2023-527A

City of
Gainesville

PEDESTRIAN LIGHTING STUDY

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1.0 INTRODUCTION

The City of Gainesville is characterized by its tree-lined streets and historic buildings. The City has prioritized the installation of pedestrian lighting to complement the aesthetic appeal of the City and enhance safety of vulnerable users. It has been shown that increased lighting has safety benefits and creates an environment where pedestrians and bicyclists feel safer using public right-of-way facilities at night. This study utilizes light fixtures approved by Gainesville Regional Utilities (GRU) to model pedestrian lighting in different context areas within the City to establish safe, cost-effective, and achievable lighting criteria for sidewalks.

2.0 PURPOSE AND NEED

The purpose of this analysis is to recommend achievable and safety-focused pedestrian lighting criteria that is compatible with the City's tree-centric philosophy. Several meetings were held with the City and the Gainesville Police Department (GPD) to discuss the goals of this study and some of the challenges that the City is facing with lighting. Some topics of discussion were:

- There are no specific lighting criteria for sidewalks outlined in the City's Land Development Code (LDC)
- Developers are building new infrastructure and are not lighting the public sidewalks as part of their project
- Trees are planted too close to light poles, blocking the light emitted from the fixture
- Large trees mature over time and their canopy/branches block light emitted from the fixture
- GPD has observed a decrease in crime-related issues in areas within the City after installing pedestrian-level lighting.

Another major theme of the conversation with stakeholders was safety of pedestrians and Crime Prevention through Environmental Design (CPTED). CPTED is an approach to infrastructure and facility design that focuses on creating a safe environment and reducing crime. Lighting is a major component of the CPTED approach and is a focus within the City of Gainesville. A few of the CPTED principles and their relationship to landscaping and lighting are summarized below:

- Natural Surveillance – aims to increase visibility in spaces by way of building design, orientation, windows, landscaping, and lighting.
- Natural Access Control – uses sidewalks, lighting, and walkways to direct pedestrians where they need to go.
- Maintenance – Using low maintenance lighting and landscaping features to assist with the other pillars of CPTED.

Documents were provided by the City to show actions that other municipalities are taking to improve pedestrian safety with lighting and CPTED. Some of the highlights from these documents are summarized below:

- The City of Tampa, Florida established a Westshore Overlay District that is required to meet specific infrastructure standards for design and development. CPTED principles and enhanced pedestrian lighting are a focus within the district.

- Broward County, Florida issued an Ordinance requiring at least two (2) public works staff members to be CPTED trained. They also required that site plans and plat approvals undergo CPTED review.
- The City of Grand Rapids, Michigan issued an Ordinance centered around implementing CPTED principles with design. This Ordinance outlines specific lighting criteria that should be met for several different types of facilities. There are also details on a timeline in which the City should have all lighting compliant with the new policy.
- The City of Seattle, Washington published a Pedestrian Lighting Citywide Plan that identified specific areas of priority for pedestrian lighting within the City. It narrowed down the top 10 projects to be included in the future Capital Improvement Plan. Other highlights of this plan were:
    - The plan recommended limiting the light fixture selection within the City to only a few fixtures.
    - It set a goal for the City to evaluate their lighting as technologies change over time.
    - It outlined a plan for tree maintenance and emphasized the importance of trimming trees near light poles.

2.1 FIELD REVIEW

A field review was conducted on August 4, 2022 around 9:00 PM. A member of the Gainesville Police Department (GPD) and a member of the City of Gainesville Public Works Department were in attendance during the site visit. Several locations within the City were observed for night-time lighting conditions. Some highlights and observations made during the site visit are summarized below.

Figure 1 shows an example of an urban area with good uniform lighting near the University of Florida campus. Results showed that the sidewalk was illuminated to 2.0-2.5 footcandles.

Figure 1: Uniform Lighting on University of Florida Campus Near Fletcher Hall (W University Ave and Buckman Drive)

Light poles in the Bed and Breakfast District were spaced further apart than those on the University of Florida campus (see **Figure 2**), but the lighting helped improve safety in the area.

Figure 2: Bed and Breakfast District Lighting (Near 300 SE 7th Street)

Pedestrian light poles in more of a suburban neighborhood as shown in **Figure 3** were spaced even further apart and were supplemented by roadway lighting.

Figure 3: Suburban-Type Development Pedestrian and Roadway Lighting (Near 800 SW 3rd Street)

Lighting along SW Depot Avenue was consistent and uniform in areas without trees as shown in **Figure 4**. This lighting was both pedestrian-level and roadway lighting.

Figure 4: Uniform Lighting Along SW Depot Avenue (Near SW 3rd Street)

Pedestrian lighting along University Avenue in areas with large trees were observed to operate well under the trimmed tree canopy as shown in **Figure 5**.

Figure 5: University Avenue Pedestrian Lighting and Trees (Near 200 E University Avenue)

Newer light poles along Main Street offer both pedestrian and roadway lighting on the same pole as shown in **Figure 6**.

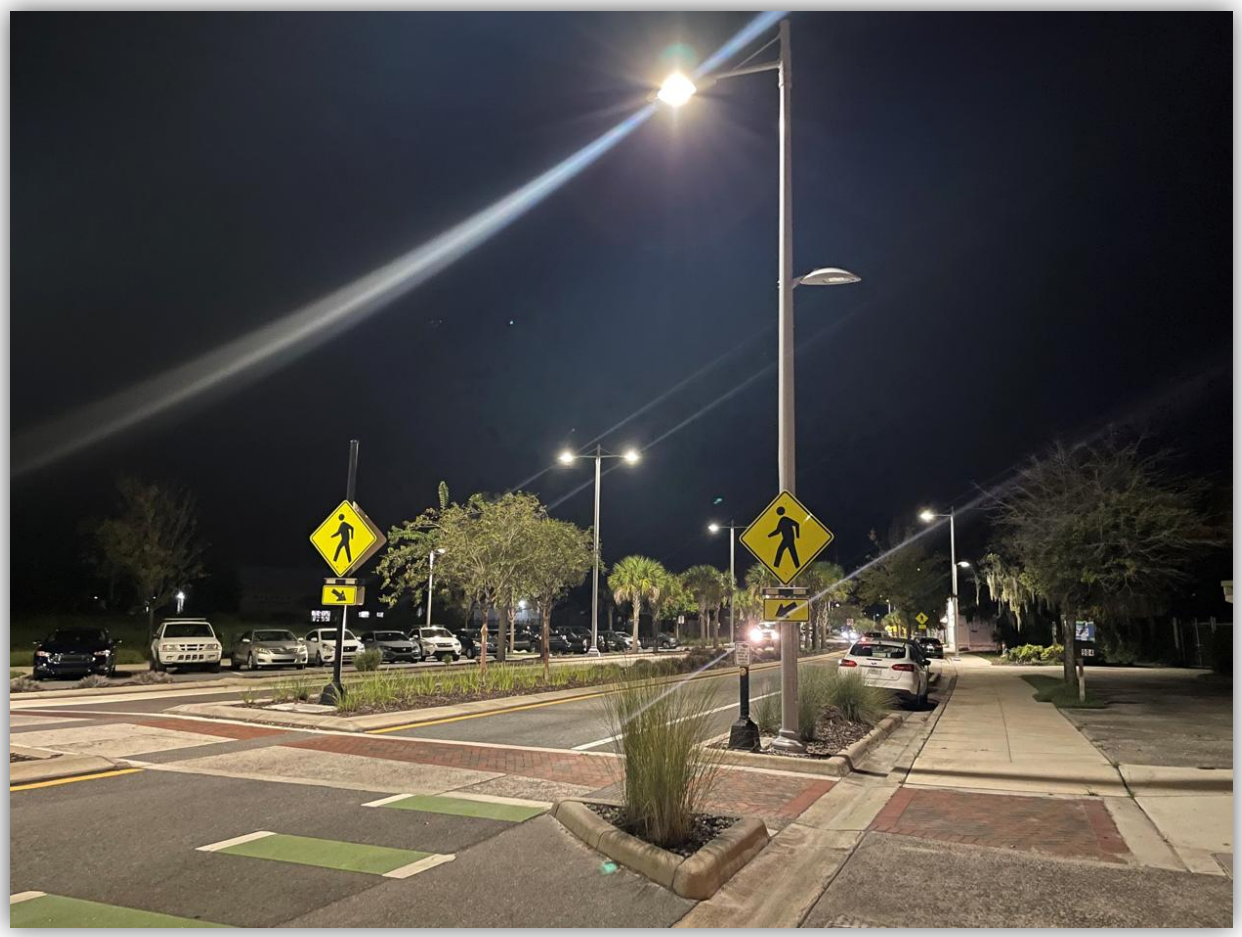


Figure 6: Main Street Pedestrian and Roadway Lighting on a Single Pole (Near 900 S Main Street)

While there were many areas within the City with great pedestrian lighting, there were also areas in need of improvement. Because different context areas within the City have different lighting needs, three (3) typical sections were developed to use in the lighting analysis.

3.0 CONTEXT AREAS

In order to establish pedestrian lighting standards unique to the City of Gainesville, it is important to understand typical layouts of different context areas within the City. Three (3) typical sections representative of these context areas were developed through coordination with the City of Gainesville and are generally based on transect information included in the City's LDC. Sidewalk widths shown in these typical sections were used as the basis of the lighting analysis. The three (3) typical sections are:

- Urban Area
- Historical Neighborhood
- Suburban-Type Development

3.1 URBAN AREA

The Urban Area typical section is shown in **Figure 7**. This typical section is consistent with the "Storefront" street description in Chapter 30 of the City's LDC where there is high pedestrian activity, high density residential and commercial-type uses, and a private zone that is often used for dining or building entrances. The Urban Area typical section has the widest sidewalk at 10 feet in width. The landscape zone is assumed to be 5-feet wide.

Figure 7: Urban Area Typical Section

3.2 HISTORICAL NEIGHBORHOOD

The Historical Neighborhood typical section is shown in **Figure 8**. This typical section is consistent with Urban Zones 2-5 as described in the Transect Section 30-4.11 of the City LDC. This context area assumes an urban residential environment where single family houses and offices or retail could exist along the same street. Both the sidewalk and the landscape zones in the Historical Neighborhood typical section are 6-feet wide.

Figure 8: Historical Neighborhood Typical Section

3.3 SUBURBAN-TYPE DEVELOPMENT

The Suburban-Type Development typical section is shown in **Figure 9**. This typical section is consistent with Urban Zone 1 as described in the Transect Section 30-4.11 of the City LDC. Streets in this area are primarily residential in nature. Both the sidewalk and the landscape zones are 5-feet wide.

Figure 9: Suburban-Type Development Typical Section

4.0 EXISTING LIGHTING CRITERIA

There are many publications and standards available that recommend lighting criteria for different applications. In Florida, the *FDOT Florida Design Manual* (FDM) and the *Florida Greenbook* are the most commonly used standards in lighting practice and design. The Illuminating Engineering Society of North America (IESNA or IES) has multiple recommended practice publications with lighting information that has been studied and researched. Many state and local municipality standards are based on IES criteria. The recommended practice publication from IES for lighting along roadways is *IES RP-8-21 - Lighting Roadway and Parking Facilities*. There are many other lighting manuals, studies, criteria, and publications available but for the purposes of this study, the FDM, Florida Greenbook, and IES RP-8-21 will be used as the basis for analysis.

Lighting design software is used to calculate how much light is falling on a surface. The software creates a grid of points in a user specified polygon. Each point measures the amount of light falling on the surface. Lighting analysis often looks at the average of the point values across the polygon for a comprehensive understanding of how well the surface is illuminated. There are several different criteria to consider when analyzing light levels. Horizontal illumination is measured in average footcandles (fc). A footcandle is the amount of light falling on a 1 square-foot area of wall space if a candle was held 1-foot away from the wall itself. Horizontal measurements are taken using the illuminance method, which measures the amount of light falling on a horizontal surface at ground level. A higher average footcandle measurement indicates a brighter area. A lower average footcandle measurement indicates a darker area.

Vertical illumination is measured by the amount of light at a point approximately 5 feet (or 1.5 m) above the ground. Vertical illumination is also measured as a unit of average footcandles, however, this study will be primarily focused on horizontal illumination.

There are also uniformity ratios associated with lighting criteria. These uniformity ratios help to describe how uniform the distribution of light is across a specific analysis area. Average to minimum (avg/min) and maximum to minimum (max/min) are the two ratios that describe how uniform light is across a surface. The avg/min ratio takes the average footcandle measurement across an analysis area and compares it to the minimum value given in the same analysis area. A high avg/min ratio would indicate that there is a large difference between the average value and the minimum lighting value (less uniform). The max/min ratio takes the maximum footcandle measurement and compares it to the minimum footcandle measurement. Lower uniformity ratios are desired because these indicate that lighting is uniform (i.e. there is less of a difference between either the average and minimum values or the maximum and minimum values). A 1:1 uniformity ratio would be a perfect scenario, meaning that the average value (or maximum value) is equal to the minimum value in the grid analysis area. Uniformity is important because dark spots (low minimum values) and bright spots (high maximum values) can be disorienting for both vehicles and pedestrians.

Table 1 summarizes pedestrian lighting criteria, standards, and recommendations from the FDOT FDM [1](Table 231.2.1), the Florida Greenbook[2] (Chapter 6, Table 6-2), and IES RP-8-21 [3](Table 11-2).

Table 1: Pedestrian Lighting Criteria Summary

Source	Title	Average Horizontal Footcandles	Average Vertical Footcandles	Uniformity Ratio (avg/min)	Uniformity Ratio (max/min)
FDOT	Sidewalks and Shared Use Paths	2.5	N/A	4:1 or less	10:1 or less
Florida Greenbook	Commercial	1.3	N/A	3:1	N/A
	Intermediate	0.8	N/A	4:1	N/A
	Residential	0.4	N/A	6:1	N/A
IES RP-8-21	High Ped Activity	0.9	0.5	5:1	N/A
	Medium Ped Activity	0.5	0.2	5:1	N/A
	Low Ped Activity	0.2	0.1	10:1	N/A

Lighting criteria outlined in **Table 1** is organized in order of highest average required horizontal footcandle to lowest average required horizontal footcandle. As shown, the FDOT FDM has the highest required standard for average horizontal footcandles, and the IES publications have the lowest required standards for average horizontal footcandles.

The IES recommendations are organized by level of pedestrian activity. As stated in IES RP-8-21 Section 11.3.2, “If pedestrian volume is not known, then “medium” activity should be assumed unless land use and density meet the criteria for high or low.”

[1] Florida Department of Transportation. (2022, January 1). FDOT Design Manual. FDOT. Retrieved August 30, 2022, from https://www.fdot.gov/roadway/fdm/default.shtm

[2] Florida Department of Transportation. (2018). Chapter 6. In Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (2018th ed., pp. 6–1-6–17). essay, FDOT. Retrieved August 30, 2022, from https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/roadway/floridagreenbook/2018-florida-greenbook.pdf?

[3] Illuminating Engineering Society. (2021). (publication). Recommended Practice: Lighting Roadway and Parking Facilities (pp. 1–1-GL-4). New York, NY: Illuminating Engineering Society.

5.0 EXISTING CONDITIONS AND CODE REQUIREMENTS

Lighting field conditions within the City of Gainesville were evaluated on Thursday, August 4, 2022. Several different locations with and without pedestrian-level lighting were sampled. One of the challenges that the City faces is the interaction between trees and light poles. There were many scenarios observed in the field where a light pole was installed near a tree and the canopy restricted the light from reaching the areas in which it was intended to serve. This creates shadows, dark spots, and reduced light uniformity.

5.1 LIGHTING

The City of Gainesville Land Development Code (LDC) has some detail regarding lighting standards for new development. A bullet point summary from Section 30-6.12 of the LDC are included below and are primarily focused on lighting requirements within public right-of-way spaces:

- Fixture placement and orientation shall minimize light trespass and glare onto adjacent properties
- Use fully shielded full-cutoff fixtures
- Light poles should be placed in locations that avoid conflicts with trees
- Lighting shall conform with standards published by the IES.
- Light trespass shall not exceed:
    - 1.0 footcandles for non-residential and multi-family sites
    - 0.5 footcandles for residential sites
    - 0.4 footcandles for nature parks
    - 5.0 footcandles for public and private streets

As shown in the above summary, the City's Code does not specify lighting requirements for pedestrian facilities. The code mentions that lighting should conform with IES. These IES standards are referenced in Section 4.0 of this report and were used as a basis in this analysis.

5.2 TREES

The City's LDC states that trees should be spaced between 30 and 50-feet apart but at a minimum of 25-feet and at a maximum of 60-feet. The minimum tree height within the City's Code is 7-feet. In urban areas, the City aims to trim tree canopies to at least 10-feet above ground. The recommended spacing between trees and light poles in the LDC is 10-feet. **Figure 10** illustrates City tree and light pole spacing requirements

Figure 10 City Tree and Light Pole Spacing Requirements

5.3 GRU LIGHT FIXTURES

GRU has two (2) pedestrian lights included in their Lighting Catalog. The GRU Lighting Catalog is dated April 9, 2020 and is included as **Appendix C**. The first pedestrian light available is an LED Small Pendant Pedestrian Light manufactured by Cyclone Lighting as shown in **Figure 11**. This fixture is available in a range from 40-60 watts. It is specified as a 3000K fixture with a Type II distribution. This fixture is mounted on a 19-inch long bracket at a height of 12-feet above the ground. The IES file name used for analysis is SY21P1-FGC-2-40W-3K.ies.

