



CITY OF CAPE CANAVERAL ***CASE STUDY***

CMCE LIGHTNING SUPPRESSION SYSTEM

LIGHTNING HAZARDS

Updated: January 14, 2025

City of Cape Canaveral Enhanced Lightning Suppression System Network

Issue: Lightning Hazards

Over the past several years, critical City infrastructure has been damaged or destroyed by lightning strikes. An incident of note occurred in Summer 2021 when the City of Cape Canaveral (City) Water Reclamation Facility (RWF) – which is responsible for the treatment of all of the City’s wastewater – was severely damaged by lightning resulting in a loss of telecommunications and monitoring devices, pumps, and the WRF’s Supervisory Control and Data Acquisition operating system. Because of the resulting service interruption, employees were required to initiate 24-hour staffing for several days to ensure WRF processes were not interrupted and a continuation of services was maintained. Subsequent to the replacement of all damaged equipment, the total lightning-related insurance claim was \$76,316. An additional strike at City Hall in March 2022 resulted in a total lightning-related insurance claim of over \$7,000, as well as damage to several Staff personal vehicles in the building’s parking lot.

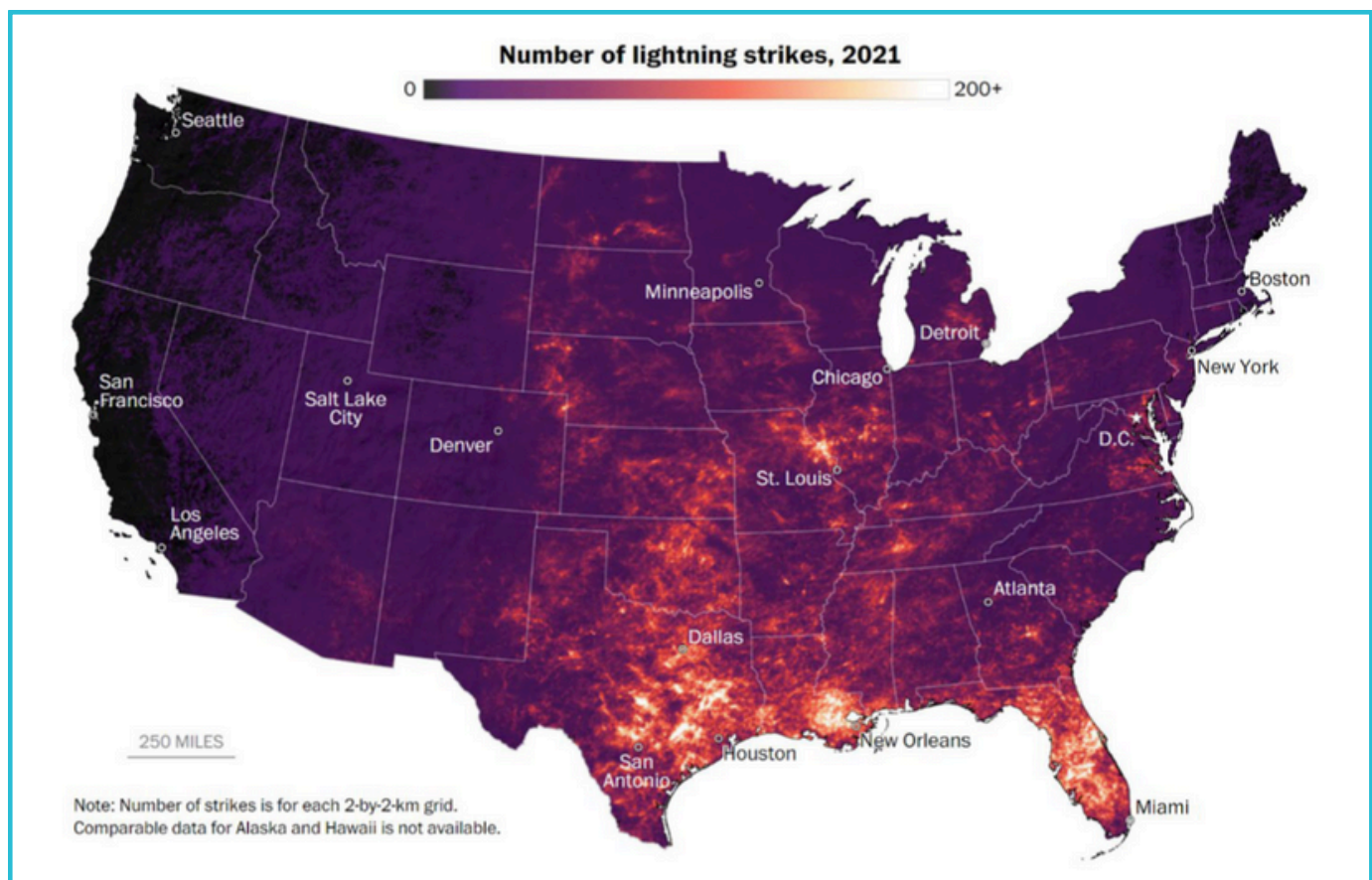


Figure 1. Continental US 2021 lightning strike map. Central Florida can be seen as a leading location for strikes.

LIGHTNING HAZARDS

