

Information about Lighthouses and Light Stations

Why were lighthouses built?

When people began going to sea to find food they needed a way help find their way home. During the daytime they used landmarks or a pile of rocks, but what if they needed to find their way home at night? A bonfire would help them find their way at night. As ships became larger and could travel farther to buy and sell goods it was helpful to have signals to indicate dangerous rocks and to assist them in finding their way.

Lighthouses were built to aid the mariner in navigation. They are aids to navigation.

What is a lighthouse?

A lighthouse is a tower with a bright light on top.

Where are lighthouses located?

Lighthouses are found in a variety of places. They are on rocky cliffs, sandy beaches, and at entrances to bays and harbors. Some warn mariners to stay away from dangerous places. They are saying "Stay away, danger!" Some, like ones at harbor entries, are saying "Come this way!" Some lighthouses perform several functions. Every lighthouse tells the mariner where he is.

Do all lighthouses look alike?

Lighthouses come in many shapes. Some are tall, some are short, some are square, some are conical, some are cylindrical, and some are even shaped like a skeleton. Sometimes the lighthouse stands apart from the house where the keeper lives. Sometimes the light tower is built right into the roof of the keeper's house.



Not only are the shapes of lighthouses different, but the way they are painted is different. Some have stripes, some have patterns, and some are solid color. Lighthouses are also built from different materials, including stone, concrete, wood, steel, or cast iron.

Each lighthouse is unique. The early mariners used landmarks to help guide them in the daytime. Lighthouses are like unique man-made landmarks. In fact, the description of what a

lighthouse looks like in the daytime is called a “**daymark**”. The daymark for the Piedras Blancas lighthouse was that it was conically shaped and painted white with black trimmings. It looked very different from other lighthouses along the coast.

How are lighthouses identified at night?

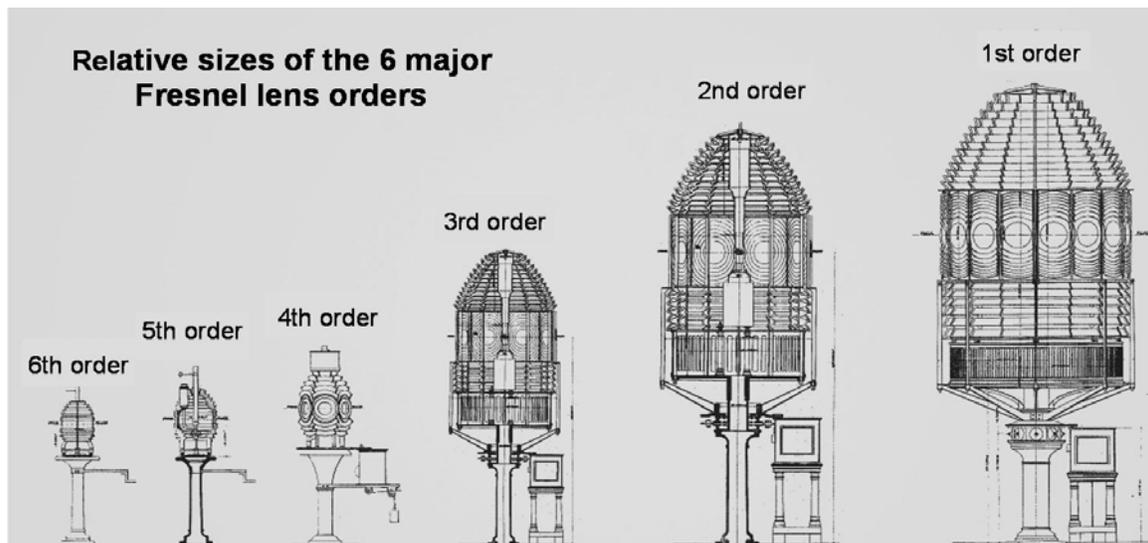
You can't see the colors or patterns on a lighthouse at night, but you can see the light (if it isn't foggy). Each lighthouse has a different light pattern at night. Some lights are steady and show continuously. Some lights have a flash pattern that identifies them. The light pattern is called a **light signature** or **light characteristic**.

