Structural Strengthening Using External PT

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Why Strengthen?

• Natural aging
• Inadequate design
• Poor corrosion protection details/material quality
• Faulty construction
• Outside influences
  – Damage
  – Environmental
  – Changes in use
  – Increased safety requirements
Solutions

- PT Repair
- Concrete restoration (epoxy injection/fiber wrap/water proofing)
- Structural renovations and strengthening
  - Steel brace frames
  - Section enlargement with internal PT
  - External PT with fire-protection
History of Post-Tensioning


1960-1970: Buttonhead Post-Tensioning System

1970-1980: Extruded HDPE Strand Encasement

Today: Optional 100% Encapsulation
Post-Tension Repair
Concrete Restoration

Epoxy Injection    Fiber wrap
Steel Brace Frames
Section Enlargement with Internal PT

• PT placed using cores, trenches, or newly enlarged concrete members
• Design evaluation is very similar to external PT
• Addresses all fire ratings
External Post-Tensioning

• Utilizes high strength cables, strands and steel bars to strengthen or restore the load capacity of structures
• Introduces external forces to the structural elements to offset the effects of external loads
  – Crack/Deflection Control
  – Increased Loads
Considerations: Design of External PT

- Anchor Zones
- Existing reinforcement
- Existing damage, corrosion, deterioration
- Modification to the existing member geometry
- Fire Protection
Example 1 - Oakwood
Example 2 - Monterey
Project Documentation
Thank You!

Questions?