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History of Lighthouses

Before lighthouses

Hard for modern day people to appreciate ancient night-time darkness

Beacon fires on hilltops or beaches

Guided mariners and warned of dangers

Earliest references made in Iliad and Odyssey in 8th Century BC

Phoenicians

Trading around the Mediterranean and possibly as far as Great Britain

Route marked with lighthouses

Wood fires or torches in open or only with roof

After 1st century: candles or oil lamps inside lanterns with glass or thin horn panes

Modern lighthouse at La Coruna, Spain near ancient Phoenician lighthouse

Ancient wonders:

Colossus of Rhodes

Bronze statue of Helios, Greek god of sun

100 feet high over island in harbor at Rhodes

Said to have fires inside visible through its eyes and a hand to guide vessels

Destroyed by earthquake in 244 BC

Pharos in Alexandria

1st man made lighthouse at Alexandria, Egypt

Completed in 280 BC

Stood 350 (to 436) feet high; three levels

Square level 236' high and 100' square

Octagonal story 115' high

Cylindrical tier 85' high

Brazier with fire on top

Spiral ramp to the top

Fine quality stone cemented together with melted lead

Ptolemy II, Macedonian ruler of Egypt and architect,

Sostratus of Cnidus

Damaged in 641 AD when Alexandria fell to Islamic troops

Destroyed by earthquake in 1346

Ruble used in Islamic fortress in 1477

Lighthouse in French is *phare* and *faro* in Spanish

Romans:

Also used lighthouse towers as they expanded their empire
From Black Sea to Atlantic, and as far north as Dover, England
Included Ostia (Rome), Boulogne and Dover.
By AD 400, about 30 Roman lighthouses
Style was short and sturdy towers with fire on top

Dover tower built in 1st century AD was octagonal and 29' tall
Boulogne, France
Built by deranged Emperor Caligula to commemorate his victory over Neptune
AD 40, 124' high
Reputedly restored by Charlemagne in AD800
Finally fell into the sea in1644
La Coruna, Spain
Roman: Tower of Hercules
Square stone tower, 100' tall
Only a shell by 16th Century
Refurbished by Spain in 1682, only to deteriorate again
Repaired and relit in 1791
Coal fire replaced by Fresnel Lens and olive oil lamp in 1847.

Medieval lighthouses

Monks tried to assist mariners by lighting fires on towers of their churches.
Dark ages halted construction until 1100 AD
Italy and France were most advanced
Mentioned often in travel books after 1500
By 1600, 30 or more major lights were in use
Most similar to ancient ones
Burned wood, coal or open torches; sometimes candles or oil lamps
Laterna of Genoa,
1st built in 1139, rebuilt 1544 after being damaged in fighting, still in use
Keeper in 1449 was Antonio Columbo, uncle of Christopher Columbus
1544 version had square foundation, with 2 stone tiers stacked above = 200' high

Meloria, Italy
- Built in 1157
- Destroyed in 1290 in fighting between Italy's city states.
- Replaced in 1304 by lighthouse on isolated rock at Leghorn, a rock in Livorno Harbor (1st built there in 1154)
  - Destroyed by Genoan forces in 1284
  - Demolished again in WWII
  - Rebuilt in 1956 using original stone

Roman tower at Boulogne
- Repaired in 800 AD by Charlemagne.
- Lasted until 1644.
- Collapsed because of erosion

Cordouan

- Built in estuary of Gironde, near Bordeaux
- Original built in 14th Century by Edward, the Black Prince.
- Wooden tower in 1355
- Polygonal stone tower, 53' high attended by monks, in 1360
- 1584, new tower built by Louis de Foix, and engineer architect under Henri III
- A magnificent achievement for the day
  - 135' in diameter at the base
  - 100' high
- Elaborate interior of vaulted rooms, decorated with gilt, carved statuary & arched doorways
- Took 27 years to build because of the sinking of the substantial looking island
- Finished in 1611, island was totally submerged
  - Became 1st lighthouse built on open sea.