Lightning is formed from the buildup and discharge of electrical energy between positively and negatively charged ice particles within a storm cloud. A thunderstorm generates a huge static electrical charge as ice particles inside the storm collide and, through friction, generate a static charge. These particles of suspended ice in a thunderstorm collide as they are carried around by the updrafts and downdrafts. Once the static electrical charge is strong enough to travel from the cloud to the ground, a lightning bolt is created.

Due to its unique geography and atmospheric conditions, the State of Florida is considered the lightning capital of the United States (US) according to the National Weather Service. Specifically, the corridor between Tampa Bay and Titusville receives some of the highest recorded amounts of lightning strikes in the US each year, with an average of 56 strikes annually per square mile. Ninety percent of these lightning strikes occur between May and October, between noon and midnight.

Lightning is hotter than the surface of the sun, with the temperature of the channel of air through which it passes measured at 50,000 degrees Fahrenheit. A typical lightning strike – also known as a lightning stroke – contains about 300 million volts and about 30,000 amps. For comparison, a household current is typically 120 volts and 15 amps. It has the capability of striking well away from the heaviest of thunderstorms, being measured to strike as far as 10 to 12 miles away from the center of a storm system. Lightning is a persistent and dangerous annual threat to the City's infrastructure, as well as the lives of Staff and community members.

