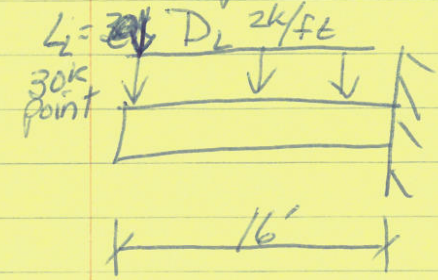
Example 4.18 Cantilever (Alternate Stirrups when 2 or more rows of bars)



Example
One Way Slabs
Continuous Beam
Two Way Slabs
ACI Moment Coefficient Assumptions

$\gamma_c = 150\ \#/ft^3$

$f_y = 60{,}000\ psi$
$f'_c = 4{,}000\ psi$
$\rho = (1/2)\rho_{bal} = 1/2(0.0285) \leftarrow$ TBL A.7 (seven)
$= 0.01425$

Assume beam weight $= 750\ \#/ft$

$w_u = 1.2(DL + Wt) = 1.2(2 + 0.75)$
$= 3.3\ k/ft$
$P_u = 1.6(LL) = 1.6(30^k) = 48^k$
$M_u = (3.3)(16)(8) + 48(16) = 1190.4\ ft\text{-}k$

$\frac{M_u}{\phi b d^2} = 747.15 \leftarrow$ Tbl A.13

$bd^2 = \frac{M_u}{\phi 747.15} = \frac{12(1{,}190{,}400)}{(0.9)(747.15)} = 21.243$

16 x 36.44
18 x 34.35 * Pick use 18 x 39 d = 34.5"
20 x 32.59

Check beam weight

$$\frac{(18)(39)}{144}(.150) = 731\ \#/ft < 750\ \#/ft \quad \checkmark \text{ O.K.}$$