The invention of the **Fresnel lens** was a major discovery in helping create the light in lighthouses. A Fresnel lens consists of glass prisms and lens that bend and reflect the light. Some lenses are stationary and produce a steady light. Some lenses are mounted on a rotating frame. Fresnel lens were pieces of ground glass, cut and polished and arranged in a way that collects and redirects the light into a beam. As the lens turns, light is focused through panels that create a beam and give the impression that the light is flashing off and on.

(See illustration, page 19)

The light characteristic at Piedras Blancas varied over the years. At one time it was a double flash every 15 seconds. Today it is a single flash every 10 seconds. Mariners carried a book called a **light list** that described the daymarks and light characteristic for each lighthouse so they could determine where they were.

Fresnel lens came in a variety of sizes. The smaller ones were used along bays and harbors. The larger ones produced the brightest light and were used along the seacoast, where the light had to be seen farther. The Piedras Blancas lighthouse lens was a first order. Below is a representation of the relative sizes of the 6 major orders.



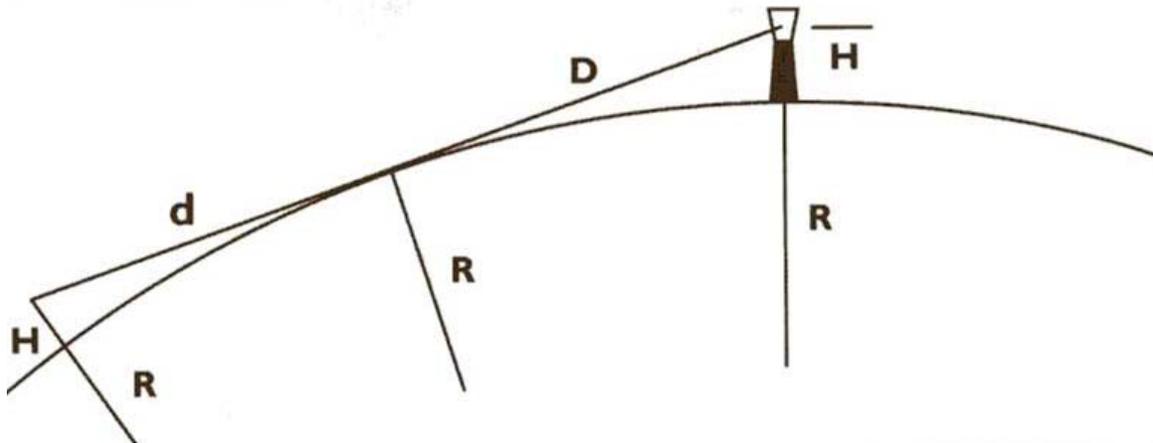
Fresnel lenses were replaced with aero beacons, which are big search lights used at airports. Today a marine rotating beacon is used at Piedras Blancas. It uses the same principle as the Fresnel lens in re-directing the light. The automobile headlight is an example of the modern use of Fresnel lens technology.

What fuels produced the light?

The first lights were big bonfires made from wood or coal. Then candles were used but they did not produce a very bright light. Later lamps were lit with whale oil, lard oil (animal fat), or kerosene. Today electricity is used to produce the light. The first lighthouse in the United States to use electricity was the Statue of Liberty.

How far could the light be seen?

How far the light could be seen depends on several factors, including the strength of the light and the height of the light above sea level. Obviously a brighter light can be seen at a greater distance than a weaker one, but even the strongest light is limited because of the curvature of the earth. The distance a light can be seen depends on the height of the light above sea level and how high the observer is. Why not build really tall towers so the light could be seen farther? The answer to that question is that if the light is too high it can be obscured by fog or low clouds. The first lighthouse built at Point Loma, San Diego, was 422 feet above sea level but it was often obscured by fog so another lighthouse was built at 88 feet above sea level. Below is an illustration showing the relative visibility of the light, depending on the height of the light and the altitude of the observer.



