

U.S. Lighthouse Society photo

Historic Lighthouse Preservation:

WOOD

Figure 1. Wooden Mukilteo Light Station in Mukilteo, Washington.

Wood was the third most common building material used in historic lighthouse construction. As a general rule the first towers at early light station sites were constructed of wood and were used until funds were available to build a more durable structure of masonry or iron. In some locations, however, the wood tower remained or was chosen as the permanent lighthouse structure.

Easily shaped by sawing, planing, carving, and gouging, wood was used for virtually all components of historic lighthouses. Wooden towers were generally timber frame construction covered with sheathing and clapboards or shingles. All other lighthouse components such as door and window surrounds, cornices, deck railings, decking, doors and windows were also constructed of wood. The use of wood in lighthouse construction, however, was not

limited to the structure. Many masonry and iron lighthouses were fitted with wooden parts. For example, a common Chesapeake Bay lighthouse configuration is a masonry tower fitted with wooden interior stairs and wooden tongue-and-groove beadboard lantern parapet walls. All wooden components, both functional and decorative, may be important in defining the historic character of a lighthouse. The retention, protection, and repair of these features is important during any preservation treatment.

Although wood is not as durable as iron or stone, with proper preservation care, wooden structures can last virtually forever. As with all materials, the expected life span of wood can be significantly shortened if maintenance is deferred or treatments cause damage to the wood.



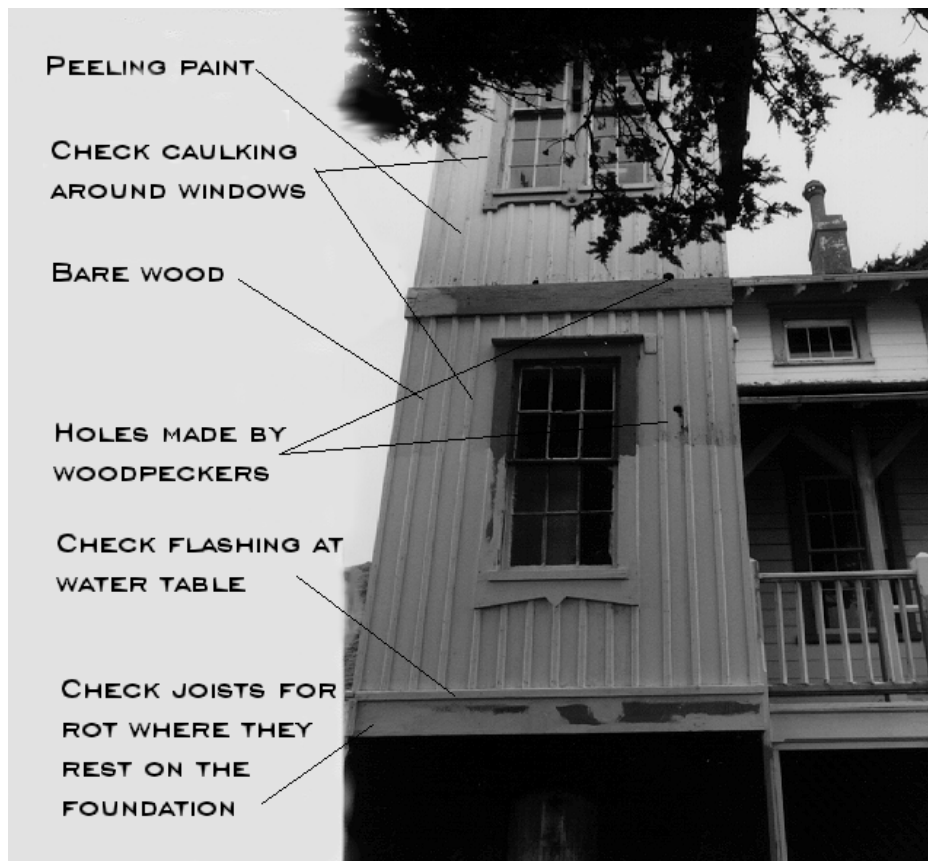
Figure 2. Wooden Point Fermin Light Station in San Pedro, California.

Why Does Wood Deteriorate?

