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## Research & Editorial

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## Master Planning: Low-Voltage Lighting Design

by Kenny Perez, principal, Nate Mullen Visual Concepts



The Oaks, a recreation center in Carlsbad, California, demonstrates that low-voltage lighting has its place in the commercial arena. The carrotwood trees and ornamental grasses around the pool patio are lit biaxially with (2) 35 watt Apollos. The downlighting for the trellis is performed via 35-watt Quasar 1 fixtures. Nate Mullen's International Academy of Architectural Landscape Lighting teaches three levels of lighting: Level 3 is the focal point, the brightest area (here the seating areas); Level 2 is the "connecting bridge of light" to the focal point (the trellis); Level 1 extends space and defines boundaries (the trees and grasses on the edges of the property).

I started my electrical design experience 15 years ago while working for the local utility company. After 20 years of field experience as an electrician and injuries suffered on the job, I thought it a natural transition to go from building electrical systems to designing them.

After a few years of designing waste water treatment facilities, sewage pumping stations and power grid systems, I turned my attention to the lighting industry. My lighting career began with designing roadway lighting systems. This led to providing lighting designs for parking lots for companies such as Lowe's HIW, Carl's Jr., McDonald's, Sav-Ons, Ralph's and Kohl's.

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**Three 35-watt Apollo uplights create depth and highlighting for the California Plains tree and ornamental grasses. "The light up in the sky, I cannot take credit for," says Kenny Perez, "but it was a nice touch."**

I want to credit three mentors who helped me immensely with my lighting and design career: Milton Niederhaus P.E, formerly of Kanrad Electrical Engineering, Fred Lipscomb, formerly of San Diego Lighting Association and Pat Thoma of Pacific Lighting Sales. Without their continued mentorship, I would not be where I am today! Thank you all!

Landscape lighting for homes and master planned communities soon became my favorite type of lighting design. Quite often, and especially for homeowners, the pride and joy of the landscaping is usually lost at night. I often liken designing landscape lighting plans to "painting a portrait with light" and take great joy in turning a beautifully landscaped site by day into a masterpiece by night.



### Pacific Highlands Ranch - Unit 10 Site Lighting Plan

The site lighting plan by Kenny Perez, principal, Nate Mullen Visual Concepts, for one section of the new Pacific Highlands Ranch, a new San Diego master-planned coastal community. "What we are designing will not typically be built for some months," he notes.

## Costly Systems

A major dilemma that I continued to face in designing lighting jobs for clients was the high installation cost of line voltage lights (120 volts and above). A lighting designer wants each project to "sparkle," but with the high cost associated with the fixtures and the installation of conduit, wire and trenching, clients often did not have enough money in their budgets to sustain the cost. So, rather than have a project that sparkled at night, we usually ended up with projects that flickered with light. This led me to look into the option of designing projects with low-voltage lighting. I knew I'd be able to install many low-voltage lights for the cost of just one line-voltage light. I would now be able to make those projects sparkle and not just flicker. I could give my clients the look they sought and stay within their budgets.

Soon, I embarked on the quest to find a low-voltage lighting system that would not only meet my high demands, but also one that would stand up to the rigors of the elements. Most people think of low-voltage lights as the kind stocked at the local hardware store, you know, the ones that fall apart when you bump them with the lawn mower. There were many products and companies that caught my attention, but as an electrician by trade who keeps in mind ease-of-installation, the products that made perfect sense to me and the ones that I knew would work best for my clients were manufactured by Unique Lighting.

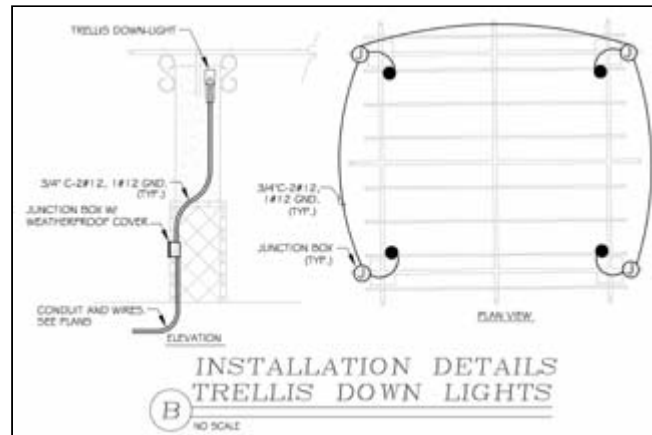


While Kenny Perez focuses primarily on exterior site lighting, he is qualified in all areas of electrical design. He did not only the lighting design for the site and building but all the electrical for the building. The oak in the foreground is downlit by (3) 35-watt Quasar 1 fixtures for a moon lighting effect, creating shadowing on the hardscape. The tree in back of the oak is uplit with (2) 35-watt Apollos. When it comes to lighting design you want to create focal points that cast enough "spill" light to illuminate walkways. The lights on the retaining wall are CW Cole 26-watt fluorescent recessed wall lights. The lights on the building were owner/architect specified.

