The VOIDSPAN Port Anchor System

A Brief Introduction
The need for a Composite Anchoring System that could simultaneously tie and bond separate masonry became evident in what would become our first “pilot” project, the Grace Episcopal Church in New Bedford, MA.
The tower’s southeast pilaster had become separated from the tower core behind it, and had literally split down the middle.

This had been caused by the differential moisture growth of the brick mass with respect to the stone core.

This pilaster supported a vertical load of more than 400,000 lbs. and resisted a transverse arch thrust and was at an outside corner. The separation had made it unstable.
The Need for a Composite Anchoring System

According to probes the masonry had “filleted” itself by up to 4 inches.
The Need for a Composite Anchoring System

If left unrepaired the brick pilaster would eventually peel off of the tower. This would shift load onto the back-up stonework, which could then buckle and fail.

If Left Unrepaired
The Need for a Composite Anchoring System

Simply providing a tension tie between the outer and inner masonry would not return it to its original integrity.

The corner of the tower would act like two thin piers tied together but with a fraction of the strength of one combined pier.

If Tied but Not Bonded
The Need for a Composite Anchoring System

Simply providing a mortar or grout bond across the cavity would not be sufficient to resist the tension forces created by the outward bow.

The brick pilaster could eventually de-bond and continue to peel off of the tower as if it was never repaired.

If Bonded but Not Tied
The Need for a Composite Anchoring System

Bonded and Tied:

Providing a mechanical tie that works in combination with grout bonding of the cavity will provide the necessary tension and shear capacity needed to restore the pier to a permanently solid, composite state.
Composite Anchoring System/Structural Function

Maintain the Relative Positions of Detached Layers Until Permanently Re-Bonding
Composite Anchoring System/Structural Function

Maintain the Relative Positions of Detached Layers Until Permanently Re-Bonding

Provide a Direct Pathway for Cleaning, Dampening and Grout Injection Into the Cavity
Composite Anchoring System/Structural Function

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Provide a Direct Pathway for Cleaning, Dampening and Grout Injection Into the Cavity

Resist Temporary Grouting Pressures
Composite Anchoring System/Structural Function

Maintain the Relative Positions of Detached Layers Until Permanently Re-Bonding

Provide a Direct Pathway for Cleaning, Dampening and Grout Injection Into the Cavity

Resist Temporary Grouting Pressures

Provide Confinement of the Composite Mass
Composite Anchoring System/Structural Function

Maintain the Relative Positions of Detached Layers Until Permanently Re-Bonding

Provide a Direct Pathway for Cleaning, Dampening and Grout Injection Into the Cavity

Resist Temporary Grouting Pressures

Provide Confinement of the Composite Mass

Resist Internal or External Tension Loads Within the Masonry
Composite Anchoring System/Structural Function

Maintain the Relative Positions of Detached Layers Until Permanently Re-Bonding

Provide a Direct Pathway for Cleaning, Dampening and Grout Injection Into the Cavity

Resist Temporary Grouting Pressures

Provide Confinement of the Composite Mass

Resist Internal or External Tension Loads Within the Masonry

Resist “Rolling Shear” in the Composite Mass
The **VoidSpan PORT ANCHOR**

- All stainless steel construction.

- Perforated and single or double rodded open shank anchors available to suit loading, grouting conditions and injection pressures.

- *Cintec* anchor socks are available at either or both ends, with bearing plates available in lieu of or in addition to the socks.

- Removable threaded rods socket into outer ends of anchor in order to directly attach dunnage to counter injection pressures- The port anchor doubles as the fastening system for the dunnage, avoiding the need for external bracing.

- Double ended anchors available where dunnage needed on both faces of masonry.

- Anchor shear capacity **not** reliant on dowel action but based upon shear friction “haunch” theory, with the maximum tie capacity provided at the point of best grout compaction- at the anchor. No shear lag, no bending or crushing, only direct fixation.

- Hollow or open shank allows insertion of secondary rods for additional shear capacity, and electric heating wands if needed for installation during cold weather conditions.

