ACI CUSTOM SEMINAR TOPIC

Seismic Design for Liquid-Containing Concrete Structures

ONE DAY, 7.5 HOURS

Based on the ACI 350 Standard

Program Content:

ACI published a Standard for the design of environmental engineering concrete structures, specifically liquid-containing structures (LCS). The main objective of this intensive seminar will be to familiarize the attendees with the requirements for seismic design of LCS and improve the state of practice. With the use of several design examples, LCS will be designed based on the current code approach.

- **Basic Theory**
  - Housner's tank model
  - Dynamic characteristics: circular and rectangular tanks
  - Mode shapes and frequencies
  - Equivalent mass for impulsive and convective
  - Effective mass coefficients
  - Heights to center of gravity
  - Stiffness parameters
- **Tank Configurations**
  - Rectangular—fixed and hinged base
  - Circular—fixed, hinged, and flexible base
  - Pedestal-mounted tanks
- **Design Loads**
  - Dynamic lateral forces
  - Base shear and base moment
  - Vertical acceleration
- **Earthquake Pressures**
  - Hydrodynamic pressure distribution
  - Shear transfer
- **Application of Site-Specific Response Spectra**
  - SDF system
  - Equation of motion
  - Construction of acceleration and displacement response spectra
  - Damping coefficients and ductility
  - Elastic/inelastic response spectra
- **Stresses**
  - Vertical and horizontal bending stresses
  - Membrane stresses in circular tanks
- **Freeboard**
  - Calculation of sloshing displacements
- **Earthquake-Induced Earth Pressures**
  - Design of buried tanks
  - Calculation of seismic forces due to earth pressures
- **Parametric Study**
  - Effect of tank parameters on response of circular and rectangular tanks
- **Design Examples**
  - Design of tall above-ground circular and rectangular tanks with different base conditions
  - Design of shallow and wide above-ground circular and rectangular tanks with different base conditions
  - Design of circular and rectangular buried tanks
  - Design of pedestal-mounted tanks

Who should attend:

Consulting engineers, government agencies including municipalities, material suppliers, testing agencies, academia, and contractors

Instructors:

Carl Gentry, Charles S. Hanskat, M. Reza Kianoush, Nicholas A. Legatos, Javed A. Munshi, and William C. Sherman.

Seminar handouts:

- Code Requirements for Environmental Engineering Concrete Structures and Commentary (ACI 350/350R)
- Seismic Design of Liquid-Containing Structures and Commentary (ACI 350.3/350.3R)
- Special handout with notes and design examples authored by the instructors