

## Historic Lighthouse Preservation:

# DOORS

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**Figure 1.** Close-up of large, double-leaf, wood-frame and panel doors at the Cape Henry Lighthouse (second tower), Fort Story, Virginia.

Tower exterior doors were quite often the focus of historic lighthouses. Together with their functional and decorative features such as steps, balustrades, pilasters, and architrave (trim or molding which surrounds the door opening), they can be extremely important in defining the overall character of a lighthouse. Usually entrances were integral components of a historic lighthouse's stylistic design and featured hallmark elements that defined the architectural style upon which the ornament of the structure was based. For example, entrances may be detailed with large raised panel doors trimmed with masonry or cast-iron pediments and pilasters which were associated with neoclassical architecture of the late 19th and early 20th centuries. The detailing may not be so grandiose but rather simple and utilitarian, such as the plain non-trimmed masonry openings fitted with vertical plank doors associated with the lighthouses built before the Civil War.

The primary cause of lighthouse door deterioration is moisture penetration of the various components by rain driven against and into doors, standing water on sills, and

interior condensation. In a marine environment, deterioration caused by moisture penetration is exacerbated by extended periods of damp weather, which prevent the door and its components from drying out, thereby encouraging expansion



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**Figure 2.** View of the neoclassical doorway at the Ponce De Leon Inlet Lighthouse, Florida.



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**Figure 3.** View of the simple pre-Civil-War-style replacement plank door at the Ocracoke Lighthouse, North Carolina.



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**Figure 4.** View of gothic revival style entrance at Piedras Blancas Lighthouse, California.

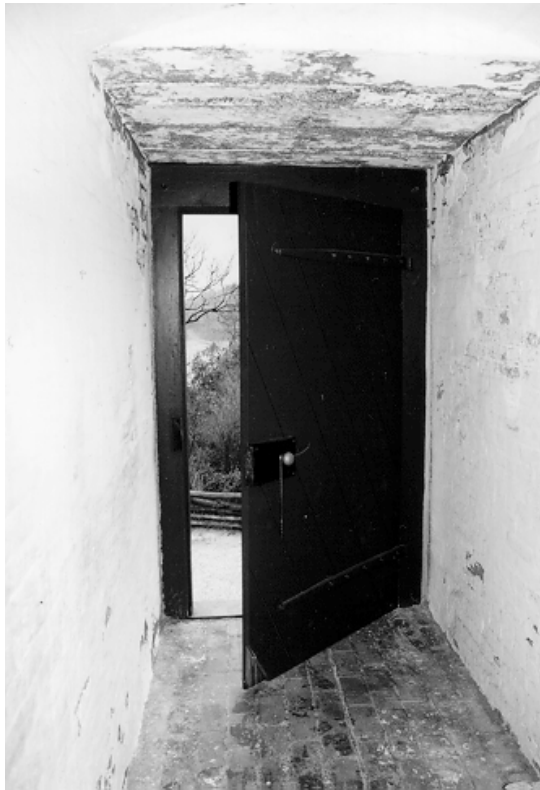
and rot. Other factors that contribute to door deterioration are poor design, vandalism, insect/fungal attack, settlement over time, paint buildup, and deferred maintenance. This chapter will concentrate on the operational door components. (For information concerning the door surrounds and associated features refer to the **Masonry, Iron, and Wood** sections of this handbook.) This text is concerned with the preservation of historic lighthouse doors and their role in preserving the integrity of historic lighthouse. For more information on designs for recreating missing lighthouse doors, refer to Part V., **Beyond Basic Preservation**.

## Door Types

A variety of door types were used in historic lighthouse construction. The

following is a brief discussion of common historic lighthouse door types.