The second pedestrian light is a 67-watt LED Acorn Pedestrian Light also manufactured by Cyclone Lighting. This fixture is shown in **Figure 11**. It is mounted at a 10-foot pole, has a Type III distribution, and is 3000K. The IES file name used for analysis is AG10T4C-VS3AR-3-50W-3K-120-F30-PTDR-BK-TXCP6115.ies.

Figure 11: GRU Small Pendant Pedestrian Light (Left), and GRU Acorn Pedestrian Light (Right)

5.4 NEW PEDESTRIAN LIGHT FIXTURE

As discussed in Section 5.3, GRU has two (2) pedestrian light fixtures available for use within the City. These fixtures are specific to the poles available in the GRU Lighting Catalog, which limits their placement to locations where a standalone pole can be installed. Existing utilities, infrastructure, and trees within the City often restrict placement opportunities for new standalone light poles. Thus, the City expressed a desire to include an additional pedestrian light fixture that can be mounted to an existing pole. This fixture will be coordinated with GRU to ultimately be incorporated into their Lighting Catalog.

Pedestrian fixtures are typically mounted no higher than 20-feet. Based on discussions with GRU, existing overhead utility poles cannot be used to mount these pedestrian fixtures because the area on the pole at 15-20-feet is reserved for other uses. Therefore, these fixtures can only be mounted on existing poles that are not used for overhead utilities.

Two fixtures were considered for recommendation to GRU:

1. Autobahn ATB Micro
2. Lumec Capella

These fixtures were modeled at a 70’ spacing across the Urban Area Typical Section to compare their performance capabilities. Both fixtures were a Type II distribution at 37W. They were modeled at a 15-foot mounting height and a 2-foot bracket arm length. Their photometric shapes are shown in **Figures 12 and 13**. These figures are provided to show the shape of light and coverage projected from the fixture.

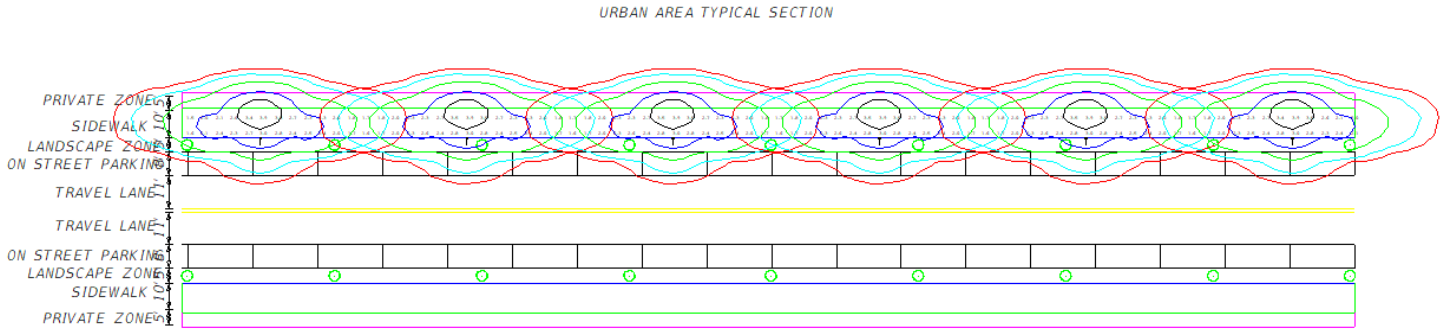


Figure 12: ATB Micro Fixture at a 70’ Spacing

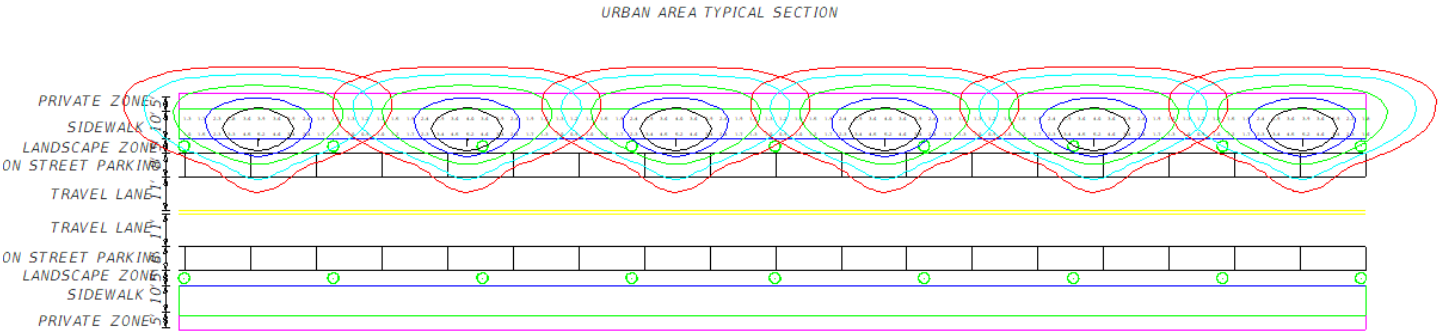


Figure 13: Capella Fixture at a 70’ Spacing

The photometric results of the fixture comparison at the 70' spacing are shown in **Table 2** below.

Table 2: Fixture Performance Comparison at 70' Spacing

Fixture	Typical Section	Mounting Height	Bracket Arm Length	Avg (fc)	Avg/min	Max/Min
Autobahh ATB Micro	Urban	15 feet	2 feet	2.40	1.60	2.60
Lumec Capella				2.45	2.72	5.78

As shown in the table, both fixtures operate similarly under the same conditions. The Capella was shown to have a slightly higher average illuminance over the Autobahn.

Upon coordination with GRU and the City, the Capella light fixture by Lumec was chosen as the fixture to further analyze in this report. This fixture is already used in several locations throughout the City and has several wattage options that allow it to be retrofitted to an existing pole at a lower mounting height. The fixture specification sheet is included in **Appendix E**.

The specifications selected for the Capella pedestrian fixture are:

- Wattage: 37W
- Color Temperature: 3000K
- Distribution Type II

For the purposes of this analysis, the Capella fixture was assumed to be mounted at a 15-foot mounting height using a 2-foot long bracket arm.

6.0 LIGHTING ANALYSIS

As discussed, the goal of this study is to develop pedestrian lighting standards that are achievable with the available fixtures and can be met with the tree requirements in the City's Code. The pedestrian lighting criteria developed in this study is specific to sidewalks separate from the roadway. A series of analyses were run to model each pedestrian-level light along each of the three typical sections.

Since trees are such an important part of the City's landscape, it is important to consider the impact to lighting as a result of tree planting and growth. According to the IES RP-8-21, "Light loss of 10% to 20% to be included in design when new or existing trees are in close proximity to the lighting." Based on IES research, a light loss factor (LLF) of 0.85 was used in this analysis. This means that the fixtures were modeled to perform at 85% of their normal capacity. Thus, the results of the analysis will be conservative and achievable.

6.1 LIGHT POLE SPACING AND PERFORMANCE ANALYSIS

Two analysis strategies were used to evaluate the performance capabilities of the available light fixtures in GRU's Lighting Catalog and the new Capella light fixture. The two strategies are listed below with a brief explanation.

Interval Spacing Analysis

The available light fixtures in GRU's Lighting Catalog were modeled using AGi32 software at 10-foot pole spacing intervals from 40-feet to 70-feet to better understand how the fixtures perform across the three typical sections. Due to the large amount of data processed as part of this study, results are included as **Appendix A** and a summary of findings is included by typical section in subsequent sections.

The Capella light fixture was modeled at 10-foot pole spacing intervals from 65-feet to 95-feet because it will be mounted higher up than the other two pedestrian light fixtures. Results are included as **Appendix A**.

Optimized Spacing Analysis

Light pole spacing was optimized using AGi32 software to evaluate the pole spacing required to meet FDOT, Florida Greenbook, and IES criteria. Results of this analysis are included as **Appendix B**.

As previously mentioned, observations made from the data are broken down in subsequent sections by typical section.

6.2 URBAN AREA

Interval Spacing Analysis

Observations from the urban interval spacing analysis data for the acorn and pendant pedestrian lights are:

- Average footcandle values at a 40' spacing were high at 4.71 fc (pendant) and 3.88 fc (acorn)
- Average footcandle values at 70' spacing were more consistent with FDOT criteria at 2.84 fc (pendant) and 2.34 fc (acorn)
- The highest avg/min uniformity ratio was with the 70' spacing in the pendant light at 5.68:1, and in the acorn light at a 40' spacing at 4.31:1
- Highest max/min uniformity ratio was at 70' spacing with both the pendant light and the acorn light at 13:1, and 8.33:1, respectively.

These results prove that the two fixtures perform differently across the same analysis zone. The appropriate pole spacing will vary from fixture to fixture, but this analysis shows what types of values these fixtures are able to meet under ideal conditions.

The interval spacing analysis for the Capella light fixture showed that average footcandle values at a 65' spacing yielded results closest to FDOT criteria at 2.56 fc. As the spacing increases from 65', the average value does not drop drastically (1.78 fc at 95' spacing), but the uniformity ratios have more variation.

Optimized Spacing Analysis

Using the three criteria already established by FDOT, Florida Greenbook, and IES (see **Table 1**), an optimizer tool was run using the urban area typical section and the available GRU light fixtures. This tool runs iterations using a specific fixture and mounting height to return the best light pole spacing under the criteria set in the tool. For example, the pendant light was used at a 12' mounting height along the urban area sidewalk width of 10'. FDOT criteria was input into the tool and results showed that the pendant light should be spaced at 58' between poles to satisfy that criterion. General observations from the urban area optimizer are summarized below:

- The pendant light requires closer spacing than the acorn light to meet all standards
- Uniformity ratios from the pendant light output were generally higher than those from the acorn light
- The required spacing for the pendant light to meet criteria was, on average, 50'
- The required spacing for the acorn light to meet criteria was, on average, 65'
- The required spacing for the Capella light to meet criteria was, on average, 75'. It should be noted that a 2' setback was assumed in the optimizer (all typical sections) for the Capella light since this light fixture will be used in retrofit scenarios where poles may not be placed directly adjacent to a sidewalk.

6.3 HISTORICAL NEIGHBORHOOD

Interval Spacing Analysis

Observations from the historical neighborhood interval spacing analysis data are:

- Average values at a 40’ spacing were highest (pendant: 4.99 fc, acorn: 4.03 fc), consistent with the urban area results
- Average values at a 70’ spacing were the lowest (pendant: 3.01 fc, acorn: 2.42 fc)
- The highest avg/min uniformity ratio was with the 40’ spacing in both lights (pendant 5.54:1, acorn 5.04:1)
- Highest max/min uniformity ratio was at 70’ spacing with both the pendant light and the acorn light at 12:1, and 7.67:1, respectively.
- Average values for the Capella light were relatively consistent across the different interval scenarios. For example, the average at a 65’ spacing was 2.69 fc and the average at an 85’ spacing was 2.18 fc.
- The max/min uniformity ratio for the Capella light exceeds 10:1 at a 95’ spacing (12.50:1)

Optimized Spacing Analysis

Optimizer spacing results from the historical neighborhood typical section are:

- The optimizer returned an outlier of a 29’ spacing for the acorn light under FDOT criteria, however, this spacing yields a high average value of 4.48 fc. The avg/min uniformity ratio appears to be the limiting factor under this condition as it is close to the FDOT 4:1 max at 3.93:1.
- Required pendant light spacing under the historical neighborhood typical section was 52’ on average.
- The required spacing for the Capella light to meet criteria was, on average, 72’.

6.4 SUBURBAN-TYPE DEVELOPMENT

Interval Spacing Analysis

Observations from the suburban-type development interval spacing analysis data are:

- Average values at a 40’ spacing were highest (pendant: 4.64 fc, acorn: 3.95 fc), consistent with the urban area results
- Average values at a 70’ spacing were the lowest (pendant: 2.81 fc, acorn: 2.38 fc)
- The highest avg/min uniformity ratio was with the 70’ spacing in the pendant light at 5.62:1, and in the acorn light at a 40’ spacing at 4.39:1
- Highest max/min uniformity ratio was at 70’ spacing with both the pendant light and the acorn light at 13.4:1, and 7.83:1, respectively.
- Similar consistencies to the historical typical section in average values were observed in the suburban typical section with an average value of 2.66 fc at a 65’ spacing and 2.15 fc at an 85’ spacing
- The avg/min and max/min uniformity ratios are high in the 95’ spacing at 6.23:1 and 17:1, respectively.

Optimized Spacing Analysis

Optimizer spacing results from the suburban-type development typical section are:

- Similar to the historical neighborhood typical section, the optimizer returned an outlier spacing of 30’ for the acorn pedestrian light under FDOT criteria. This close spacing would yield an average value of 4.09 fc. The avg/min at 3.97:1 is the limiting factor in this scenario as it is close to the required 4:1 maximum.
- The average required pendant light spacing under this typical section was 52’.
- The required spacing for the Capella light to meet criteria was, on average, 72’.

7.0 RECOMMENDATIONS

Results of the analyses in Section 6.0 of this report were combined with field observations and feedback from the City/GPD to develop pedestrian level lighting recommendations for sidewalks separate from the roadway. **Table 3** summarizes these recommendations, along with typical pedestrian-level light pole spacing required to meet these criteria and suggested roadway lighting criteria based on existing standards.

Table 3: Lighting Criteria Recommendations

Context Area	Pedestrian Lighting Criteria Sidewalks[1]			Typical Pedestrian Light Pole Spacing (ft)[2]		Roadway Lighting Criteria[3]		
	Average (fc)[4]	Avg/min	Max/min	GRU Pendant Pedestrian Light	GRU Acorn Pedestrian Light	Average (fc)[4]	Avg/min	Max/min
Urban Area	2.0	4:1 or Less	10:1 or Less	40-60'	60-80'	1.2	3:1 or Less	N/A
Historical Neighborhood	1.3	5:1 or Less	N/A	40-60'	60-80'	0.8	4:1 or Less	N/A
Suburban-Type Development	1.0	6:1 or Less	N/A	50-70'	70-90'	0.4	6:1 or Less	N/A

[1]Criteria applies to sidewalks separate from the roadway. In locations where sidewalks are directly adjacent to the roadway, it is recommended to use the roadway lighting criteria.

[2]Spacing of light poles may be outside of this range as long as the recommended criteria is met.

[3]Roadway lighting criteria is consistent with the 2018 Florida Greenbook - Chapter 6, Table 6-2 (Urban: Intermediate Principal Arterial, Historic: Intermediate Collector, and Suburban: Residential Local)

[4]Horizontal footcandles.

Although an interval analysis was performed for the Capella light fixture, spacing recommendations were not added to the "Typical Pedestrian Light Pole Spacing" column of **Table 3**. The Capella fixture will be used primarily in retrofit scenarios where the fixture will be mounted to an existing pole. Therefore, there will be no opportunity to space the fixtures out in an ideal condition.

As noted in the table, the max/min recommendations for the historical neighborhood and suburban-type development typical sections are shown as "N/A". Based on field observations, the max/min uniformity ratio was less likely to be met in the historical neighborhood and suburban-type development areas. These context areas were characterized as having pole spacing that was a bit further apart than in an urban area. These areas also have less dense pedestrian activity than the urban area and are more residential in nature. In order to increase the pole spacing distance in these context areas, it is recommended that a specific max/min ratio is not set. A strict max/min ratio would require a closer pole spacing and will yield an overall higher average value. In a residential area, bright pedestrian lighting can impact the quality of life of the surrounding dwelling units as light could shine into windows at night. As shown in the pole spacing analyses, 70' spacing yielded average values and avg/min uniformity ratios that were acceptable under at least one of the three analysis criteria (FDOT, Greenbook, and IES). However, the max/min uniformity ratio was higher than a typical 10:1 at this spacing for both fixtures.

Typical pole spacing shown is compatible with the City's code requirements for tree spacing (see Section 5.2). Where the ranges exceed the maximum tree spacing requirement of 60', pedestrian level light poles may not need to be placed at a 1:1 ratio with trees. If the illumination requirements are met, the spacing may allow for 1 pedestrian light pole for every 2 trees. The ranges are intended to provide flexibility in design to accommodate constraints such as existing infrastructure and trees.

Urban Area Recommendations

As shown in **Table 3**, the recommended average fc value is 2.0 for the Urban Area typical section. Field observations in different urban settings showed that areas with a 2.0-2.5 average fc range was desired for this context area. As discussed, FDOT criteria for Sidewalks and Shared Use Paths is 2.5 average horizontal fc, however, Florida Greenbook recommends 1.3 fc for commercial uses. Increasing the recommendation to match the 2.5 fc FDOT criteria would require closer spacing of pedestrian poles. Based on the analysis results and the constraints that the City faces with existing infrastructure and trees, it is recommended that the minimum average value be set at 2.0 fc. This recommendation is within the range of different lighting publication recommendations. It is also consistent with the approach to provide pedestrian lighting recommendations that are achievable not only for new construction, but also for retrofit scenarios.

The 4:1 or less avg/min uniformity ratio is consistent with FDOT criteria which is the strictest lighting criteria outlined in this report. Different model scenarios of the available fixtures show that this uniformity ratio is achievable under the analysis conditions.

Historical Neighborhood Recommendations

The recommended average fc value for the Historical Neighborhood typical section matches Florida Greenbook criteria for commercial uses at 1.3 fc. The average value recommendation of 1.3 fc allows for a larger pole spacing distance. During the field visit, historical neighborhood-type areas were observed to be constrained by trees and existing infrastructure. In order for recommended criteria to be achievable, pole placement constraints need to be more flexible. However, when the pole spacing is increased, the uniformity ratios typically increase as well (less uniform light distribution). Thus, the recommended avg/min for the Historical Neighborhood typical section is higher than the Urban Area at 5:1 or less. It should also be noted that house shields are recommended on fixtures placed in residential areas to prevent light spillback into properties. The Capella pedestrian fixture has a house shield option available for use in these scenarios.

