



Extending the Life of Your Concrete Tank

Nick Belmont

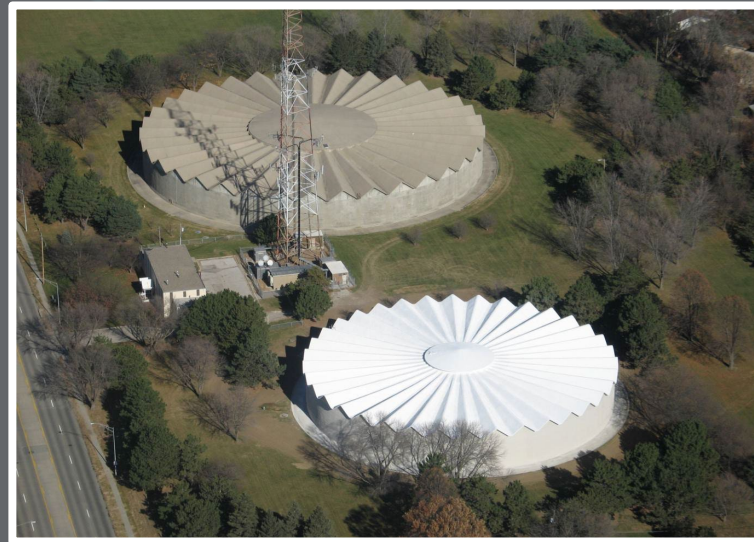
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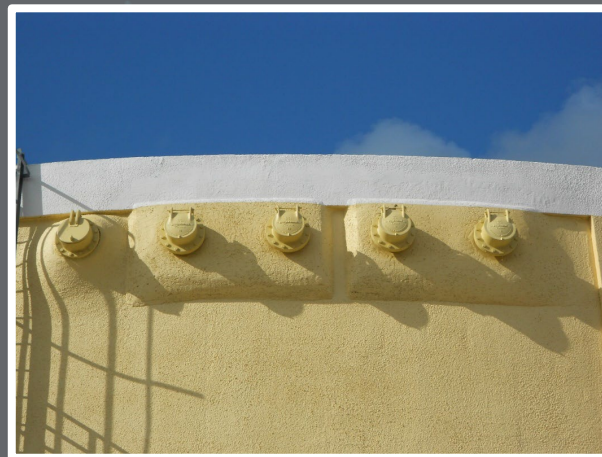
Agenda

- Why Retrofit Concrete Tanks?
- Importance of Inspections
- Project Case Studies:
 - Process Tank Retrofit
 - Tank Access Retrofits
 - Operational Retrofits
 - Seismic Retrofit
- Conclusion



Why Retrofit Concrete Tanks?

- Aging infrastructure
- Changes in operational needs
- Water quality
- Changing regulations



