XYPEX®

Xypex Use in Tunnels and Other Below Grade Concrete

Tangent Piles, Secant Piles & Slurry Walls

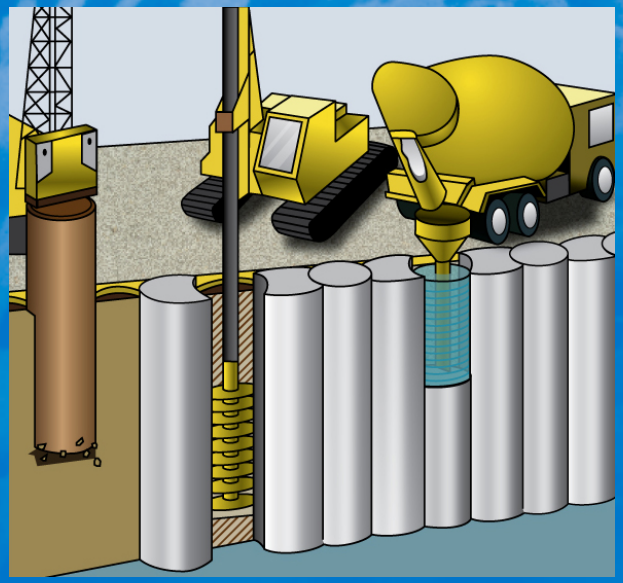
- Cut and Cover Tunneling Applications
- All very difficult to waterproof by traditional waterproofing means

XYPEX®

Tunnels and Other Below Grade Concrete - Secant Piles

Why use them?

- Edge of property line construction
- Slope stabilization and structural wall combined
- Shallow Cut and Cover Tunnels



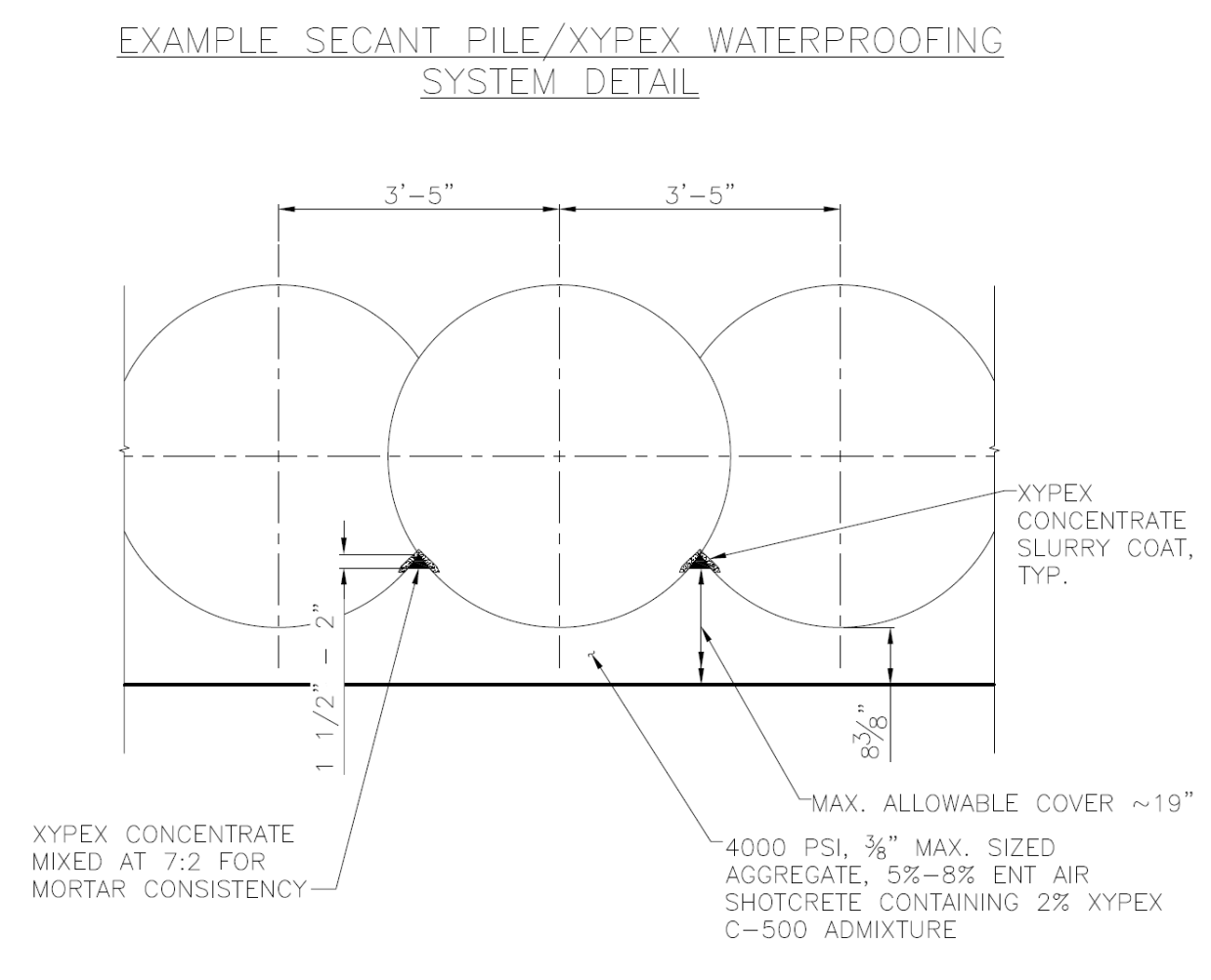
Common Applications

- Deep Foundations
- Cut and Cover Tunnels

Secant Interior Finishes

- Leave as is – pressure wash only
- Surface parge
- Blind side form and pour
- Shotcrete and finish

