Lighting Design


NORTER


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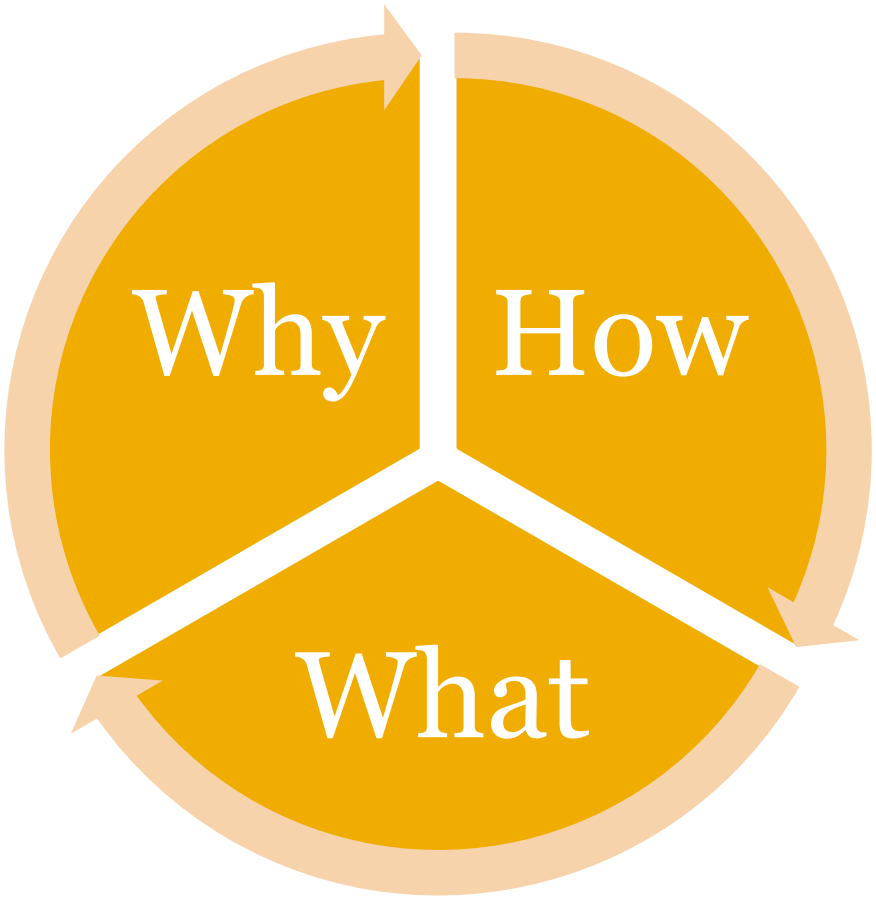
The Design Cycle



Why Light

- Once you understand the WHY of lighting, the HOW will usually become obvious and helps you know WHAT to light.

- It is best practice to answer the WHY question before you show the client what you can do with light.

Why

- There are three general reasons individuals want lighting
  - Safety
  - Security
  - Aesthetics

Why

- Define your objective
- Select one, two, or all three of the objectives and incorporate them into the initial design phase

Safety

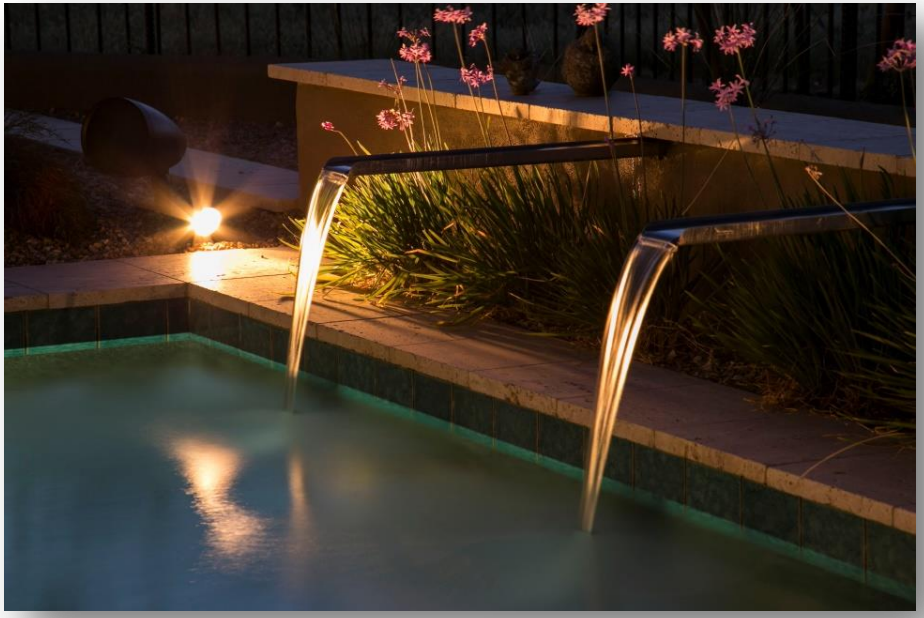
- Entry ways should be well lit
- It is important to draw attention to the entryway
  - Steps and changes of elevation
  - Walkways and paths
  - Mailboxes
  - Pool areas
  - Common areas