Hanseatic League
- Commercial trading organization along Scandinavian and Germany
- 16 lights established by 1600
- Best lighted area of the time
- Extensive use of Church towers, also in Great Britain

Modern Era

Started with Eddystone Light
- Winstanley's 120' wooden tower
- 12 iron stanchions grouted into hard red rock
- Lasted from 1699 to 1703
- Swept away in a severe storm
- Designer and builder went with it
- Rudyard Tower
  - Built in 1708
  - Wooden tower
  - Burned down in 1755
- Smeaton's tower
  - 1759
  - Dovetailed and interlocking blocks
  - Smeaton was professional engineer.
  - Curved hyperbolic profile became classic lighthouse design – like and oak
  - Modified to solid cylindrical base to break the waves
  - Replaced in 1882 by Douglass tower, still used today

United Kingdom
- Stevenson family of lighthouse engineers
  - Built upon Smeaton's design to put lighthouses on off shore reefs and other difficult places
  - Scotland's coastline became one of the best lit in the world

- Trinity House
  - Evolved from guild of river pilots based in Deptford Strond, on the River Thames.
  - Received royal charter in 1514
  - Responsible for widows and orphans originally
  - Seamarks Act of 1566 granted them the right to erect seamarks
  - Beacons and buoys in 1594
  - 17th Century had right to award lighthouse building patents, though still private LHs
  - 1836 stipulated that all lighthouses in private hands had to be transferred to Trinity House

Bell Rock: This lighthouse was designed by Lighthouse Engineer Robert Stevenson.

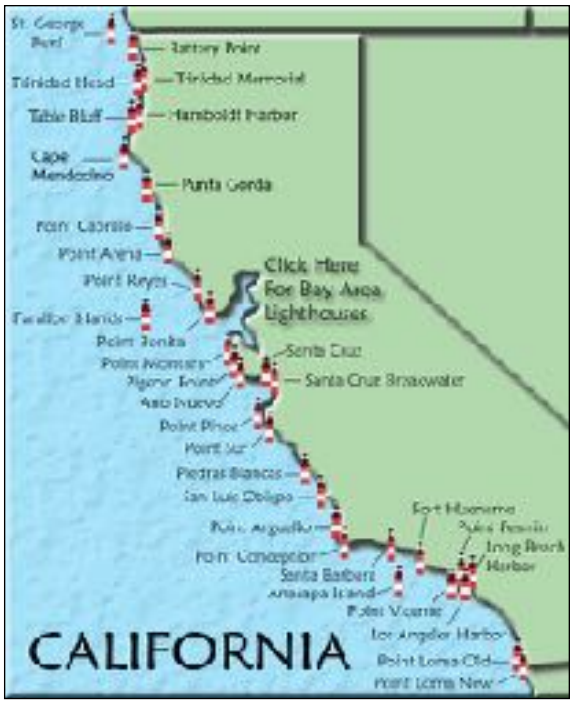
Went into service in 1811.

American Lighthouse

1st at Little Brewster Island, off Boston, 1716
- Private light
- Burned by British
- Rebuilt in 1783, made higher in 1859

Sandy Hook, NJ
- Contructed 1764
- Oldest surviving, functional LH in US

Cape Hatteras
- The Civil War saw Cape Hatteras Lighthouse in the center of conflict.
- The Confederate army wanted to destroy the lighthouse to prevent Union ships benefiting from it, and naturally the Union forces wanted to protect the lighthouse.
- After several battles in 1861, defeated Confederate troops retreated with the lighthouse's Fresnel lens.
- In 1862, the tower was relit with a second-order Fresnel lens, and then upgraded the following year with a first-order lens.
- The tower was severely damaged in the war, and after peace was restored to the country, the Lighthouse Board determined it would be less costly to build a new lighthouse, 600 feet to the north, rather than repair and refit the existing one.
- The original Cape Hatteras Light was destroyed in a blast of dynamite, and the Fresnel lens it had most recently housed was shipped to **California for use in the Pigeon Point Lighthouse.**
- In 2002, it was discovered that this "new" lens was actually the same lens used in the original tower before the Confederates absconded with it.
- The lens remained hidden throughout the Civil War, and when it was finally located, it was shipped to Paris for cleaning. Upon its return, it was placed in storage at the Lighthouse Depot on Staten Island until the new tower was ready to receive it.