Xypex Waterproofing Assembly



Assembly used at Mitchell Interchange, Wisconsin, USA

Mitchell Interchange

Concentrate Fillet Placement – by hand

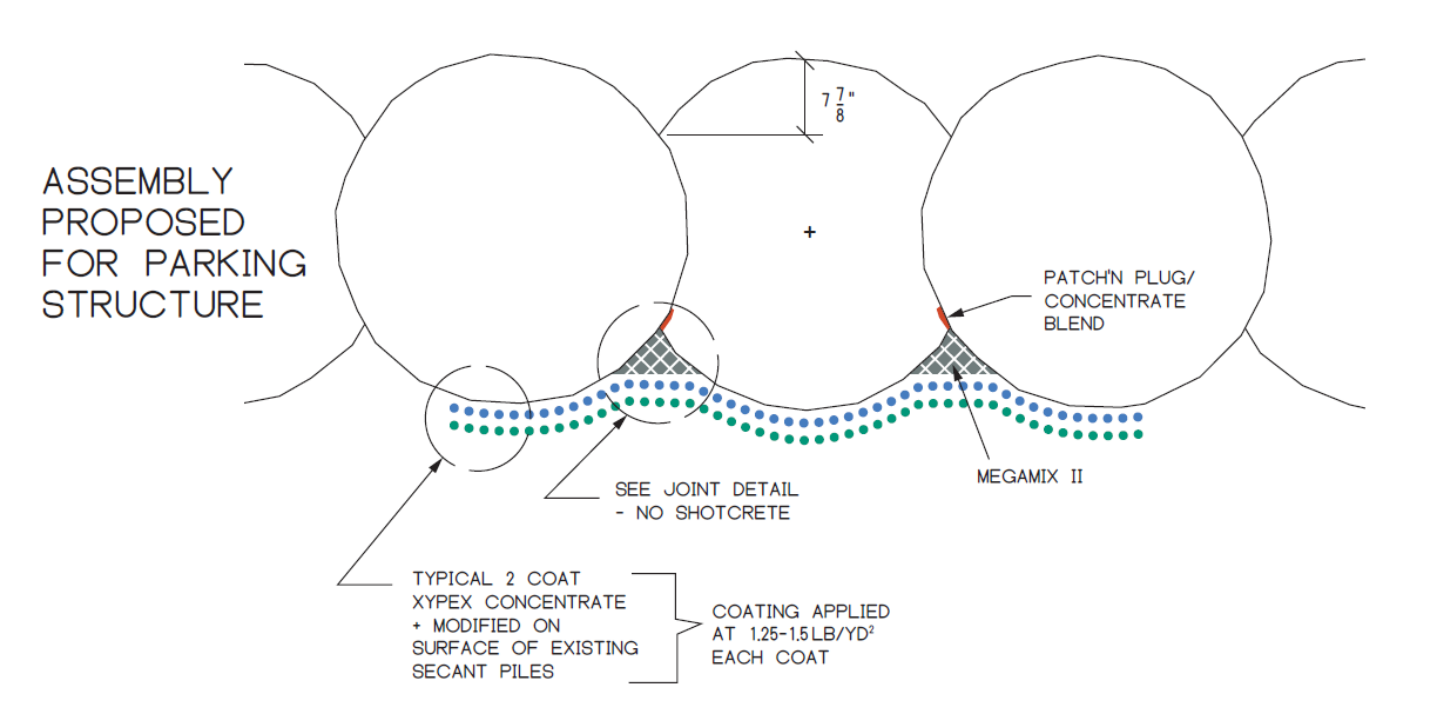
- Trowel mix – 3.5 parts powder to 1 part water
- Good trowel hold
- No cracking

Concentrate Fillet Placement – shooting

- Dry mix shotcrete – water mixed at nozzle
- Shot well
- Excellent hang
- No cracking