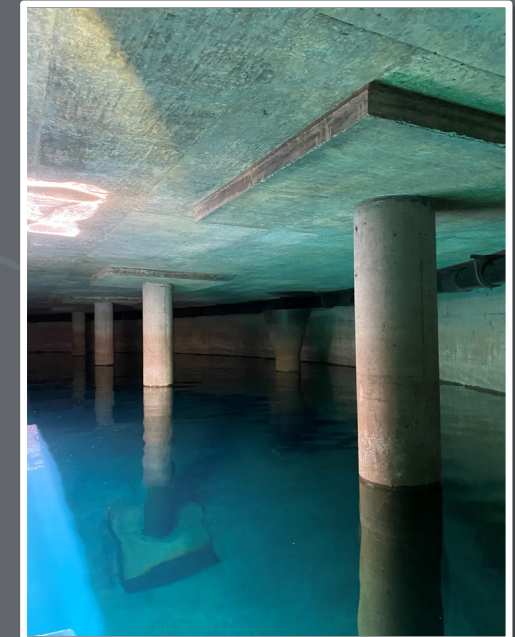
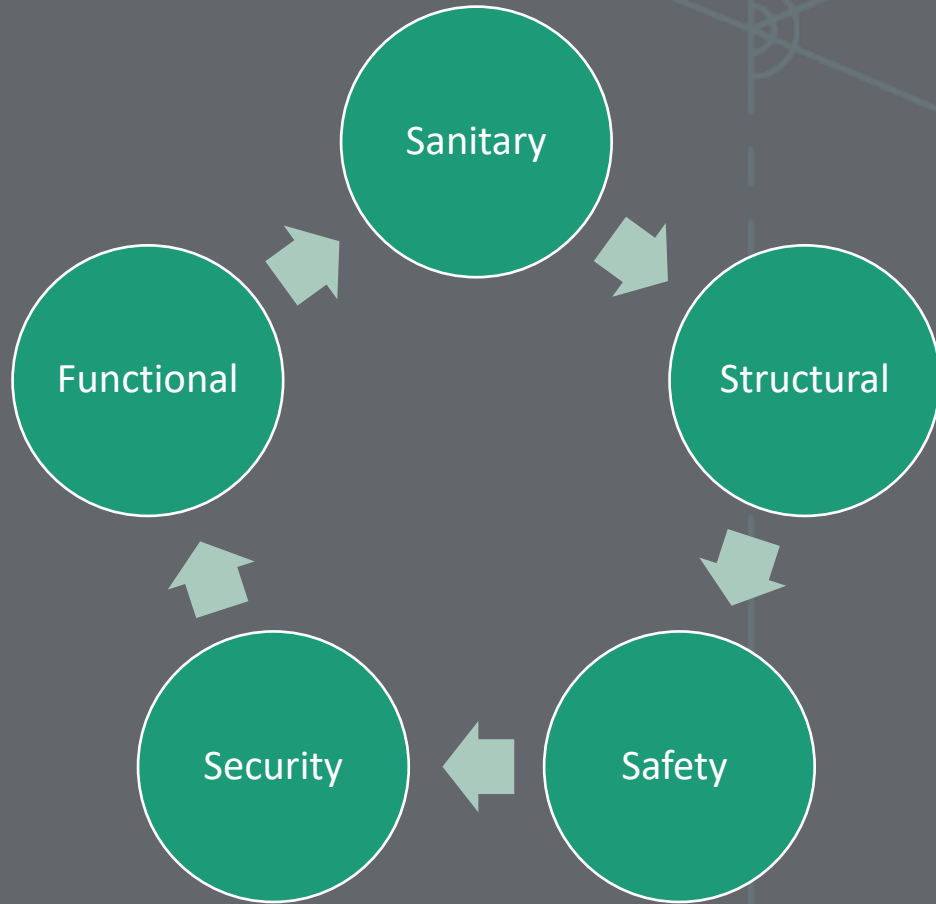
Why are Inspections Important?

- Maximize useful life of concrete structures
- Concrete water & wastewater storage tanks are critical infrastructure
 - Identify long and short-term maintenance
 - Condition assessment reports
 - Planned upgrades vs. emergency repair
 - Compliance with state & regulatory agencies



Inspection Focus Areas

Determination of existing conditions and future needs for one of the water system's most valuable assets:

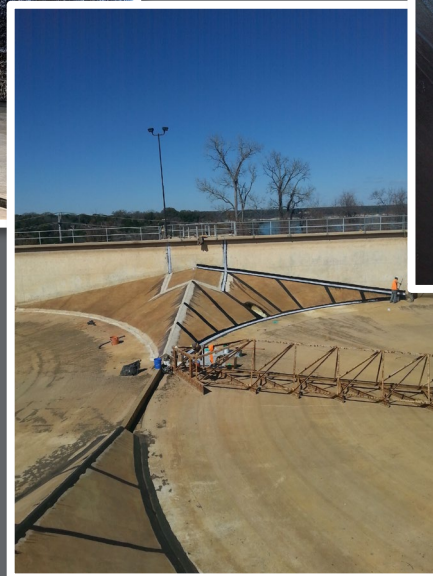
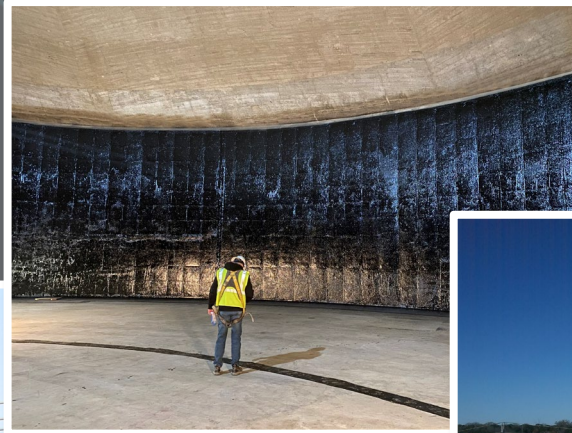
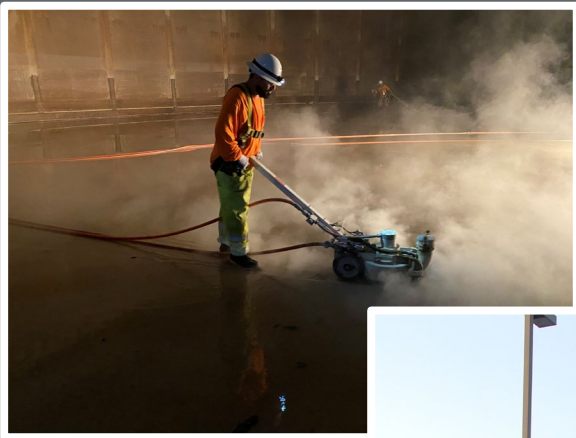


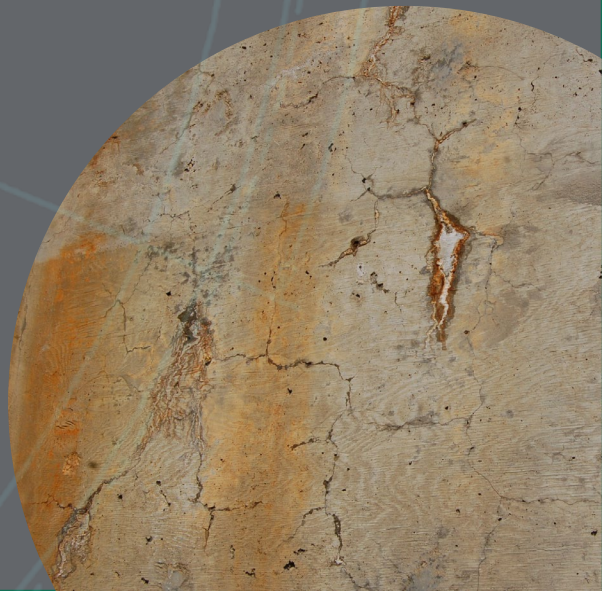
The background features a technical drawing on a dark grey background. A vertical dashed line runs through the center. A horizontal line intersects it, and a diagonal line extends from the intersection point towards the bottom right. A curved line, possibly representing a tank's profile, is visible on the right side. A small circular symbol with a crosshair is located at the intersection of the vertical dashed line and the horizontal line. The number '45' is written near the curved line, indicating a 45-degree angle.

Concrete Tank Retrofit & Rehabilitation Case Studies

Protective Coatings and Waterproofing

Experience Based Recommendations • Certified Applicators • Surface Preparation
Crack Repair • Joint Repair • Protective Coatings • Roof Coatings • Waterproofing





