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Lifetime Comparison
Landscape Lighting Systems Line Voltage/Low Voltage

Prepared for Designers Lighting Forum Meeting 11/8/93 - "Night Magic" The Techniques of Landscape Lighting Presented by: HARRY GRACE

Line Voltage Wiring - Advantages

1.) Wiring System Lifetime Integrity
- a.) Line voltage wiring must be enclosed in conduit buried to a depth of 12" - 18" below grade
  - i.) Conduit protects wiring
  - ii.) Burial depth protects both conduit and wire from accidental rupture caused by Landscape service work
  - iii.) 120 Volt System are, by physical nature, 10 times less susceptible to:
    - Voltage drops
    - Line (system) resistance
    - Environmental factors (corrosion et cetera)

2.) Maintenance Factor
- a.) Since system is conduit enclosed trouble shooting (if at all necessary) is quite straight-forward
- b.) Lifetime integrity insures little or no maintenance

Low Voltage Wiring - Advantages

1.) Lower installed price
- a.) Low voltage wire is not generally enclosed in conduit

Line Voltage Wiring - Disadvantages

1.) Higher initial cost

Low Voltage Wiring - Disadvantages

1.) System Lifetime Integrity
- a.) Low Voltage Wiring is generally not enclosed in conduit
  - i.) If enclosed in conduit wiring system cost is substantially higher than line voltage as Low voltage wire (minimum 12/2 AWM) is substantially more expensive than standard Line voltage wire
- b.) Exposed low voltage wire is easily cut (accidentally) by landscape maintenance service people
- c.) Exposed connections are prone to failure due to incursion of water and/or chemicals
- d.) Exposed connections or cuts through insulation on wire increase the voltage drop factor over a short period of time
- e.) Low voltage wire will show substantial conductor deterioration within months of installation
  - i.) Such deterioration increases voltage drop factor
- f.) Low voltage runs must never exceed amperage rating of low voltage wire
  - i.) For 12/2 AWM (rated at 15 amps) a single run (on secondary side of transformer) must never exceed 150 total watts
  - ii.) Above factor necessitates more wiring runs than are necessary using line voltage wiring system

2.) Maintenance Factor
- a.) Low voltage wiring is not generally conduit enclosed and is prone to accidental cuts, system maintenance is more often required
- b.) Low voltage wiring connections are also not enclosed they are particulary prone to separation and/or failure due to existing natural conditions
- c.) Trouble shooting (often a necessity) is much more difficult because wiring runs are non-enclosed
- d.) Failure of a single transformer will disable multiple fixtures
- e.) Failure of a single fixture may disable controlling transformer (see note "d" above)

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Line Voltage Fixtures - Types Recommended

1.) Traditional Bullet, bell, tulip, bollard, and other incandescent and halogen Fixtures
2.) Compact or Biaxial Fluorescent Flood Fixtures
3.) Self-contained low voltage MR16 Fixtures
4.) Individually transformer equipped Low Voltage MR16 Fixtures

Advantages

1.) Line Voltage Compact or Biaxial Fluorescent Fixture
- a.) Lamp Lifetime of 8,500 to 12,000 Hours
  - i.) At average burning time of 10 Hours per day re-lamping can be expected at periods of 24 to 36 months
- b.) Lighting pattern is extremely smooth
- c.) Lighting distances
  - i.) 13 watt Compact Fluorescent - up to 20 feet
  - ii.) 39 watt Biaxial Fluorescent - up to 60 feet
- d.) Available Lamp Color Temperatures
  - i.) For both 3000 K (Warm), 3500 K (Halogen), 4100 K (Cool) , 5000 K (Coolest)
  - ii.) For 13 Watt Compact Fluorescent Only - 2700 K (Incandescent)
- e.) Color Rendering Index (CRI)
  - i.) For both - 82nd (percentile)
- f.) Fixture Construction - Heavy Gauge Cast and Extruded Aluminum

2.) Self-contained Low Voltage MR16 Fixture
- a.) Lamp Lifetime - 2000 Hours
  - i.) At average burning time of 10 Hours per day relamping can be expected at periods of 9 to 12 months
- b.) Depending upon beam spread selected (available - 6 degree, 14 degree, 27 degree, 32 degree, 40 degree, 60 degree - in 50 watt MR16 lamp) light pattern can be from extremely narrow spot to very wide flood
- c.) Lighting distances - (to 5 footcandle level - approx. 5 X full moonlight level)
  - i.) 14 degree (EXT Narrow Spot) 65 Feet
  - ii.) 27 degree (EXZ Narrow Flood) 23 Feet
  - iii.) 40 Degree (EXN Flood) 14 Feet
- d.) Lamp Color Temperature - 3050 K
- e.) Color Rendering Index (CRI) - 99th (percentile)
- f.) Heavy Gauge Formed and Machined and Extruded Aluminum

3.) Individually Transformer Equipped Low Voltage MR16 Fixtures (Downlights mounted in trees)
- a.) Electronic transformer is mounted in weather proof Bell Box at base of tree

a.) Nature of yard at many projects necessitate a Line Voltage Wiring System to Most of the Yard Area

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