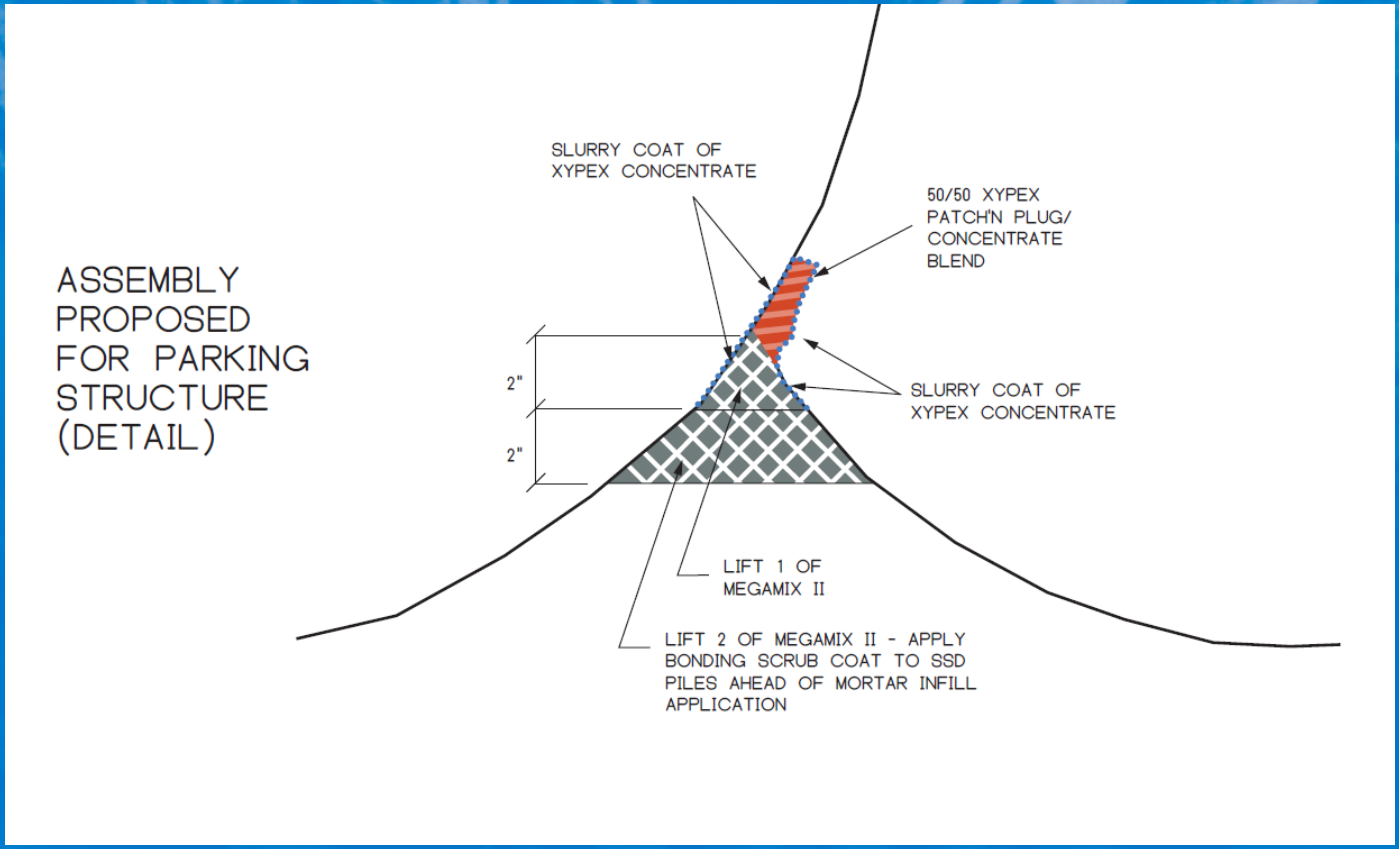
Xypex Waterproofing Assembly

Coating of Non-Xypex Admix Piles



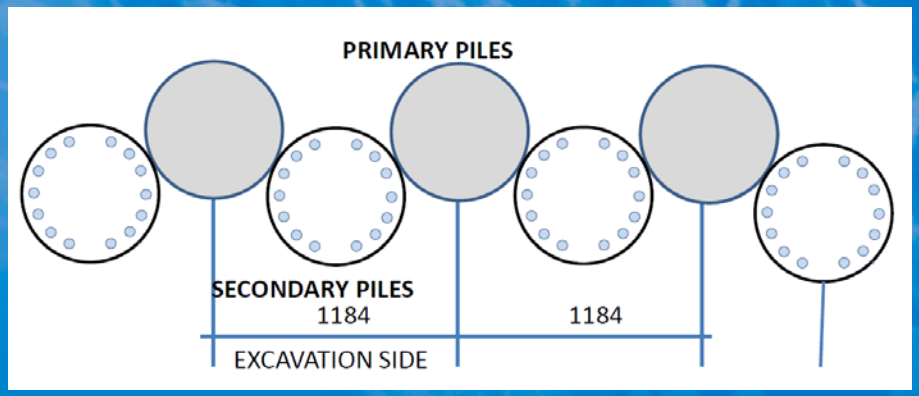
Assembly Proposed for Parking Structure, New England, USA

