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ARCH 324 - Structures 2, Winter 2009

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Given: \( A_s = 2 \text{ in}^2 \)
\( f_y = 60 \text{ KSI} \)
\( f'c = 3 \text{ KSI} \)

Find \( M_u \)

**Step 1:**
\[ A_c = \frac{A_s f_y}{0.85 f'c} \]
\[ A_c = \frac{2(60)}{0.85(3)} \]

**Step 2:** Find where \( A_c \) lies on shape
\[ 47.06 - 24 = 23.06 \text{ in}^2 \]
\[ 16 \times 23.06 \quad x = 1.44 \]

**Step 3:** Since shape is not rectangular do not use \( \frac{a}{2} \) but rather find centroid of area
\[ \bar{y} = \frac{\Sigma A d}{\Sigma A} \]
I'll choose top as baseline
d is distance fr. centroid of shape to baseline
\[ \frac{24(2) + 23.04(3.72)}{24 + 23.04} = 2.84'' \text{ fr. top} \]

**Step 4:**
\[ z = d - \bar{y} \]
\[ z = 18 - 2.84 \quad z = 15.16'' \]

**Step 5:**
\[ M_u = 0.9 A_s f_y z \]
\[ 0.9 \times 2 \times (60) \times 15.16 = 1637.28 \text{ KIN} \]
\[ = 136.4 \text{ KFT} \]