California Lighthouses

Established as a result of the Gold Rush

- 1850 Congress appropriated funds to build 8 lighthouses
- 7 in California
- 1 in Washington territory
- The plan was to use a single design
- 1 ½ story cottage, with a tower protruding through the center of the roof.
- This is also called a Cape Cod design.
- 1852 change-order to use Fresnel lenses instead of lamp reflectors.
- In some cases the buildings were done before the lens arrived from France

1) Alcatraz Island 1854
2) Point Pinos 1855
3) Fort Point 1855
4) Point Loma 1855
5) Farallon Islands 1855
6) Point Conception 1856
7) Cape Disappointment 1856 WA
8) Humboldt Harbor 1856

National Lighthouse Administration

George Washington played active roll in lighthouse administration

Lighthouse administration bounced from

- Treasury
  - Commissioner of Revenue
  - 5th Auditor of the Treasury
- Lighthouse Board
  - Broke administration into 12 districts
  - Naval officers in charge of districts
  - Also collected customs
- Lighthouse Service
- USCG

History of lighthouses

https://www.britannica.com/technology/lighthouse

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Lighthouses of antiquity

The forerunners of lighthouses proper were beacon fires kindled on hilltops, the earliest references to which are contained in the *Iliad* and the *Odyssey* (c. 8th century bce). The first authenticated lighthouse was the renowned Pharos of Alexandria, which stood some 350 feet (about 110 metres) high. The Romans erected many lighthouse towers in the course of expanding their empire, and by 400 ce there were some 30 in service from the Black Sea to the Atlantic. These included a famous lighthouse at Ostia, the port of Rome, completed in 50 ce, and lighthouses at Boulogne, France, and Dover, England. A fragment of the original Roman lighthouse at Dover still survives.

The Phoenicians, trading from the Mediterranean to Great Britain, marked their route with lighthouses. These early lighthouses had wood fires or torches burning in the open, sometimes protected by a roof. After the 1st century ce, candles or oil lamps were used in lanterns with panes of glass or horn.

Pharos of Alexandria

Medieval lighthouses

The decline of commerce in the Dark Ages halted lighthouse construction until the revival of trade in Europe about 1100 ce. The lead in establishing new lighthouses was taken by Italy and France. By 1500, references to lighthouses became a regular feature of books of travel and charts. By 1600, at least 30 major beacons existed.

These early lights were similar to those of antiquity, burning mainly wood, coal, or torches in the open, although oil lamps and candles were also used. A famous lighthouse of this period was the Lanterna of Genoa in Italy, probably established about 1139. It was rebuilt completely in 1544 as the impressive tower that remains a conspicuous seamark today. The keeper of the light in 1449 was Antonio Columbo, uncle of the Columbus who crossed the Atlantic. Another early lighthouse was built at Meloria, Italy, in 1157, which was replaced in 1304 by a lighthouse on an isolated rock at Livorno. In France the Roman tower at Boulogne was repaired by the emperor Charlemagne in 800. It lasted until 1644, when it collapsed owing to undermining of the cliff. The most famous French lighthouse of this period was one on the small island of Cordouan in the estuary of the Gironde River near Bordeaux. The original was built by Edward the Black Prince in the 14th century. In 1584 Louis de Foix, an engineer and architect, undertook the construction of a new light, which was one of the most ambitious and magnificent achievements of its day. It was 135 feet in diameter at the base and 100 feet high, with an elaborate interior of vaulted rooms, richly decorated throughout with a profusion of gilt, carved statuary, and arched doorways. It took 27 years to build, owing to subsidence of the apparently substantial island. By the time the tower was completed in 1611, the island was completely submerged at high water. Cordouan thus became the first lighthouse to be built in the open sea, the true forerunner of such rock structures as the Eddystone Lighthouse.

The influence of the Hanseatic League helped increase the number of lighthouses along the Scandinavian and German coasts. At least 15 lights were established by 1600, making it one of the best-lighted areas of that time.

During this period, lights exhibited from chapels and churches on the coast frequently substituted for lighthouses proper, particularly in Great Britain.