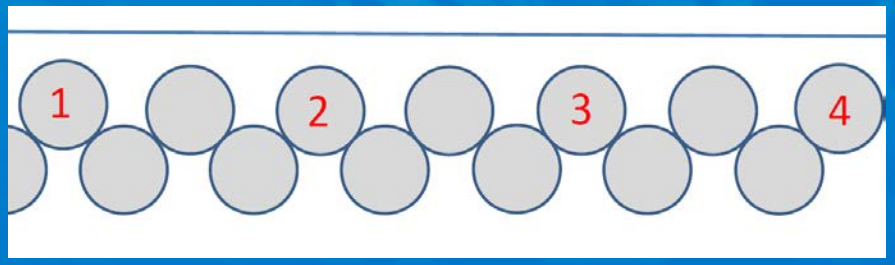
Xypex Waterproofing Assembly

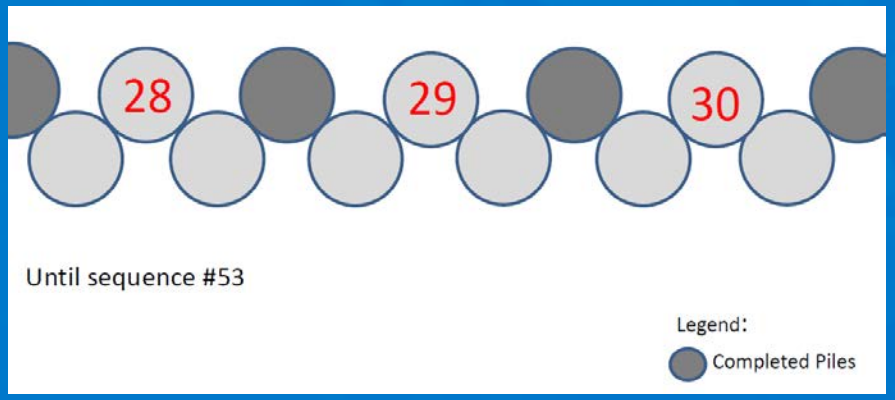


Assembly Proposed for Parking Structure, New England, USA

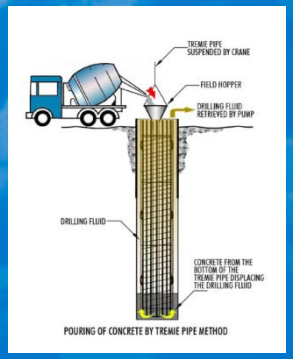
Tangent Pile Construction







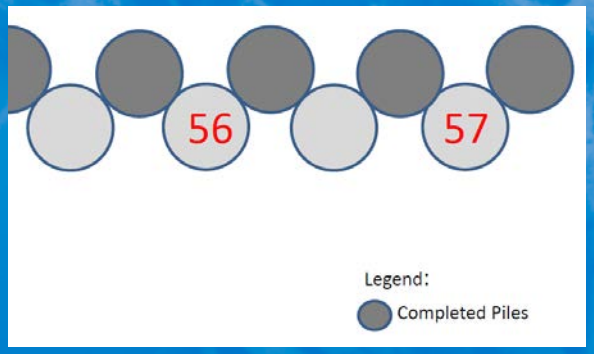
Similar to Secant Piles

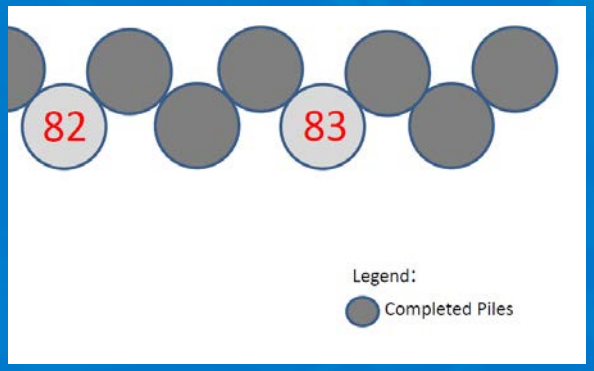


Step 1 - Every Second Primary Pile is Drilled and Cast

Step 2 – The infill Primary Piles are Drilled and Cast

Tangent Pile Construction



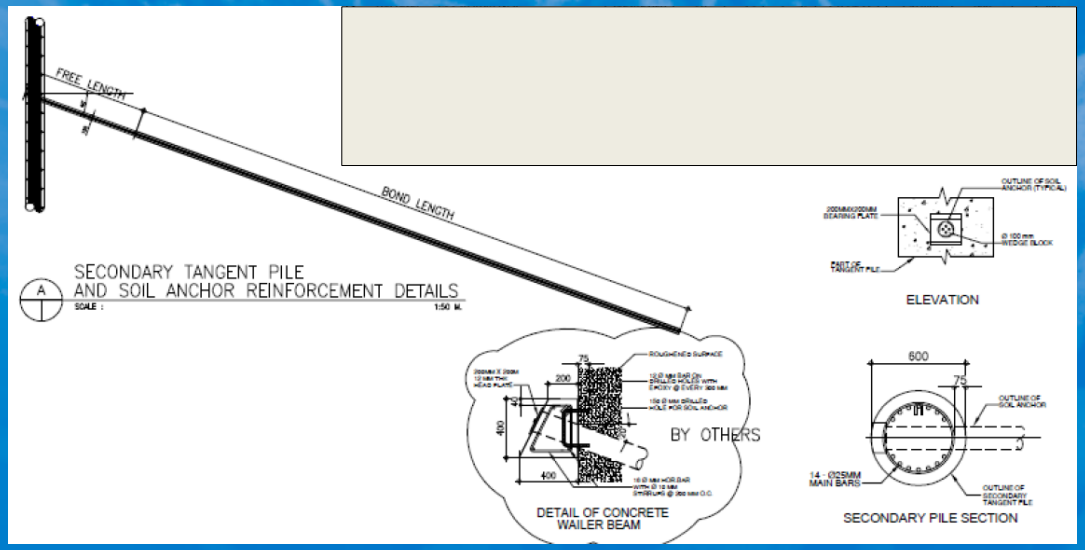


Similar to Secant Piles

Step 3 - Every Second Secondary Pile is Drilled and Cast – Rebar Cage Installed

Step 4 – The infill Secondary Piles are Drilled and Cast

Tangent Pile Construction



Drill and Install Tie Back Anchors through Secondary Piles – Waterproof Through Pile Holes

