

# Security Lighting

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If you grew up during the “energy crisis” of the 1970’s, you may be conditioned to turn lights off whenever possible. I know I’m often going around my house turning off lights that my wife and children have left on.

However, there is one type of lighting for which you must act opposite you instinct: **security lighting**. Criminals often operate at night for the obvious reason – the darkness helps to conceal their activities. Security around your home can be increased by having security lighting around your home. With modern LED lighting, it also requires very little energy (which comforts those of use who grew up during the “energy crisis”). LED lights also last a long time, so you won’t have to spend a lot of time replacing burned-out lightbulbs.

When I drive around Arcadia at night, one observation I make is that it’s **too dark**. Homeowners need to invest in security lighting (which also has the added benefit of beautifying your property).

## Use What You Have

As you’ll discover in the following sections, security lighting often means placing a lot of light fixtures around the property.

Until you execute any plans to upgrade your lighting, use what you have. Leave your front porch light on. Have outdoor lights by the garage? Leave them on. Replace the bulbs with LED bulbs to minimize energy usage.

## Where To Place Lights

Think in terms of rings of security.

The first ring is the exterior of your home. Lights should be placed all around the exterior, lighting the walls. Also include:

- Anywhere that will be overlooked by you, your neighbors, and people passing by in the street.
- By the entrance door
- In the side driveway, as long as its length is visible from the street
- Above a gate at the entrance to a driveway or alleyway
- Your garage
- A side door to your garage



*Figure 1--the first ring of lighting security is to illuminate the structure of your home. Not only does this provide security, it can showcase the beauty of your home at night.*



*Figure 2 -- Lights can be placed under eaves and shine down to illuminate walls and adjacent areas*

One important area to light is a side door to your garage – a common target for break-ins.



*Figure 3-- A side door to a garage is an important area to illuminate, as it is often a target for break-ins.*

Moving out from your home is the second ring of security – path lights and down lights to porches and patios. Path lights help illuminate walkways and help to keep people from accidentally stumbling into your landscaping. *Up lights* can be used to shine up into trees. Flood lights can be used to illuminate large areas.

Landscape lighting will provide a greater sense of depth for your property at night.



*Figure 4--Path lighting provides security and safety*

The final ring is exterior walls or fences. Consider up lights shining up onto exterior walls. If you have fence, consider illuminating the landscaping near the fence. This lighting will help provide general illumination to your yard. It also can alert you to someone present in your yard, for you will see his silhouette as he passes in front the lights.

If you have tall trees, you can consider installing landscape “moonlighting.” This lighting technique replicates the lighting of the moon by placing down-lights or spotlights high in trees (at least 25 feet high).

The end goals are:

- If you look at your home from the street, you should not be able to see any large areas of shadow where someone can hide.
- If you’re inside your home, you should be able to look out your windows and clearly see all critical areas of your yard.

However, also remember to have some fun with it – additional lighting can make your home more beautiful and make it more pleasant to be outdoors at night.