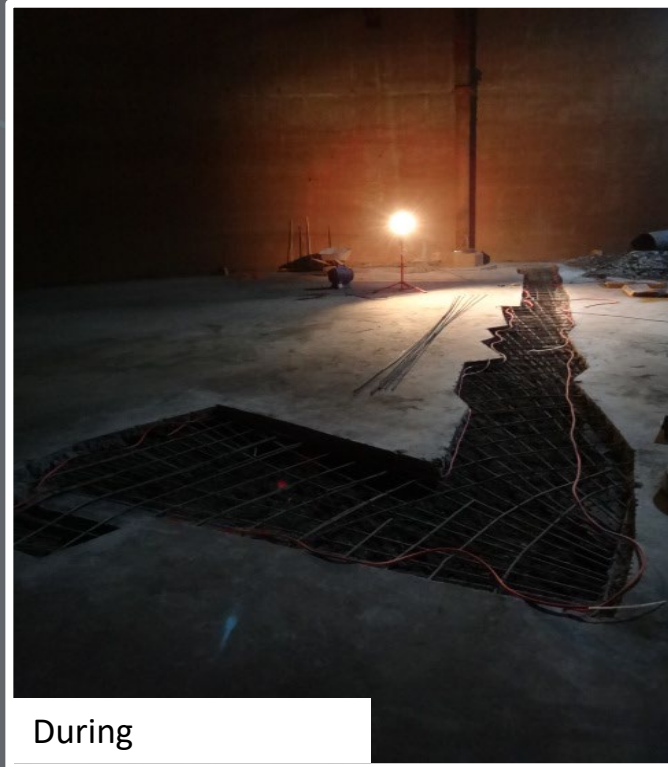
Wall Damage & Crack Repair
Sanitary, structural & safety improvements

Floor Leakage

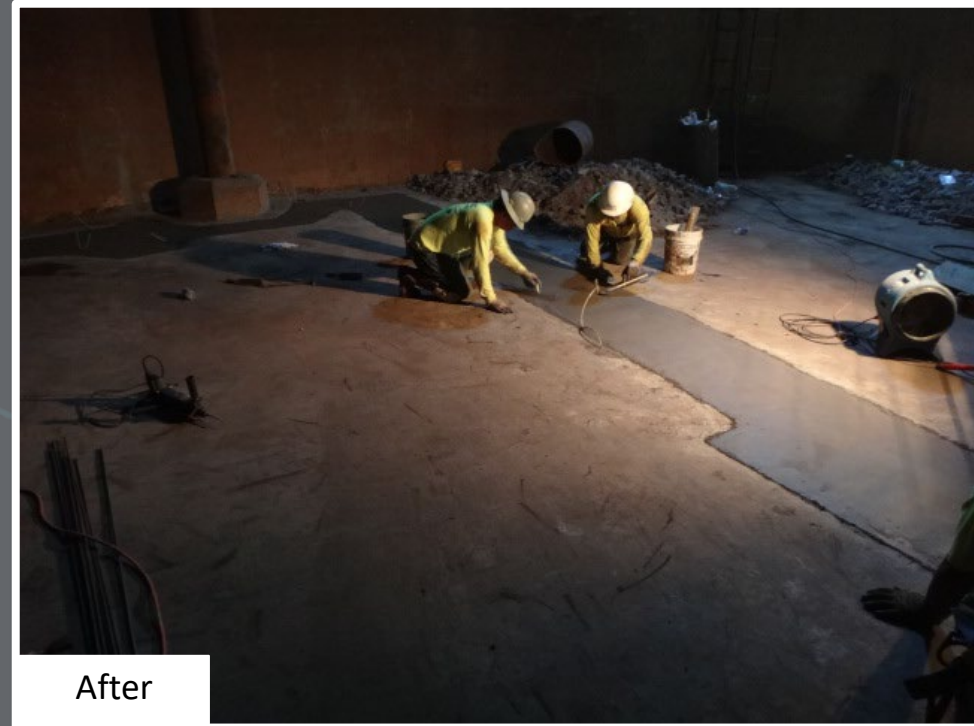
Sanitary, structural & safety improvements