Suburban-Type Development Recommendations

Field observations of Suburban-Type Developments were that many of the sidewalks in these areas were served by both pedestrian light poles and ambient light from roadway lighting. The pedestrian fixtures installed in suburban developments were spaced further apart. Bright pedestrian lighting is often not needed in suburban developments because pedestrian activity in these areas typically decreases at night. It is important to provide safe pedestrian lighting that balances cost and is achievable in the setting to which it is intended for. Thus, the recommended average fc value for the Suburban-Type Development typical section is 1.0 fc, which is still higher than any of the pedestrian lighting criteria outlined in the IES publication. The avg/min value was recommended at 6:1 to allow for a greater spacing between light poles.

8.0 COST ANALYSIS

Lighting in the City of Gainesville will be maintained by GRU. The City will pay GRU a rental fee on a per month basis for light fixtures and poles that they maintain on the City's behalf. A brochure of light fixture and pole rental rates were provided from GRU and are included as **Appendix D**. There are two avenues for payment of light poles and fixtures: non-contributed and contributed. The non-contributed rates assume that the monthly cost of the light fixture and pole includes the upfront cost for installation. The contributed rates separate out an upfront construction cost that is paid for separately from the monthly rental rate.

A cost per mile model by fixture type was developed as part of this study and is included as **Tables 4A and 4B**. Roadway lighting was included to give a snapshot of the full cost of lighting a corridor. The roadway fixture chosen was the "LED Roadway 3" light in GRU's External Lighting Catalog. This fixture is manufactured by General Electric as part of their Evolve series. A 35' mounting height and 10' bracket arm was assumed based on information in GRU's catalog. This roadway light fixture was input into AGi32 software to find the optimal pole spacing under the roadway lighting criteria shown in **Table 4A**. Costs shown in the table are "non-contributed rates" from the *GRU Official Public Lighting Catalog* dated October 1, 2022 (see **Appendix D**).

Table 4A: Cost Analysis using GRU Non-contributed Rates

Fixture	Mounting Height	Typical Section	Assumed Light Pole Spacing (ft)[1]	Light Poles Required per Mile[2]	Non-Contributed Monthly				Yearly
					Rental Rate of Fixture (per month)	Rental Rate of Pole (per month)	Total Rental Rate (per assembly, per month)	Monthly Rental Cost per Mile	Yearly Rental Cost per Mile
Pendant Pedestrian Light	12 feet	Urban	50	212	$ 30.50	$ 18.88	$ 49.38	$ 10,468.56	$125,622.72
		Historic	50	212	$ 30.50	$ 18.88	$ 49.38	$ 10,468.56	$125,622.72
		Suburban	60	176	$ 30.50	$ 18.88	$ 49.38	$ 8,690.88	$104,290.56
Acorn Pedestrian Light	10 feet	Urban	70	152	$ 31.19	$ 15.34	$ 46.53	$ 7,072.56	$ 84,870.72
		Historic	70	152	$ 31.19	$ 15.34	$ 46.53	$ 7,072.56	$ 84,870.72
		Suburban	80	132	$ 31.19	$ 15.34	$ 46.53	$ 6,141.96	$ 73,703.52
Capella Light	15 feet	Urban	70	152	$ 31.83	N/A[3]	$ 31.83	$ 4,838.16	$ 58,057.92
		Historic	70	152	$ 31.83	N/A[3]	$ 31.83	$ 4,838.16	$ 58,057.92
		Suburban	80	132	$ 31.83	N/A[3]	$ 31.83	$ 4,201.56	$ 50,418.72
GE Evolve Roadway Light	35 feet	Urban	135	80	$ 18.51	$ 9.98	$ 28.49	$ 2,279.20	$ 27,350.40
		Historic	215	50	$ 18.51	$ 9.98	$ 28.49	$ 1,424.50	$ 17,094.00
		Suburban	250	44	$ 18.51	$ 9.98	$ 28.49	$ 1,253.56	$ 15,042.72

[1] Light pole spacing applies to one side of the roadway.

[2] Assumes pedestrian lighting on both sides of the roadway and roadway lighting staggered on each side.

[3] Capella light to be mounted to existing poles.

GRU Contributed rates were estimated based on coordination directly with GRU and are detailed in **Table 4B**. These rates were estimated in February 2023 but are expected to change often. A summary of GRU coordination is included in **Appendix D**.

Table 4B: Cost Analysis using GRU Contributed Rates

Fixture	Mounting Height	Typical Section	Assumed Light Pole Spacing (ft)[1]	Light Poles Required per Mile[2]	Estimated Upfront Construction Cost[3] (per assembly)	Estimated Upfront Construction Cost[3] (per mile)	Contributed Monthly				Yearly
							Rental Rate of Fixture (per month)	Rental Rate of Pole[4] (per month)	Total Rental Rate (per assembly, per month)	Monthly Rental Cost per Mile	Yearly Rental Cost per Mile
Pendant Pedestrian Light	12 feet	Urban	50	212	$ 1,713.00	**$363,156.00**	$ 6.23	N/A	$ 6.23	$ 1,320.76	$ 15,849.12
		Historic	50	212	$ 1,713.00	**$363,156.00**	$ 6.23		$ 6.23	$ 1,320.76	$ 15,849.12
		Suburban	60	176	$ 1,713.00	**$301,488.00**	$ 6.23		$ 6.23	$ 1,096.48	$ 13,157.76
Acorn Pedestrian Light	10 feet	Urban	70	152	$ 1,872.00	**$284,544.00**	$ 7.33		$ 7.33	$ 1,114.16	$ 13,369.92
		Historic	70	152	$ 1,872.00	**$284,544.00**	$ 7.33		$ 7.33	$ 1,114.16	$ 13,369.92
		Suburban	80	132	$ 1,872.00	**$247,104.00**	$ 7.33		$ 7.33	$ 967.56	$ 11,610.72
Capella Light	15 feet	Urban	75	142	$ 2,078.00	**$295,076.00**	$ 5.50		$ 5.50	$ 781.00	$ 9,372.00
		Historic	80	132	$ 2,078.00	**$274,296.00**	$ 5.50		$ 5.50	$ 726.00	$ 8,712.00
		Suburban	80	132	$ 2,078.00	**$274,296.00**	$ 5.50		$ 5.50	$ 726.00	$ 8,712.00
GE Evolve Roadway Light	35 feet	Urban	135	80	$ 2,728.00	**$218,240.00**	$ 6.34		$ 6.34	$ 507.20	$ 6,086.40
		Historic	215	50	$ 2,728.00	**$136,400.00**	$ 6.34		$ 6.34	$ 317.00	$ 3,804.00
		Suburban	250	44	$ 2,728.00	**$120,032.00**	$ 6.34		$ 6.34	$ 278.96	$ 3,347.52

[1] Light pole spacing applies to one side of the roadway.

[2] Assumes pedestrian lighting on both sides of the roadway and roadway lighting staggered on each side.

[3] Estimated in February, 2023. Subject to change.

[4] Pole cost included in upfront construction cost.

9.0 CONCLUSION

The goal of this study is to develop pedestrian lighting standards that are achievable with the fixtures in GRU's Lighting Catalog and can be met with the tree requirements in the City's Code. The pedestrian lighting criteria developed in this study is specific to sidewalks separate from the roadway. A series of analyses were run to model each GRU pedestrian-level light along three typical sections:

- Urban Area
- Historical Neighborhood
- Suburban-Type Development

Results of the pedestrian light pole analyses were combined with field observations and feedback from the City/GPD to develop pedestrian lighting recommendations for sidewalks. These recommendations are provided in **Table 3**. A cost analysis was performed for full corridor lighting which includes both roadway and pedestrian-level lighting. The cost per mile information is included in **Tables 4A and 4B**.

APPENDIX A

Interval Spacing Analysis Results

Light Poles at a 40-foot Spacing

Fixture	Typical Section	Mounting Height	Assumed Light Pole Spacing	Avg (fc)	Avg/min	Max/min
GRU Pendant Ped Light	Urban	12 feet	40'	4.71	4.71	6.90
	Historic			4.99	5.54	8.33
	Suburban			4.64	4.64	6.90
GRU Acorn Ped Light	Urban	10 feet	40'	3.88	4.31	6.00
	Historic			4.03	5.04	6.25
	Suburban			3.95	4.39	5.67

Light Poles at a 50-foot Spacing

Fixture	Typical Section	Mounting Height	Assumed Light Pole Spacing	Avg (fc)	Avg/min	Max/min
GRU Pendant Ped Light	Urban	12 feet	50'	3.81	3.81	6.60
	Historic			4.04	4.49	8.11
	Suburban			3.75	3.75	6.70
GRU Acorn Ped Light	Urban	10 feet	50'	3.12	3.47	5.67
	Historic			3.24	4.05	5.88
	Suburban			3.18	3.98	6.00

Light Poles at a 60-foot Spacing

Fixture	Typical Section	Mounting Height	Assumed Light Pole Spacing	Avg (fc)	Avg/min	Max/min
GRU Pendant Ped Light	Urban	12 feet	60'	3.29	3.29	6.60
	Historic			3.48	3.48	7.20
	Suburban			3.24	3.24	6.70
GRU Acorn Ped Light	Urban	10 feet	60'	2.68	2.98	5.56
	Historic			2.79	3.49	5.88
	Suburban			2.73	3.41	5.88

Light Poles at a 70-foot Spacing

Fixture	Typical Section	Mounting Height	Assumed Light Pole Spacing	Avg (fc)	Avg/min	Max/min
GRU Pendant Ped Light	Urban	12 feet	70'	2.84	5.68	13.00
	Historic			3.01	5.02	12.00
	Suburban			2.81	5.62	13.40
GRU Acorn Ped Light	Urban	10 feet	70'	2.34	3.90	8.33
	Historic			2.42	4.03	7.67
	Suburban			2.38	3.97	7.83

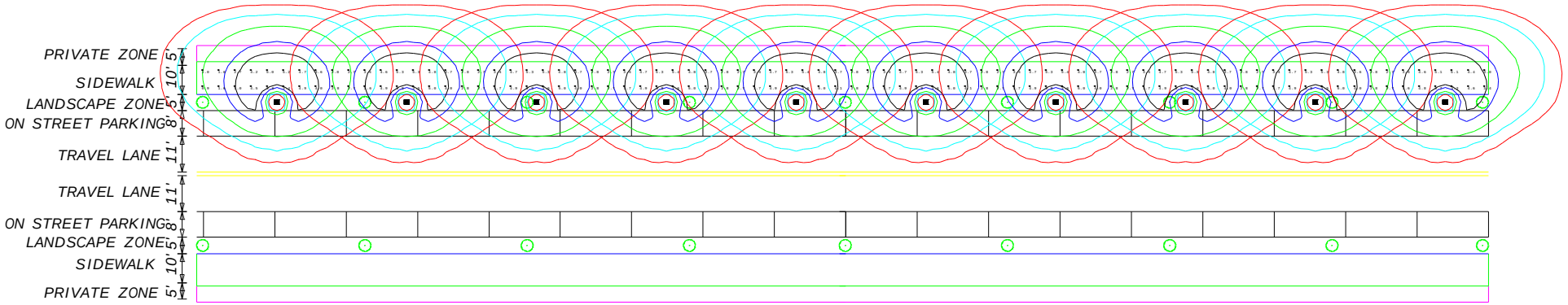
Capella Light Fixture Interval Spacing

Fixture	Typical Section	Mounting Height	Assumed Light Pole Spacing	Avg (fc)	Avg/min	Max/min
Capella Light	Urban	15 feet	65'	2.56	2.56	5.20
	Historic			2.69	2.45	4.55
	Suburban			2.66	2.22	4.25
	Urban		75'	2.25	2.81	6.50
	Historic			2.38	2.64	5.56
	Suburban			2.37	2.96	6.38
	Urban		85'	2.06	4.12	10.40
	Historic			2.18	3.63	8.33
	Suburban			2.15	4.30	10.20
	Urban		95'	1.78	5.93	17.33
	Historic			1.88	4.70	12.50
	Suburban			1.87	6.23	17.00

Calculation Summary
Acorn Pedestrian Light - 40' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	3.88	5.4	0.9	4.31	6.00

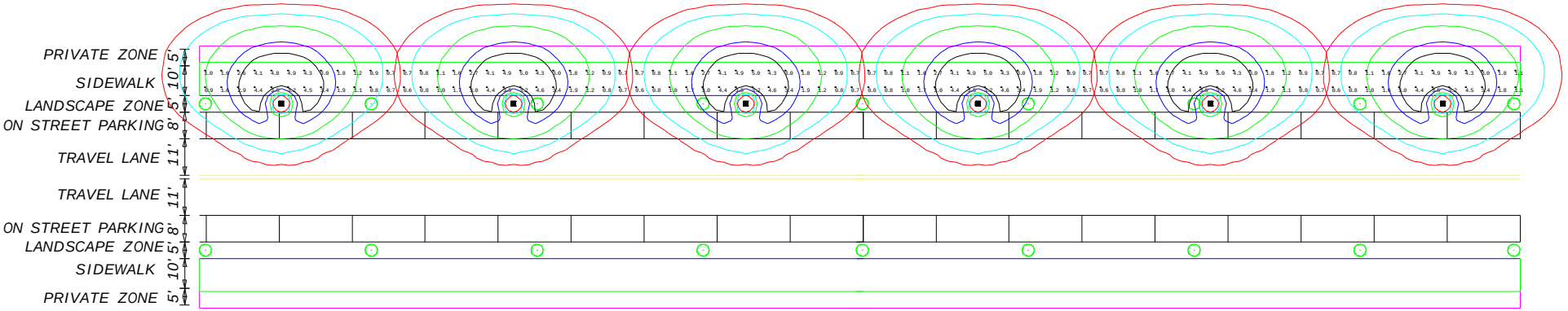
URBAN AREA TYPICAL SECTION



Calculation Summary
Acorn Pedestrian Light - 70' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	2.34	5.0	0.6	3.90	8.33

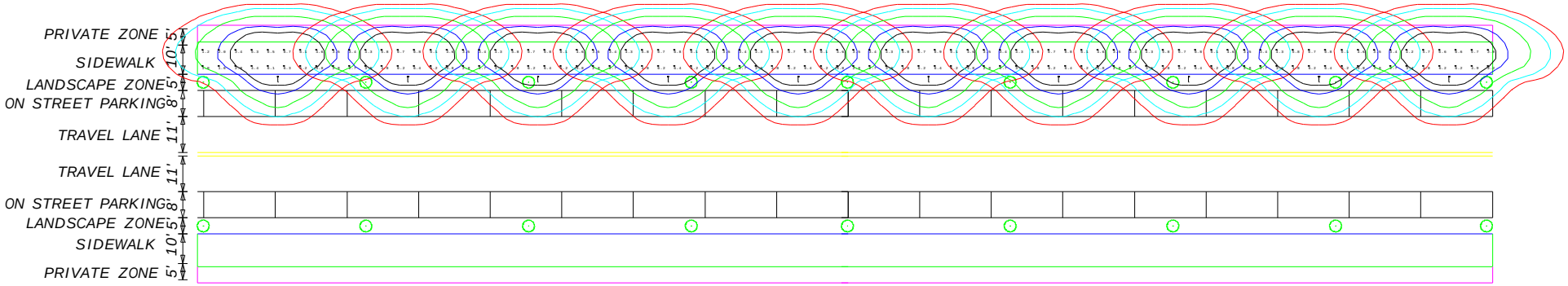
URBAN AREA TYPICAL SECTION



Calculation Summary
Pendant Pedestrian Light - 40' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	4.71	6.9	1.0	4.71	6.90

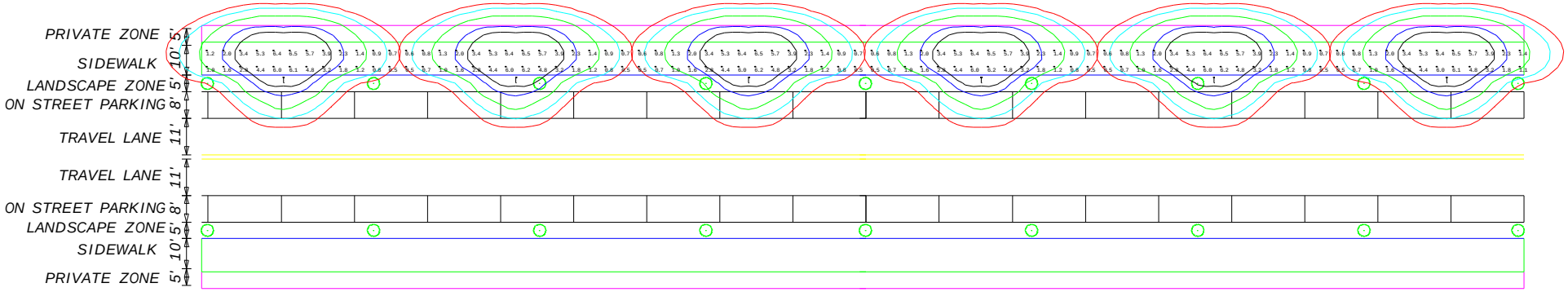
URBAN AREA TYPICAL SECTION



Calculation Summary
Pendant Pedestrian Light - 70' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	2.84	6.5	0.5	5.68	13.00