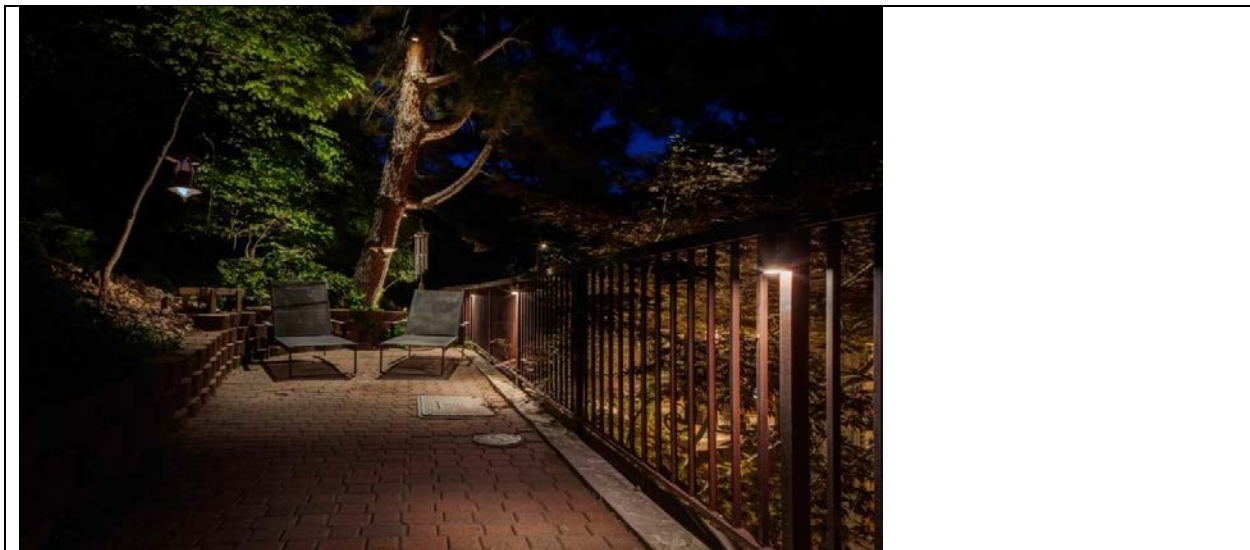


Figure 5--Moonlighting places lights high in trees to simulate uniform illuminate from the Moon

## Types of Light Fixtures

Choose light fixtures with a cutoff degree to avoid glare, light trespass onto your neighbor’s property, and light pollution of the sky. Glare actually reduces security. Choose light fixtures that are cutoff (minimum), or full cutoff (preferred).

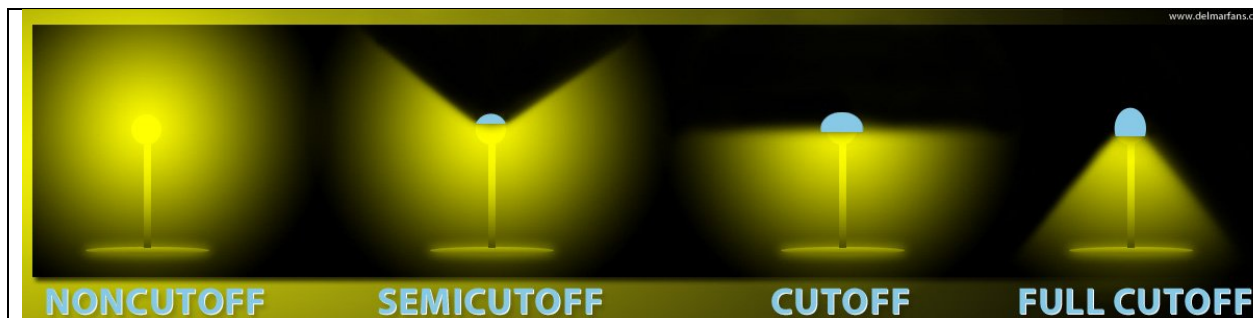


Figure 6--Cutoff and Full Cutoff light fixtures avoid glare by shielding direct view of the light bulb.



## How Bright?

As you can see from the pictures including, the lighting doesn't have to be super bright.

For an unshielded bulb (if you must), the maximum wattage to not cause pain for someone viewing it is about 40 W (incandescent; about 6 W for LED) – or about 450 lumens. People are detected as their silhouette occludes your view of the lights; it's not necessary to illuminate them directly. Guidelines for outdoor illumination are 20 -50 lux (where lux is lumens per square meter).

One exception is your front entryway; you will want to have a switched light that will let you recognize faces from 30 feet away.



*Figure 7--You don't need this much lighting*

## When To Operate Your Security Lighting

Leave them on from dusk until dawn. This means your property will be secured from dusk until dawn.

Lights can be controlled with photocells to automatically turn themselves on and off. Alternatively, modern timers can calculate the time of dusk and dawn for your position and turn the lights on appropriately as the length of day changes throughout the year.

## Think Twice About Motion Activated Lights

It sounds like a great concept – a motion detector triggers a flood light when motion is sensed.

However, most important element for deterring criminals from entering your property with lighting is for there to be light. If a criminal sees a dark residence, it becomes a potential target.

The problem with motion activated lights is that they don't create a deterrent until after a criminal has decided to enter your property. Once a criminal locks in on a target, they've already made up their mind: a motion sensor light coming on after they've decided to enter your property isn't going to stop them.