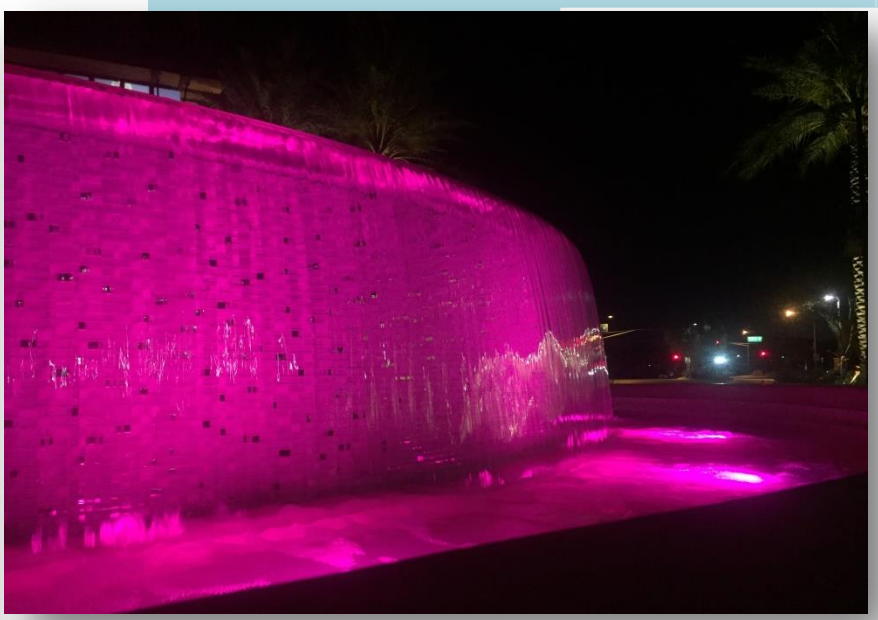
Security

- Misconception – The brighter the light the more secure the area – FALSE
- The brighter the light the darker the shadows are outside lit area
- Lower levels of light creates less contrast in the landscape

Aesthetics

- Building façade
- Wall washing
- Sculptures
- Art
- Water features
- Specimen plants