$$A_s = \rho bd = (0.0175)(18)(34.50) = 8.85\ in^2$$

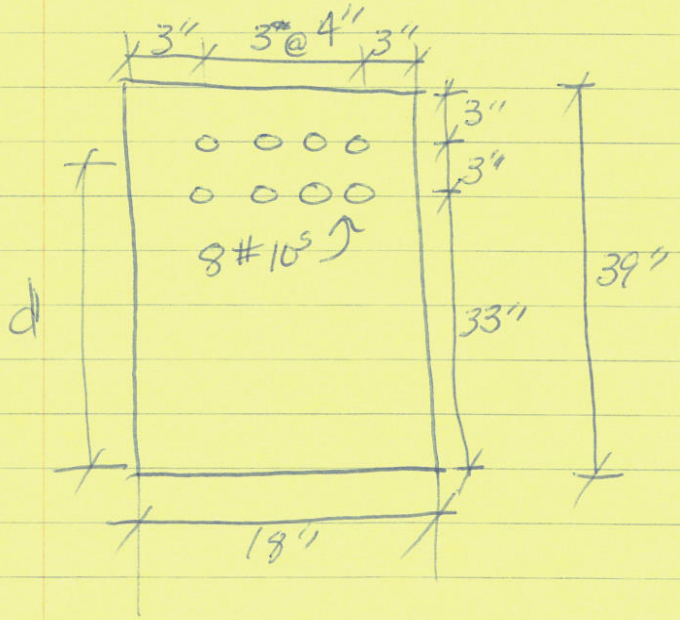
Bars

9 #9	9.00	2 Layers/odd #
8 #10	10.16	2 Layers ✓ Check ϵ_t

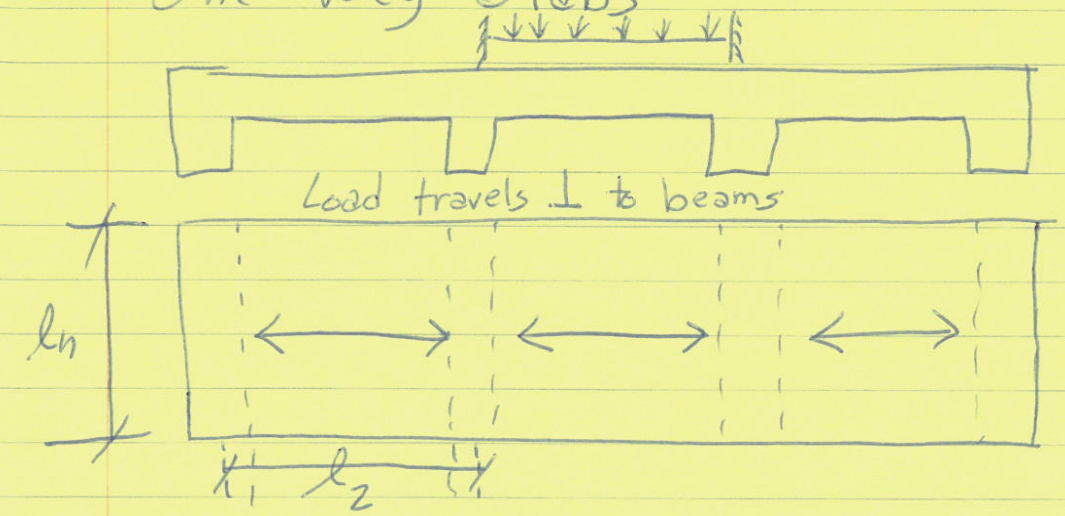
↑ Use this one

$$\rho = \frac{A_s}{bd} = \frac{10.16}{(18)(34.5)} = 0.0163 > \rho_{min} = 0.0033$$

$$< \rho_{max} = 0.0181$$



One Way Slabs



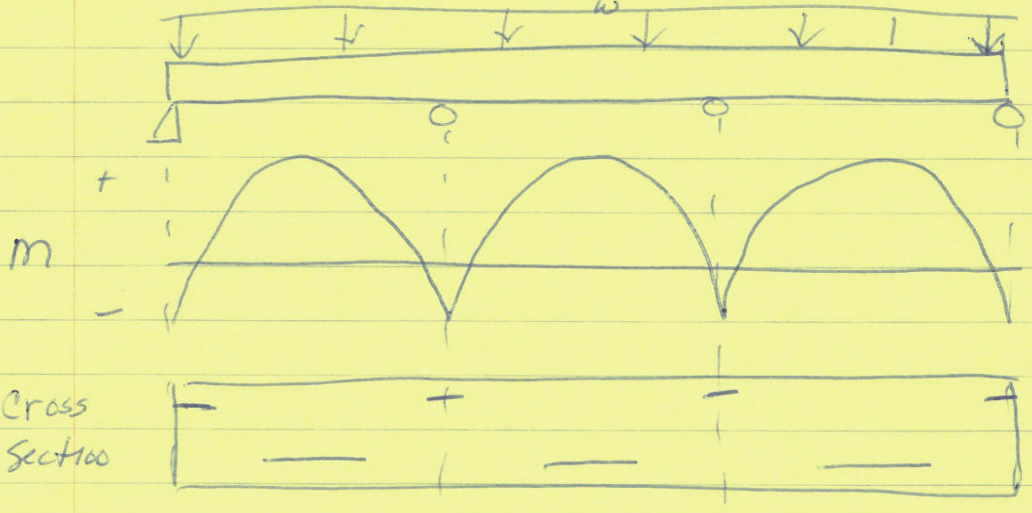
h (slab) = Slab thickness

$l_1 / l_2 \geq 1.5$

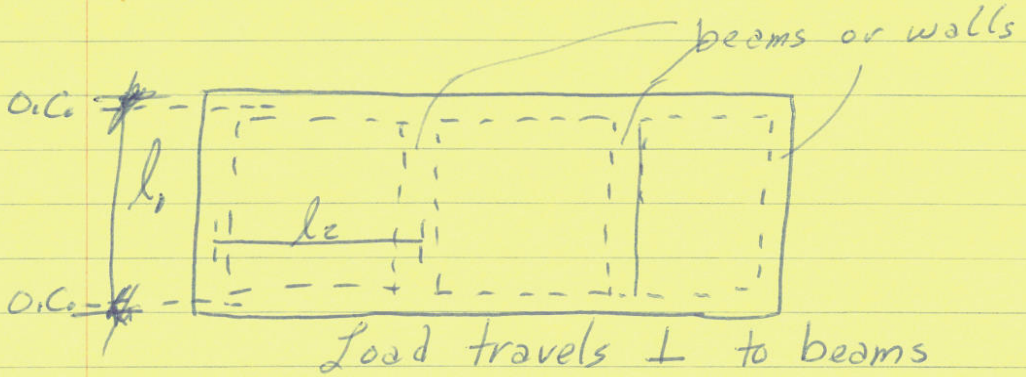
- reinforcement for flexure ⊥ to beams
- " " temp & Shrinkage // to beams

Continuous Beams

- one way slabs are continuous beams



Two way Slabs



$\frac{l_1}{l_2} < 1.5$

reinforced for flexure in both directions

ACI Moment Coeffients

- for continuous beams & 1 way slabs [8.3.3]
  only at face of support not center of beam

Must have:

- 2 or more spans
- Spans approx. equal
- load uniformly distributed
- service Live Load ≤ 3x service DL
- Members prismatic
- ~~g~~ gravity Loads ONLY