What I found that made Unique special, aside from their high-quality light fixtures, was their "Multi-Tap" transformer and their "hub" wiring method. Why were these things important to me? Well, this is where basic

electricity and the fundamentals of light come into the picture. Unfortunately, this is an area in which many architects and contractors lack knowledge, which, unfortunately, leads to poor lighting design and installation. Watts are watts, regardless of the voltage being used. In other words, you get the same amount of light out of a 35-watt bulb being powered by 12 volts as you do with 120 volts. The problem inherent with low-voltage systems is that you have little room for losses in voltage (voltage drop) on these systems. Low voltage to your lights will result in a weak light output, thus a weak "lighting portrait." To compensate for the drop in voltage, the Unique transformer allows you to change the voltage tap at the transformer to get the proper voltage you need.

The "hub" wiring method allows you to deliver the proper voltage to a central point, where you then split off to your individual lights. This results in the same voltage to each light, thus the same light output of each light. The final result is an overall even-lighting portrait. This is the key to a great "lighting portrait." The inexperienced low-voltage lighting system designer/installer tends to use the "daisy chain" method, wherein the first light looks great but the other lights on that run get progressively weaker.



## Concept to Construction

I have been asked how I come up with my designs and what makes my designs different from the landscape architects or landscape contractor. Have I attended a lot of classes on lighting design? Yes, I have attended many classes on the fundamentals of light, the uses and applications and also classes on photometrics. A photometric study reveals how much light you have on a site. This is the first step in determining how, when and where I place lights. The photometric study will let you know if the site is sufficiently lit for safety and security. In our litigious society there are indeed attorneys that represent people who have been injured due to improperly lit walkways. My most valuable teacher, however, has been the years spent in the field as an electrician installing electrical systems, including lighting. Nothing can take the place of work experience, not even the best instructors. Don't get me wrong, there is much that I now do differently because of my schooling. The field experience, however, is invaluable, especially when it comes to lighting design. Think about it, who would know better how to design a job than a person who has actually built these systems? I can truly say that this has given me an edge up over the competition, being that I speak the same electrical lingo.

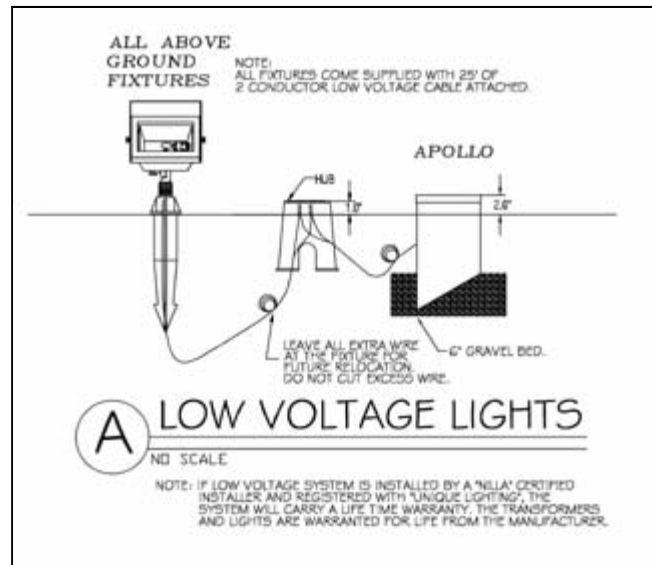


The Phillippee residence, from left: The Sago palm (*Cycas revoluta*) is lit on two sides with (2) 20-watt Stellars. Directly behind the palm is a Bloodgood maple (*Acer palmatum*) front and back lit with (2) 35-watt Big Bangs. "Though the tree is small at this time, we lit the tree with its future growth in mind," notes Kenny Perez, the lighting designer. The light in the back corner by the fence is an *Arundinaria bamboo* back lit with (2) 35-watt Apollos to provide silhouetting. To the right of the palm is a Lagerstroemia "Natchez," the "queen of crapemyrtles" triangulated with (3) 35-watt Apollos to make this, as Unique Lighting says, a "focal point" of the "lighting portrait." Architectural elements are brought about by up-lighting the columns on each side of the window with 35-watt Apollos. The plant to the left of the garage is an *Ilex Wilsonii* front lit with a single 35-watt Apollo. The pathway lights are 20 watt Neptunes. All lights are Unique Lighting fixtures.