- **VoidSpan CG70 Grout** has been designed to work with Port Anchors.
The **VOIDSPAN PORT ANCHOR**

**RODDED SHANK ANCHOR**

**OPEN SHANK ANCHOR**
The VOIDSPAN PORT ANCHOR/
Open Shank For Cavity Tying and Injection-

Open Shank Anchor In-Situ Mock-up
The VOIDSPAN PORT ANCHOR/Cavity Tying and Injection-

INSTALLATION AND REQUIREMENTS

1. Drill holes for the anchors using a diamond core bit to minimize damage to the masonry. Retain the drill cores, cut the outer ends into “biscuits” for patching the holes.

2. Measure the “a”, “b” and “c”, solid/cavity/solid dimensions of the core drilled masonry to determine the “A”, “B” and “C” anchor dimensions and required end details. With this plus the dunnage and loading requirements we can engineer the Port Anchors.

3. Thoroughly clean all friable materials out of the cavity using the cored holes as well as additional “clean-outs” created by removing isolated masonry units.

4. Insert the anchors into the holes and inflate the socks to 40 psi with Cintec’s “Presstec” Grout (follow Cintec instructions and installation procedures). If dunnage is required to brace the masonry, fasten this with rods inserted into the anchors’ threaded ends.

5. Pre-dampen then inject the cavity using VOIDSPAN #600 series PHLc Injection Grout (or pre-approved substitute), working in one meter (or three foot) maximum daily lifts.

6. Remove the dunnage and patch the holes with the cut off cores.
The VoidSpan PORT ANCHOR/ Cavity Tying and Injection -

Illustrated Sequence
The VOIDSPAN PORT ANCHOR/Cavity Tying and Injection-

Illustrated Sequence
The VOIDSPAN PORT ANCHOR/ Cavity Tying and Injection-

Illustrated Sequence

Grouting Day 4
- Grout in flowable state
- Grout in semi-plastic state
- Grout in semi-hardened state
- Remove dunnage and relocate above

Grouting Day 5
- Grout in flowable state
- Grout in semi-plastic state
- Grout in semi-hardened state
- Remove dunnage and relocate above

Grouting Completed
- All grout going from semi-hardened to hardened state
- Remove all dunnage
The VoidSpan PORT ANCHOR/ Cavity Tying and Injection -

Stabilizing a delaminated stone leaf with Port Anchors
The VoidSpan PORT ANCHOR/
Cavity Tying and Injection-

Filling Chimney Flues with a Lightweight Grout
The VoidSpan PORT ANCHOR/ Rodded Shank For Masonry Mass Consolidation-

Open Shank Port Anchor In-Situ Mock-up
The VOIDSPAN PORT ANCHOR/
Mass Consolidation-

INSTALLATION AND REQUIREMENTS

1. Drill holes for the anchors using a diamond core bit to minimize damage to the masonry. Retain the drill cores cut the outer ends into “biscuits” for patching the holes.

2. Measure the “a”, “b” and “c”, front/core/back dimensions of the drilled masonry to determine the “A”, “B” and “C” anchor dimensions and required end details. With this plus the dunnage and loading requirements we can engineer the Port Anchors.

3. Thoroughly flush out the internal masonry core using the holes as well as additional “clean-outs” created by removing isolated masonry units or drilling additional hole.

4. Insert the anchors into the holes and inflate the socks to 40 psi with Cintec’s “Presstec” Grout (follow Cintec instructions and installation procedures). If dunnage is required to brace the masonry, fasten this with rods inserted into the anchors’ threaded ends.

5. Pre-dampen then inject the core using VOIDSPAN #600 series PHLc Injection Grout (or pre-approved substitute), working in one meter (or three foot) maximum daily lifts.

6. Remove any temporary dunnage and patch the holes.
The VoidSpan PORT ANCHOR/ Mass Consolidation -

Wall Consolidation w/ Double Ended Anchors: Illustrated Sequence
Double Ended Anchor Application: Wall Condition
The VoidSpan PORT ANCHOR/
Mass Consolidation-

Double Ended Anchor Application: Pier Condition
Double Ended Anchor Application: Pier Condition