Before



During



After

Floor Leakage

Sanitary, structural & safety improvements



45°

Process Tank Retrofit

Sanitary, structural & safety improvements

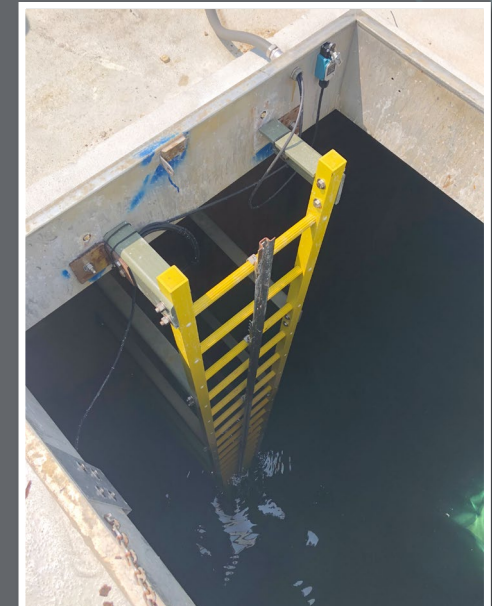


Safety, Security & Access Enhancements

Retrofit solutions to modify or upgrade existing tank to comply with regulatory, safety, and security requirements



Roof Safety Systems



Interior Access Systems



Security Upgrades



Wall Penetration Retrofit

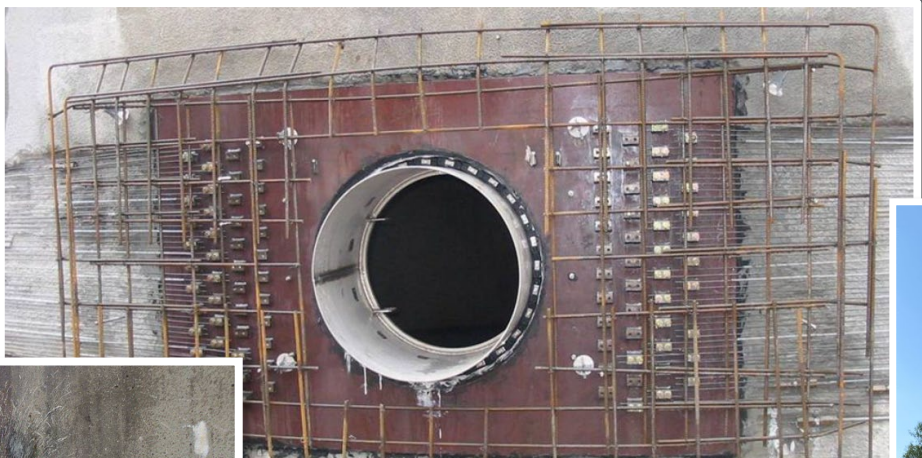
Improved safety and access for operations and inspection crews



Layout for Retrofit Manway



Coring Operation



Reinforcing the Manway



Retrofit Manway

Under Floor Pipe Retrofit

Improved safety and access for operations and inspection crews



Under Floor Pipe Retrofit

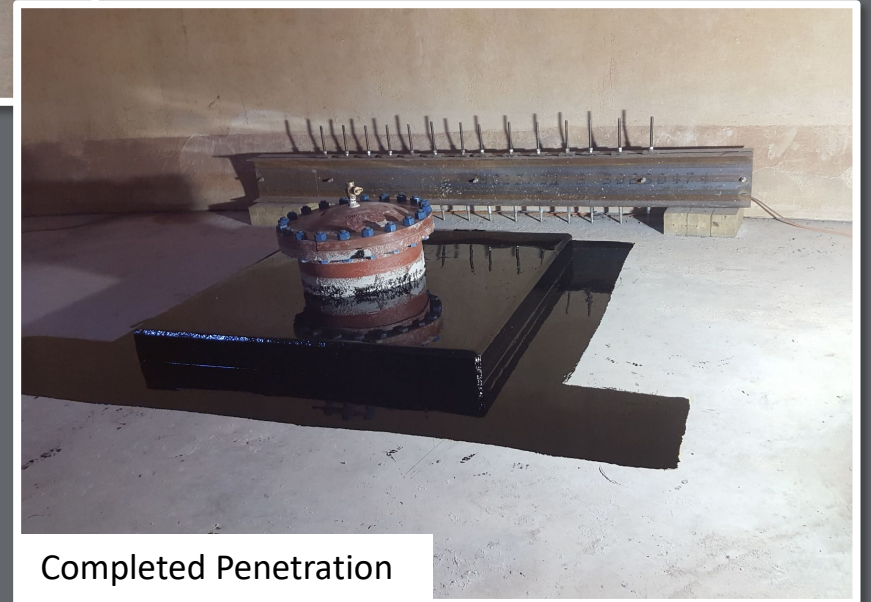
Improved safety and access for operations and inspection crews