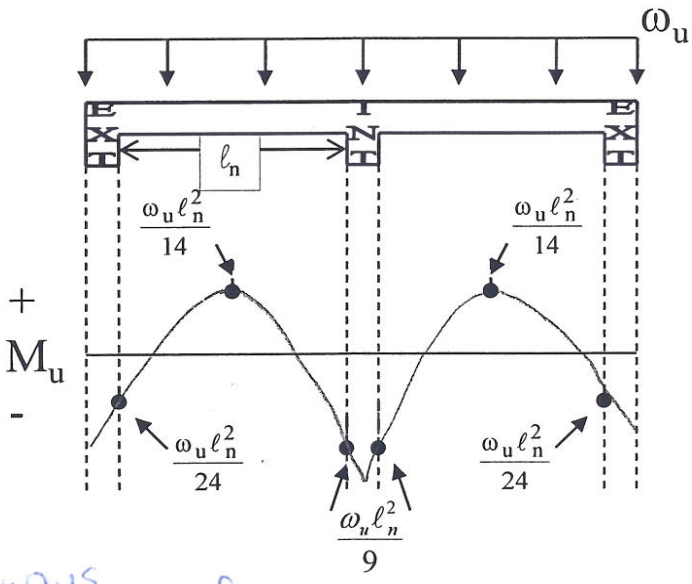
unfactored

unfactored

ACI Moment Coefficients
ENCE 4359 Structural Concrete Design
Dr. Lamanna

8.3.3

2 Span One-Way Slab

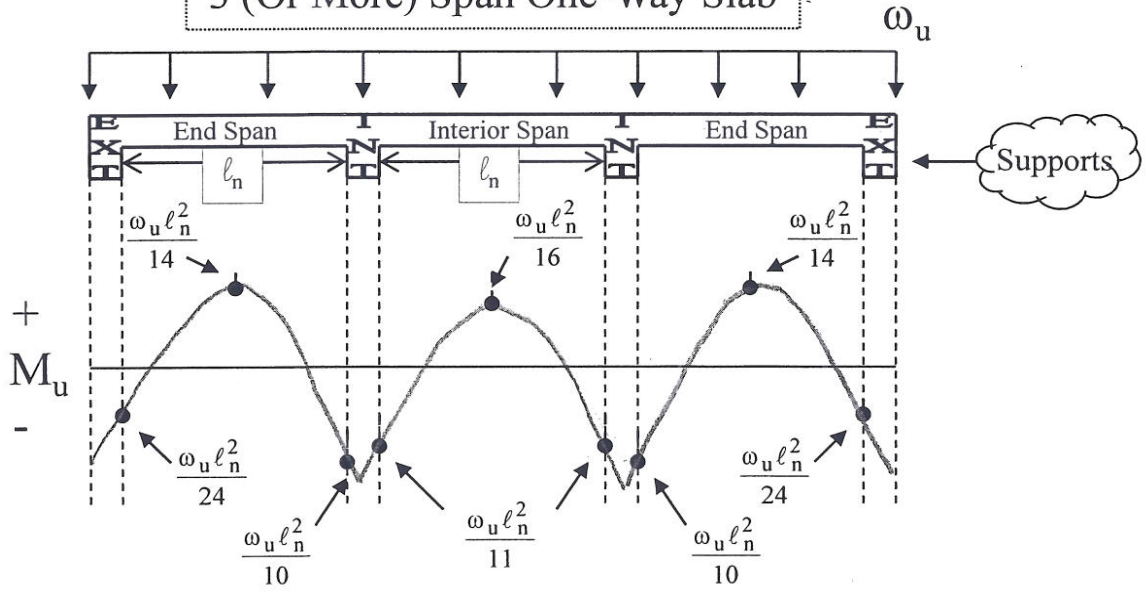


ALWAYS the face of the support

Assumptions for CVEN 443

- Spandrel beams serve as exterior supports
- If $\ell_n \leq 10$ ft, negative moment = $\omega_u \ell_n^2/12$ at all faces
- $Vu = \omega_u \ell_n/2$ except at exterior face of 1st support where it equals $1.15\ \omega_u \ell_n/2$

3 (Or More) Span One-Way Slab



Use to determine moment, M_u, on <u>one-way slabs</u> or <u>continuous beams</u>

Assumptions for This Class

- Spandril beams serve as external supports
- If $l_n \leq 10$ ft, negative moment $= w_u l_n^2$ at all faces
- $V_u = \frac{w_u l_n}{2}$ except @ exterior face of 1st interior support where it equals $1.15 \frac{w_u l_n}{2}$