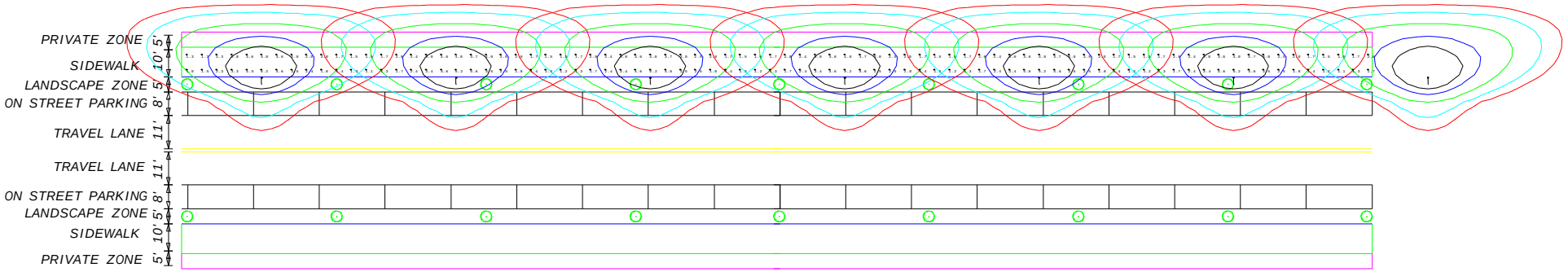
URBAN AREA TYPICAL SECTION



Calculation Summary
Capella Pedestrian Light - 65' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	2.56	5.2	1.0	2.56	5.20

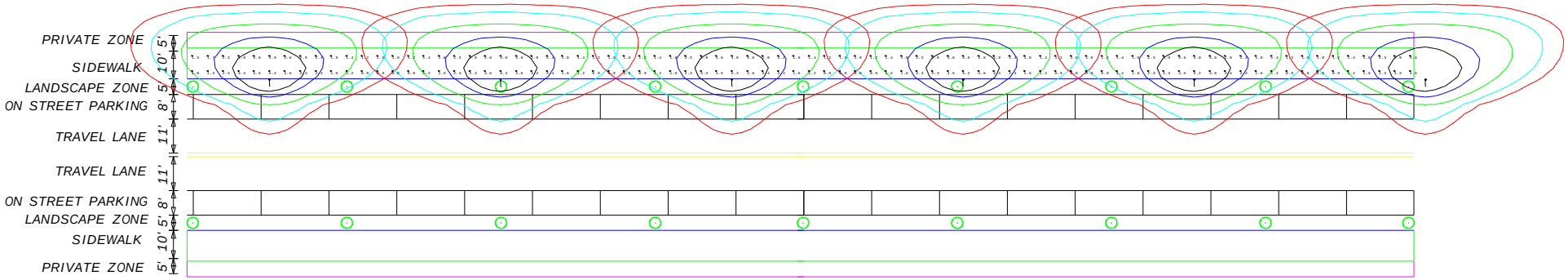
URBAN AREA TYPICAL SECTION



Calculation Summary
Capella Pedestrian Light - 75' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	2.25	5.2	0.8	2.81	6.50

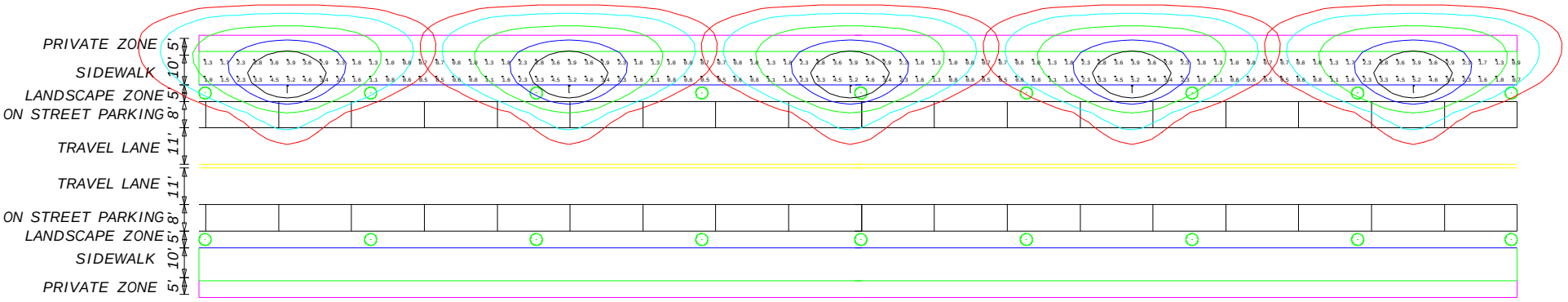
URBAN AREA TYPICAL SECTION



Calculation Summary
Capella Pedestrian Light - 85' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	2.06	5.2	0.5	4.12	10.40

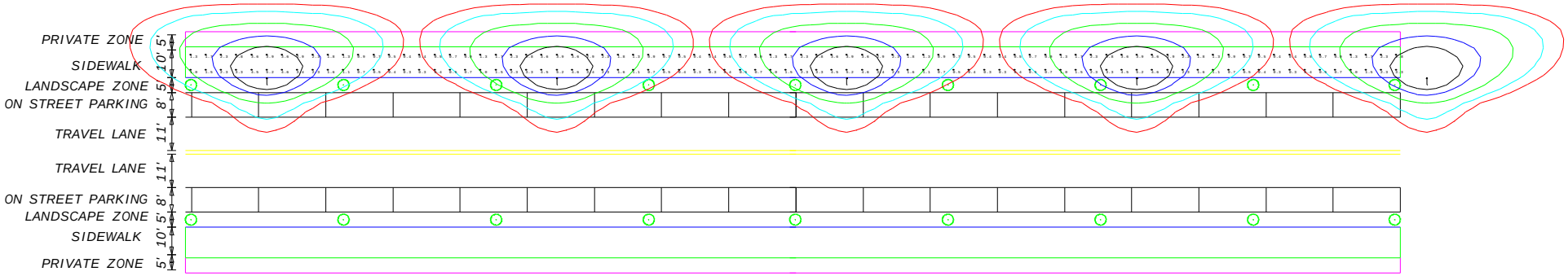
URBAN AREA TYPICAL SECTION



Calculation Summary
Capella Pedestrian Light - 95' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	1.78	5.2	0.3	5.93	17.33

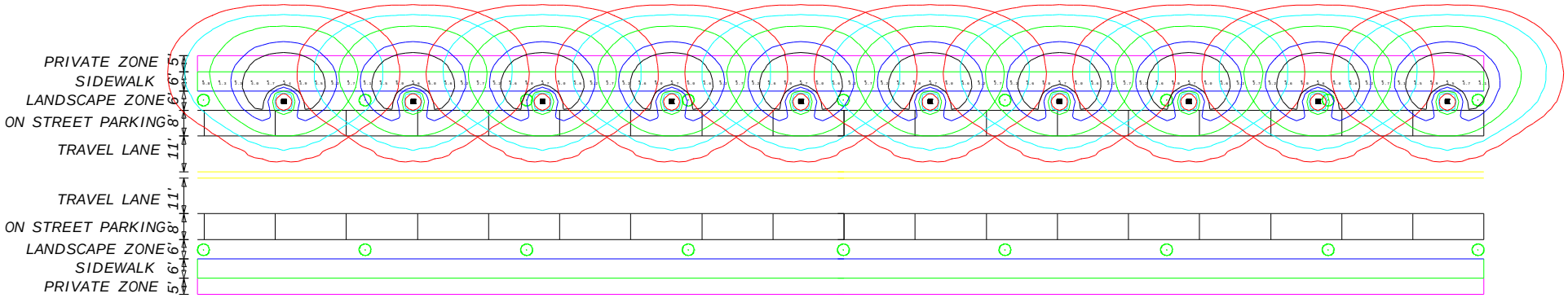
URBAN AREA TYPICAL SECTION



Calculation Summary
Acorn Pedestrian Light - 40' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	4.03	5.0	0.8	5.04	6.25

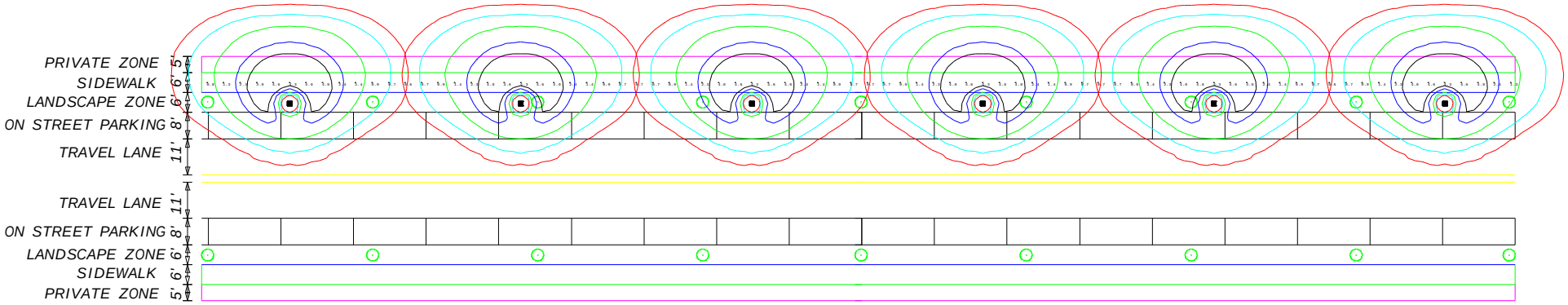
HISTORICAL NEIGHBORHOOD TYPICAL SECTION



Calculation Summary
Acorn Pedestrian Light - 70' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	2.42	4.6	0.6	4.03	7.67

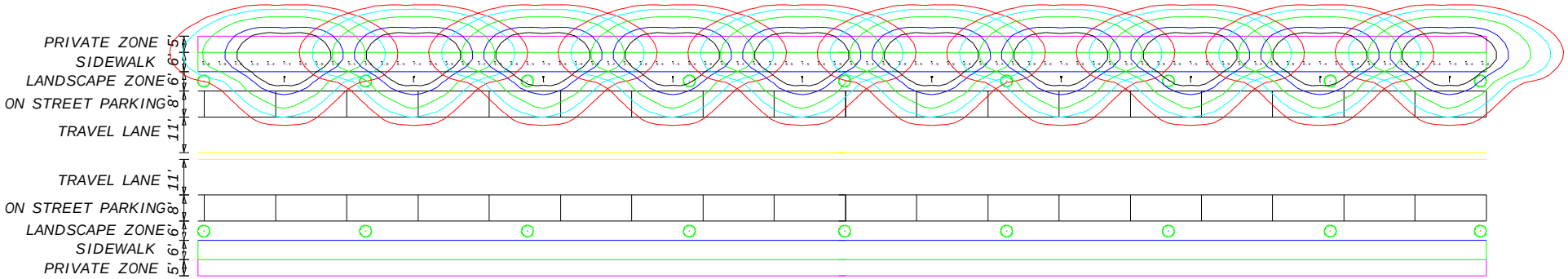
HISTORICAL NEIGHBORHOOD TYPICAL SECTION



Calculation Summary
Pendant Pedestrian Light - 40' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	4.99	7.5	0.9	5.54	8.33

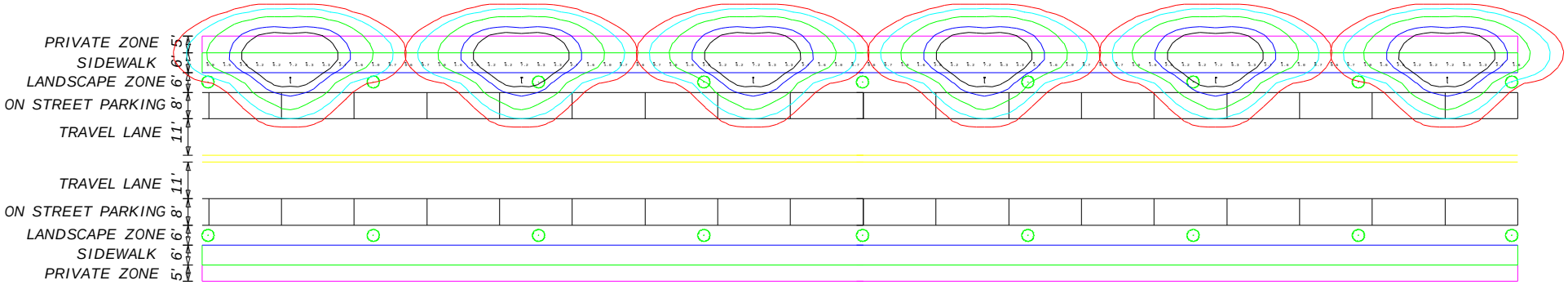
HISTORICAL NEIGHBORHOOD TYPICAL SECTION



Calculation Summary
Pendant Pedestrian Light - 70' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	3.01	7.2	0.6	5.02	12.00

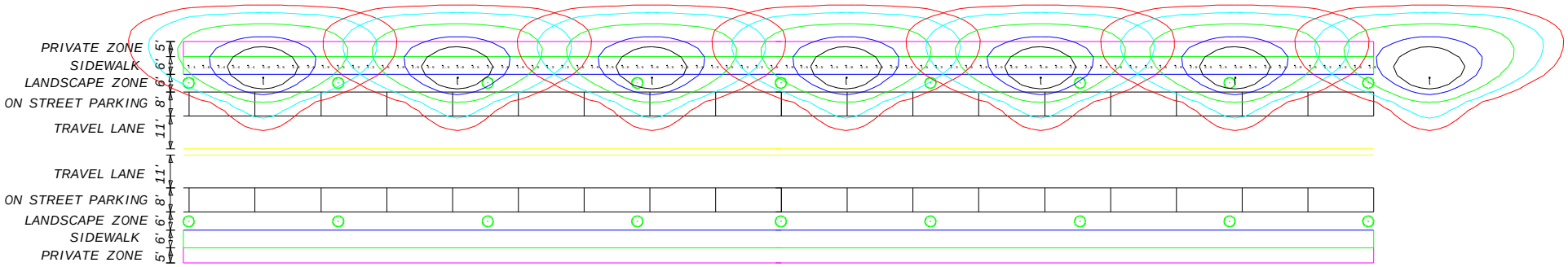
HISTORICAL NEIGHBORHOOD TYPICAL SECTION



Calculation Summary
Capella Pedestrian Light - 65' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	2.69	5.0	1.1	2.45	4.55

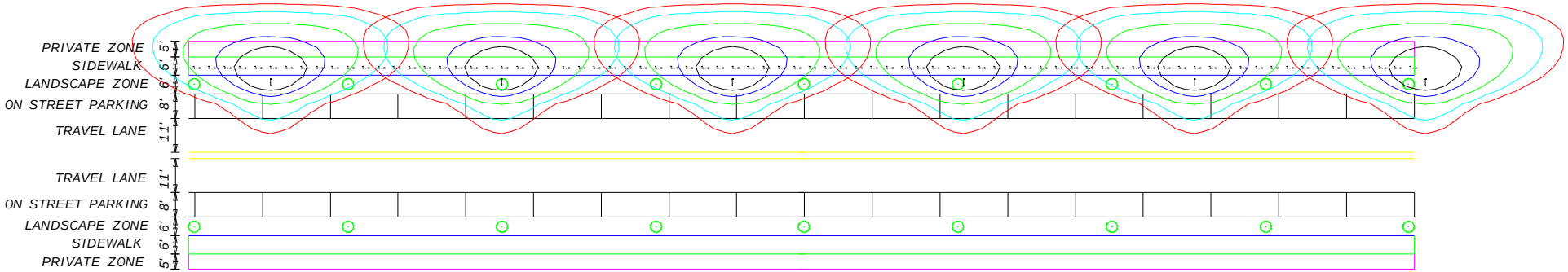
HISTORICAL NEIGHBORHOOD TYPICAL SECTION



Calculation Summary
Capella Pedestrian Light - 75' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	2.38	5.0	0.9	2.64	5.56

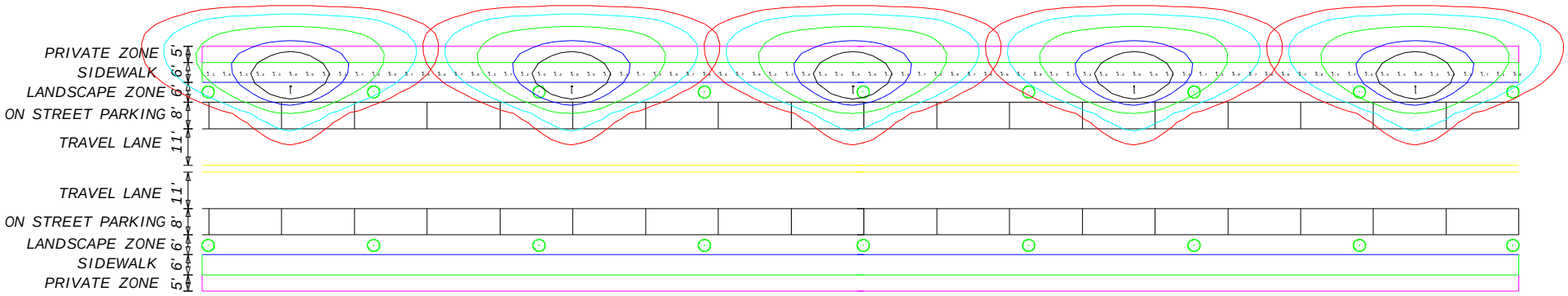
HISTORICAL NEIGHBORHOOD TYPICAL SECTION



Calculation Summary
Capella Pedestrian Light - 85' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	2.18	5.0	0.6	3.63	8.33