Tangent Pile Construction

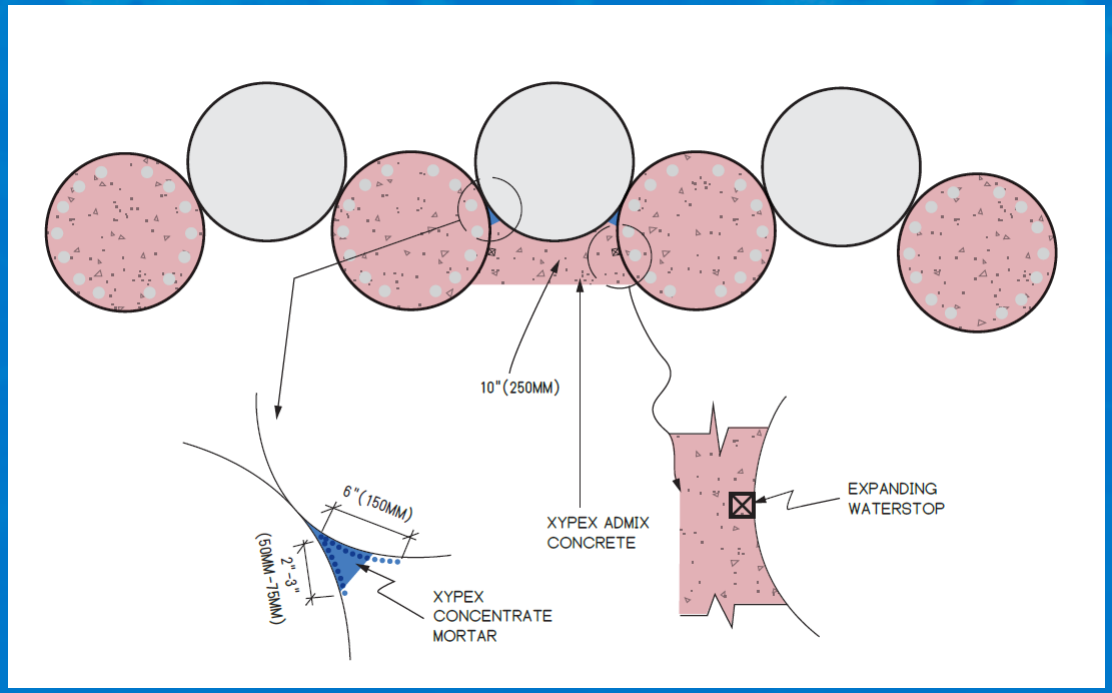
Xypex Waterproofing Assemblies

- Shotcrete Inner Wall – 200 mm minimum thickness
- Xypex Admix Concrete

Tangent Pile Construction

Xypex Waterproofing Assemblies

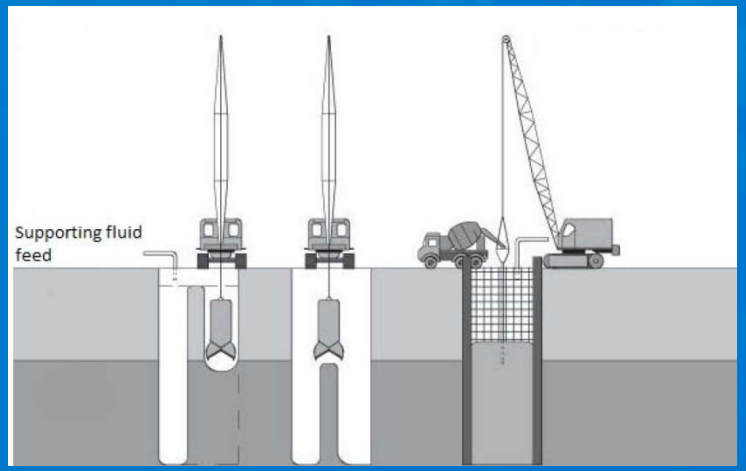
- Shotcrete Infill Between Piles
  - Xypex Concentrate Slurry
  - Xypex Concentrate Fillet
- Xypex Admix Concrete