H = height above sea level; D,d = distance, R = radius of the earth

The Piedras Blancas light was originally about 140 feet above sea level. If the observer was swimming in the water they could see it about 14 miles out to sea. If the observer was 20 feet above water they could see it about 20 miles at sea. The official listing is that the Piedras Blancas light could be seen for about 19 miles.

What happens if it's foggy and the light or lighthouse can not be seen?

When this happened a sound signal could be used. The first type of sound signal used to warn mariners was a cannon. Can you imagine being a keeper and having to fire a cannon every so often? Over the years various types of sounds were used: bells, whistles, sirens, and fog horns. Each light station had a unique sound pattern, or **sound characteristic**. The light lists also identified the sound characteristic for each lighthouse.

What were the duties of the keeper?

Before electricity the keepers had to light the lamp at sunset and extinguish it at sunrise. They had to keep check on the light throughout the night and wind the mechanism that caused the lens to revolve. They earned the nickname “wickie” because one of their jobs was to trim the burned lamp wick so it wouldn’t smoke and dirty the lens. The lens and all the brass in the lighthouse had to be cleaned frequently. The windows of the lantern room had to be cleaned. It was important to keep the lens and the lantern room clean so the light would shine brightly. They also had to keep a log of details of everything from the weather to the amount of fuel used. There were also a lot of other chores to be done, including regular painting or white washing of the lighthouse and other buildings. Stations with fog signals had a lot of extra work to do in maintaining the equipment and building that housed it. In the early years, there were many duties to perform at a lighthouse or light station.

What is the difference between a lighthouse and a light station?

A ***lighthouse*** is the tower itself, containing the lantern room and the lens that shines the light. A ***light station*** is the property containing multiple outbuildings of the “station” as well as the tower. Light stations usually have separate living quarters depending on how many keepers lived there, an oil house, a barn, fog-signal building, etc.

When were the first lighthouses built in the United States?

The first lighthouses were built in colonial times, before we became an independent nation. They were placed at the major ports to help guide ships into harbors. The first lighthouse built in the U.S. was Boston Light, in 1716.

When was the first lighthouse built in California?

Following the discovery of gold in California there was an increase in ship traffic as people from all around the world came to seek their fortunes in the gold fields. Most of that ship traffic came into San Francisco. Therefore it is not surprising that the first lighthouse built in California was on Alcatraz Island, San Francisco Bay. The first Alcatraz Island Light was lit in 1854.

Why were lighthouses important in California History?

Following the Gold Rush, settlers spread out along the coast of California and communities developed. Shipment of goods and supplies arrived by coastal steamers prior to railroads being built. Farmers, ranchers, and other businesses shipped their products by steamer to markets in larger cities, like San Francisco. As commerce developed, lighthouses played an important role in protecting the flow of goods and people along the coast.

Did lighthouse keepers have families?

Some keepers had wives and children. Some did not. At Piedras Blancas there were times when a lot of children lived there and times when there were none. Some lighthouses were very isolated and life for the children was lonely. They had to make their own fun – and frequently had to help with the chores too. There are many wonderful children’s books about lighthouses and life at a lighthouse.

Classroom aides

Classroom presentations may be arranged. A representative from the Piedras Blancas Light Station will talk to your class about lighthouse history, the work of the keepers, and the lives of the children who lived at the light station.

The Piedras Blancas Light Station has a teacher's treasure chest available for use in the classroom with books, posters, and more. An annotated list of children's books is available or go to: http://www.amlhcc.org/pdf/ALCC_LH_Child_Book_Biblio.pdf

Sources of information on-line regarding lighthouse studies for children:
<http://www.uscg.mil/history/WEBLIGHTHOUSES/LighthouseCurriculum.pdf>
http://www.uslhs.org/assets/The_Lighthouse_Story.pdf