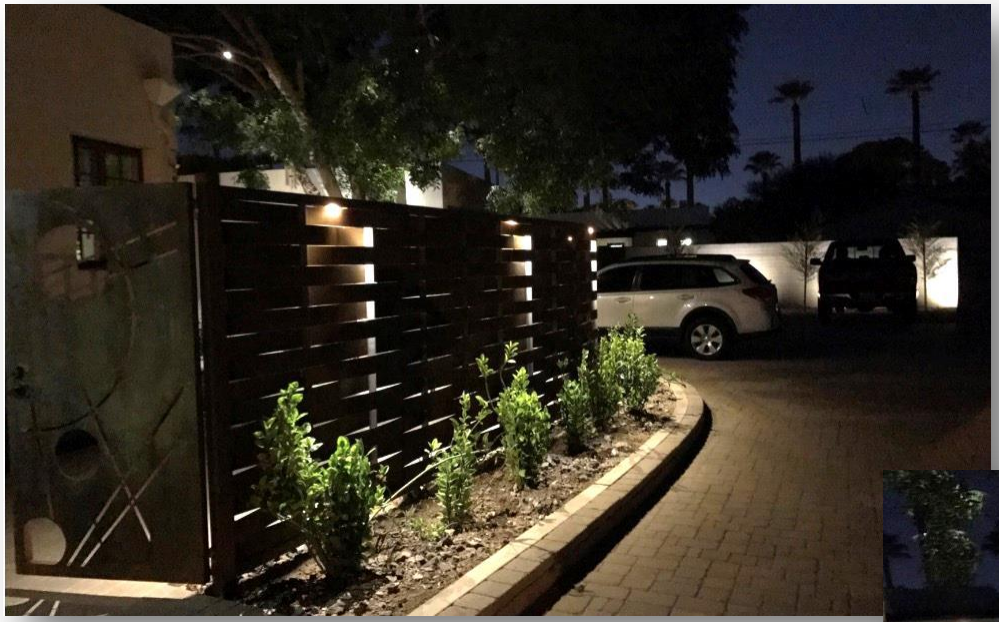


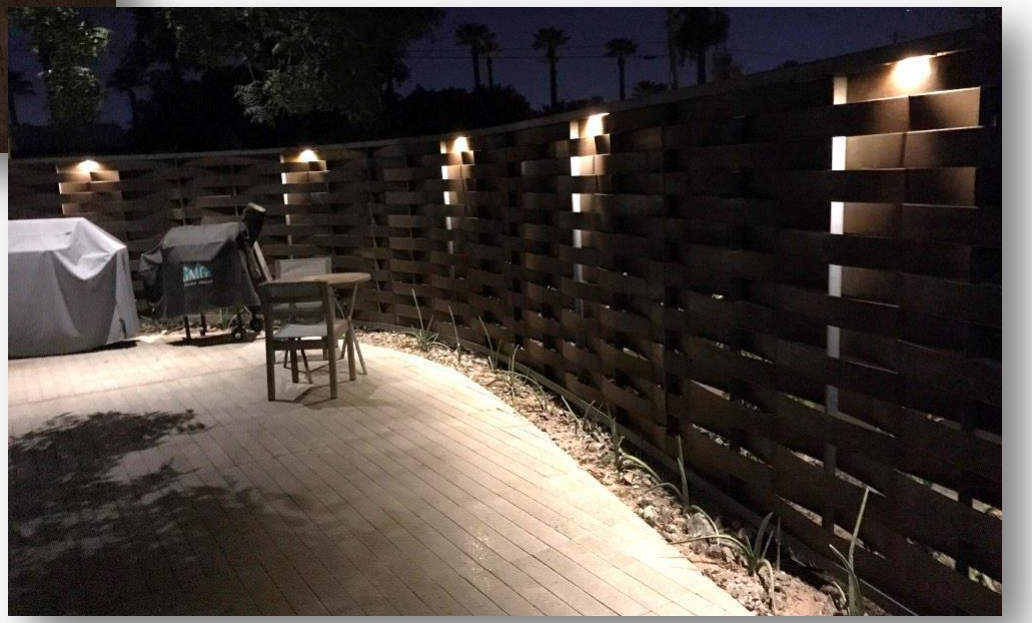
How

- The basic lighting design techniques
  - Uplighting
  - Downlighting
  - Backlighting
  - Arealighting
- Combining these techniques can create many types of lighting effects to serve different functions