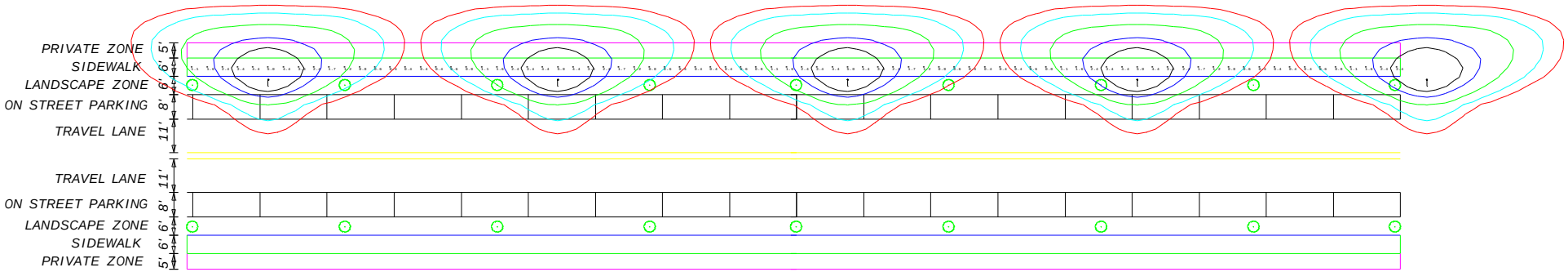
HISTORICAL NEIGHBORHOOD TYPICAL SECTION



Calculation Summary
Capella Pedestrian Light - 95' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	1.88	5.0	0.4	4.70	12.50

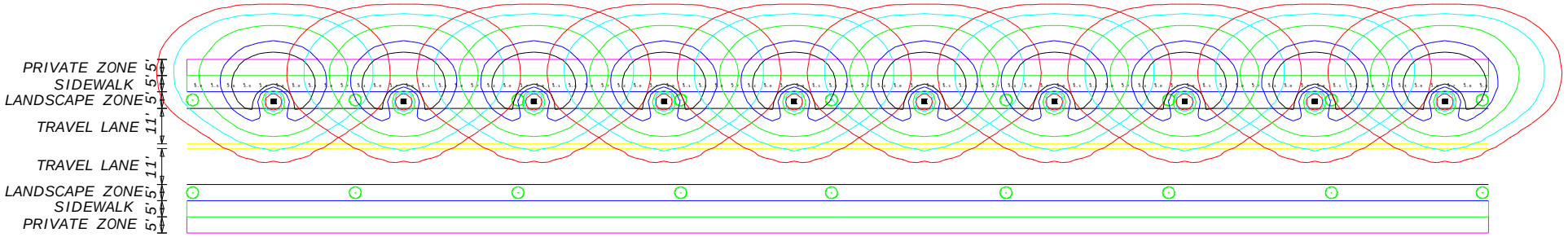
HISTORICAL NEIGHBORHOOD TYPICAL SECTION



Calculation Summary
Acorn Pedestrian Light - 40' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	3.95	5.1	0.9	4.39	5.67

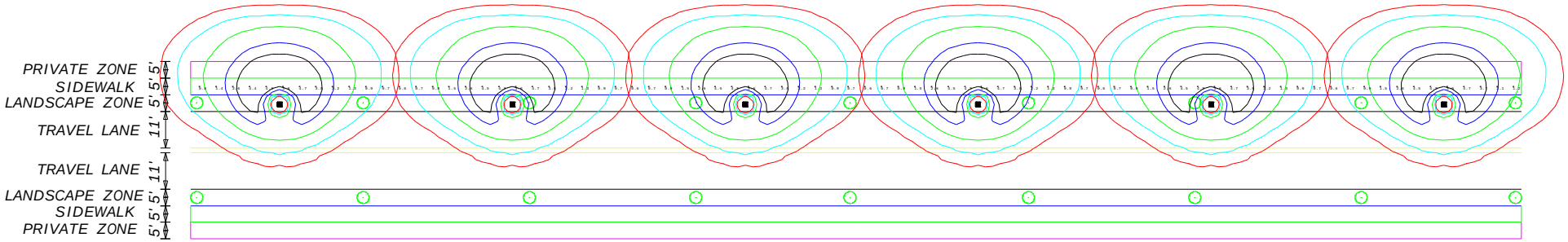
SUBURBAN TYPE DEVELOPMENT TYPICAL SECTION



Calculation Summary
Acorn Pedestrian Light - 70' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	2.38	4.7	0.6	3.97	7.83

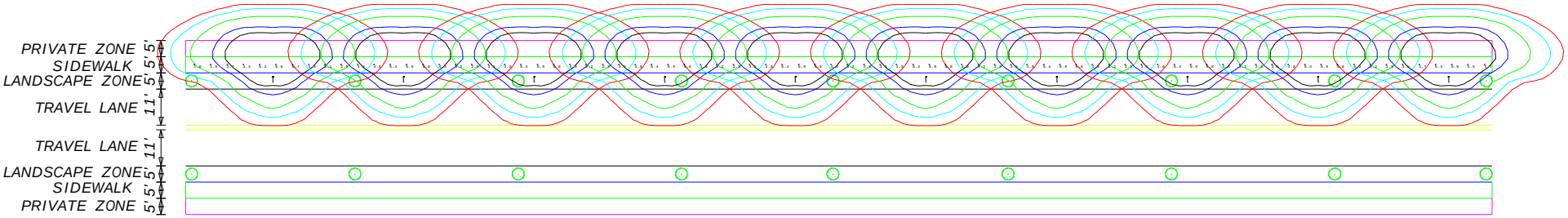
SUBURBAN TYPE DEVELOPMENT TYPICAL SECTION



Calculation Summary
Pendant Pedestrian Light - 40' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	4.64	6.9	1.0	4.64	6.90

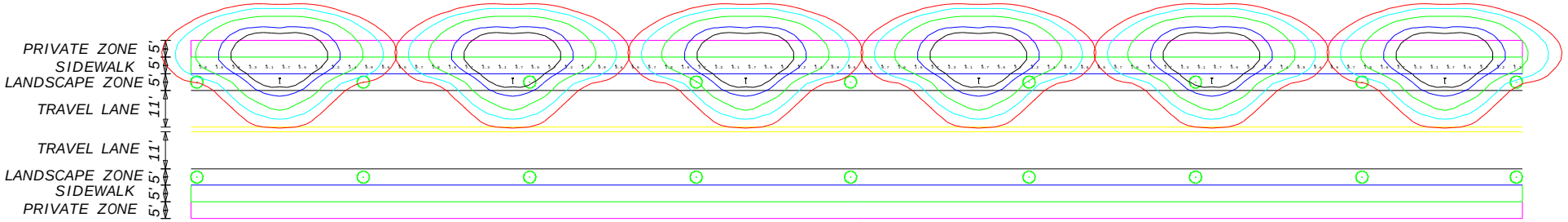
SUBURBAN TYPE DEVELOPMENT TYPICAL SECTION



Calculation Summary
Pendant Pedestrian Light - 70' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	2.81	6.7	0.5	5.62	13.40

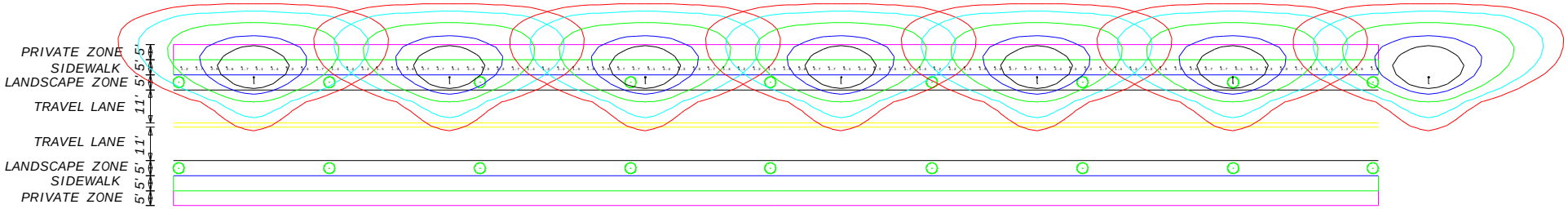
SUBURBAN TYPE DEVELOPMENT TYPICAL SECTION



Calculation Summary
Capella Pedestrian Light - 65' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	2.66	5.1	1.2	2.22	4.25

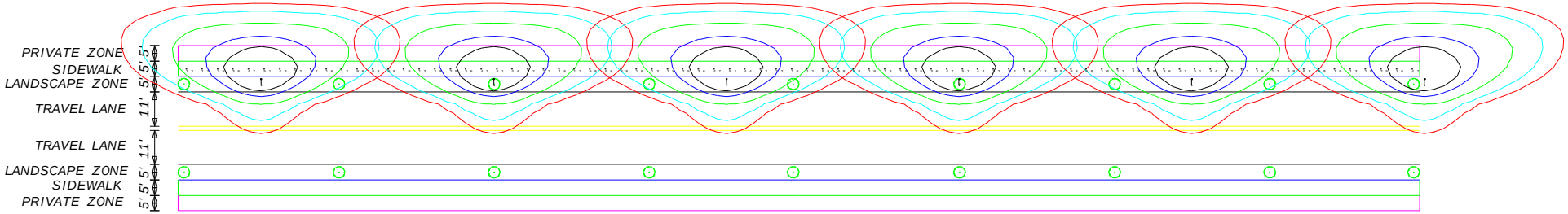
SUBURBAN TYPE DEVELOPMENT TYPICAL SECTION



Calculation Summary
Capella Pedestrian Light - 75' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	2.37	5.1	0.8	2.96	6.38

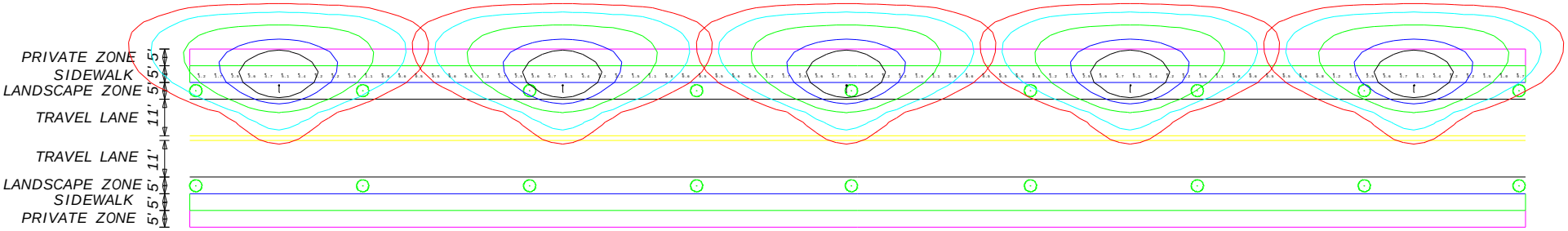
SUBURBAN TYPE DEVELOPMENT TYPICAL SECTION



Calculation Summary
Capella Pedestrian Light - 85' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	2.15	5.1	0.5	4.30	10.20

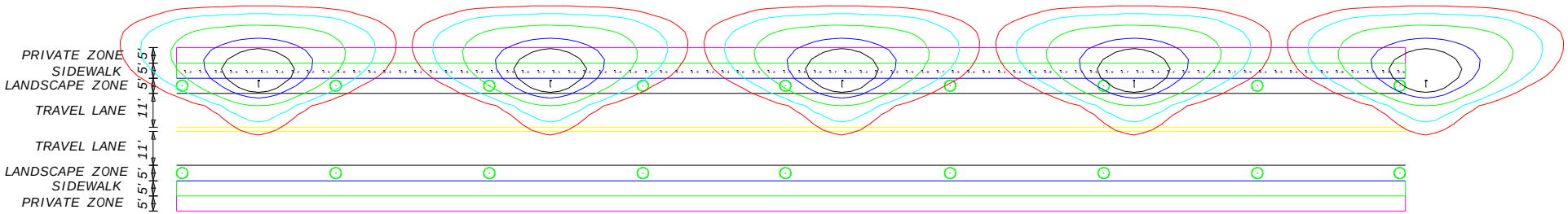
SUBURBAN TYPE DEVELOPMENT TYPICAL SECTION



Calculation Summary
Capella Pedestrian Light - 95' Spacing

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
N_Sidewalk	Illuminance	Fc	1.87	5.1	0.3	6.23	17.00

SUBURBAN TYPE DEVELOPMENT TYPICAL SECTION



APPENDIX B

Optimized Spacing Analysis Results

Urban Area Optimizer Spacing

Fixture	Typical Section	Mounting Height	Tree Spacing Req. (ft)	FDOT Standards				Greenbook Standards				IES Standards			
				Light Pole Spacing Req. (ft)	Avg (fc)	Avg/min	Max/min	Light Pole Spacing Req. (ft)	Avg (fc)	Avg/min	Max/min	Light Pole Spacing Req. (ft)	Avg (fc)	Avg/min	Max/min
GRU Pendant Ped Light	Urban	12 feet	30-50'	**58**	3.00	3.95	9.37	**46**	3.78	3.00	5.83	**56**	3.11	3.70	8.52
GRU Acorn Ped Light		10 feet	30-50'	**60**	2.41	2.46	4.96	**65**	2.22	2.88	6.39	**75**	1.9	3.8	9.78
Capella Light		15 feet	30-50'	**67**	2.50	2.38	4.60	**75**	2.24	2.91	6.16	**82**	2.05	3.53	8.03

Historical Neighborhood Optimizer Spacing

Fixture	Typical Section	Mounting Height	Tree Spacing Req. (ft)	FDOT Standards				Greenbook Standards				IES Standards			
				Light Pole Spacing Req. (max)	Avg (fc)	Avg/min	Max/min	Light Pole Spacing Req. (max)	Avg (fc)	Avg/min	Max/min	Light Pole Spacing Req. (max)	Avg (fc)	Avg/min	Max/min
GRU Pendant Ped Light	Historic	12 feet	30-50'	**57**	2.50	3.97	9.13	**42**	3.38	2.94	5.2	**59**	2.41	4.16	9.9
GRU Acorn Ped Light		10 feet	30-50'	**29**	4.48	3.93	5.16	**69**	1.82	2.94	6.19	**78**	1.63	3.98	8.88
Capella Light		15 feet	30-50'	**68**	2.50	2.75	5.19	**70**	2.43	2.89	5.58	**78**	2.18	3.52	7.4

Suburban-Type Development Optimizer Spacing

Fixture	Typical Section	Mounting Height	Tree Spacing Req. (ft)	FDOT Standards				Greenbook Standards				IES Standards			
				Light Pole Spacing Req. (max)	Avg (fc)	Avg/min	Max/min	Light Pole Spacing Req. (max)	Avg (fc)	Avg/min	Max/min	Light Pole Spacing Req. (max)	Avg (fc)	Avg/min	Max/min
GRU Pendant Ped Light	Suburban	12 feet	30-50'	**53**	2.49	3.56	7.61	**43**	3.06	2.94	5.25	**60**	2.2	4.15	9.91
GRU Acorn Ped Light		10 feet	30-50'	**30**	4.09	3.97	5.46	**69**	1.75	2.87	6.26	**83**	1.46	4.56	9.81
Capella Light		15 feet	30-50'	**67**	2.51	2.73	5.24	**69**	2.44	2.87	5.65	**80**	2.11	3.77	8.38

APPENDIX C

GRU External Lighting Catalog

Lighting Catalog

(Pictures, Materials and Rates)

April 9, 2020

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Index

Index cont.

GRU RENTAL LIGHT RATE CLASSES

*** Light Rate Classes:**

All GRU Rental Lights covered under the "Light Rate Classes" listed below are owned by GRU. Lights installed behind a meter are private lights owned by the customer.

1) Public Street Light Rate Class (Non-Contributed): This class of light rates are lights used by a governmental body, mainly the City of Gainesville or Alachua County Board of Commissioners (Public Works) which pays the monthly rental rate. The monthly Public Street Light Rate includes all materials including wire, the cost of installation, maintenance and energy of the light(s). The rental rate for lights does not include the rental rate of a **pole to support the light. If a pole is necessary to support a rental light a separate pole rental rate shall be charged in addition to light rental rate. The monthly Pole Rental Rate includes all materials including wire, the cost of installation and maintenance of the pole(s). The pole shall also be rented under this same class.

2) Public Agency Light Rate Class (Contributed): This class of light rates are lights used by a governmental body, mainly the City of Gainesville or Alachua County Board of Commissioners (Public Works), and the monthly rental rate is paid for by the Public Agency. The Public Agency monthly rate, which allows the agency to "Buy Down" the rental rate, includes the energy charge and normal maintenance cost ONLY. The rates for lights do not include the installation of **poles. The installation cost (materials, including wire, GRU engineering, construction cost and overheads) for lights and poles (if needed) shall be paid for up front by the governmental body responsible for the monthly rental charges prior to installation by GRU. **The ownership of the lights and poles remains with GRU.**

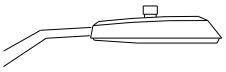
3) Rental Light Rate Class (Non-Contributed): This class of light rates are lights used by a commercial, industrial or residential customer where the monthly rental rate is paid for by the customer. The monthly Rental Light Rate includes all materials including wire, the cost of installation, maintenance and energy of the light(s). The rental rate for lights does not include the rental rate of a **pole to support the light. If a pole is necessary to support a rental light a separate pole rental rate shall be charged in addition to light rental rate. The monthly Pole Rental Rate includes all materials including wire, the cost of installation and maintenance of the pole(s). The pole shall also be rented under this same class.

