

Case Study

Rehabilitating an icon of Freedom:**The Statue of Liberty****Restoration Project**

New York, US

Project Highlights**Application:**

Structural rehabilitation of a National Historic Monument

Completion date:

Phase 1: 2012 – Repairs on Stair C

Phase 2: 2021 – Rehabilitation of the historic Fort Wood.

The outcome:

Repairing the Statue of Liberty's star shaped pedestal – Fort Wood.

100+ Cintec Grout Pillows**The History**

The construction of the Statue of Liberty **began in France in the 1870s**, designed by sculptor Frédéric Auguste Bartholdi. The statue was constructed primarily from copper sheets, allowing the metal to be shaped by hammering it from the reverse side. The internal support structure was designed by engineer Gustave Eiffel, who **utilized a skeletal framework of iron to provide stability while minimizing weight**.

Once completed in 1884, the statue was disassembled and shipped to the United States in 1885. It was reassembled on Liberty Island, where **it was anchored to a massive stone pedestal**, designed by architect Richard Morris Hunt, using granite and concrete for durability. Since 1886, the Statue of Liberty has rested atop the **eleven-pointed, star-shaped Fort Wood**, which now contains the Statue of Liberty Exhibit. Fort Wood was built between 1808 and 1811 as part of New York's harbor defense system, which protected New York from British invasion.

**Owners:**

US National Park Service

General Contractors:

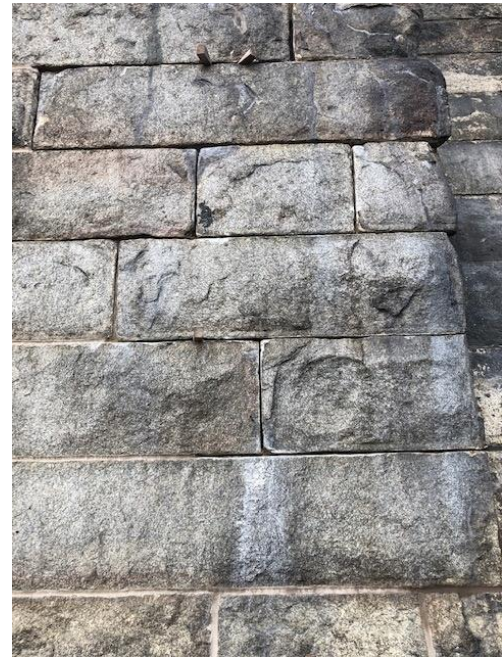
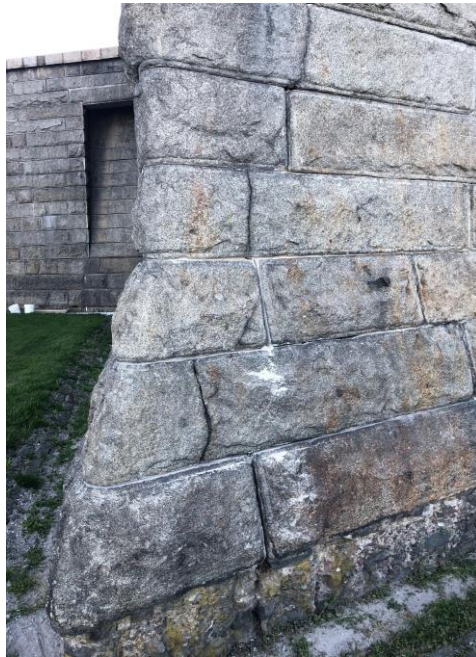
Phase 1: J. Natoli Construction Corp.