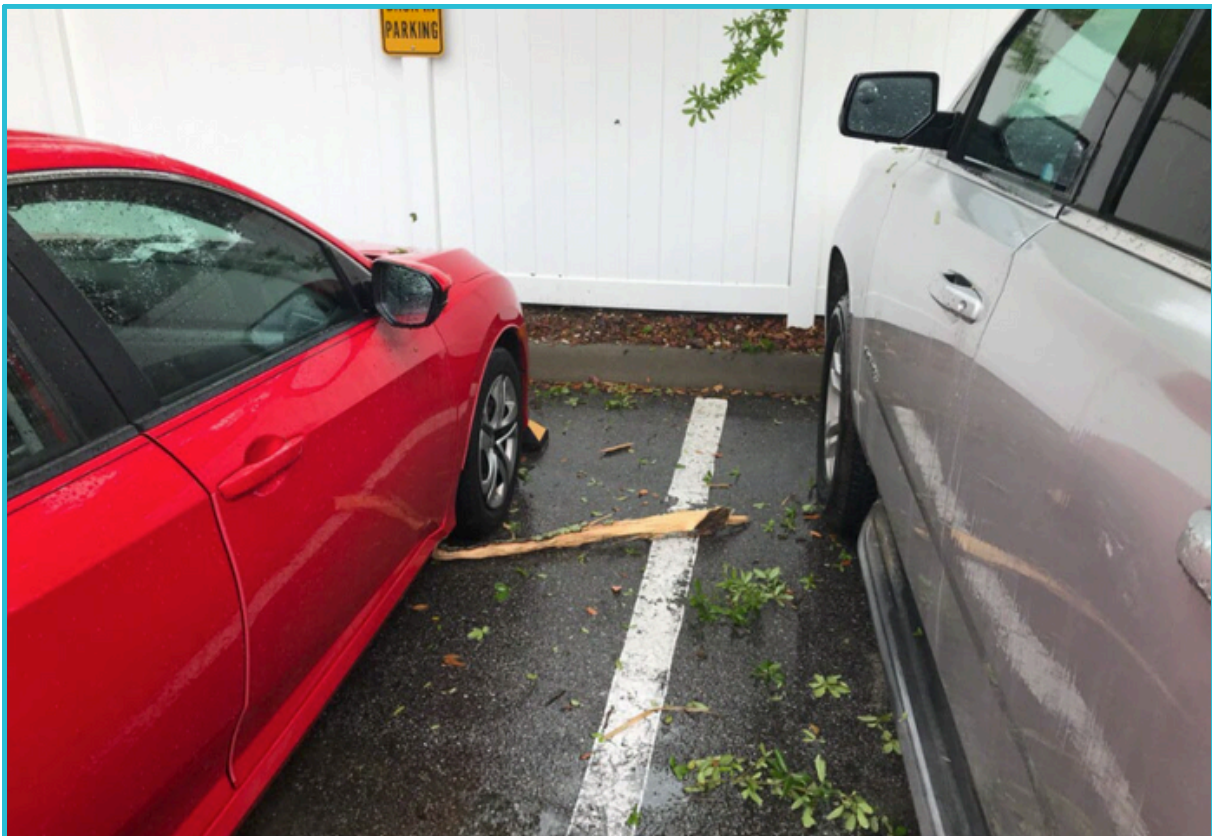


Figure 2. Aftermath of a lightning strike that struck a tree in the parking lot of Cape Canaveral City Hall in March 2022. Several Staff personal vehicles were severely damaged, as well as the building's infrastructure.

CMCE LIGHTNING SUPPRESSION

Solution: CMCE Devices – Lightning Suppression System

In order to protect critical City infrastructure, buildings, and facilities, as well as Staff and community members, the city began implementing an enhanced lightning suppression system (LSS). After the lightning strike that severely damaged the City's WRF in Summer 2021, Staff researched and implemented a newer form of LSS called a CMCE device. Two of these devices (CMCE-120 and CMCE-55) were installed in January 2022 at the WRF: one atop the facility's primary radio tower above the Public Works Services Administrative Building, and the other atop the carbon feed tank enclosure. Each of their respective active suppression ranges can be seen in Figure 3. The total project cost was \$27,100.