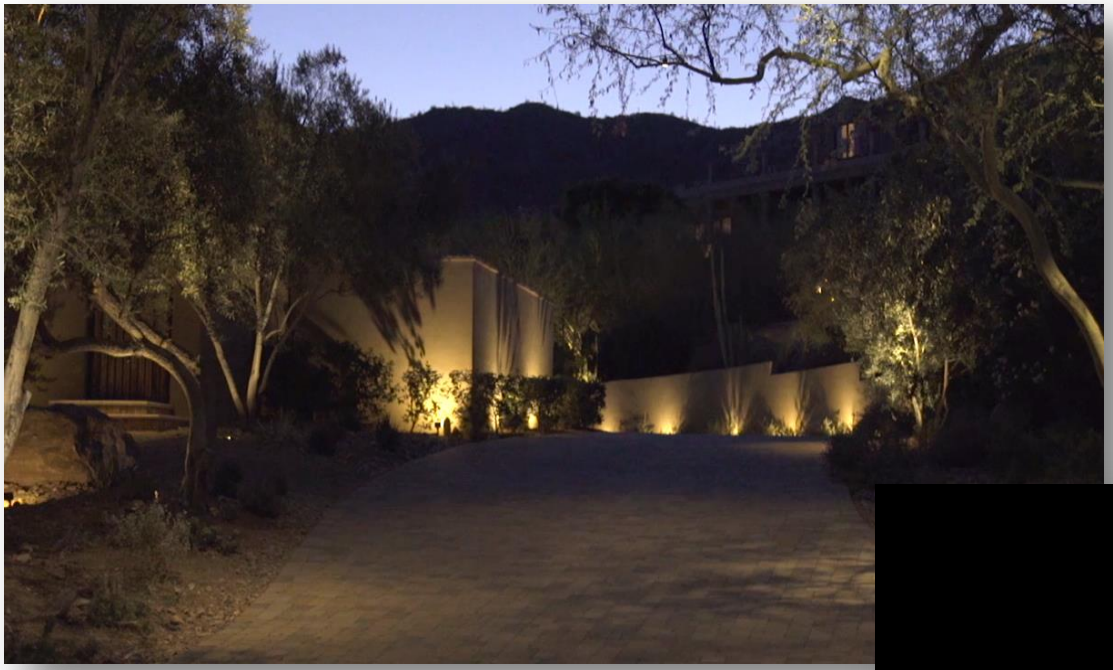
Uplighting

Downlighting

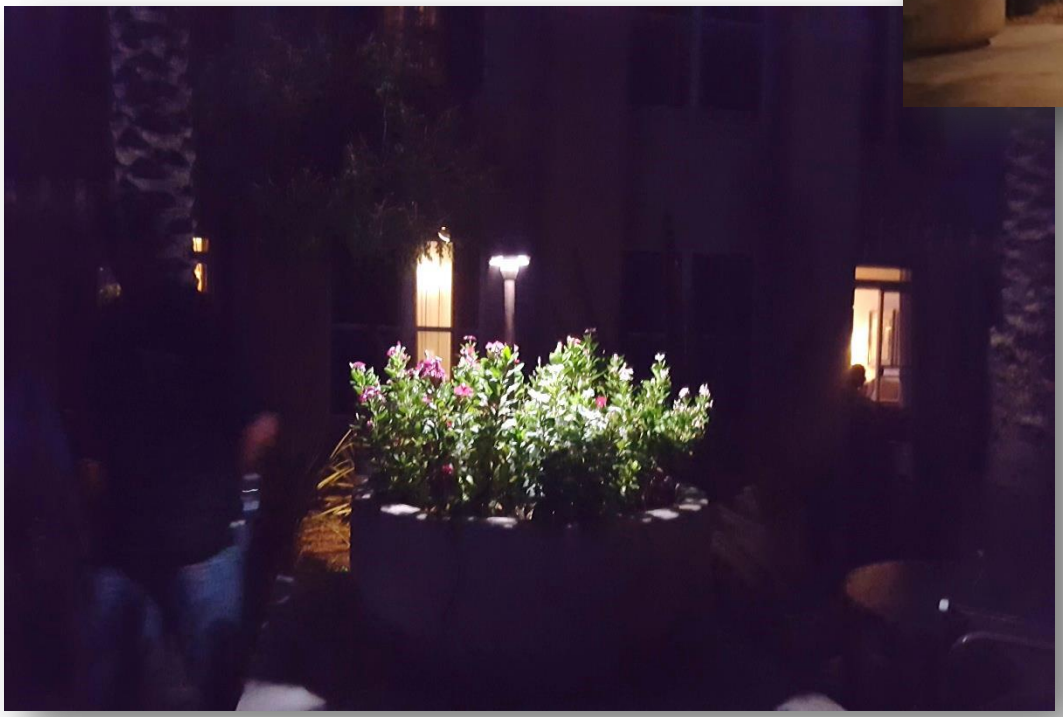




Backlighting



Arealighting

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