- **Wood plank door:** A door of one or two leaves that is constructed of two layers of tongue and groove wood planks that run vertically on the exterior side of the door, and typically run horizontally or diagonally on the interior. The planks are typically fastened by clinch nailing (nails that are driven through the outside of the door and bent over on the inside). The door is usually reinforced with horizontal 'battens' at the hinge locations: a diagonal batten may run from the top batten to the bottom batten. Such a door is typically hung on strap hinges; however, butt hinges may have been used. This construction method is used to limit the exposure of the end grain in the boards to the top and bottom of the door.
- **Wood-framed panel door:** A door of one or two leaves, constructed of a frame that is comprised of vertical stiles and horizontal rails connected by mortise and tenon joints; the openings in the frame are filled with flat or



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**Figure 5.** View of the large, single-leaf, wood-plank door at the Cape Henry Lighthouse (first tower), Fort Story, Virginia.



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**Figure 7.** Another variation on the double-leaf, sheet-iron door configuration at the Cape Canaveral Lighthouse, Florida.



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**Figure 6.** Close-up of the neoclassical, double-leaf, sheet-iron door at the Cape Charles Lighthouse, Smith Island, Virginia.



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**Figure 8.** An example of a typical watertight 'ship' style door at Los Angeles Harbor Lighthouse, California.

raised panels. This construction method allows the exposure of the wood end grain only at the top and bottom of the stiles.

- **Sheet iron or steel door:** A door of one or two leaves, typically constructed of a single sheet of steel or iron that is reinforced along its perimeter with angle steel or iron, either riveted or welded to the sheet. The door is typically

hung on strap or butt hinges that are either riveted or welded to the sheet.

- **Watertight steel 'ship' style door:** This door type was predominantly used in lighthouses that were located in wave-swept locations in open water and on the ends of breakwaters. The door is secured by multiple quick-action dogs that are actuated by an interior hand wheel.

## Inspection and Evaluation

The first step to repairing historic doors is a thorough inspection of each door unit. Poor design, moisture, vandalism, insect attack, and lack of maintenance contribute to both metal and wood door deterioration. Of these factors, moisture is the primary factor in wood decay and metal corrosion. The following are some common problems to look for when inspecting doors for deterioration. (For more information on the deterioration of wood and metal refer to the **Wood** and **Iron** sections of this handbook.)

<b>Inspection Chart for Lighthouse Doors</b>	
<i>Look For:</i>	<i>Possible Problems:</i>
<b>Wood Doors</b>	
Look for areas of paint failure and wood deterioration	Failing paint may indicate the wood is in poor condition and in need of repair. Wood is frequently in sound condition, however, beneath unsightly paint. After noting areas of paint failure, inspect the condition of the wood. Use an ice pick or an awl to test wood for soundness in an inconspicuous location. Pry up a small section of the wood. Sound wood will separate in long fibrous splinters. Decayed wood will lift up in short irregular pieces because of the breakdown of fiber strength. Plank doors are especially susceptible to wicking moisture along their bottom edge where the end grain is exposed. The lower ends of the stiles of a frame-and-panel door are especially susceptible to wicking moisture through the end grain. If deterioration has begun from within the wood member and the core is badly decayed, the visible surface may appear to be sound wood. Pressure on a probe can force through an apparently sound outer layer to penetrate deeply into decayed wood. This technique is especially useful for checking sills where visual access to the underside is restricted.

<i>Look For:</i>	<i>Possible Problems:</i>
<b>Metal Doors</b>	
Look for areas of paint failure	This may indicate the paint is at the end of its effective life span. Damage caused by bending will make the less flexible paint fracture and 'pop' off the door frame.
Look for areas of corrosion on all surfaces of the door leaf, frame, sub-frame (if visible), and hardware	This may indicate a moisture infiltration problem. Corrosion, typically in the form of rust, will occur along the bottom edge of the door leaf.
Look for bowing or misalignment of door leaves	Deformation could be the result of misuse/abuse or corroding components that have been deformed by rust-jacking or have simply deteriorated. Bowing or misalignment will more than likely prevent the door from being weathertight.
<b>Both Door Types</b>	
Check for gaps or cracks in the joint between the door frame and the lighthouse wall	Cracks or gaps are possible water infiltration points.
Examine the sill for a downward slope which allows water to drain	Without a downward slope, water will collect under the door causing deterioration or may run into the lighthouse causing deterioration of interior features.
Examine all flashing to ensure that water is directed away from the lighthouse and door opening	Improperly installed flashing may collect water or direct water into the lighthouse, causing premature deterioration of the lighthouse door, door frame, or interior features.
Check the moving parts of the doors	Bound or tight operating doors may simply be painted shut or may be stuck because of deteriorating frame members or bowed leaves, or may be bound by corroded hardware.
Inspect door units for water entering around the edges of the frame	The joints or seams should be caulked to eliminate water infiltration. Check the weather seal for cracked, loose, or missing sections.