4) Rental Agency Light Rate Class (Contributed): This class of light rates are lights used by a commercial, industrial or residential customer and the monthly rental rate is paid for by the customer. The Rental Agency monthly rate, which allows the agency to "Buy Down" the rental rate, includes the energy charge and normal maintenance cost ONLY. The rates for lights do not include the installation of **poles. The installation cost (materials, including wire, GRU engineering, construction cost and overheads) for lights and poles (if needed) shall be paid for up front by the customer responsible for the monthly rental charges prior to installation by GRU. **The ownership of the lights and poles remains with GRU.**

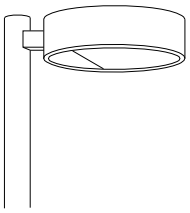
*** All Light Rate Classes do not include Poles, fuel adjustments, taxes or fees.**

**** GRU Rental Lights may be installed on GRU distribution poles or GRU Rental Light Poles ONLY.**

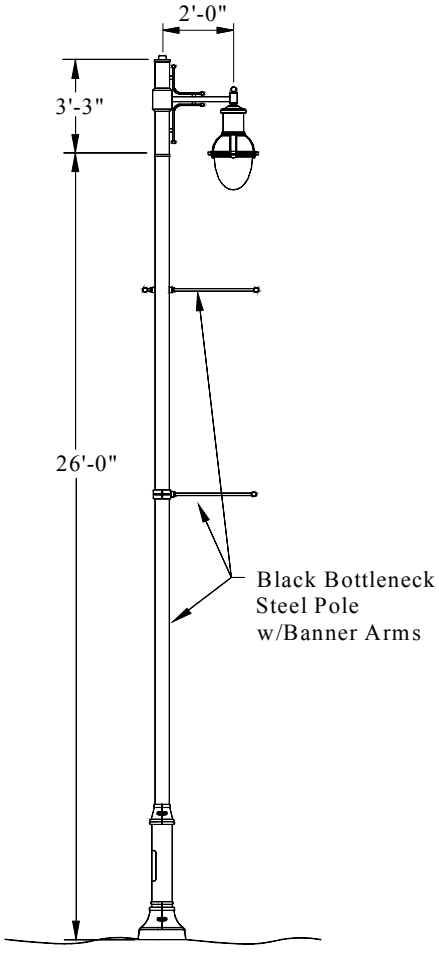
GRU RENTAL LIGHT SELECTIONS



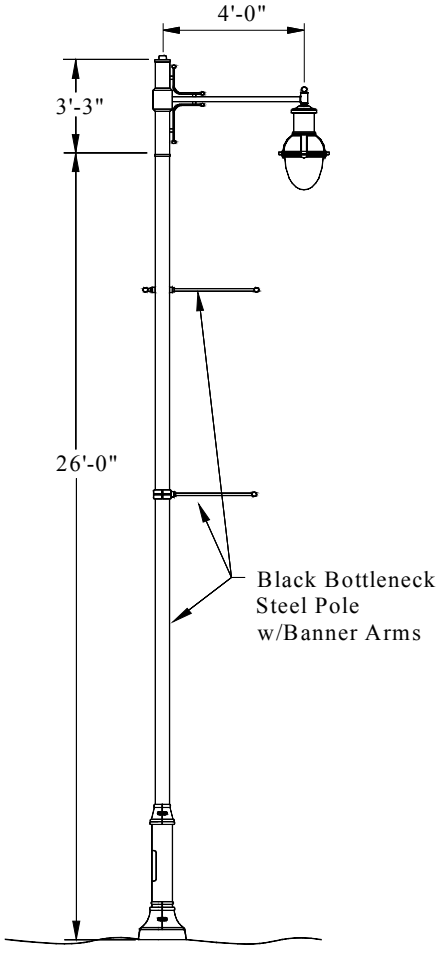
LED Roadway Cutoff Light
(gray & black)
(Light Types L38, L39, L40, L41, L42, L43, L44)



LED Round Roadway Light
w/Aluminum Pole (Black)
(Light Type L51: Pole Type P11)



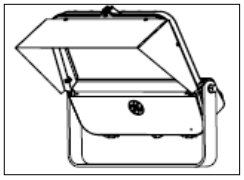
LED Teardrop Light
w/ 2'-0" Mounting Arm Bracket
and 26' Black Bottleneck Pole
(Light Type L53; Pole Type P7)



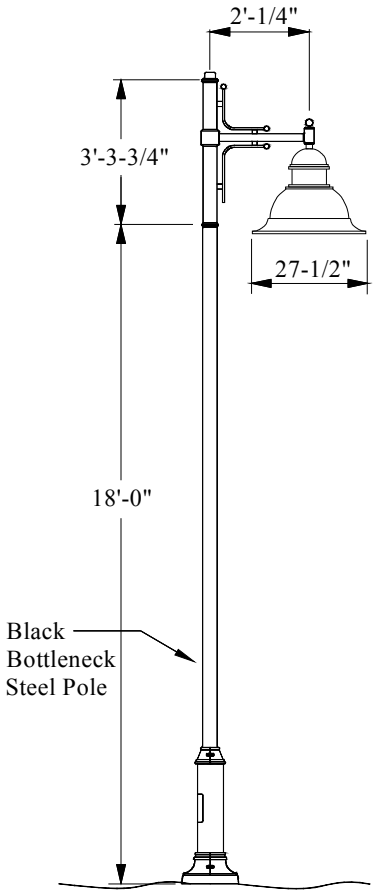
LED Teardrop Light
w/ 4'-0" Mounting Arm Bracket
and 26' Black Bottleneck Pole
(Light Typ4 L54: Pole Type P7)

GRU RENTAL LIGHT SELECTIONS

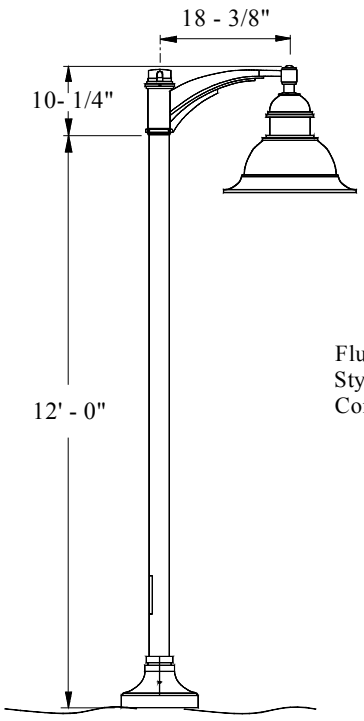
LED Floodlight with Shield
(Light Type L57)



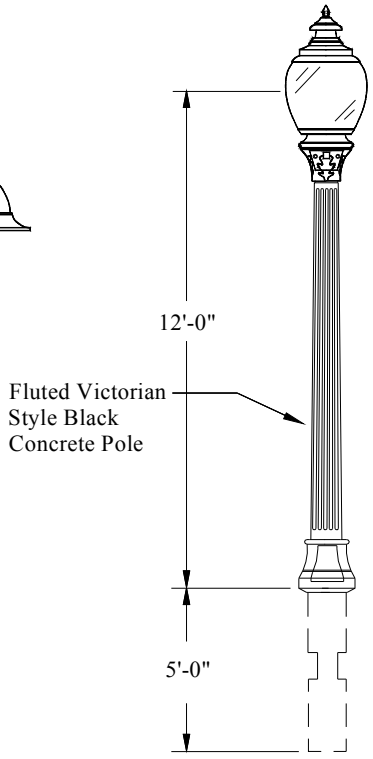
LED Floodlight with Shield
(Light Types L58, L59)



LED Pendant
Roadway Light
w/18' Black Bottleneck Steel Pole
(Light Type L55; Pole Type P5)

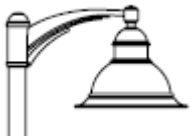


LED Small Pendant
Roadway Light
w/12' Black Steel Pole
(Light Type L56; Pole Type P21)



LED Acorn Light
w/ Concrete Pole
(Light Type L52; Pole Type P1)

GRU LIGHT & POLE TYPES QUICK REFERENCE

GRU Lighting Type Sheet	Light Type	Photo
LED Roadway Cutoff 1N - Gray	L38	
LED Roadway Cutoff 2 - Gray	L39	
LED Roadway Cutoff 3 - Gray	L40	
LED Roadway Cutoff 4 - Gray	L41	
LED Roadway Cutoff 2 - Black	L42	
LED Roadway Cutoff 3 - Black	L43	
LED Roadway Cutoff 4 - Black	L44	
LED Teardrop 2 Roadway Light (2ft Arm) - Black	L53	
LED Teardrop 4 Roadway Light (4ft Arm) - Black	L54	
LED Round Roadway Light (Hockey Puck) - Black	L51	
LED Pendant Roadway Light - Black	L55	
LED Acorn Pedestrian Light - Black	L52	
LED Small Pendant Pedestrian Light - Black	L56	
LED Floodlight 1 (Residencial), - Gray	L57	
LED Floodlight 2 - Gray	L58	
LED Floodlight 3 - Gray	L59	

GRU LIGHT & POLE TYPES QUICK REFERENCE

GRU Pole Type Sheet	Pole Type	Photo
10 ft Direct Buried Decorative Black Concrete Pole for Light Types L29, L30 and L52	P1	
30 ft Concrete Pole 35 ft Concrete Pole 40 ft Concrete Pole 45 ft Concrete Pole	P9 P13 P16 P19	
35 ft Octagonal Black Concrete Pole (30' mounting) for Light Types L42 and L43	P14	
40 ft Octagonal Black Concrete Pole (35' mounting) for Light Types L43 and L44	P17	
30 ft Fiberglass Break-a-way Pole	P10	
18 ft Steel Domus/LED Pendant Roadway Light Black pole for Light Type L27 and L55	P5	

GRU LIGHT & POLE TYPES QUICK REFERENCE

GRU Pole Type Sheet	Pole Type	Photo
26 ft Steel Renaissance/LED Teardrop 2 & 4 Roadway Black Pole for Light Types L33, L34, L53 and L54	P7	
30 ft wood Pole 35 ft wood Pole 40 ft wood Pole 45 ft Wood Pole	P8 P12 P-15 P18	
12 ft Steel Small Domus/LED Small Pendant Pedestrian Light Black pole for Light Types L38 and L56	P21	
30 ft Non-Tapered Round Black pole for Light Type L17	P11	

Lighting Definitions:

Cutoff -	light or luminaire that describes a luminaire having a light distribution in which the candela per 1000 lamp lumens does not numerically exceed 25 (2.5%) at or above an angle of 90° above nadir, and 100 (10%) at or above a vertical angle of 80° above nadir. This applies to all lateral angles around the luminaire.
Fixture -	same as luminaire and light - main housing, lamp and photoelectric control (photo cell, sun switch)
Floodlight -	Flood Light
H.P.S. -	High Pressure Sodium - type of lamp (this light type is no longer available)
LED -	light-emitting diode - light type
Light -	same as luminaire and fixture - main housing, lamp and photoelectric control (photo cell, sun switch)
Luminaire -	same as light and fixture - main housing with light source and photoelectric control (photo cell, sun switch)
M.H. -	Metal Halide - type of lamp (this light type is no longer available)
Pedestrian -	areas used by walking traffic
Roadway -	areas used by automobile traffic

Rental Light Rate Class -
(Commercial & Residential - Non-Contributed)

Light Type	*Monthly Rate
Roadway Lights:	
LED Roadway Cutoff 1N (gray) (3000K) (Light Type L38)	$ 13.35
LED Roadway Cutoff 2 (gray) (3000K) (Light Type L39).	$ 16.80
LED Roadway Cutoff 3 (gray) (3000K) (Light Type L40)	$ 19.10
LED Roadway Cutoff 4 (gray) (3000K) (Light Type L41)	$ 24.70
LED Roadway Cutoff 5 (gray) (3000K) (Light Type L45)(FDOT)	$ 25.40
LED Roadway Cutoff 2 (black) (3000K) (Light Type L42)	$ 17.80
LED Roadway Cutoff 3 (black) (3000K) (Light Type L43)	$ 20.10
LED Roadway Cutoff 4 (black) (3000K) (Light Type L44)	$ 25.70
LED Roadway Cutoff 5 (black) (3000K) (Light Type L46)(FDOT	$ 26.40
Decorative Roadway Lights:	
LED - Round Roadway (Light Type L51)	$ 42.25
LED Teardrop Roadway on 2'-0" Mounting Arm Bracket (black) (Light Type L53)	$ 40.75
LED Teardrop Roadway on 4'-0" Mounting Arm Bracket (black) (Light Type L54)	$ 41.95
LED - Pendant Roadway (black) (Light Type L55)	$ 37.05
LED Floodlights:	
LED Floodlight 1 (Light Type L57).	$ 13.96
LED Floodlight 2 (Light Type L58)	$ 20.81
LED Floodlight 3 (Light Type L59)	$ 23.88
Decorative Pedestrian Lights:	
LED Acorn Pedestrian - (Black) (Light Type L52)	$ 29.55
LED Small Pendant Pedestrian - (black) (Light Type L56	$ 30.55

*** Monthy Rates DO NOT include Fuel Adujustment Charges, Fees, or Taxes**

POLE RATES ARE NOT INCLUDED IN LIGHT RATES
PLEASE SEE DEFINITIONS FOR
GRU LIGHT RATE CLASSES

Rental Agency Street Light Rate Class - (Mass Change Out)

Light Type	*Monthly Rate
Roadway Lights:	
LED Roadway Cutoff 1N (gray) (3000K) (Light Type L61)	$ 6.70
LED Roadway Cutoff 2 (gray) (3000K) (Light Type L62).	$ 9.45
LED Roadway Cutoff 3 (gray) (3000K) (Light Type L63)	$ 11.15
LED Roadway Cutoff 4 (gray) (3000K) (Light Type L64)	$ 15.10
LED Roadway Cutoff 2 (black) (3000K) (Light Type L65)	$ 9.45
LED Roadway Cutoff 3 (black) (3000K) (Light Type L66)	$ 11.15
LED Roadway Cutoff 4 (black) (3000K) (Light Type L67)	$ 15.10
Decorative Roadway Lights:	
LED - Round Roadway (Light Type L68)	$ 34.20
LED Teardrop Roadway on 2'-0" Mounting Arm Bracket (black) (Light Type L70)	$ 28.95
LED Teardrop Roadway on 4'-0" Mounting Arm Bracket (black) (Light Type L71)	$ 28.95
LED - Pendant Roadway (black) (Light Type L72)	$ 24.10
Decorative Pedestrian Lights:	
LED Acorn Pedestrian - (Black) (Light Type L69).	$ 25.50
LED Small Pendant Pedestrian - (black) (Light Type L73)	$ 22.20

*** Monthy Rates DO NOT include Fuel Adujustment Charges, Fees, or Taxes**

POLE RATES ARE NOT INCLUDED IN LIGHT RATES PLEASE SEE DEFINITIONS FOR GRU LIGHT RATE CLASSES

Rental Light Pole Rates - (Commercial & Residential)

Pole Type	* Monthly Rate
30 Ft. Non - Tappered Aluminum (Pole Type P11)	$ 30.75
12 Ft. Non - Tappered Aluminum (Pole Type P21)	$ N/A
10 Ft. Concrete (black "fluted" decorative) (Pole Type P1)	$ 15.00
30 Ft. Concrete (Pole Type P9)	$ 6.50
35 Ft. Concrete (Pole Type P13)	$ 6.75
35 Ft. Concrete (black octagonal) (Pole Type P14)	$ 18.25
40 Ft. Concrete (black octagonal) (Pole Type P17)	$ 27.75
40 Ft. Concrete (Pole Type P16)	$ 8.75
45 Ft. Concrete (Pole Type P19)	$ 9.25
30 Ft. Fiberglsass (break-a-way) (Pole Type P10)	$ 15.00
18 Ft. Steel Black “Bottleneck” (Pole Type P5)	$ 22.00
26 Ft. Steel Black “Bottleneck” (Pole Type P7)	$ 35.50
30 Ft. Wood (Pole Type P8)	$ 4.50
35 Ft. Wood (Pole Type P12)	$ 4.75
40 Ft. Wood (Pole Type P15)	$ 5.00
45 Ft. Wood (Pole Type P18)	$ 15.00

*** Monthy Rates DO NOT include Fuel Adjustment Charges, Fees, or Taxes**

POLE RATES ARE NOT INCLUDED IN LIGHT RATES
PLEASE SEE DEFINITIONS FOR
GRU LIGHT RATE CLASSES

Rental Agency Light Rate Class - (Residental/Commercial - Contributed)

Light Type	* Monthly Rate
Roadway Lights:	
LED Roadway Cutoff 1N (gray) (3000K) (Light Type L38)	$ 2.70
LED Roadway Cutoff 2 (gray) (3000K) (Light Type L39)	$ 4.30
LED Roadway Cutoff 3 (gray) (3000K) (Light Type L40)	$ 5.60
LED Roadway Cutoff 4 (gray) (3000K) (Light Type L41)	$ 8.80
LED Roadway Cutoff 5 (gray) (3000K) (Light Type L45)(FDOT)	$ 8.10
LED Roadway Cutoff 2 (black) (3000K) (Light Type L42)	$ 4.30
LED Roadway Cutoff 3 (black) (3000K) (Light Type L43)	$ 5.60
LED Roadway Cutoff 4 (black) (3000K) (Light Type L44)	$ 8.80
LED Roadway Cutoff 5 (black) (3000K) (Light Type L46)(FDOT)	$ 8.10
Decorative Roadway Lights:	
LED - Round Roadway (Light Type L51	$ 10.45
LED Teardrop Roadway on 2'-0" Mounting Arm Bracket (black) (Light Type L53)	$ 6.15
LED Teardrop Roadway on 4'-0" Mounting Arm Bracket (black) (Light Type L54)	$ 6.15
LED - Pendant Roadway (black) (Light Type L55).	$ 4.15
LED Floodlights:	
LED Floodlight 1 (Light Type L57).	$ 0.89
LED Floodlight 2 (Light Type L58)	$ 3.90
LED Floodlight 3 (Light Type L59)	$ 6.77
Floodlight:	
Decorative Pedestrian Lights:	
LED Acorn Pedestrian - (Black) (Light Type L52)	$ 4.30
LED Small Pendant Pedestrian - (black) (Light Type L56)	$ 3.75