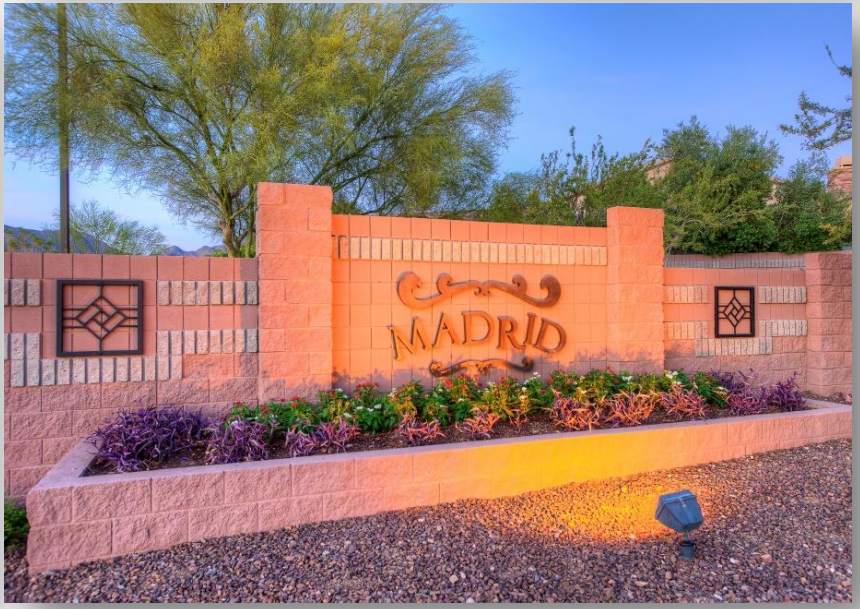
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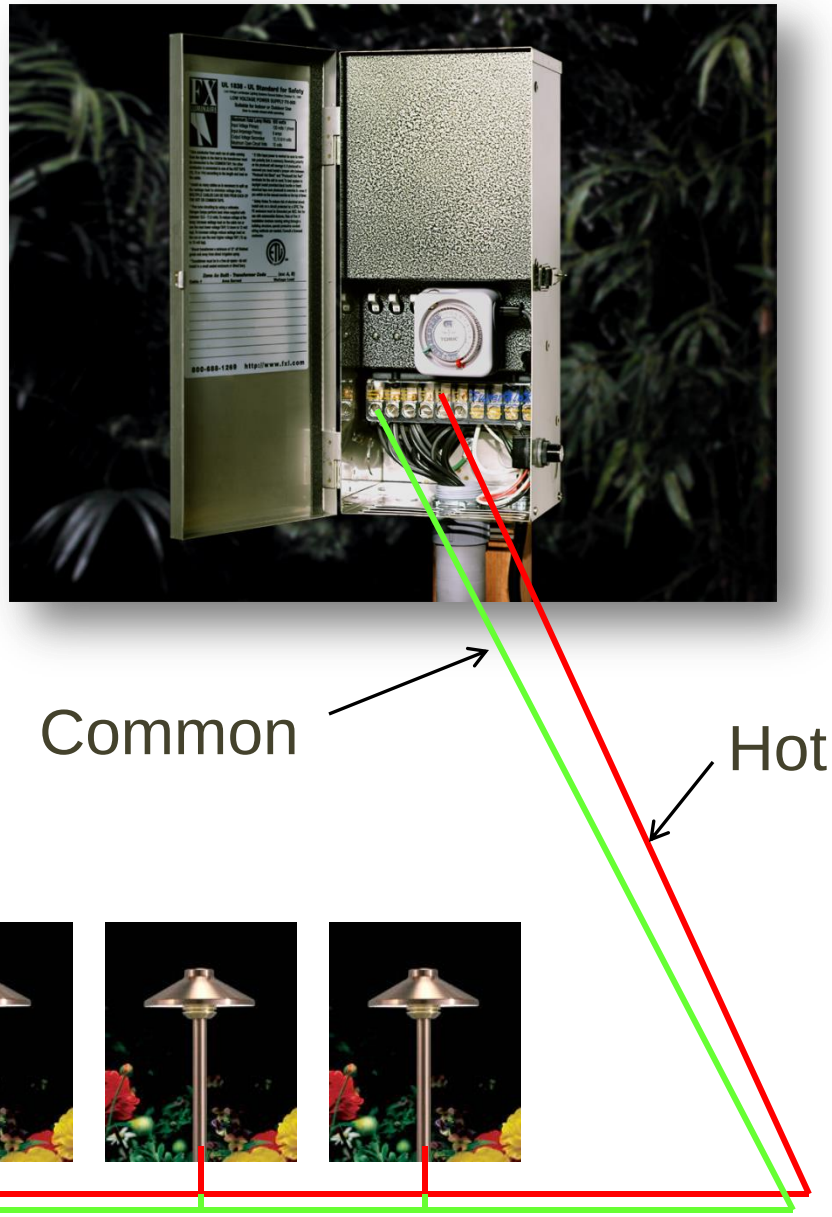
Electricity 101



