<u>Design of One-Way Slabs</u>

- Check if it is one-way slab system
  - If clear span in one direction, L1, is greater than or equal to two times the clear span in other direction, L2, then it is.
  - L1 ≥ 2 x L2, okay
- Design principal flexural reinforcement for short span, perpendicular to that direction place temperature and shrinkage reinforcement.
- Choose slab height, h, to limit deflections h-min (table 9.5a)
  - Simply supported, l/20 (l = clear span)
  - One end continuous, l/24
  - Both ends continuous, l/28
  - Cantilever, l/10
- Determine dead load
- Find Mn_{req} (=Mu/ϕ) using factored loads [use moment modification factors if dealing with an indeterminate multiple span system]
- Determine effective depth, d, based on cover requirements and assumed bar size
- Design section $Mn_{req} = A_s f_y (d - A_s f_y / 1.7 f'_c b)$
- Find As_{req}
- Check that the flexural reinforcement is less than $0.75\rho_{balanced}$
- Check that the flexural reinforcement is greater than
  - $\max\left\{\frac{200}{f_y} \text{ and } \frac{3\sqrt{f'_c}}{f_y}\right\}$
  - ***<u>and</u>*** greater than temperature and shrinkage reinforcement requirements
- Choose bars and spacing for flexural reinforcement
- Check spacing
  - Spacing of the flexural steel should be less than 3 x slab thickness and less than 18"
- Determine temp and shrinkage reinforcement in perpendicular direction to flexural reinforcement.
  - ACI 7.12.2.1
  - $\rho = \left\{\begin{array}{c} \textit{Grade } 40 \text{ or } 50 \text{ deformed bars, } 0.0020 \\ \textit{Grade } 60 \text{ deformed bars or welded wire mesh, } 0.0018 \\ \text{Reinforcement greater than 60,000 psi, } \frac{0.0018x60{,}000}{f_y} \end{array}\right\}$ and ≥0.0014
- Choose bars and spacing for temperature and shrinkage reinforcement
- Spacing shall be less than the min(5h, 18")
- Draw cross-sections