Project Title:	**Project Name**		**Calc. By**	**Date**	**Rev.**
Subject:	**Reinforced Concrete Beam - Bending Moment Capacity (ACI 318)**		Author	today	0

Beam section dimensions

h =	32	in
b =	16	in
Area =	512 in^2	

Reinforcement

cover	2.37 in	
d =	29.63 in	
depth to bottom reinforcement		

$$0.85f_c'$$
$$C = 0.85f_c'ab$$
$$d - \frac{a}{2}$$
$$T = A_s f_y$$
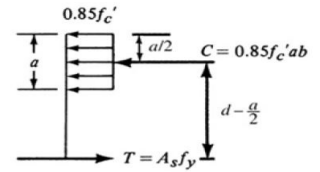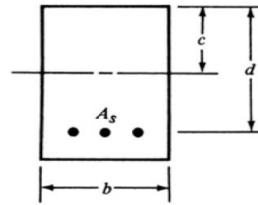
Concrete class (characteristic cylinder strength)

f_c' =	4	ksi

Bar size #	10	no	no	
n =	4	0	0	no of bars
Area =	5.08	0	0	
A_s =	5.1 in^2			reinf. in tension side
$\rho_{tens.reinf}$ =	0.99 %			% of tension reinf

Reinforcement type | A 615

Grade	60	
f_y =	60	ksi

Minimum area of flexural reinforcement per ACI 318 - Section 10.5.1

$A_{s,min}$ = $[3*sqrt(f_c')/f_y]*b_w*d$ but not less than $200*b_w*d/f_y$

where sqrt(f_c') is the square root of specified compressive strength of concrete in psi

$[3*sqrt(f_c')/f_y]*b_w*d$ =	1.50	in^2
$200*b_w*d/f_y$ =	1.58	in^2
$A_{s,min}$ =	1.58	in^2
A_s	>	$A_{s,min}$ hence OK

Section strength reduction factor per ACI 318-05 Section 9.3

ϕ =	0.90

β_1 =	0.85	per ACI 318-05 - Section 10.2.7.3

Depth of equivalent rectangular per ACI 318-05 - Section 10.2.7.1

a = $\beta_1 * c$

Bending moment capacity - Stress and strain equilibrium for pure bending

T =	$A_s * f_y$ =	304.8 kip
C = T		
a =	$C / (0.85 * f_c' * b)$ =	5.60 in
c =	a / β_1 =	6.59 in
ϕM =	$\phi A_s * f_y*(d-a/2)$ =	613.30 kip-ft

References:
ACI318-05 - Building code requirements for structural concrete