



## Totten Shutters

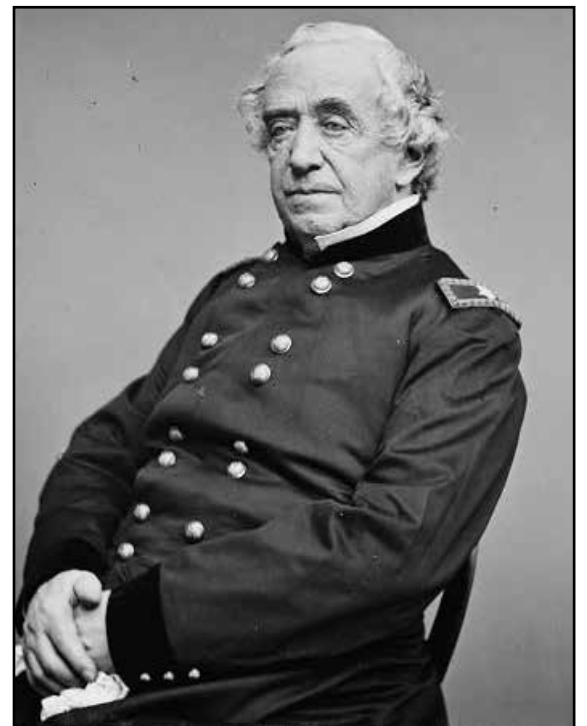


Construction of Fort Jefferson began in 1846 and continued through the Civil War until the 1870's. Fort Jefferson is part of the Third System of seacoast fortifications defined by systematic and refined casemate details. One of the most important features of Fort Jefferson is the original iron Totten Shutter; a uniquely designed and highly engineered defense feature. Ultimately the Totten Shutter became the first time that armor became a standard element of harbor defenses as a result of extensive experimentation and exhaustive study by one man; Joseph G. Totten

### Joseph G. Totten and the Totten Shutters

Joseph G. Totten was born in New Haven, CT in 1788 and lived until 1864. Joseph Totten attended the United States Military Academy and then joined the Corps of Engineers in 1805. Although the nation had been constructing fortifications for most of its history it wasn't until 1816 that a group of engineers were organized to direct and standardize the locations, design, and construction of defensive fortifications. Brevet Lieutenant Colonel Joseph G. Totten became one of these engineers on what was referred to as the Bernard Board, named after Simon Bernard, a French military engineer that served under Napoleon.

In 1838 Totten became the Army's Chief Engineer, a position he held until his death in 1864. As Chief Engineer most of Totten's career was spent studying the use of lime mortars and natural cement as well as experimenting with ways to improve the defense of and stability of the gun casemates of the third system forts. Ultimately his experiments decreased the size of the openings



General Joseph G. Totten; August 23, 1788 – April 22, 1864

and simultaneously allowed the guns to swivel on a 60 degree angle laterally providing an optimal firing range. Additionally, he developed a shutter system that instantly opened upon firing of a projectile and then immediately slammed shut which protected the guns and personnel from return fire while they prepared the next round of ammunition. This incredible engineering innovation is referred to as the Totten Shutter. The basic elements that make up a Totten Shutter assembly consist of exterior and interior elements and the swinging doors. On the exterior face of

the scarp wall an iron breast plate frames the opening, while a header, sill, and side jambs frame the exterior side of the smaller opening. It is here that the two shutter doors are hinged to fly open when a projectile is fired and then shut immediately. Finally, armor blocks line the interior throat of the opening. Look for the original Totten Shutter elements around the lower tier embrasure openings as you move around Fort Jefferson and see if you can identify the original elements.

## Project History

As part of the Dry Tortugas National Park enabling legislation it is our duty to protect, stabilize, restore, and interpret Fort Jefferson, an outstanding example of 19th Century masonry fortification.

Due to the extreme marine environment at the Dry Tortugas the original iron Totten Shutters have severely rusted and expanded which in turn has created severe delamination of the brick from the scarp wall and loss of original historic material.

Dry Tortugas National Park has initiated a multi-phased, multi-year preservation project to stabilize Fort Jefferson. The scope of this project is to remove all of the rusted iron elements of the original Totten Shutter assemblies and stabilize the exterior walls of Fort Jefferson. This is completed by rebuilding the embrasures with replicated shutter components made from cast Portland cement and lime and combining original salvaged historic brick and new brick to rebuild sections of collapsed masonry and repointing joints with American Natural Cement.

All treatment is done within *The Secretary of the Interior's Standards for the Treatment of Historic Properties*.



*Original iron Totten Shutter assembly embedded within the scarp wall*

## Work in Progress

Currently the work you see being done today is a continuation of the on-going stabilization project. The original iron work is being completely removed from embrasures on Front 3 and the exterior scarp wall is being stabilized with new mortar made of the same materials used in the 1800's. Additionally, the embrasure openings on the first level are being reconstructed and the parapet and 2nd tier openings are being stabilized with selective brick replacement and repointing.

A contract was awarded to Stone and Lime Inc, of Brookfield, MA to perform this task.

On site today you will witness tradesman installing new replicated Totten Shutter pieces such as the armor blocks, headers and sills. They are also repointing unreconstructed sections of the scarp wall.

This work has already been completed on various fronts since the 1990's to various degrees. Look for older phases of work and see if you can identify rebuilt sections of the scarp compared to the original construction period.



*Replicated Totten Shutter components to be embedded within scarp wall*



*Replicated Totten Shutter assembly embedded in scarp wall with shutter doors and an exterior breast plate*

## Contact Information

For further information about this project or other on-going preservation work at Fort Jefferson and the rest of Dry Tortugas National Park please contact:

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