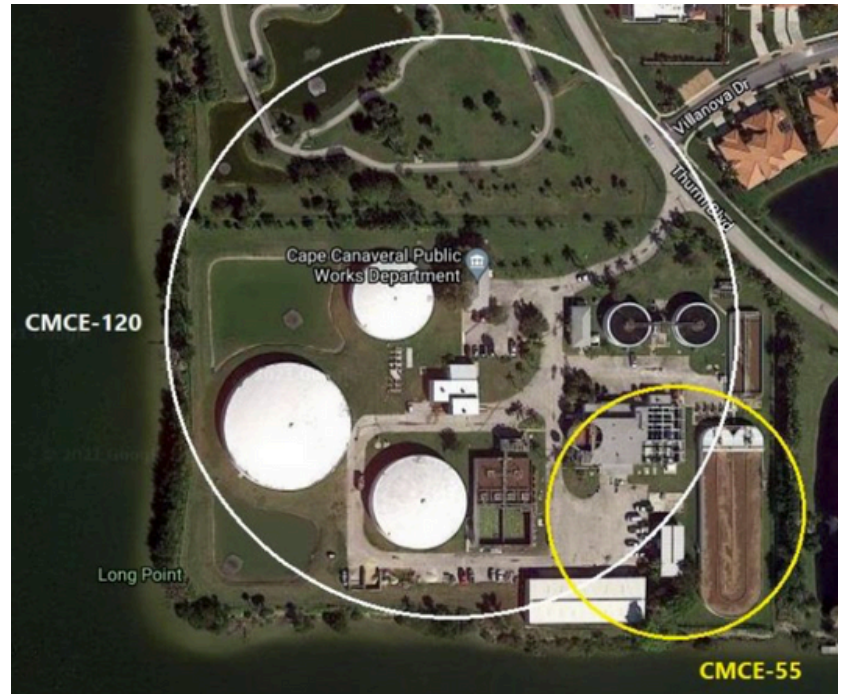


Figure 3. Areas protected by two CMCE devices installed at the City's WRF.

CMCE devices create a protective dome over the point in which they are installed that eliminates the possibility of direct lightning strikes. The devices work to balance the ambient electrical field by constantly draining current from the field, both positive and negative, and reduce the potential difference that naturally builds up during a storm. This process works to eliminate upward streamers (i.e., the charge trying to find its way up towards the cloud) and effectively camouflages structures and objects from prospective lightning strikes seeking to make contact with the ground that are descending from clouds and attempting to make a connection. All CMCE devices include a 10-year warranty, all ground components include a 5-year warranty, and all CMCE installations come with a \$500,000 no direct strike guarantee. This equipment is seen as superior to more traditional passive lightning rods that still allow for lightning strikes on property and do not always provide adequate protection to surrounding structures. Maintenance is minimal, only requiring annual checks of each device's singular grounding wire to ensure it is still efficient and not corroded.

Since their installation, the WRF has not seen any direct lightning strikes, nor has any damage been observed on property, even through multiple summer months when lightning is most prevalent. With this success, the Staff moved forward with the installation of more CMCE devices at other critical City buildings and facilities. What follows is a listing of additional City buildings and facilities where CMCE devices have either already been installed or are recommended for installation in the near future, as budgeting is made available each fiscal year. Pictures of the City's already installed CMCE devices can be found in Appendix 1 broken down by installation site.

CMCE LIGHTNING SUPPRESSION

Municipal Complex

The Municipal Complex consists of City Hall, the Brevard County Sheriff's Office (BCSO) Cape Canaveral Precinct Building, the Cape Canaveral Public Library, the CAPE Center, and the Nancy Hanson Recreation Complex, as well as several parks and other pedestrian-oriented pieces of infrastructure. This is a highly trafficked area devoted to providing several critical municipal functions and services, as well as event hosting (such as Friday Fest), that has had lightning-related issues occur in the past.

In March 2023, a CMCE-55 and a CMCE-120 were placed atop City Hall via a ballasted mount and a tennis court light pole at the north end of the Nancy Hanson Recreation Complex adjacent to Taylor Ave, respectively. These two devices provide a dome of protection around each stated area 375 feet and 790 feet in size, respectively (Figure 4). The total project cost was \$29,300. Since installation, no lightning strikes have been observed within the area of the Municipal Complex, nor has any damage been recorded. It is important to note that even with the devices, out of an abundance of caution, it is City policy that public outdoor events will still be cancelled if lightning is present and thunder is audible.