Forming New Penetration



Placing New Pipe



Completed Penetration

Piping Retrofits for Operational & Functional Changes



12" Inlet



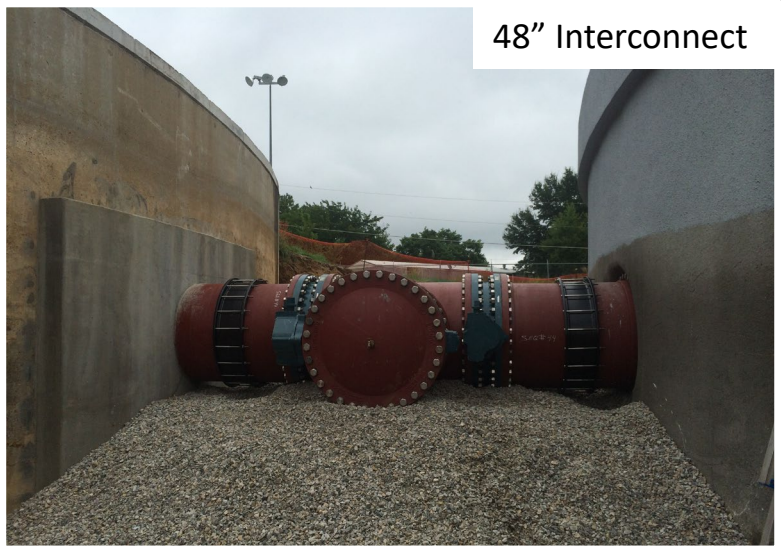
54" Suction



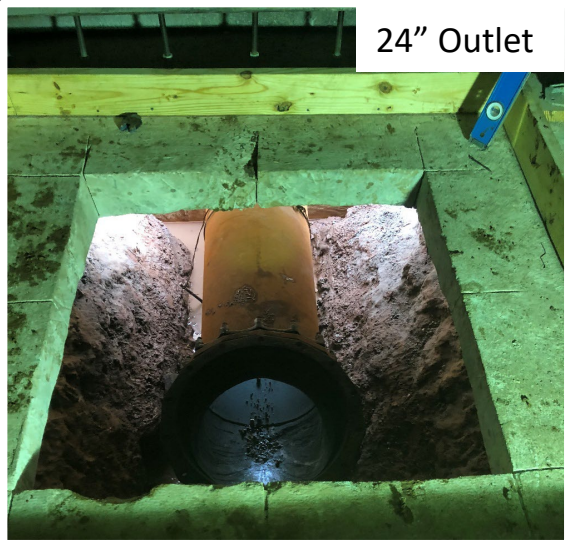
Overflow Weir



30" Overflow



48" Interconnect



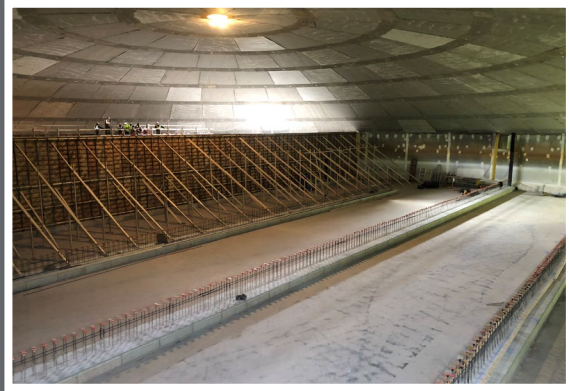
24" Outlet



24" Inlet & 18" Overflow

Water Quality & Equipment

Water system upgrades to meet evolving treatment and quality requirements



Baffle Walls



Pipe Modifications



THM Removal System



Walkways



Automated Washdown Systems



Mixing Equipment

Roof Retrofit

Structural and functional improvements



Before



During



After

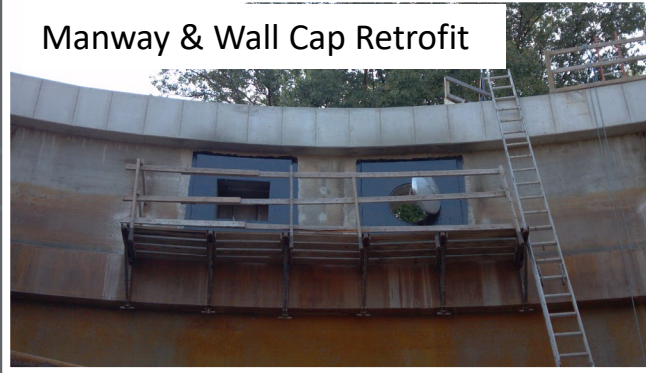
Digester Roof Retrofit

Structural, functional & safety improvements

Existing Steel Roof



Manway & Wall Cap Retrofit



Reinforcing the Manway



Existing Roof Removed



Retrofitted Digester

45'

Seismic Retrofits