Sir James N. Douglass's Eddystone Lighthouse, Plymouth, England, photochrome print, c. 1890–1900. The remnants of John Smeaton's lighthouse are at left.

The beginning of the modern era

The development of modern lighthouses can be said to have started about 1700, when improvements in structures and lighting equipment began to appear more rapidly. In particular, that century saw the first construction of towers fully exposed to the open sea. The first of these was Henry Winstanley's 120-foot-high wooden tower on the notorious Eddystone Rocks off Plymouth, England. Although anchored by 12 iron stanchions laboriously grouted into exceptionally hard red rock, it lasted only from 1699 to 1703, when it was swept away without a trace in a storm of exceptional severity; its designer and builder, in the lighthouse at the time, perished with it. It was followed in 1708 by a second wooden tower, constructed by John Rudyerd, which was destroyed by fire in 1755. Rudyerd's lighthouse was followed by John Smeaton's famous masonry tower in 1759. Smeaton, a professional engineer, embodied an important new principle in its construction whereby masonry blocks were dovetailed together in an interlocking pattern. Despite the dovetailing feature, the tower largely relied on its own weight for stability—a principle that required it to be larger at the base and tapered toward the top. Instead of a straight conical taper, though, Smeaton gave the structure a curved profile. Not only was the curve visually attractive, but it also served to dissipate some of the energy of wave impact by directing the waves to sweep up the walls.

Owing to the undermining of the foundation rock, Smeaton's tower had to be replaced in 1882 by the present lighthouse, constructed on an adjacent part of the rocks by Sir James N. Douglass, engineer-in-chief of Trinity House. In order to reduce the tendency of waves to break over the lantern during severe storms (a problem often encountered with Smeaton's tower), Douglass had the new tower built on a massive cylindrical base that absorbed some of the energy of incoming seas. The upper portion of Smeaton's lighthouse was dismantled and rebuilt on Plymouth Hoe, where it still stands as a monument; the lower portion or "stump" can still be seen on the Eddystone Rocks.

Lighthouse at Beachy Head, a chalk headland near Eastbourne, East Sussex, England, on the English Channel coast. It was automated in 1983.

Following the Eddystone, masonry towers were erected in similar open-sea sites, which include the Smalls, off the Welsh coast; Bell Rock in Scotland; South Rock in Ireland; and Minots Ledge off Boston, Massachusetts, U.S. The first lighthouse of the North American continent, built in 1716, was on the island of Little Brewster, also off Boston. By 1820 there were an estimated 250 major lighthouses in the world.

A Brief History of America's Lighthouses

https://marinesanctuary.org/blog/a-brief-history-of-americas-lighthouses/

17 Jun, 2020

Lighthouses all over the world are iconic symbols of hope, resiliency, and safety. They stand resolute in all kinds of natural and built environments — from bustling cities to remote rocky shores — and often reflect the aesthetics and culture of their surrounding communities. For hundreds of years, these towers and their beacons made maritime exploration, trade, and travel possible. Their presence and light guides vessels in and out of harbors by warning mariners of the approaching coast, shallow waters, rocky terrain, and other hazards to ships.

The first lighthouse erected in the United States was the Boston Light, finished in the year 1716 and located on Little Brewster Island in the Boston Harbor. Toward the end of the Revolutionary War, the British all but destroyed the Boston Light but it was restored in 1783. According to the National Park Service, the Boston Light is our nation's oldest continually used and the last remaining staffed lighthouse in America.

In 1789, the First United States Congress passed the Lighthouses Act to promote trade and commerce in the newly-established nation and extended federal control and funding to lighthouses that were previously administered by individual states. The Lighthouses Act was the first public works program to install lighthouses and other navigational aids like beacons on dangerous points of the nation's coastlines as a way to make sailing activities safer. This bill was of such importance to Congress, they passed it before passing legislation that established pay for Members of Congress.