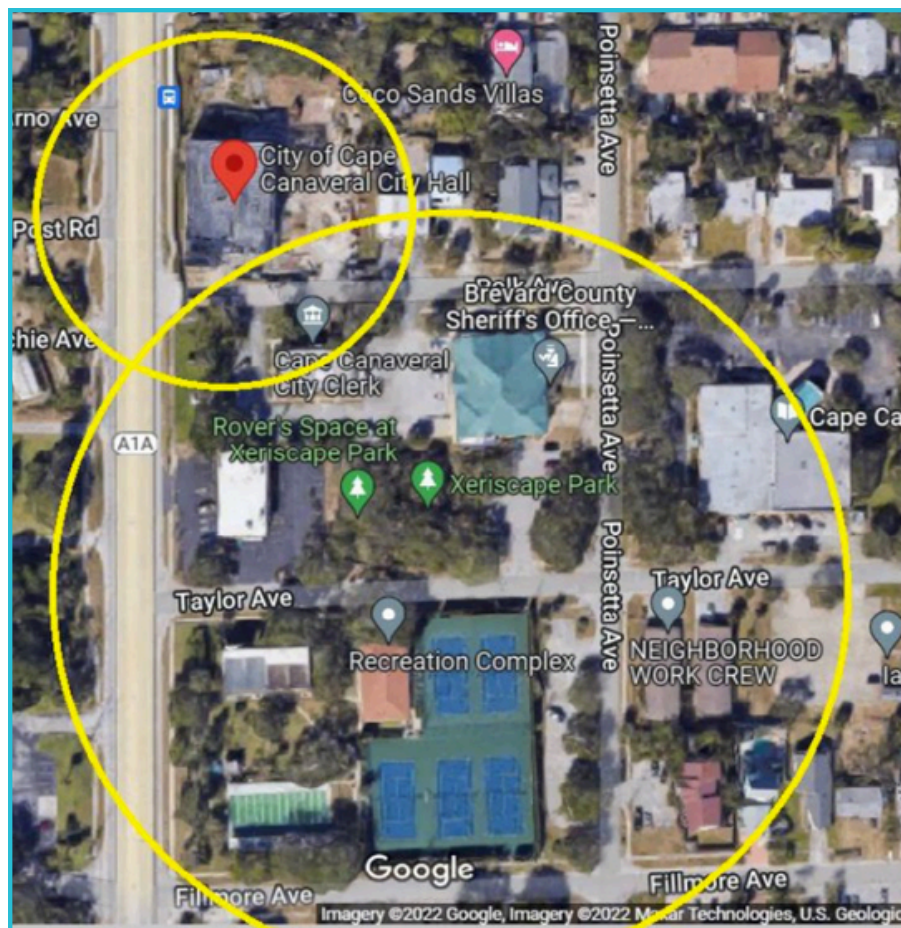


Figure 4. Areas protected by two CMCE devices installed at the Municipal Complex.

Figure 5. Area protected by CMCE-120 device installed at the C5.

CMCE LIGHTNING SUPPRESSION

Canaveral Fire Rescue Station #53:

Canaveral Fire Rescue Station #53 – located at Jackson Ave. – is the sole fire station within the City’s limits. It delivers lifesaving fire response, rescue, and medical services to the community and is considered a critical asset that must be hardened against all forms of inclement weather. In October 2024, the C5's existing CMCE-55 device was moved and installed atop the radio mast immediately west of Canaveral Fire Rescue Station #53 to provide a dome of protection around the building 375 feet in diameter (Figure 6). The project cost \$15,500 and also included the installation of a larger CMCE-120 device on the C5. Upon completion of this specific project, all critical City facilities and properties have been adequately protected from lightning strikes. A total of six CMCE devices are present at five different municipally owned properties.