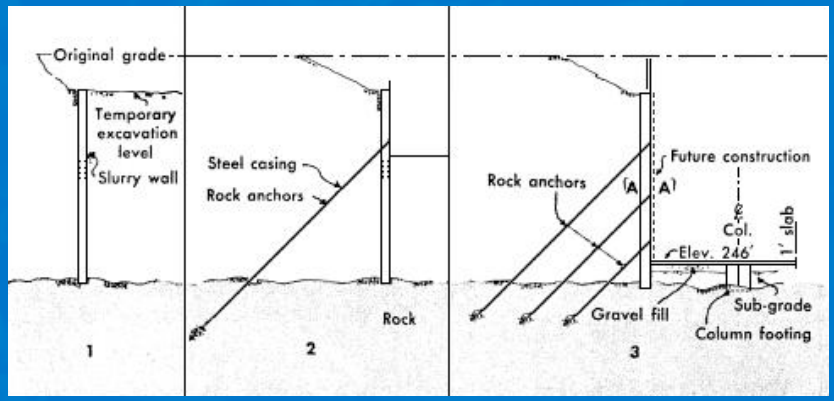


Slurry Wall Construction

Xypex Waterproofing Assemblies

- No Membrane
- Several Projects Done
- Admix in Slurry Wall Concrete

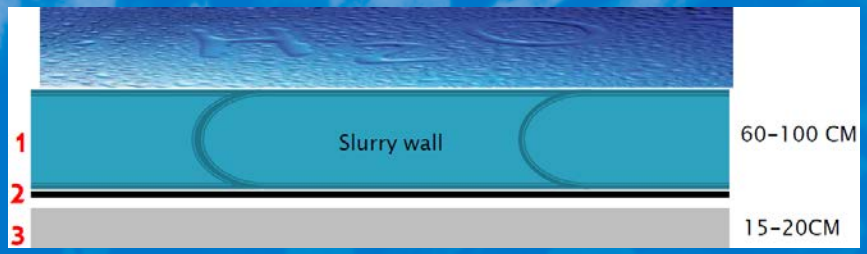




Slurry Wall Construction

Project Completed in Israel

Design Concept
- Slurry Wall
- Membrane
- Inner Wall

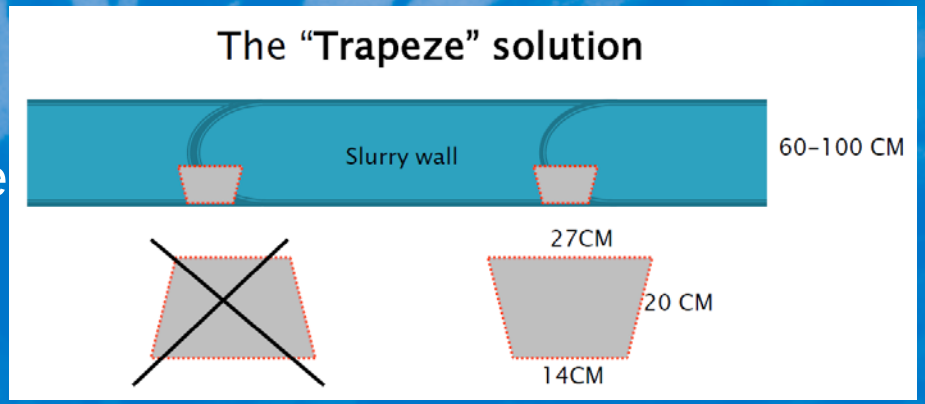


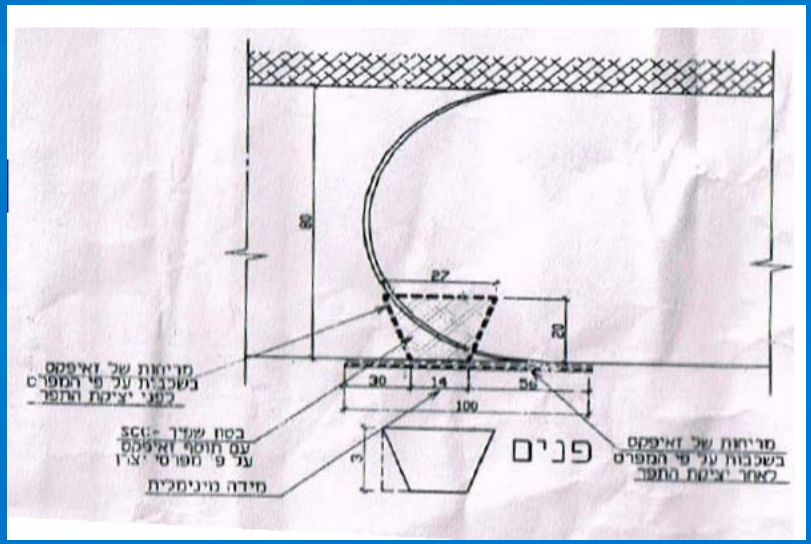
The Membrane Did Not Hold

Slurry Wall Construction

Xypex Based Design Concept

- Slurry Wall
- Xypex Admix in Concrete
- No Membrane
- No Inner Wall
- Joint Assembly





Slurry Wall Construction

Xypex Based Design Concept – Joint Assembly

Structural Shotcrete

- Common in Mined Tunnels
- Difficult to waterproof by traditional waterproofing means

Structural Shotcrete

Why use it?

- Tunnels, Mines, Edge of Property Line Construction
- Fast, Efficient concrete placement

Common Applications

- Structural below grade foundation walls
- Structural wall blind side placed against sheet, secant or other piles
- Concrete repair

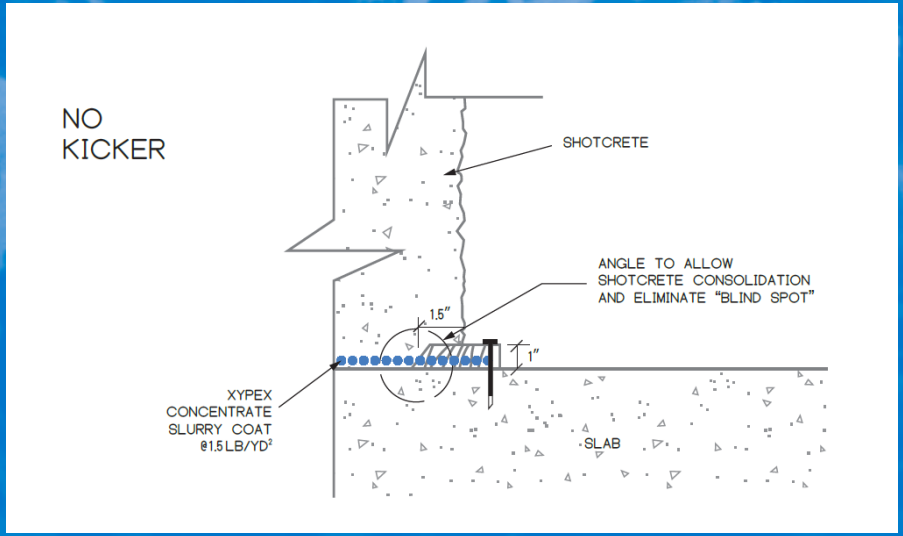
Shooting Xypex C-500 Admix shotcrete at 1 level below grade foundation in Seattle, WA

Mix Considerations

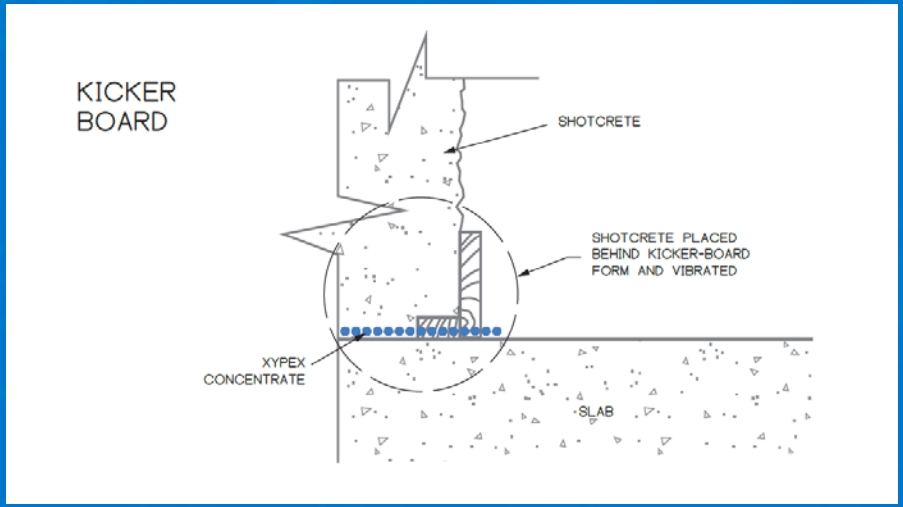
- Nozzelman want
  - no delay in set
  - no affect slump or slump loss
  - no affect on finish ability
    - No stickiness
    - No excess bleed
  - no affect on rebound
- Usually recommend Xypex C-500