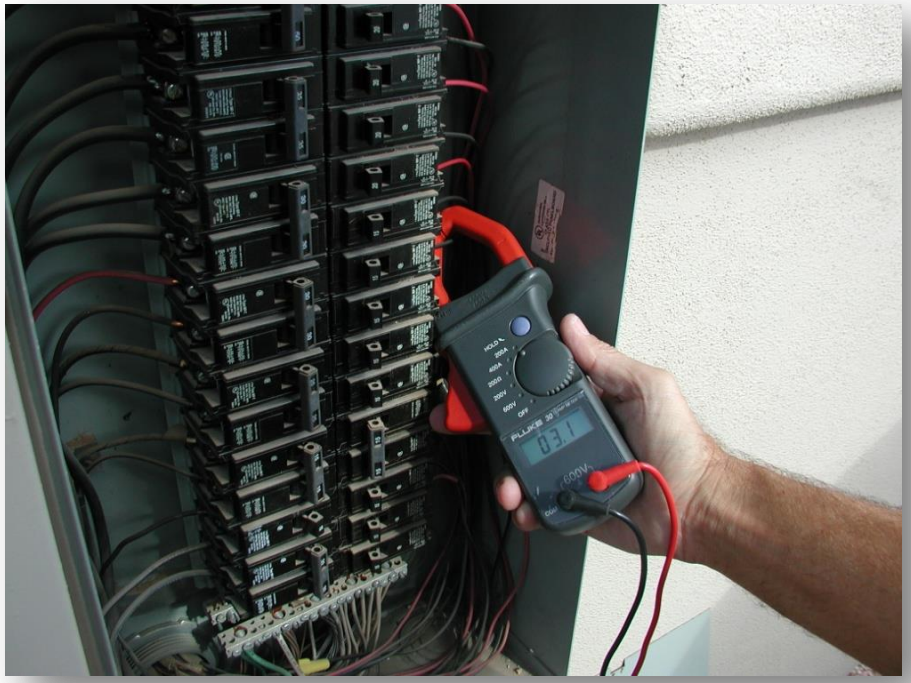
Key Word

- ***Circuit*** **–** *a continuous flow of electricity*

Electricity 101

Key Word

- ***Amp*** *or Amperage - Electrical Flow*



High Voltage Amps

Low Voltage Amps

Electricity 101

Key Word

- ***Watt or Wattage***- *Electrical consumption*

Electricity 101

Key Word

- ***Ohms Law–***
  Volts x Amps = Watts


X

=


120 volts x **15** amps = **1800** watt capacity

X

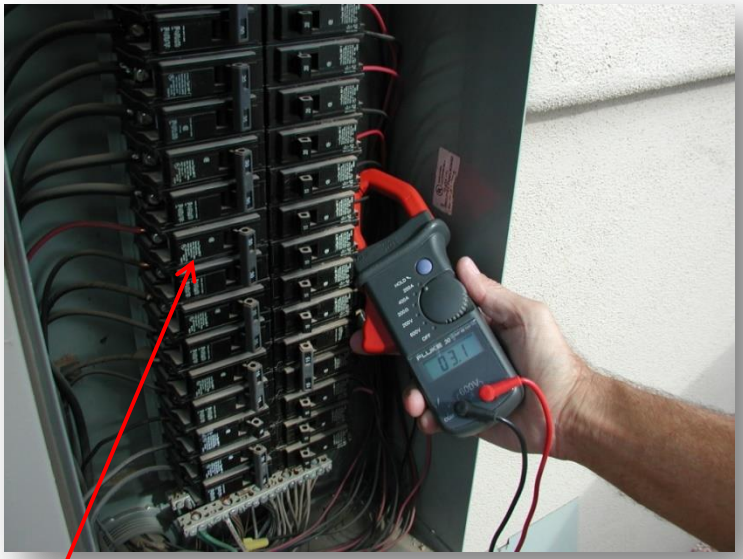
=


12 volts x **25** amps = **300** watt capacity

Electricity 101

Key Word

- ***Circuit Breakers*** *- electrical safety devices*



High Voltage Circuit Breakers (15 amps)

Low Voltage Circuit Breakers (25 amps)

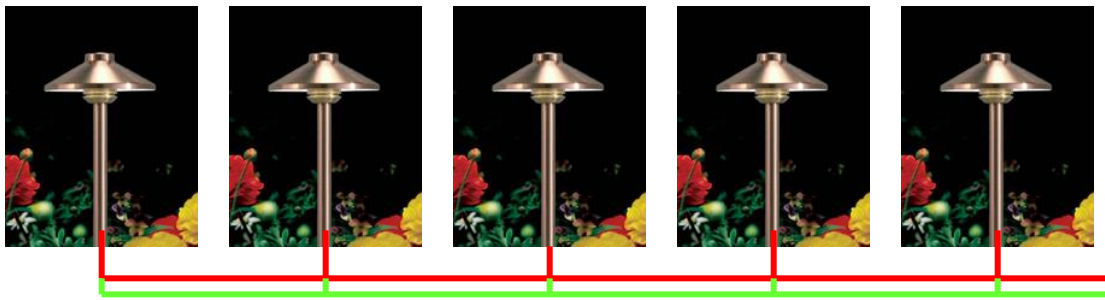
Electricity 101

Key Words

- ***Load*** *– total watts or amps on a given circuit*
- ***Run*** *– distance from transformer to fixtures*