*** Monthy Rates DO NOT include Fuel Adujustment Charges, Fees, or Taxes**

POLE RATES ARE NOT INCLUDED IN LIGHT RATES PLEASE SEE DEFINITIONS FOR GRU LIGHT RATE CLASSES

GRU Rental Light Rate Material Matrix

LED ROADWAY LIGHTS:

Gray:

LED Roadway Cutoff 1N - (gray) (Light Type L38 and L61)
(Rate includes: Fixture, 4ft. Mounting Arm, Photo Control, Connectors, Wire)
LED Roadway Cutoff 2 - (gray) (Light Type L39 and L62)
(Rate includes: Fixture, 10 ft. Mounting Arm, Photo Control, Connectors, Wire)
LED Roadway Cutoff 3 - (gray) (Light Type L40 and L63)
(Rate includes: Fixture, 10 ft. Mounting Arm, Photo Control, Connectors, Wire)
LED Roadway Cutoff 4 - (gray) (Light Type L41 and L64)
(Rate includes: Fixture, 10 ft. Mounting Arm, Photo Control, Connectors, Wire)

Black:

LED Roadway Cutoff 2 - (black) (Light Type L42 and L65)
(Rate includes: Fixture, 10 ft. Mounting Arm, Photo Control, Connectors, Wire)
LED Roadway Cutoff 3 - (black) (Light Type L43 and L66)
(Rate includes: Fixture, 10 ft. Mounting Arm, Photo Control, Connectors, Wire)
LED Roadway Cutoff 4 - (black) (Light Type L44 and L67)
(Rate includes: Fixture, 10 ft. Mounting Arm, Photo Control, Connectors, Wire)

LED Round Roadway - (black) (Light Type L51 and L68)
(Rate includes: Fixture, Photo Control, Connectors, Wire)

LED Teardrop Roadway - (black) on 2'-0" Mounting Arm Bracket (Light Type L53 and L70)
(Rate includes: Fixture, 2 ft. Mounting Arm, Photo Control, Connectors, Wire)
LED Teardrop Roadway - (black) on 4'-0" Mounting Arm Bracket (Light Type L54 and L71)
(Rate includes: Fixture, 4 ft. Mounting Arm, Photo Control, Connectors, Wire)

LED Pendant Roadway - (black) (Light Type L55 and L72)
(Rate includes: Fixture, Mounting Arm, Photo Control, Connectors, Wire)

LED FLOODLIGHT:

LED Floodlight 1 (Light Type L57)
(Rate includes: Fixture, Mounting Arm, Photo Control, Connectors, Wire)
LED Floodlight 2 (Light Type L58)
(Rate includes: Fixture, Mounting Arm, Photo Control, Connectors, Wire)
LED Floodlight 3 (Light Type L59)
(Rate includes: Fixture, Mounting Arm, Photo Control, Connectors, Wire)

PEDESTRIAN LIGHT:

LED Acorn Pedestrian - (Black) (Light Type L52 and L69)
(Rate includes: Fixture, Photo Control, Connectors, Wire)

LED Small Pendant Pedestrian - (black) (Light Type L56 and L73)
(Rate includes: Fixture, Mounting Arm, Photo Control, Connectors, Wire)

GRU Light Manufacturer Information

Manufacturers or Manufacture Representatives:

General Electric:	Joey McDonald (Manuf. Rep.)	Electric Sales Associates, Inc. 13274 CR 200 Oxford, FL 34484 Email: joeym@electricsalesinc.com
Cyclone Lighting:	Ron Steedman (Manuf. Rep.)	R.J Steedman, LLC 2268 SE 28th Street Cape Coral, FL 33904-3332 Email: RLUMENATOR@aol.com

NOTE:
Contact GRU to verify Manufacturers List

GRU Pole Manufacturer Information

Manufacturers or Manufacture Representatives:

Wood Poles:

T. R. Miller Mill Co., Inc.
P.O. Box 708
Brewton, Al. 36427
Phone: (205) 867-4331

Atlantic Wood Industries, Inc.
P. O. Box 1608
Savannah, Ga. 31498

Swift Lumber, Inc.
P. O. Box Drawer 1298
Atmore, Al. 36502
Phone: (205) 368-2138

Apalachee Pole Company, Inc.
P. O. Box 7
Graceville, Fl. 32440
Phone: (904) 643-2121
(Send RFQ To: P.O. Box 68, Bristol, Fl. 32321)

Ace Pole Co., Inc.
Waycross Hwy. 82E
P. O. Box 1323
Phone: (912) 449-4011

Langdale Forest Products Co.
P.O. Box 1088
Valdosta, GA 31603
Phone: (912) 964-1234

Concrete Poles:

Dura-Stress

Philips/Lumec Poles:

Gary Woods (Rep.)

SESCO Lighting
8110 Cypress Plaza Drive, Suite 301
Jacksonville, FL 32256
Phone: (904) 646-4772
Email: gwood@sescolighting.com

Traditional Concrete, Inc.

Judy Graddy

JAG Lighting Solutions, Inc..
Phone: (407) 760-9817
jgraddy@Jaglightingsolutions.com

NOTE:
Contact GRU to verify Manufacturers List

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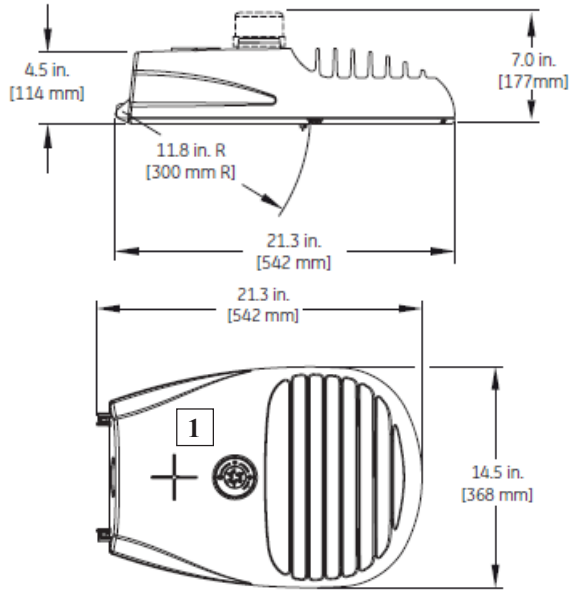
LED Roadway Cutoff - (Gray) Light

(Light Types L38, L39, L40, L41; Pole Types P9, P13, P16, P19, P10, P8, P12, P15, P18)

GRU Lights, Poles and Brackets, cont.

LED Roadway Cutoff 1 - (Gray) Light:



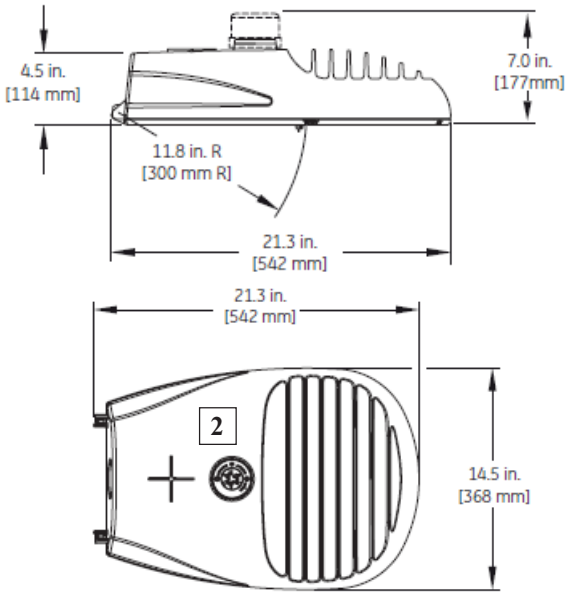
GENERAL ELECTRIC LIGHTING

Description		Manufacturer	Catalog No.
LUMINAIRE, LED ROADWAY CUTOFF 1N, GRAY WITH DIE-CAST ALUMINUM HOUSING. **SEE COMPLETE SPECIFICATIONS ON PAGE L-90.00 THRU L-90.03.**			
SPECIFICATIONS:			
LAMP WATTAGE RANGE:	45 TO 55 WATTS	GENERAL ELECTRIC	ERL1-0-05-A3-30-A GRAY-GLR-176
LUMEN RANGE:	4800 TO 5000		
VOLTAGE:	120 - 277 VOLTS (WIRED FOR 120V.)		
LIGHT DISTRIBUTION - IES TYPE:	II - NARROW		
COLOR TEMPERATURE (CCA):	3,000 K. +/- 300		
COLOR RENDERING INDEX:	70		
OPERATING TEMPERATURE:	-4 TO 122 F.		
SURGE PROTECTION (MIN.):	10kV/10kA		
INTERNAL BUBBLE LEVEL			
TOOL-LESS ENTRY			
NEMA PHOTOCONTROL RECEPTACLE			
EXTERNAL FIELD I.D. MARKER: A REFLECTIVE YELLOW "1" ON BLACK BACKGROUND (1-1/2" TALL)			
ADJUSTABLE SLIPFITTER:	1-1/4" TO 2"		
COLOR:	GRAY		
WEIGHT:	18 LBS.		

NOTE:
20 YEAR PHOTOCONTROL LISTED ON ELECTRIC STANDARDS PAGE P-5.45, S/N 58146-1

GRU Lights, Poles and Brackets, cont.

LED Roadway Cutoff 2 - (Gray) Light:

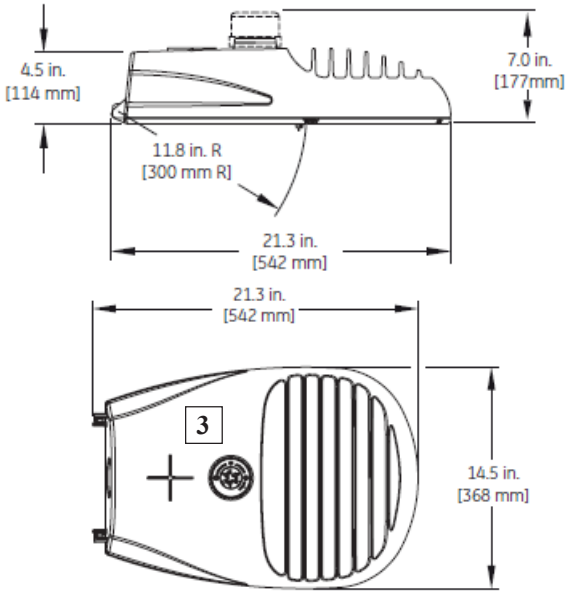


GENERAL ELECTRIC LIGHTING

Description	Manufacturer	Catalog No.
LUMINAIRE, LED ROADWAY CUTOFF 2, GRAY WITH DIE-CAST ALUMINUM HOUSING. **SEE COMPLETE SPECIFICATIONS ON PAGE L-90.00 THRU L-90.03.**		
SPECIFICATIONS:		
LAMP WATTAGE RANGE: 80 TO 105 WATTS LUMENS RANGE: 8,000 TO 8,800 VOLTAGE: 120 - 277 VOLTS (WIRED FOR 120V.) LIGHT DISTRIBUTION - IES TYPE: III COLOR TEMPERATURE (CCA): 3,000 K. +/- 300 COLOR RENDERING INDEX: 70 MIN. OPERATING TEMPERATURE: -4 TO 122 F. SURGE PROTECTION (MIN.): 10kV/10kA INTERNAL BUBBLE LEVEL TOOL-LESS ENTRY: YES NEMA PHOTOCONTROL RECEPTACLE EXTERNAL FIELD I.D. MARKER: A REFLECTIVE YELLOW "1" ON BLACK BACKGROUND (1-1/2" TALL)	GENERAL ELECTRIC	ERL1-0-09-C3-30-A-GRAY-GLR-111
ADJUSTABLE SLIPFITTER: 1-1/4" TO 2" COLOR: GRAY WEIGHT: 18 LBS.		
NOTE: 20 YEAR PHOTOCONTROL LISTED ON ELECTRIC STANDARDS PAGE P-5.45, S/N 58146-1		

GRU Lights, Poles and Brackets, cont.

LED Roadway Cutoff 3 - (Gray) Light:



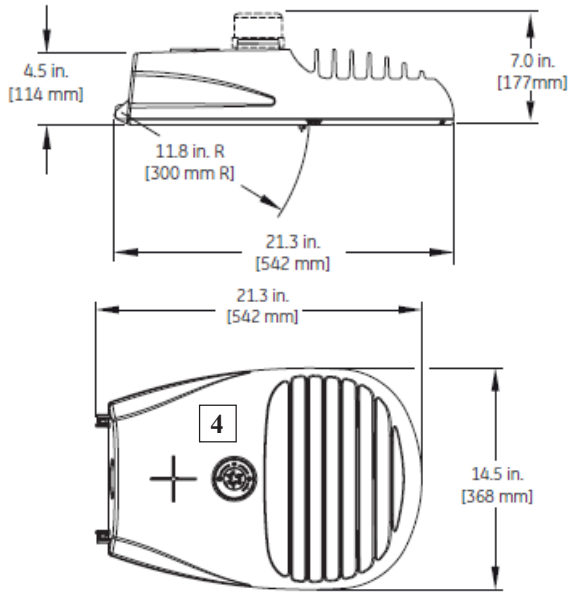
GENERAL ELECTRIC LIGHTING

Description	Manufacturer	Catalog No.
LUMINAIRE, LED ROADWAY CUTOFF 3, GRAY WITH DIE-CAST ALUMINUM HOUSING. **SEE COMPLETE SPECIFICATIONS ON PAGE L-90.00 THRU L-90.03.**		
SPECIFICATIONS: LAMP WATTAGE RANGE: 140 TO 155 WATTS LUMEN RANGE: 12,500 TO 13,500 VOLTAGE: 120 - 277 VOLTS (WIRED FOR 120V.) LIGHT DISTRIBUTION - IES TYPE: III COLOR TEMPERATURE (CCA): 3,000 K. +/- 300 COLOR RENDERING INDEX: 70 OPERATING TEMPERATURE: -4 TO 122 F. SURGE PROTECTION (MIN.): 10kV/10kA INTERNAL BUBBLE LEVEL TOOL-LESS ENTRY: YES EXTERNAL FIELD I.D. MARKER: A REFLECTIVE YELLOW "1" ON BLACK BACKGROUND (1-1/2" TALL) ADJUSTABLE SLIPFITTER: 1-1/4" TO 2" COLOR: GRAY WEIGHT: 20 - 25 LBS.	GENERAL ELECTRIC	ERLH-0-13-C3-30-A-GRAY-GLR-052

NOTE:
20 YEAR PHOTOCONTROL LISTED ON ELECTRIC STANDARDS PAGE P-5.45, S/N 58121-6

GRU Lights, Poles and Brackets, cont.

LED Roadway Cutoff 4 - (Gray) Light:

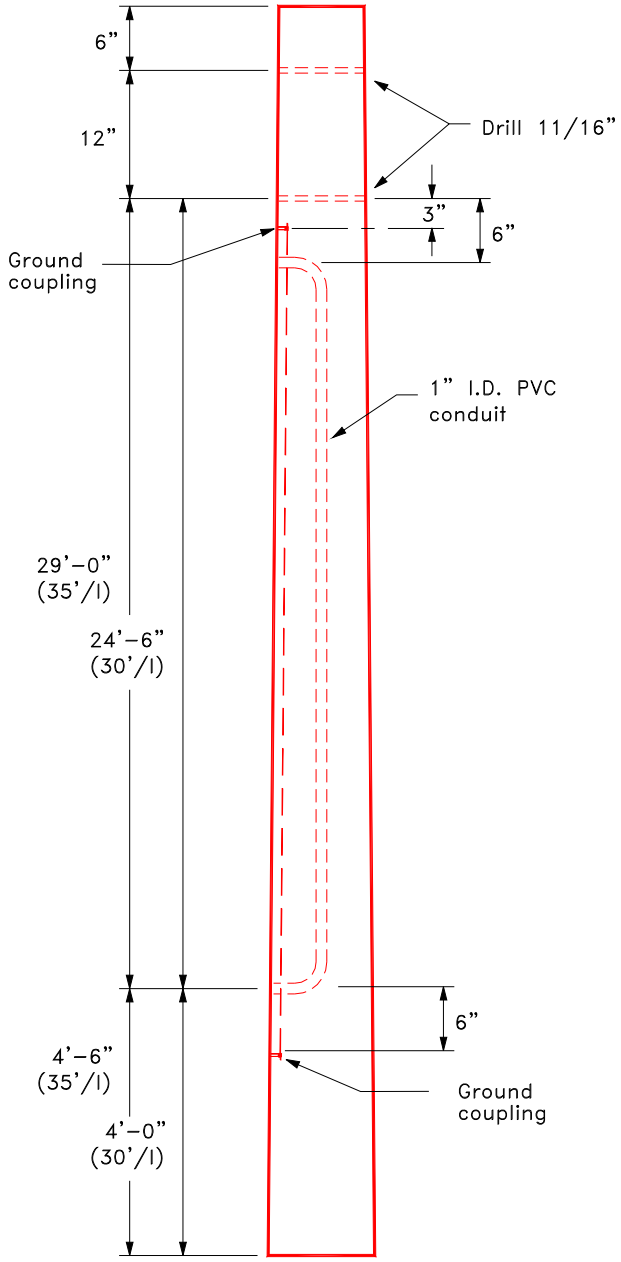


GENERAL ELECTRIC LIGHTING

Description	Manufacturer	Catalog No.
LUMINAIRE, LED ROADWAY CUTOFF 4, GRAY WITH DIE-CAST ALUMINUM HOUSING. **SEE COMPLETE SPECIFICATIONS ON PAGE L-90.00 THRU L-90.03.**		
SPECIFICATIONS:		
LAMP WATTAGE RANGE: 190 TO 230 WATTS LUMEN RANGE: 21,000 TO 23,000 VOLTAGE: 120 - 277 VOLTS (WIRED FOR 120V.) LIGHT DISTRIBUTION - IES TYPE: III COLOR TEMPERATURE (CCA): 3,000 K. +/- 300 COLOR RENDERING INDEX: 70 OPERATING TEMPERATURE: -4 TO 122 F. SURGE PROTECTION (MIN.): 10kV/10kA INTERNAL BUBBLE LEVEL TOOL-LESS ENTRY: YES EXTERNAL FIELD I.D. MARKER: A REFLECTIVE YELLOW "1" ON BLACK BACKGROUND (1-1/2" TALL)	GENERAL ELECTRIC	ERL2-0-23-C3-30-A-GRAY-GLR-032
ADJUSTABLE SLIPFITTER: 1-1/4" TO 2" COLOR: GRAY WEIGHT: 20 TO 25 LBS.		
NOTE: 20 YEAR PHOTOCONTROL LISTED ON ELECTRIC STANDARDS PAGE P-5.45, S/N 58131-3		

GRU Lights, Poles and Brackets, cont.