Once the photometrics are in and I've determined how much light is required, my next step is to contact the

landscape architect or contractor to get a feel for what it is that he is expecting in the way of accent or landscape lighting. For example, what trees does he envision being uplit? What walls or monuments does he want to highlight? At this point I will ask to see some details of the walls, monuments, trellises, trees, etc., and then make my recommendations as to what I feel would look good. Would I say that my way is the best way to approach a light job? Remember, just as with painting, everyone has a style or favorite method.

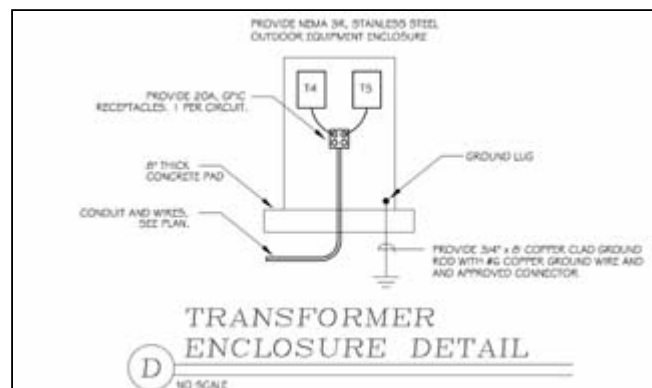
Still, there are certain tricks of the trade, so to speak, that truly are no-no's. What would some of those things be? One of the most common problems I find when I review a set of plans prepared by others who are vaguely familiar with lighting techniques is front lighting, which is exactly what it sounds like: lighting objects from the front side only. This is the most widely used technique of lighting that the inexperienced employ. For one thing, everything is lit to the same intensity. Your eye has no true focal point. Nothing truly stands out or captures your attention. Every object is on the same playing field, vying for attention. "Look at me! Look at me!" The other problem with front lighting objects is that nothing has dimension. Every object is now on the same plane of dimension. Nothing really has shape. By employing other techniques of lighting, such as back lighting, side lighting and silhouetting, to name a few, objects can take shape and have dimension. Now you have truly created a lighting portrait that others will ooh and ahh over. You now have a destination for the eye.



Unique Lighting's preferred wiring method is the "hub." A home run wire goes to a lug placed in a hub (direct burial J box). From there the fixtures extend a maximum of 25 feet on 16/2 wire and 50 feet on 12/2 wire. A maximum run of 4 or 5 fixtures is employed. A voltage adjustment is made at the Multi-Tap transformer to compensated for voltage drop.

Now that the stage is set, it is time to pick up the brush and go to the canvass. As I stated before, my first task would be the photometric study. Once I have determined the necessary task or safety lighting locations, I then decide where the landscape/accent lighting would best be placed. We have already had our consultation with the client and from our conceptual ideas we now create the AutoCAD drawing. Remember, we are working off of concepts and envisioning in our mind's eye how things are going to look after the lights are installed. This is much different than a design-build job in which you see what is being built during the time of construction. What we are designing will not be built typically for some months.

You really have to have vision when designing in this mode. And trust me, there is a lot of room for error in this way of designing.



Once the plans are developed, it is time for the city's review. Once approved and ready for installation, the major advantage in using low-voltage lighting over line-voltage lights is that this system is truly forgiving. If you make a mistake on placement, you can easily move these lights around to the desired location. Once again, this is another advantage of the Unique Lighting system over the competition in my opinion. Each Unique light comes pre-wired with 25' of cable attached. So moving or repositioning is not a problem. This allows you to dial

in the system, so to speak.

The need for a lighting designer to be available during the construction phase is crucial in my book. Think about it, someone is trying to build what you have conceived. They do not know what you were trying to accomplish. You need to be involved in the installation and to communicate with the contractor. If you don't, no complaining on how your lighting portrait turns out. And remember this: Your name and reputation is attached to the job. It is not the contractor that gets the blame for how bad the job looks. You were the designer of record. So take pride in your work. Stay involved. Stay with the job from concept to completion. And may all of your lighting portraits be true concepts of vision.



A closer look at the focal point of the Phillippe residence, the Lagerstroemia "Natchez" lit from three sides with 35-watt Apollos. "We have tied in the architectural element with 35-watt Apollo uplights," explains Mr. Perez. Some try to light a tree with one fixture and a high-watt lamp, which results in a trunk that glows, a "hot spot." The 35-watt lamp has an even beam spread that can light lights objects two feet to 30 feet or higher with no problem. "The front door and garage lights are ones that were owner specified/installed. We usually try to convince the owner/client to either remove these lights or replace them with a 'direct-non-direct' (up-down) light to avoid nuisance glare. There is nothing worse in a landscape lighting portrait than to see the direct glare of a light bulb. We want to see the effects of the light, not typically the light itself."

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