- Retrofit older tanks to meet today's seismic design standards
 - Cast in place concrete and prestressed concrete tanks
- Critical areas for seismic improvements:
 - Bearing capacity
 - Joints
 - Wall strength



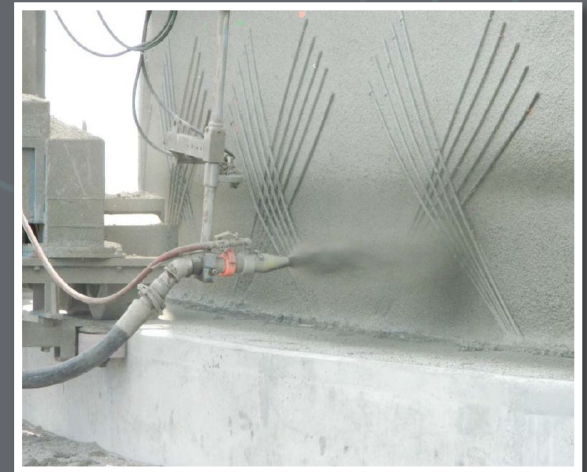
Extended Footing



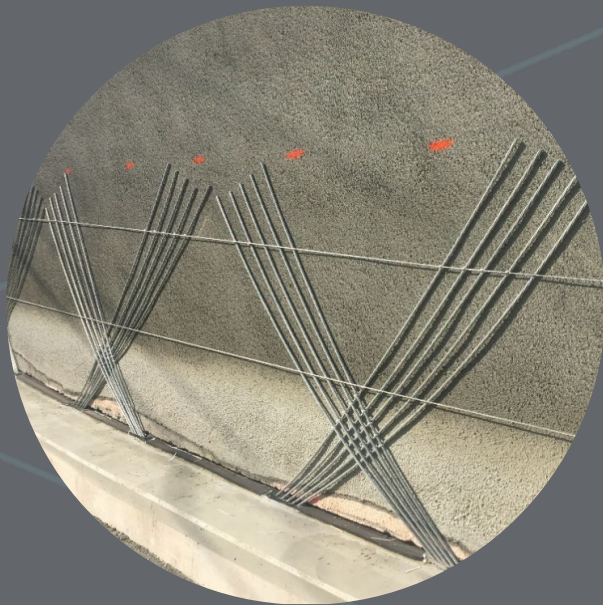
Base Restraint Cables



Strand Wrapping



Shotcrete Application



Seismic Retrofits

Addition of Seismic Cables



Seismic Retrofits

Additional Seismic Cables & Prestressing

Rehabilitation of Aesthetics



Highlights and Conclusions

- Retrofits can extend useful life of tanks
 - Potentially best value option vs. replacement
 - Operational, access & structural improvements
- Value of Inspections:
 - Avoid emergency repairs
 - Stay current with changing regulations
- Evaluate entire concrete tank structure prior to making any significant modifications





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