Phase 2: Allegrone Masonry

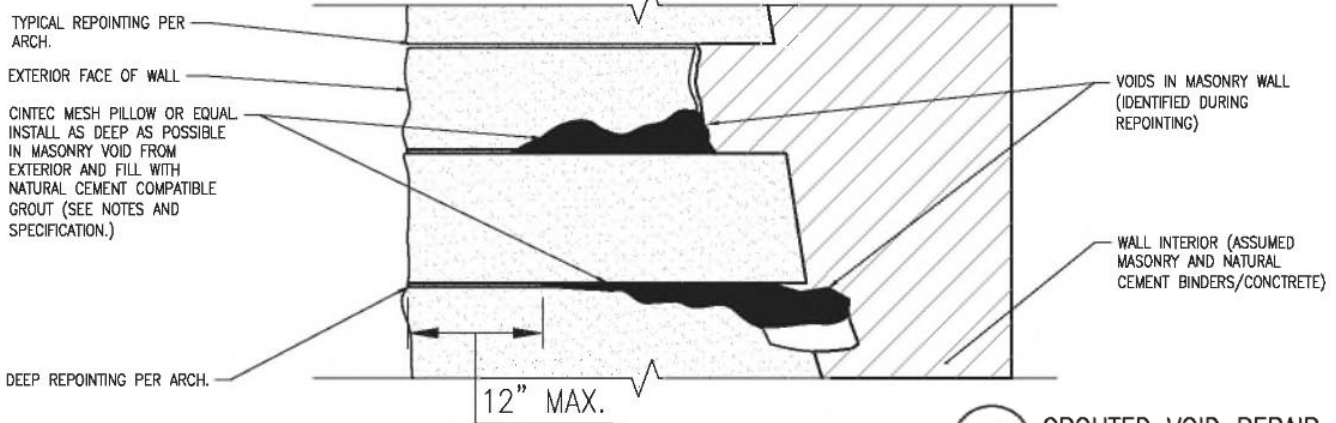
The Requirement

In 2020, and after 200+ years of exposure to storms and seawater, **the exterior stone walls at Fort Wood needed to be rehabilitated.** As part of the masonry restoration, some mortar joints were extremely deteriorated to the point that grout repairs were required to infill the bedding joints. For repointing repairs of 0" – 12", typical repointing was specified.

Injection repairs included the infill of bedding joints for depths greater than a feasible repointing depth (>12"). This repair was provided by Cintec, and it was necessary to **replace the deteriorated – or nonexistent – mortar joints and fill up the voids** at the back of the wall.



The Solution



SECTION VIEW

2
S4.01

GROUTED VOID REPAIR
N.T.S.

Credits: U.S. National Park Service Denver Service Center

The Cintec Grout Pillows (9" by 24" and 12" by 12"), were designed to be installed as deep as possible into the bed joint and filled with Presstec® Grout.

As the grout was injected, **the Cintec Grout Pillow expanded to fill the voids and molded to the contours of the substrate, establishing both a mechanical and adhesive attachment, and resulting in a robust bond and support.**

The Installation

The Cintec Grout Pillow allowed to **constrain the grout to the bed joints** without infilling large voids within the rubble wall, also **preventing leakage of grout and damage to the surface**.



Over 100 Cintec Grout Pillows were installed as part of the exterior stone wall rehabilitation. Additional anchors were installed to reinforce Stair C on a preliminary phase.

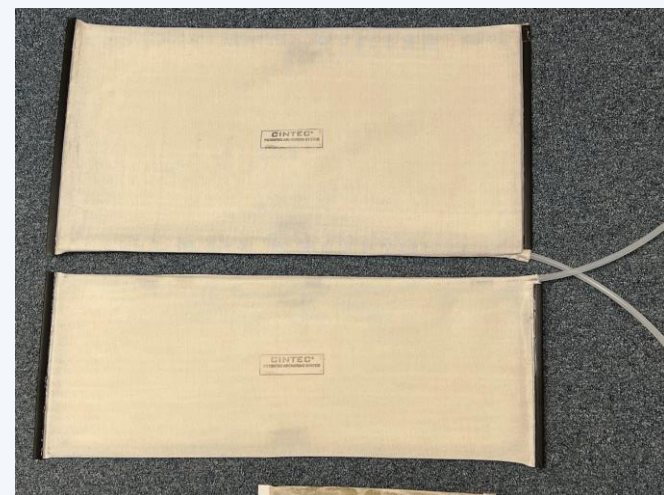
In conclusion, the successful implementation of Cintec Grout Pillows for the repair of the Statue of Liberty's star-shaped **pedestal not only restored the structural integrity of Fort Wood but also ensured the longevity of this historic monument**.

The Presstec® Grout is **non-absorbent and thus not susceptible to freeze-thaw damage**.

By effectively addressing the deteriorated mortar joints and filling voids with precision-engineered grout, **we have reinforced the pedestal's foundation, preserving its iconic legacy for future generations to admire**.



The Details



Cintec Grout Pillows, custom-designed to meet the needs of the project.