By the end of the 19th century, America had lighthouses on every coast and on the Great Lakes and technology evolved to include fog signals, radio beacons, and other advances. Unfortunately, even with improvements, lighthouses were not perfect solutions and vessel groundings still occurred as a result of poor positioning accuracy. Supplementary technology like unlit reef beacons used in the Florida Keys were also

used to assist ships in navigating tricky waters and weather conditions before the invention of GPS and other modern navigational tools. Now, newer technology assists lighthouses in guiding mariners such as GPS, nautical charts, radar beacons, and telecommunications and as a result, maritime navigation is safer than ever.

Luckily, the addition of modern technology hasn't made lighthouses a thing of the past. These landmarks help residents and tourists alike learn about America's seafaring history and the histories of the communities near which they stand, attract tourism activities, and serve as important cultural symbols.

Important Dates in United States Lighthouse History

https://www.foghornpublishing.com/history.cfm

1716 - First lighthouse built in the United States was Boston Lighthouse built on Little Brewster Island. This lighthouse was destroyed during the Revolutionary War and was rebuilt in 1783 and still stands today.

1719 - First Fog Signal was a cannon placed near Boston Lighthouse. When there was fog, the cannon would be constantly fired to warn ships away from the rocky ledges.

1789 - The United States Lighthouse Establishment was created and operated under the Department of the Treasury. This was the Ninth Law as well as the first Public Works Act passed by Congress on August 7 of that year. Because of this, every August 7th is National Lighthouse Day. This law also passed ownership and responsibility of all lighthouses to the federal government. Prior to that the lighthouses were built and owned by the individual states or territories.

1791 - The first lighthouse completed under the ownership of the federal government was completed at Portland Head Light in Maine. Construction had been actually started and funded by the State of Massachusetts.

1792 - Cape Henry Lighthouse, Virginia, became the first lighthouse built and completed by the Federal Government.

1793 - First Lightship approved by President George Washington; it would be used on the Delaware River.

1818 - First lighthouses on the Great Lakes were established at Buffalo, NY on Lake Erie and Presque Isle, PA, also on Lake Erie.

1820 - First use of bells as a fog signal device was at West Quoddy Head Light in Maine.

1822 - The French physicist, Augustin Fresnel, beginning this year, "revolutionized lighthouse practice by developing a built-up annular lens comprised of a central spherical lens surrounded by rings of glass prisms, the central portions of which refract and the outer portions both reflect and refract in the desired direction the light from a single lamp placed at the central focus (inside the middle of the light)."

1831 - First lighthouse in the United States to operate using natural gas was the lighthouse at Barcelona (Portland Harbor), NY on the south shore of Lake Erie.

1837 - The first lightship on the Great Lakes began operation. It was stationed at the junction of Lakes Huron and Michigan.

1840 - The first Lighthouse Tender of the U.S. Lighthouse Service started service. It was the former U.S. Revenue Service Cutter RUSH. Prior to this date other government vessels and private vessels were used to maintain buoys and supply lighthouses. This practice continued until the Lighthouse Service had enough ships to perform the job on their own.

1841 - The first Fresnel lens used in a United States lighthouse was imported from France and installed in Navesink Lighthouse in New Jersey.

1844 - Long Island Head Lighthouse in Boston Harbor, Massachusetts became the first cast iron lighthouse to be built in the United States. It stood until 1880 when it was replaced by a new cast iron tower.

1850 - First screw-pile lighthouse was constructed in the United States at Brandywine Shoal.

First iron lighthouse in the United States was built in a position directly exposed to the sweep of the ocean was completed at Minot's Ledge, MA. It was destroyed in a storm the following year, killing two of its keepers.

1852 - The Lighthouse Board was created to oversee all of the lighthouses in the United States.

1854 - First lighthouse on the Pacific coast was completed on Alcatraz Island in San Francisco Bay.

1860 - The first stone lighthouse built in the ocean in the United States is completed at Minot's Ledge, MA. Construction started in 1855 and it took five years to complete. It was one of the great engineering building accomplishments of its time.

1869 - First steam-powered fog signals in the United States were installed at Maine lighthouses at West Quoddy Head and Cape Elizabeth.

First Flag - The first use of the U.S. Lighthouse Service flag was a red, white and blue pennant with a lighthouse.

1871 - Duxbury Pier Light became the first caisson lighthouse built in the United States.