80’ Home Run to 1st Fixture

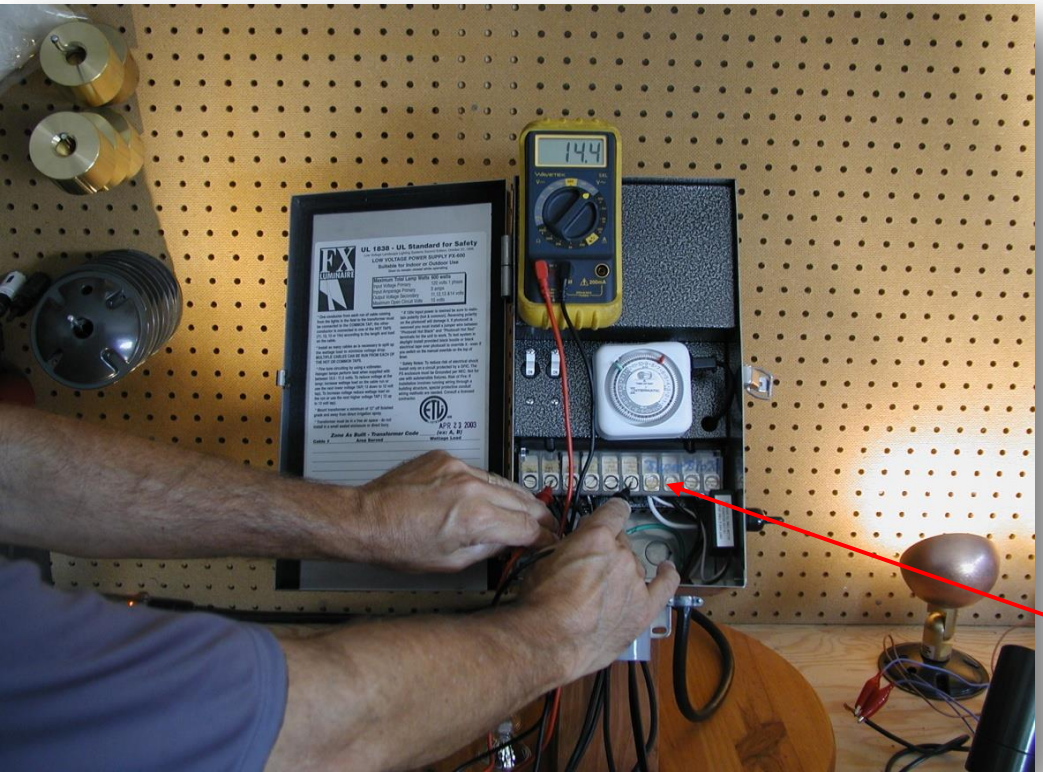
(100 watts of load)