Jointing Details

No kicker board

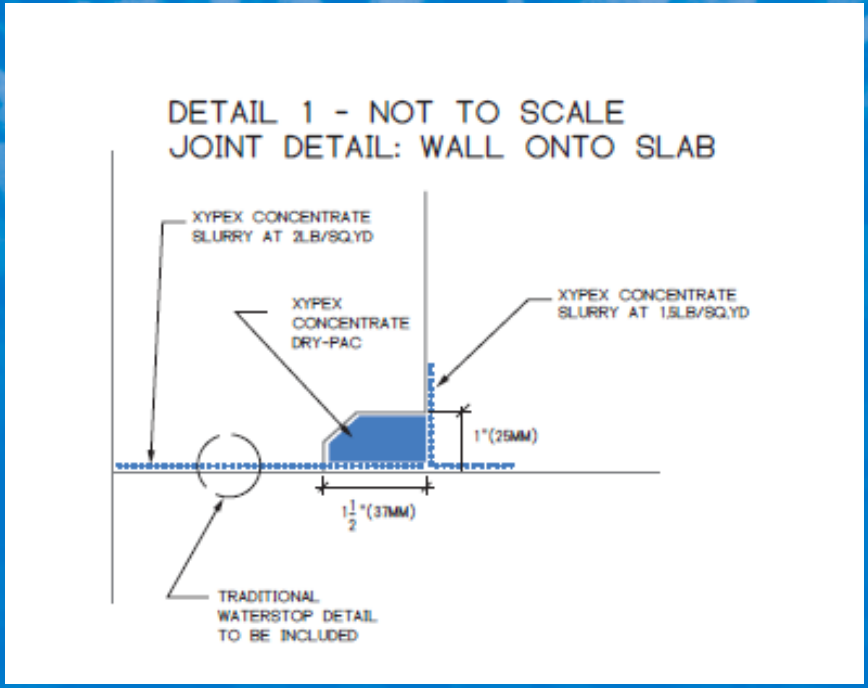


Kicker board



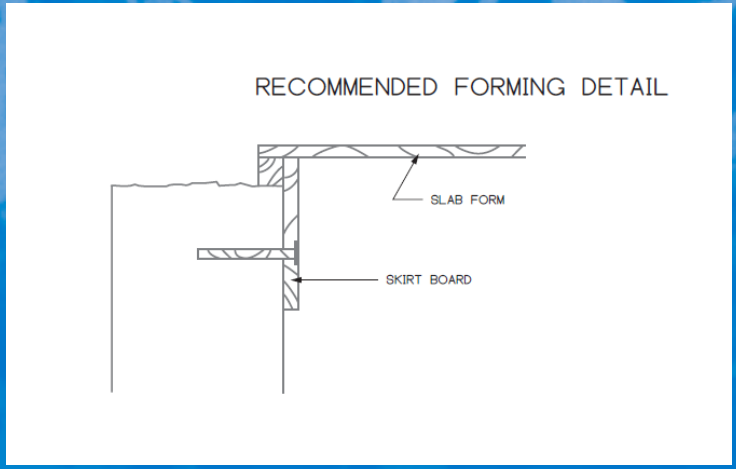
Jointing Details

Final Assembly

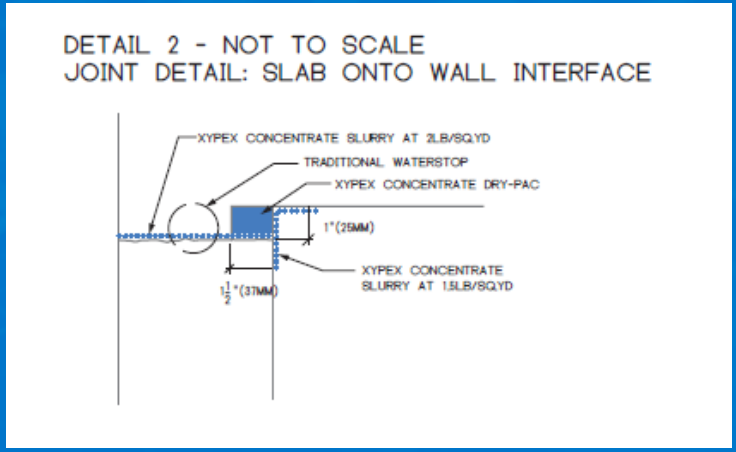


Jointing Details

Top of Wall to Slab Detail



Final Assembly



Uses in TBM Tunnels

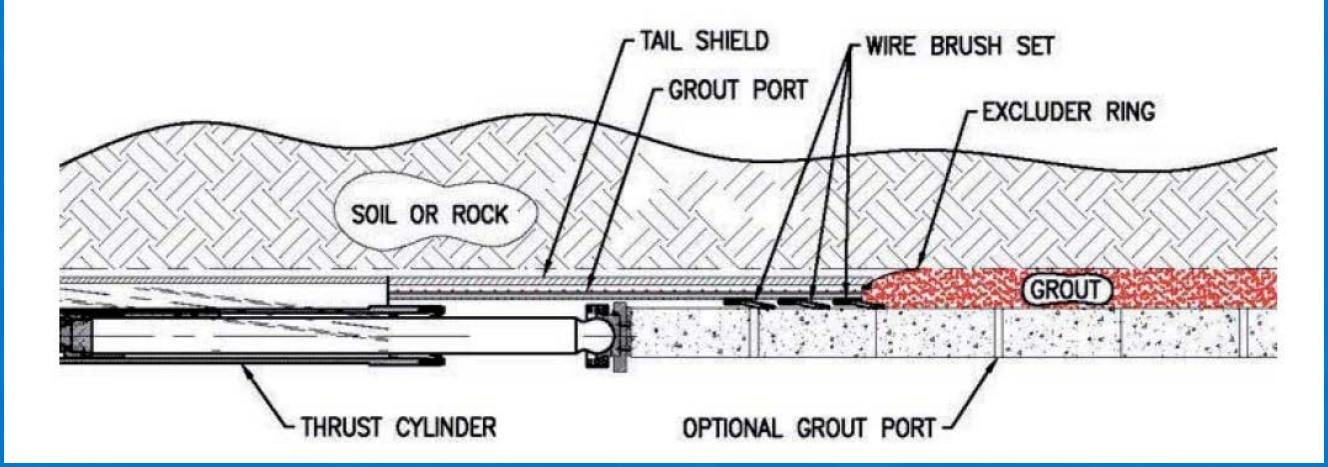
Xypex Waterproofing Assemblies

- Used in Panels
  - Caracas Metro Phase 3
- Used in Grout?
- Used in Bulkheads
- Repairs
  - Joints
  - Cracks