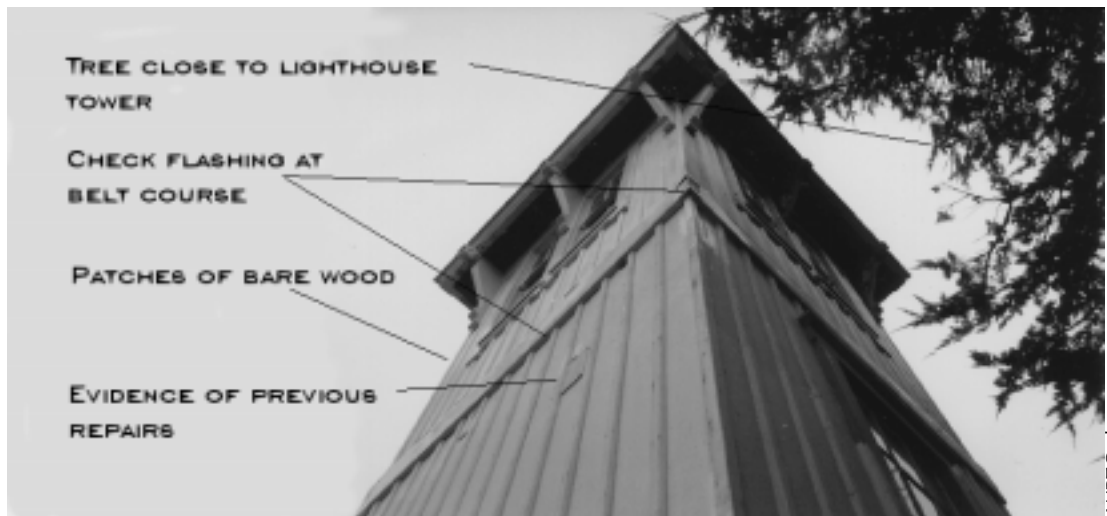
Wood in a marine environment is subject to a host of forces. How successfully a wooden lighthouse resists these pressures depends on how well it is designed and maintained.

Leading causes of wood decay:

- inherent design flaws or missing/damaged features that allow for the exposure of wood end grain to moisture or allow water to puddle or collect on wooden components;
- lack of trim elements and metal flashing to protect the wood elements by shedding water away from the lighthouse;
- failed coating systems that allow raw wood to come in contact with moisture;
- moisture trapped within a cavity defined by wooden components such as within a wall; and
- attack by fungus, insects, or other pests.



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Figures 3 and 4.

Inspecting for Problems Associated with Wooden Lighthouses

In order to develop an effective treatment plan for problems associated with wooden lighthouses and their components, an in-depth inspection should be made of the lighthouse and its immediate surroundings. The following chart is a listing of locations that should be inspected regularly. Associated with these locations are the possible problems to look for during the inspection.

Inspection Chart for Wooden Lighthouses

THE SITE

Look For:

Possible Problems:

Environment

General climatic conditions, including average temperatures, wind speeds and directions, humidity levels, and average snow accumulation

Severe conditions can lead to wooden lighthouse component deterioration, including cracking, coating failure, and severe weathering.

Number of freeze-thaw cycles

Severe cycles can produce damage from frost action that can cause wooden lighthouse components to crack and split, as well as premature coating failure.

Location near sea

Salt in the air can lead to severe chalking of the paint surface and cause premature failure of latex paint products.

Acid rain in the region or from nearby industry

Acid rain can accelerate the deterioration of paint and exposed wood surfaces.

Proximity to a major road highway or railroad

Vibrations are harmful to mortar joints and other lighthouse parts.

Location in the flood plain of a river, lake, or sea

Floodwaters can bring damaging moisture in contact with wooden lighthouse components.

Exposed or sheltered sections of a lighthouse

Exposure to the sun and elements affects moisture evaporation and rain penetration. In damp climates mildew and other fungal growth tends to grow on the north side of the lighthouse and under gallery decks where the surface never receives direct sunlight.

Terrain

Soil type—clay, sand, rock

The type of soil influences water drainage around the structure. Excessive water in the soil can cause rising damp within the foundation, permitting moisture to migrate into adjacent wooden lighthouse components.

Slope away from lighthouse on all sides

If no slope exists, puddles will form at the base of the lighthouse walls during heavy rains, leading to water penetration and splash-back. Splash-back can cause localized saturation of the wooden lighthouse walls, which will cause premature paint or coating failure.

Earth covering part of a brick or stone wall or foundation

Moisture accumulation or penetration is possible which in turn can migrate into adjacent wooden lighthouse components.

<i>Look for:</i>	<i>Possible Problems:</i>
Asphalt or other impervious paving touching walls encourage premature rotting and deterioration.	Water accumulation and rain splash-back onto the walls can result, causing wood members to be constantly saturated. This condition will
Trees and Vegetation	Species of trees with 50 feet
Elms and some poplars dry up clay soil, leading to	possible lighthouse foundation failure.
Branches rubbing against a wall	Branches abrade surfaces and cause premature coating failure.
	Ivy or creepers on walls
	Leaves prevent proper drying of the painted surface
which can lead to mildew and prolonged damp conditions. Tendrils from some species can penetrate joints in the wooden sheathing members and may ultimately cause the failure of the wooden lighthouse component.	
THE LIGHTHOUSE	Overall Condition
General state of maintenance and repair	A well maintained lighthouse should require fewer major repairs.
Evidence of previous fire or flooding	Such damage may have weakened the wooden lighthouse structure members or caused excessive moisture.
Consistent wall plane	
A crooked wall may be a sign of stabilized	structural settlement as well as unstable foundations and may possibly lead to partial or total lighthouse collapse.
Lantern	Gallery decks
frame lighthouse walls.	Gaps in gallery decking (cast-iron plate, flat-seam metal) and wood tower wall copings can allow water to penetrate the interior cavities of wood
	Condition of lantern storm panels
	Cracks and holes in storm panel glazing can provide an infiltration point for moisture into the lantern thus affecting the interior wooden