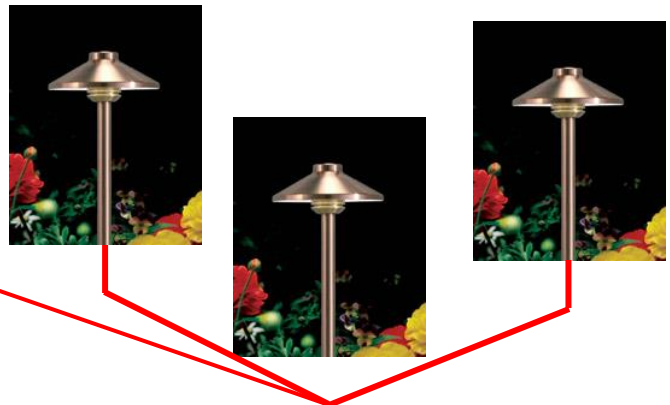


Electricity 101

Key Word

- ***Voltage Drop*** *- Loss of Electrical Pressure*

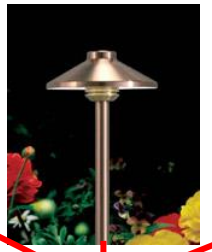




Voltage Drop – critical factors

Length

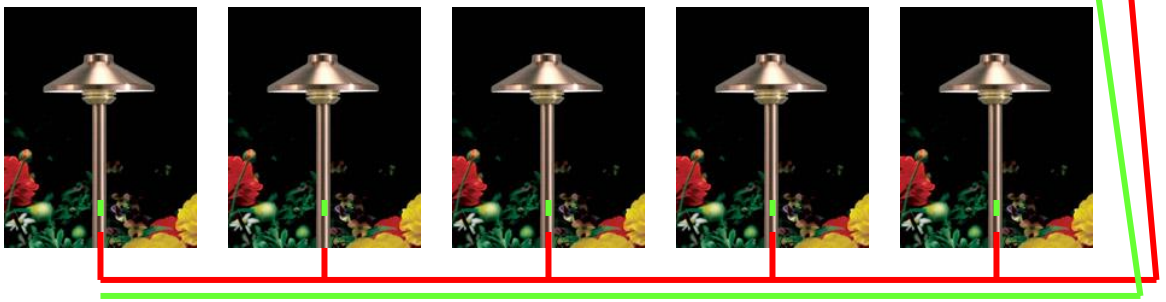
Watts



Cable size

Variables

- Load (watts)
- Run (length of cable)
- Cable Size (gauge)
- Cable Method (daisy chain, hub)
- Tap (volts)



Voltage Drop

- Length of Run
- Total watts on run
- AC current (2)
- Size of cable (cable constant)
- Wire still has an AMP rating

Exceeding AMP ratings

Installation operating range 10-15 volts

Quiz!

What is the operating range for LED in volts?

Low Voltage Lighting Cable

UF Rated Cable Specifications

Size	Max Safe Load
16/2	10 amps – 120 watts
14/2	12 amps - 144 watts
12/2	16 amps - 192 watts
10/2	24 amps - 288 watts
8/2	25 amps - 300 watts*

(*32 amps – 384 watts)

Calculating Voltage Drop

$$\frac{\text{Length of run x total watts x 2}}{\text{cable constants}} = \text{Voltage Drop}$$

The number you arrive at when you solve this Equation must be under 4

Calculating Voltage Drop

$$\frac{\text{Length of run } \mathbf{x} \text{ total watts } \mathbf{x}\ 2}{\text{Cable constants}} = \text{Voltage Drop}$$

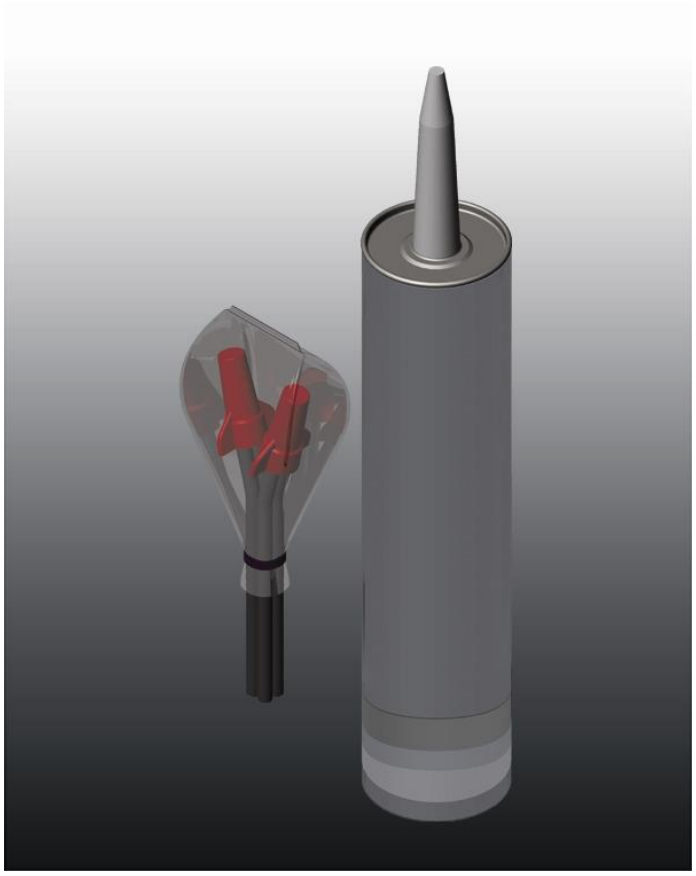
Constants :

8 gauge	18960
10 gauge	11920
12 gauge	7500
14 gauge	3500
16 gauge	2200

Low Voltage connection 3 Requirements

- Metal to Metal
- Permanent
- Water Tight

Cable Connectors



These are not UL under water rated splices. This type of mistake could void a manufacturers warranty.

Do Night Demonstrations Help to Sell a Project ?