That said, there could still be some utility in having some motion activated lights. In an area that is not normally under your observation, a motion activated flood light could supplement other security lighting. Say you have a side yard that is normally dark. You install some low intensity security lighting. You supplement that with a motion activated floodlight. While that area is not normally under your observation, you might notice from inside the house if all of a sudden it is brightly illuminated.

Another aspect of motion-activated lights is their hands free operation. If you need to light up an area of your property, but there isn't a good place to put a light switch, a motion activated light could be convenient, as it comes on as you move about your property.

## Light Your House Number

If you have your house address number on your house, install lighting to illuminate it at night. This not only makes it easier for guests to find your house at night, it also helps police and fire services in they are called to your home.

## Put A Lock On Your Electrical Panel

A secret service agent once told me how he performed an arrest. He and his partner went to the suspect's house, and the agent went to the side of the house and turned off the main power breaker. The suspect then came out onto his front porch to see if other homes in the neighborhood had lost power. He was apprehended on the front porch.

A small nuisance lock is sufficient, such as the [Master Lock 646D](#). The electrical panel latch is not very strong, so there is no sense in putting a really strong lock on it.

## How To Install

Reading the above and evaluating your property, you're likely thinking you're going to need a lot of lights. You would be correct. It's a big job.

Low-voltage lighting, such as the Malibu lights and similar, is easier for a do-it-yourselfer. These systems require a transformer, the power rating of which is determined by how many lights you're going to install. The transformer typically mounts on the house. From there, a single low-voltage cable is routed to every light installed, in a daisy-chain fashion. Pro-tip: make a complete loop back to the transformer and connect it – this reduces the resistance of the cable in half and will give you more uniform lighting.

It is possible to run 120 volt cable underground. Special cable is required, called direct burial cable, or [UF Cable](#) (UF stands for *underground feeder*). Requirements for burying it are covered in the next paragraph.

Always check and follow the [National Electric Code](#), which specifies how to install electrical systems to protect people from electrical hazards. Some [important requirements of the code for outdoor wiring](#) as related to outdoor lighting are:

- Low voltage light fixtures must be no closer than 5 feet away from the outside walls of pools, spas, or hot tubs. There are many code requirements for electrical installations around pools, so you could review the code prior to any planned electrical work in pool areas.
- Low voltage cable (carrying no more than 30 volts) must be buried at least 6 inches deep.
- UF cable can be direct-buried (without conduit) with a minimum of 24 inches of earth cover.
- UF cable buried within metal conduit can must be buried 6 inches deep. PVC conduit must be 18 inches deep.
- Backfill material must be smooth granular material with no rocks.
- Buried wire that transitions from underground to above ground must be protected in conduit from the required cover depth, or 18 inches (whichever is less) up to its termination point above ground.

All of the work for installing UF cable is in digging the trench, so you might as well put it in conduit. As you are backfilling the trench, first do a partial fill of the entire trench. Next, run a neon-colored nylon string the entire length of the trench. Then finish the backfill. The string is to alert any person digging in the future that they're digging in a trench with electrical wire (or something important) underneath.

You might consider also running an ethernet cable in the trench. Outdoor, waterproof ethernet cable is also made. Use Cat 5E or Cat 6 double-shielded cable rated for outdoor direct burial. Again, the hard work is digging the trench. The material cost to lay an ethernet cable in there is low. Doing this would give you future flexibility to install security cameras at the perimeter of your property.

Call before you dig! Call [Arizona 811](#) at least two working days before you're planning to dig. The utility companies will come out and mark the location of their buried lines. This is a free service. You can use power equipment to dig to within 24 inches of the marked lines, then you must use hand tools.

All of the above is hard work. You may want to hire someone to do the work. Lights mounted to your home can be installed by an electrician. Landscaping companies, and specialty outdoor lighting companies, can design and install outdoor lighting systems.

## References

1. [Guidelines for Security Lighting for People, Property, and Public Spaces.](#)
2. [National Electrical Code \(NEC\) Rules for Outdoor Wiring](#), The Spruce, 12/09/20.
3. [Arizona 811](#)