1877 - Kerosene became the primary fuel used to power the lighthouses. Prior to that various illuminants were used such as sperm oil, colza or rapeseed oil, and lard oil.

1884 - First uniforms were introduced for male lighthouse keepers as well as for masters, mates and engineers of lightships and tenders. The wearing of both dress and fatigue uniforms was mandatory. Female lighthouse keepers were not required to wear a uniform.

1884 - The first use of electricity for lighthouse purposes was at the Hell Gate Lighthouse at the Hell Gate Passage, East River, Long Island Sound, New York. It was discontinued the same year because it was too bright.

1886 - The Statue of Liberty was second lighthouse to utilize electricity to become the first "permanently" electrified lighthouse in the United States.

1898 - All seacoast lighthouses were turned off for the first time in history as a precaution during the Spanish-American War.

The first use of electricity to light a Fresnel lens at a lighthouse in the United States took place on June 30, 1898 at the Navesink Light Station in Highlands, New Jersey.

First wireless message sent from ship to shore was from the San Francisco Lightship.

1903 - On July 1, 1903 the United States Light-House Board under the Department of the Treasury was terminated and transferred to the newly created United States Bureau of Lighthouses to be operated under the Department of Commerce.

1904 - First ship with radio communications was the Nantucket Lightship. It was the first U.S. vessel to so be equipped.

1910 - Name Change. An act of Congress abolished the Lighthouse Board and created the Bureau of Lighthouses to be in charge of all lighthouses, thus changing its operating name from the United States Lighthouse Establishment (USLHE) to the United States Lighthouse Service (USHLS). Under the new law the first Commissioner of Lighthouses, George R. Putnam, took office.

1916 - First powerboats for lighthouses were designed, built and tested at Great Lakes lighthouses.

1917 - World War I saw the transfer of most lighthouse tenders, lightships and primary lighthouses to War Department and U.S. Navy until the end of the war.

An Act of Congress appropriated $300,000 to install telephones and telephone lines to all Coast Guard Stations and the most important lighthouses.

1918 - First American lightship sunk by an enemy was the Diamond Shoals Lightship off the Outer Banks of North Carolina. All crew members survived.

1926 - The Lighthouse Airways Division was established by U.S. Lighthouse Service; its work covering the examination of airways and landing fields and the erection of aids to air navigation. Instead of have beams of light that pointed out to sea, towers were built with beams of light pointed into the sky.

1928 - First radio beacon in the United States, automatic in operation, was completed and put into commission at Cape Henry Lighthouse, Virginia.

1933 - The U.S. Lighthouse Service Airways Division was transferred to Department of Commerce and put under the control of the Assistant Secretary for Aeronautics.

1934 - Lightship sunk - The Lightship No. 117, Nantucket, occupying the Nantucket Shoals Station in a dense fog, was struck by the HMS OLYMPIC (sister ship of the TITANIC) and cut in two and sunk almost immediately with the loss of seven crewmembers.

1936 - "Most decentralized branch of government", so stated a report which indicated that less than one percent of the approximate 5000 total employees of the U.S. Lighthouse Service were located away from the seat of government in Washington D.C.

1937 - Trucks replacing tenders - With the ever-improving road system in the United States, the Lighthouse Service started using motor trucks to supply some lighthouses and other easy to reach shoreline aids to navigation.

1939 - (July, 1) The United States Lighthouse Service is abolished and merged into the United States Coast Guard. This was the first time in the history of the United States Government that a military branch took over another branch of the government. At that time there were 5,355 employees of the U.S. Lighthouse Service, consisting of 4,119 full-time and 1,156 part-time employees, which included 1,170 light-keepers and assistants, 56 light attendants, 1,195 officers and crews of lightships and tenders; 113 Bureau officers, engineers and draftsmen as well as district superintendents, technical assistants, 226 clerks, messengers, janitors, office laborers, 157 Depot keepers and assistants, including watchmen and laborers and 482 field-force employees in construction and repair work. There were 30,000 aids to navigation, which included lightships and lighthouses, 64 Lighthouse Service Tenders, hundreds of other types of crafts, numerous trucks, automobiles and trailers, 30 lighthouse depots, and 17 district offices.