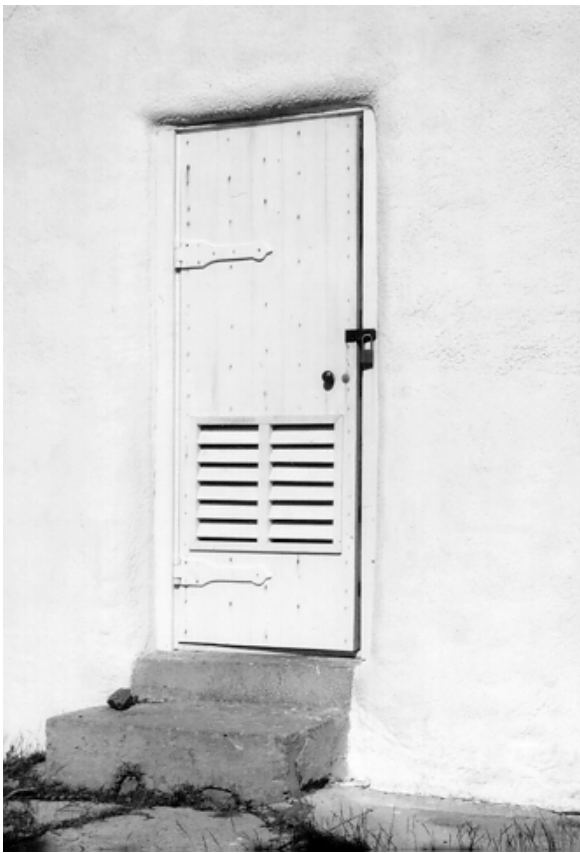
## PRESERVATION TREATMENTS

Doors reflect a period and style as well as provide security for a lighthouse. During any preservation treatment both of these functions should be maximized. Because of character-defining nature of the door and its surrounding trim, all treatments should use the gentlest means possible. All replacement materials should be of the highest quality and able to withstand a harsh marine environment.

Many of the maintenance and repair techniques described in this text, particularly those relating to cleaning and painting, are potentially dangerous and should be carried out only by experienced and qualified workmen using protective equipment suitable to the task. In many cases, it is best to involve a historical architect or building conservator to assess the condition of the door and its components and prepare contract documents for the required treatment.

### Protection and Stabilization (Mothballing)

Before any preservation treatment is performed, the lighthouse door and its surroundings should be thoroughly inspected using the information in the preceding section as a guide. From these findings, a preservation treatment plan can be developed.



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**Figure 9.** View of the Ocracoke Lighthouse five years after replacement; note rust streaks from nails. This condition indicates the paint coating has degraded to the point where moisture has permeated the surface.



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**Figure 10.** Interior view of the modern metal door at the Ocracoke Lighthouse before its replacement; corrosion like this should be removed and the affected areas treated with a rust-inhibiting coating system.

When mothballing wood or steel doors, protection of historic fabric and security should be the primary goals. Treatments for the protection of wood and iron lighthouse components during the mothballing period are covered in the sections on **Wood** and **Iron**; therefore they will not be reiterated in this section. This section will concentrate on lighthouse security during the mothballing period.

## Security

Lighthouses which have been mothballed usually have the openings on the lower level covered to reinforce entry points. The following are general guidelines to consider when securing doors during the mothballing period.