Uses in TBM Tunnels

Single Component Grouting Application

- Have recently tested in Tunnel Grout - Stantec
  - No adverse affects on set or flow
  - No increase in bleed



Uses in Mined / Form Tunnels

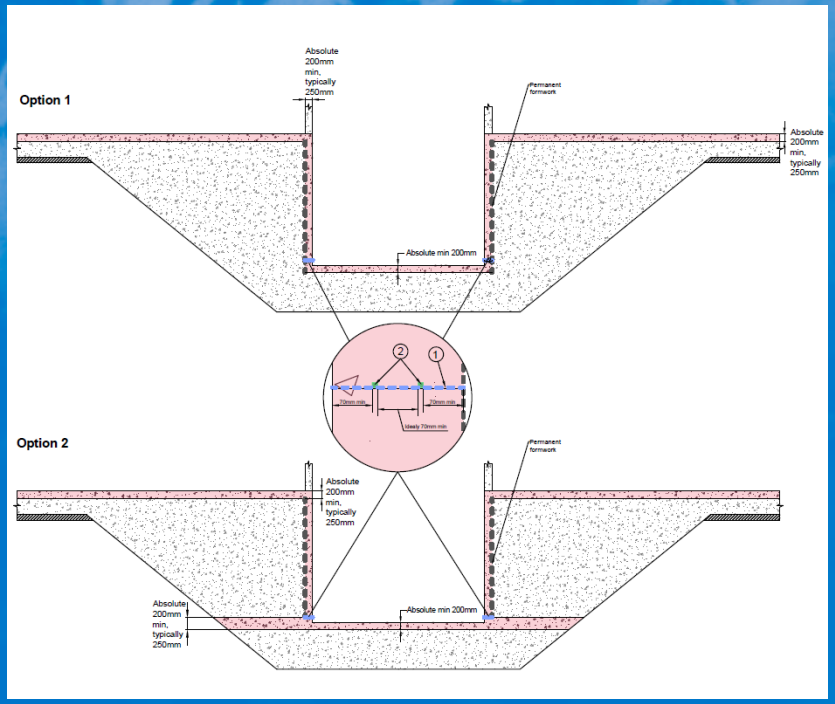
Many Projects Completed

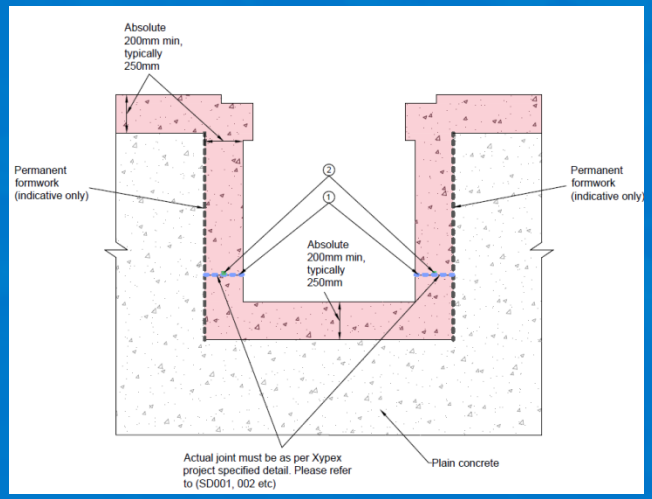
- The Cast Concrete
- Grout in Crown
- Repairs
  - Cracks
  - Joints

Uses in Other Assemblies

Thick Section Matt Slabs

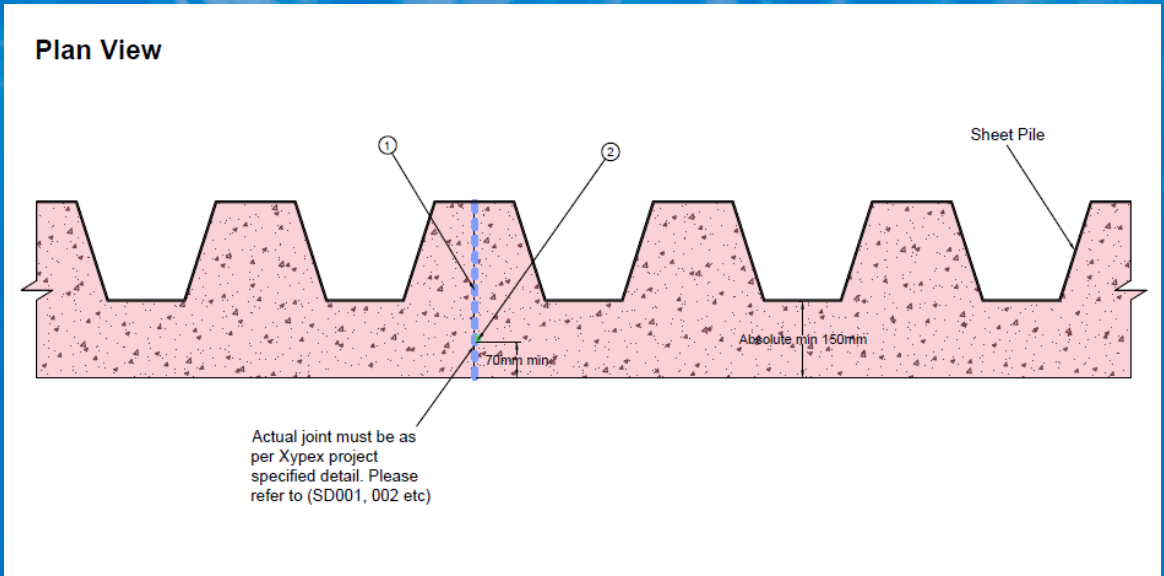
- Xypex Admix / non- Xypex Layered Construction – no cold joint between layers
- Can be Bottom of Slab
  - Increase thickness of layer





Uses in Other Assemblies

Sheet Pile Coating and Waterproofing



Tunnelling Concrete

An established, yet still developing market for Xypex Admixture

XYPEX®