components: stairs and interior parapet wall covering.	
Wood parapet walls	Holes or damaged flashings could allow water to penetrate the wall cavity causing the wood to deteriorate from the inside out, as well as cause corrosion on the interior iron structural members.
<i>Possible Problems:</i>	<i>Look for:</i>
Humidity level within the lantern	Non-functioning lantern vents can prohibit the release of humid air from within the tower. The
water vapor will ultimately condense on the surfaces inside the tower and lantern. Growth of mildew and fungus will result, thus causing premature deterioration of the wooden features.	Windows and Doors
Straight and square openings	Deformed openings are a sign of lighthouse structural settlement.
Sills sloped to shed water; drips under sills to prevent water from running back underneath; caulking	
If any of these are inadequate, water can penetrate	into the lighthouse wall.
	Gaps around perimeter of the window frame
Moisture infiltration will result, causing premature	deterioration of the wood structural framing and wood window frame.
	Foundation
Composition of foundation walls	Stone or brick is more likely than concrete to allow water to infiltrate and possibly allow moisture to migrate into adjacent wooden
lighthouse components.	
Water condensation or other signs of moisture	Wood joists resting on masonry foundation walls may begin to rot at the ends. Termites, mold, mildew, moss, or algae may be present, causing
damage to the wood.	Rising damp can cause deterioration of the
Damp proof course	
masonry wall and adjacent wood lighthouse components.	
Interior	Cracked plaster, signs of patching, floors or landings askew
These are signs of lighthouse settlement and possibly deteriorated wooden structural components.	Damp walls, mold and mildew stains on walls, rotting wood

These indicate water infiltration.	
Walls	
Construction method—heavy timber or light frame; load bearing or not load bearing	
Knowing how a lighthouse tower wall is constructed will help in analyzing problems and different treatments because of different materials.	selecting appropriate treatments.
	Evidence that parts of the lighthouse were constructed at different times or of different materials
	Similar problems with various parts may need
	<i>Look for:</i> <i>Possible Problems:</i>
Wood Components	Materials
marks, textures, etc. where the deteriorated wood component is in	Wood species, dimensions, and character defining
	Types of materials indicate the susceptibility or resistance to damage and should be matched if wood must be replaced. In hidden locations contact with stone or subjected to moisture, substitute materials such as preservative treated lumber may be used.
Areas of delicate carving or fine moldings	
These are typically character-defining features of exterior wood siding, shingles, trim, etc.	the lighthouse that will need special attention or protection during rehabilitation.
	Missing or broken foundation bricks or stones,
	Missing material may allow water penetration that could cause damage to the lighthouse's internal structural framing.
	Evidence of high pressure waterblasting, such as eroded surfaces, flaking, scaling, or crazed paint
Damaged and deteriorated surfaces can allow	water to penetrate and promote rapid degradation of wood lighthouse components.
	Dirt or stains
	Surface stains usually cause few problems other than being unpleasant to look at. Mildew growth

is a sign of damp conditions.	
Bulges and Cracks	
Bulges Bulges indicate that the wall has moved because of possible wooden structural component failure or deterioration. Corrective action may be	necessary.
Cracks in interior or exterior wall covering indicate movement has occurred within the wall.	Cracks Small cracks may be patched; large cracks may require reconstruction of the affected area. A full inspection of structural members should be performed if cracks are present.
Enlarging cracks/active movement level of activity and to properly address the problem.	Active cracks in interior plaster wall covering indicate a continuing problem. The cause must be dealt with before the crack itself is repaired. Cracks that are assumed to be the result of active movement should be monitored to determine
<i>Look for:</i>	<i>Possible Problems:</i>
Water penetration through joints between masonry	Moisture foundations and wooden lighthouse components, i.e., along mudsill
masonry and the wooden lighthouse components of the structure.	Moisture can lead to deterioration of both the
	Water penetration between the lantern gallery deck and the wooden lighthouse structure
Moisture can lead to deterioration of both the iron components and the wooden components of the lighthouse.	Exposed end grain of window and door frame members, trim components, and decking
infiltration; exposed end grain tends to actually draw or wick water through capillary action. End	All end grain is susceptible to moisture grain must be protected at all times by a well maintained coating system or by inherent trim detailing.

Coatings

Paint; type of paint

Latex paint products do not withstand the severe conditions experienced in the marine environment as well as oil-based products.

Blistering paint

Paint that blisters off the wood substrate in large sheets is a sign of moisture infiltration within the wood itself; the escaping moisture actually 'pushes' the paint off the wood.

Flaking, peeling, and crazed paint

This is usually a sign that the paint has lost its flexibility and is beginning or has already begun to