QE Topics List: *Concrete Structures*

August 2003

General: Material Properties & Design Philosophy	Behavior of Reinforced Concrete Beams & One-Way Slabs in Flexure)
Mechanical properties of plain concrete in tension, compression, and bending Mechanical properties of reinforcing steel in tension and compression Use of load factors and strength reduction factors in an ultimate strength design philosophy	Cracked elastic behavior (including stress and deflection calculations) Yield and ultimate behavior (including strength of under-reinforced & over-reinforced sections) Moment *vs.* curvature and load vs. deformation relationships

Ultimate Strength Design of Reinforced Concrete Beams & One-Way Slabs	Behavior & Ultimate Strength Design of Reinforced Concrete Columns
Required dimensions and longitudinal reinforcement Detailing of longitudinal reinforcement (including bar cut-offs and anchorage considerations) Design for shear (including shear reinforcement) Design for serviceability (cracking & long-term deflections) at working (unfactored) loads Continuous (statically indeterminate) beams	Axially loaded tied columns and spiral columns Members subjected to compression (or tension) plus bending (including interaction diagrams) Long (slender) columns

Behavior & Ultimate Strength Design of Reinforced Concrete Two-Way Slabs	Design Applications & Special Topics
Yield line method for estimating flexural capacity Strip method for design ACI direct design method ACI equivalent frame method Shear strength and deflections	Analysis and design of reinforced concrete frames for gravity and lateral (non-seismic) loads Design of reinforced concrete footings Analysis and design of discontinuity regions using strut-and-tie modeling Shear behavior of reinforced concrete members subjected to axial force and bending