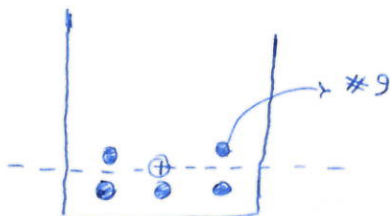
clear distance between bars

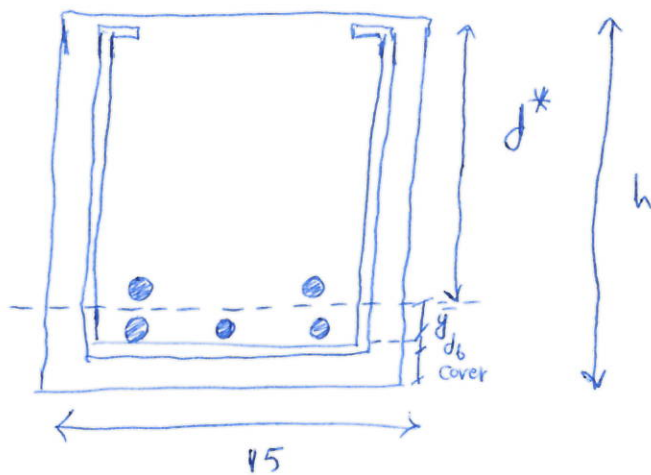
Step 4: check with code requirements

$1.122 \not\geq 1.128 \rightarrow$ it is not passed.

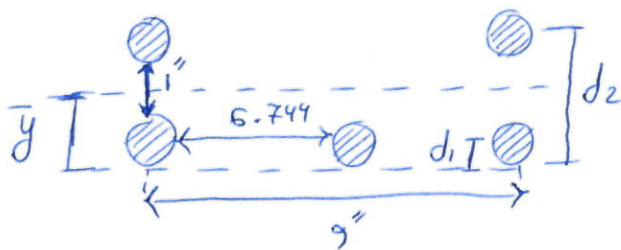
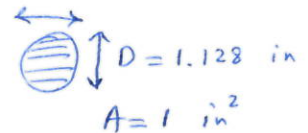
* ACI limitations	$d_b = 1.128$
	$\frac{4}{3} \text{ max aggregate}$
	$\frac{4}{3} \times 0.75 = 1''$

we need to rearrange, and place it in two rows.





9



$$\bar{y} = \frac{\sum A d}{\sum A}$$

$$\bar{y} = \frac{2(\cancel{1.128})(d_2) + 3(\cancel{1.128})(d_1)}{5(\cancel{1.128}) \text{ in}^2}$$

Area of bar #9

Number of bars in the row

$$d_1 = \frac{1.128}{2} = 0.564"$$

$$d_2 = 1.128 + 1" + \frac{1.128}{2} = 2.692"$$

$$\bar{y} = \frac{2(\cancel{1.128})(2.692) + 3(\cancel{1.128})(0.564)}{5(\cancel{1.128})} = 1.415"$$

$$d^* = h - \text{cover} - d_b - \bar{y}$$

$$d^* = 36 - 1.5 - 0.5 - 1.415 = \underline{32.585} \text{ in}$$

Compare it with d in previous arrangement : 33.436