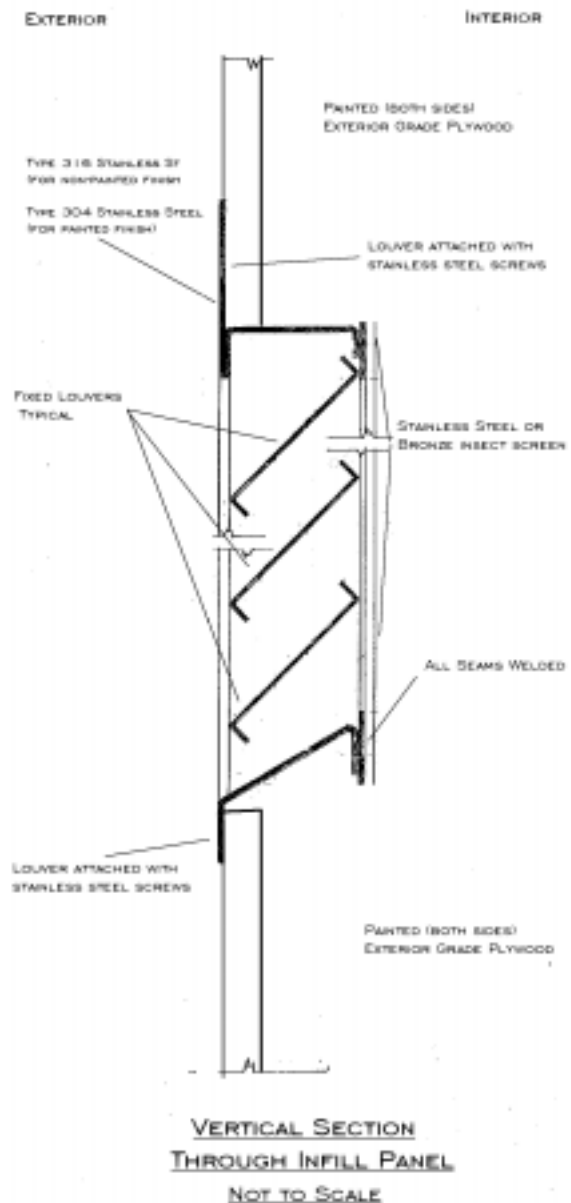
- Make all repairs to the door and frame to prevent further damage during the mothballing period. (Refer to the following repair treatment for more information.)
- When securing a door during the mothballing period, the most important factors to consider are ease of authorized entry and retention of



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**Figure 11.** These louvered doors have been installed at Point Sur Light Station for security and ventilation. Note the baffles on the exterior and the screened louvers on the interior.

character-defining features. The method of installation should not result in damage to the door, the opening, door jamb, or frame. If parts of the door must be removed to secure the opening, all parts should be labeled and stored in the lighthouse if possible.



**Figure 12.** Typical detailing of a ‘storm proof’ louver for temporary lighthouse doors. (WPTC image adapted from drawing from USCG-CEU Oakland Archives)