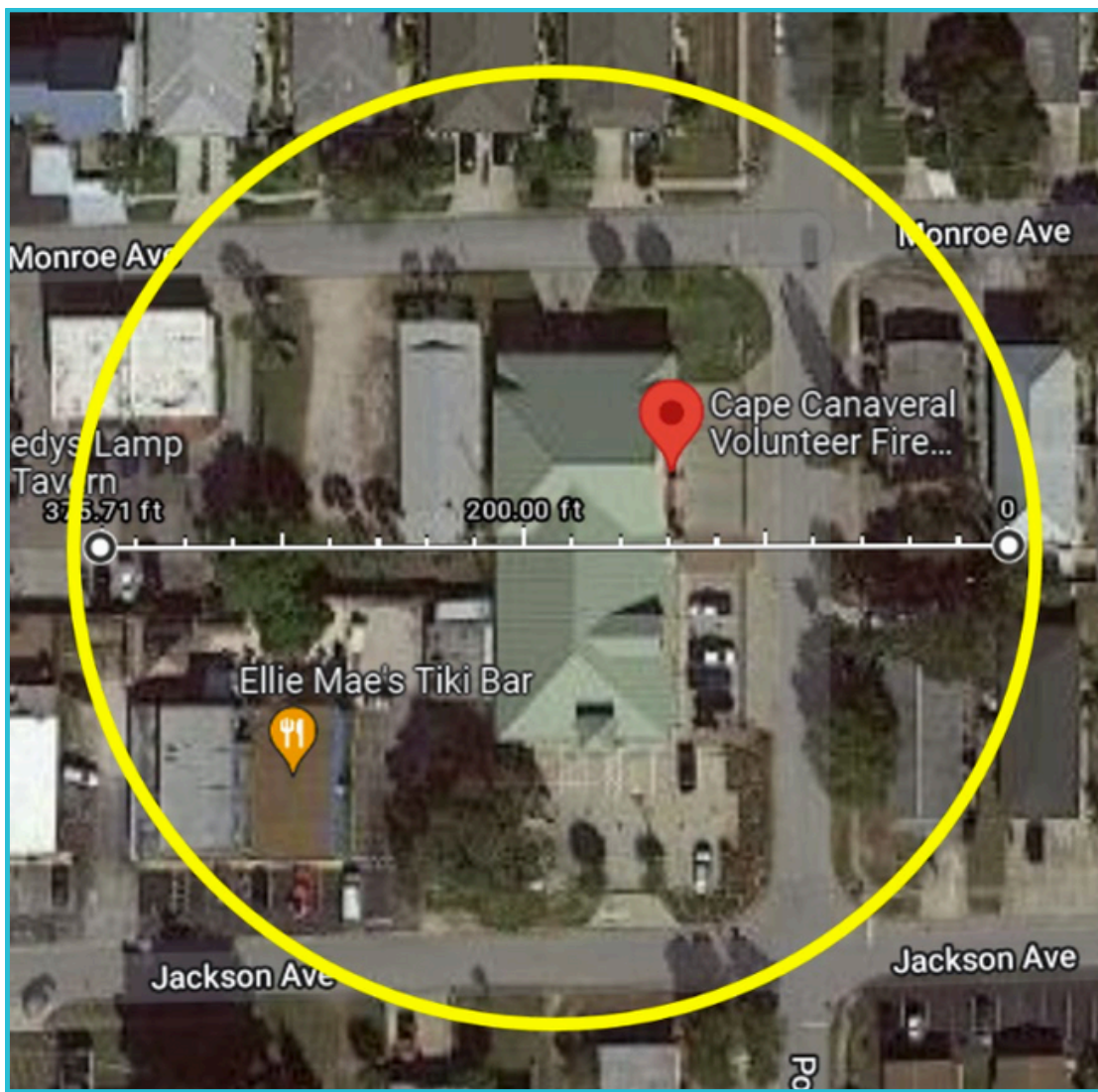


Figure 6. Canaveral Fire Rescue Station #53 CMCE device scope.

CMCE LIGHTNING SUPPRESSION

Appendix 1: WRF CMCE Devices – Complete



Figure 7. Installed WRF CMCE devices.

CMCE LIGHTNING SUPPRESSION

Municipal Complex CMCE Devices – Complete



Figure 8. Installed CMCE devices at City Hall (left) and the Nancy Hanson Recreation Complex (right).

CMCE LIGHTNING SUPPRESSION

C5 CMCE Device – Complete



Figure 9. C5 installed CMCE-120 device.

CMCE LIGHTNING SUPPRESSION

Canaveral Fire Rescue Station #53 CMCE Device – Complete



Figure 10. Installed CMCE-55 device atop Canaveral Fire Rescue Station #53.