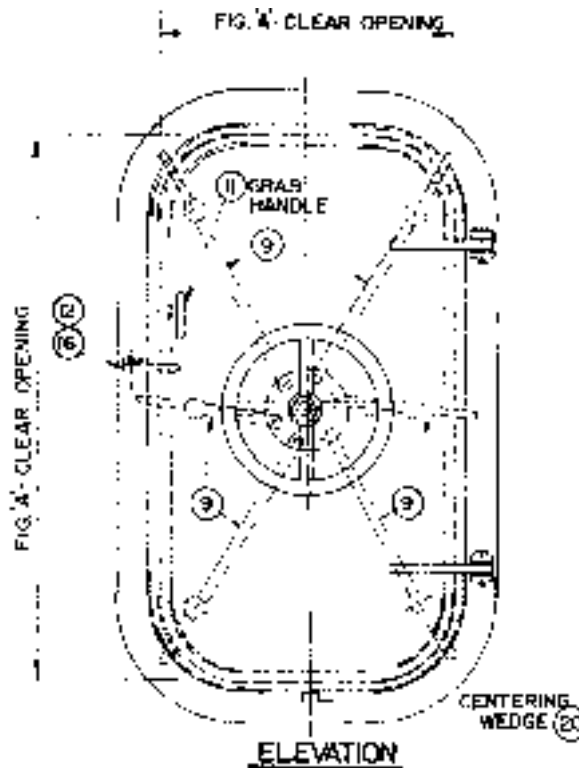


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**Figure 13.** Site-built steel door at the Turkey Point Lighthouse; this solution was chosen because of the remote location and repeated break-ins. Note exterior stiffeners and shroud over the hasp and lock.

For situations where the door has been severely damaged beyond repair or removed by vandals or has deteriorated extensively because of neglect, a temporary, reversible security door should be installed. The following are two types of temporary steel security doors:

*Site-built, fabricated steel door:* This door consists of a steel 'C' channel frame set into the existing opening that is lag-bolted to the existing door frame. On the outside of this frame, the door leaf is connected by welding the hinges to both the frame and door leaf. The door leaf should overlap the opposite door frame to facilitate the installation of an eye that will pass through a slot in the door leaf to facilitate a lock. A steel shroud big enough to facilitate lock operation with a key, but prevent bolt cutters from reaching the lock, should be welded over top of the eye slot. If the lighthouse is not in an area that is to being wave swept (i.e., if the lighthouse is located on a breakwater or pier), the door should be fitted with screened louvers that are approximately 25 percent of the total door area. The louvers



**Figure 14.** A shop drawing depicting the parts of the watertight 'ship' style door. (Drawing courtesy of Cen-Tex Marine Fabricators)



USCG Group Grand Haven

**Figure 15.** View of watertight 'ship' style door installation on the Grand Haven South Pierhead Front Range Light, Grand Haven, Michigan.



should be constructed from the same gage steel as the rest of the door.

*Watertight steel 'ship' style door:* This type of door consists of a prefabricated 'ship' style door. This door system can be fitted much the same way as the site-built door. A steel 'C' channel frame should be bolted to the door opening; the prefabricated watertight door can then be welded to the frame. The prefabricated door should have six quick-action dogs, an interior hand wheel, and a flush exterior-socket-locking

mechanism that can be actuated with a mating 'T' wrench. The hinge pin caps should be welded to prevent disassembly. This door will provide a weathertight, vandal-proof access that can be removed after the mothballing period.

**WARNING:** When installing either of these door types, the treatment should be completely reversible and not damage or cause future damage to existing historic fabric.

## Repair

When repairing wood or steel doors, protection and retention of historic fabric should be the primary goal. Here are a few general guidelines for historic lighthouse door repair; refer to the aforementioned sections for more information.

- Repair doorways by reinforcing the historic materials. Repair will also generally include the limited replacement in kind—or with compatible substitute material—of those extensively deteriorated or missing parts of repeated features such as pilasters, architrave, sidelights, door leaves, and stairs where there are surviving prototypes.
- Do not remove or radically change a door that is important in defining the overall historic character of the lighthouse. Do not strip entrances of historic material such as wood, cast iron, and brick.

## Door Hardware

Historic lighthouse door hardware is not only functional but also significant in defining the character of the historic door. Lighthouse door hardware such as door knobs, hinges, keyhole escutcheons, and even strike plates were often decoratively detailed with motifs of the architectural style of the lighthouse. When preserving historic lighthouse doors, the existing hardware should be retained. When repairs are made to the door, the hardware should be removed for protection or protected in place to avoid any damage that may be incurred during the repair process. If the hardware is removed, label each piece to



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**Figures 16 and 17.** Examples of decorative door hardware found in late 19th-century lighthouses.

ensure that it is reinstalled in its proper location.

### **Limited Replacement In Kind**

- Replace in-kind door components that are too deteriorated to repair—if the form and detailing are still evident—using the physical evidence as a model to reproduce the component. If using the same kind of material is not technically or economically feasible, then a compatible substitute material may be considered.