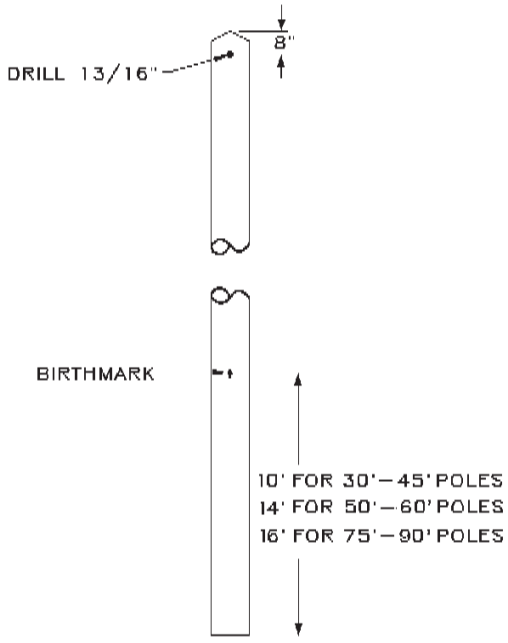
Concrete Poles for Standard (Gray) LED Roadway Cutoff Lights:



Description	Manufacturer	Catalog No.
CONCRETE POLE HEIGHT/TYPE (APR. WEIGHT): 30'/I (1,360 LBS.) 35'/I (1,800 LBS.)	ACCORD INDUSTRIES, PRESTRESSED POLE DIV. DURA-STRESS, INC.	

GRU Lights, Poles and Brackets, cont.

Wood Poles for Standard (Gray) LED Roadway Cutoff Lights:



NOTE:
BIRTHMARK INCLUDES LENGTH IN FEET, POLE CLASS, MANUFACTURER'S MARK AND YEAR PR0DUCED.

Description	Manufacturer	Catalog No.
CCA TREATED WOOD POLE, SOUTHERN PINE	NOTE: MANUFACTURERS ARE LISTED BELOW	
HEIGHT/CLASS (APPROXIMATE WEIGHT:)		
30'/6 (606 LBS.)		NONE
35'/5 (888 LBS.)		NONE

APPRIVED MANUFACTURERS

1. T. R. Miller Mill Co., Inc.
   P.O. Box 708
   Brewton, Al. 36427 Phone: (205) 867-4331

2. Atlantic Wood Industries, Inc.
   P. O. Box 1608
   Savannah, Ga. 31498 Phone: (912) 964-1234

3. Swift Lumber, Inc.
   P. O. Box Drawer 1298
   Atmore, Al. 36502 Phone: (205) 368-2138

4. Apalachee Pole Company, Inc.
   P. O. Box 7
   Graceville, Fl. 32440 Phone: (904) 643-2121
   (Send RFQ To:
   P.O. Box 68
   Bristol, Fl. 32321)

5. Ace Pole Co., Inc.
   Waycross Hwy. 82E
   P. O. Box 1323
   Waycross, Ga. 31501 Phone: (912) 449-4011

6. Langdale Forest Products Co.
   P.O. Box 1088
   Valdosta, GA 31603

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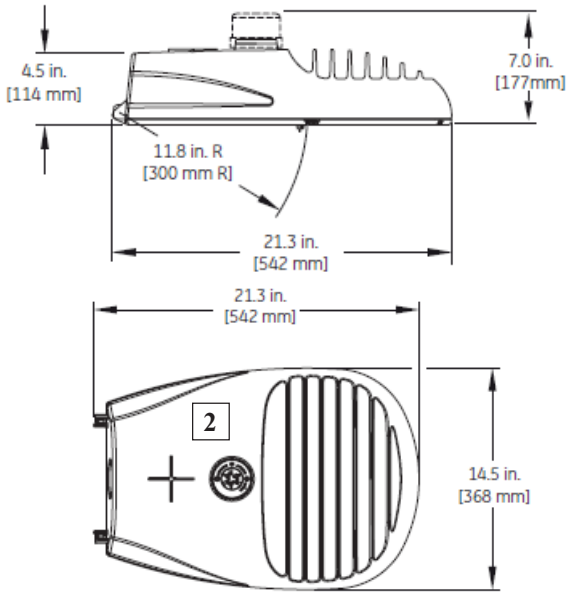
LED Roadway Cutoff - (Black) Light:
(Light Type L42, L43, L44; Pole Type P14, P17)

GRU Lights, Poles and Brackets, cont.

LED Roadway Cutoff 2 - (Black) Light:



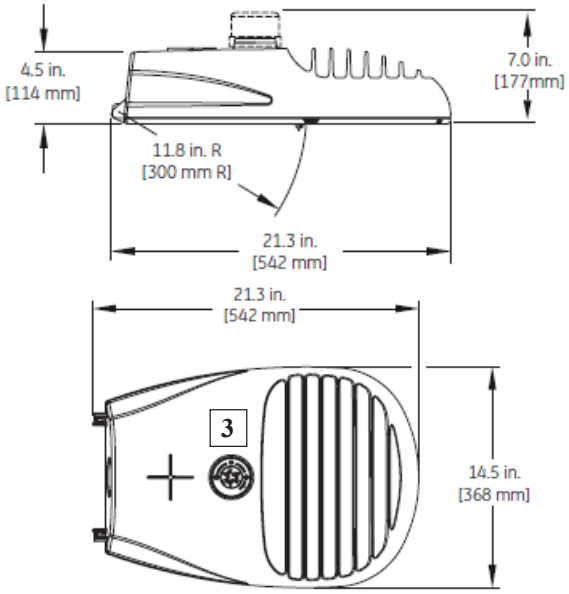
GENERAL ELECTRIC LIGHTING

Description		Manufacturer	Catalog No.
LUMINAIRE, LED ROADWAY CUTOFF 2, BLACK WITH DIE-CAST ALUMINUM HOUSING. **SEE COMPLETE SPECIFICATIONS ON PAGE L-90.00 THRU L-90.03.**			
SPECIFICATIONS:			
LAMP WATTAGE RANGE:	80 TO 105 WATTS	GENERAL ELECTRIC	ERL1-0-09-C3-30-A-BLCK-GLR-111
LUMEN RANGE:	8,000 TO 8,800		
VOLTAGE:	120 - 277 VOLTS (WIRED FOR 120V.)		
LIGHT DISTRIBUTION -			
IES TYPE:	III		
COLOR TEMPERATURE (CCA):	3,000 K. +/- 300		
COLOR RENDERING INDEX:	70		
OPERATING TEMPERATURE:	-4 TO 122 F.		
SURGE PROTECTION (MIN.):	10kV/10kA		
INTERNAL BUBBLE LEVEL			
TOOL-LESS ENTRY:	YES		
NEMA PHOTOCONTROL RECEPTACLE			
EXTERNAL FIELD I.D. MARKER: A REFLECTIVE YELLOW "1" ON BLACK BACKGROUND (1-1/2" TALL)			
ADJUSTABLE SLIPFITTER:	1-1/4" TO 2"		
COLOR:	BLACK		
WEIGHT:	18 LBS.		

NOTE:
20 YEAR PHOTOCONTROL LISTED ON ELECTRIC STANDARDS PAGE P-5.45, S/N 58151-8

GRU Lights, Poles and Brackets, cont.

LED Roadway Cutoff 3 - (Black) Light:



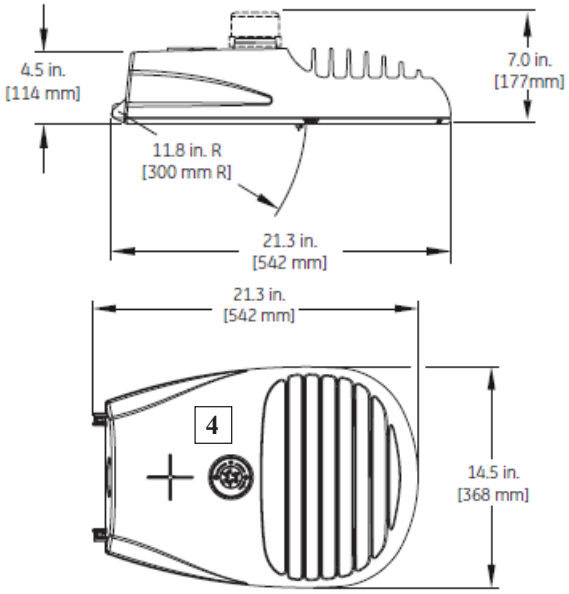
GENERAL ELECTRIC LIGHTING

Description		Manufacturer	Catalog No.
LUMINAIRE, LED ROADWAY CUTOFF 3, BLACK WITH DIE-CAST ALUMINUM HOUSING. **SEE COMPLETE SPECIFICATIONS ON PAGE L-90.00 THRU L-90.03.**			
SPECIFICATIONS:			
LAMP WATTAGE RANGE:	140 TO 155 WATTS	GENERAL ELECTRIC	ERLH-0-13-C3-30-A-BLCK-GLR-052
LUMEN RANGE:	12,500 TO 13,500		
VOLTAGE:	120 - 277 VOLTS (WIRED FOR 120V.)		
LIGHT DISTRIBUTION - IES TYPE:	III		
COLOR TEMPERATURE (CCA):	3,000 K. +/- 300		
COLOR RENDERING INDEX:	70		
OPERATING TEMPERATURE:	-4 TO 122 F.		
SURGE PROTECTION (MIN.):	10kV/10kA		
INTERNAL BUBBLE LEVEL			
TOOL-LESS ENTRY:	YES		
EXTERNAL FIELD I.D. MARKER: A REFLECTIVE YELLOW "1" ON BLACK BACKGROUND (1-1/2" TALL)			
ADJUSTABLE SLIPFITTER:	1-1/4" TO 2"		
COLOR:	BLACK		
WEIGHT:	20 - 25 LBS.		

NOTE:
20 YEAR PHOTOCONTROL LISTED ON ELECTRIC STANDARDS PAGE P-5.45, S/N 58151-8

GRU Lights, Poles and Brackets, cont.

LED Roadway Cutoff 4 - (Black) Light:



GENERAL ELECTRIC LIGHTING

Description		Manufacturer	Catalog No.
LUMINAIRE, LED ROADWAY CUTOFF 4, BLACK WITH DIE-CAST ALUMINUM HOUSING. **SEE COMPLETE SPECIFICATIONS ON PAGE L-90.00 THRU L-90.03.**			
SPECIFICATIONS:			
LAMP WATTAGE RANGE:	190 TO 230 WATTS	GENERAL ELECTRIC	ERL2-0-23-C3-30-A-BLCK-GLR-032
LUMEN RANGE:	21,000 TO 23,000		
VOLTAGE:	120 - 277 VOLTS (WIRED FOR 120V.)		
LIGHT DISTRIBUTION - IES TYPE:	III		
COLOR TEMPERATURE (CCA):	3,000 K. +/- 300		
COLOR RENDERING INDEX:	70		
OPERATING TEMPERATURE:	-4 TO 122 F.		
SURGE PROTECTION (MIN.):	10kV/10kA		
INTERNAL BUBBLE LEVEL			
TOOL-LESS ENTRY:	YES		
EXTERNAL FIELD I.D. MARKER: A REFLECTIVE YELLOW "1" ON BLACK BACKGROUND (1-1/2" TALL)			
ADJUSTABLE SLIPFITTER:	1-1/4" TO 2"		
COLOR:	BLACK		
WEIGHT:	20 - 25 LBS.		

NOTE:
20 YEAR PHOTOCONTROL LISTED ON ELECTRIC STANDARDS PAGE P-5.45, S/N 58151-8

GRU Lights, Poles and Brackets, cont.

35 Foot Black Standard LED Roadway Cutoff Lights Pole:

See Illustration on page 23

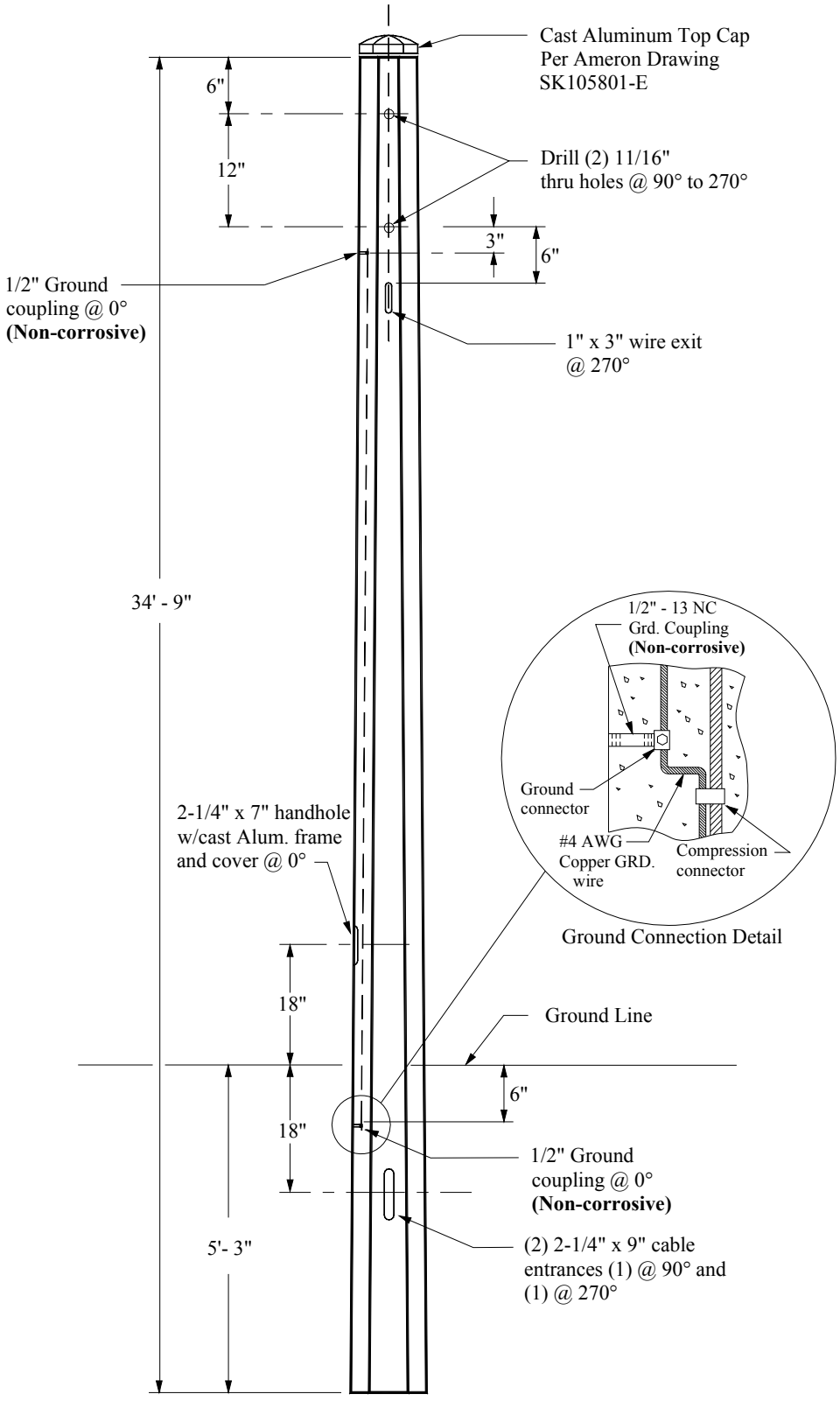
Description	Manufacturer	Catalog No.
DECORATIVE OCTAGONAL CONCRETE POLE WITH TOP CAP. TO BE USED FOR ROADWAY LIGHTING. SEE DRAWING ON PAGE 19, FOR POLE DRILLING SPECIFICATIONS AND OTHER DETAILS.		
POLE SPECIFICATIONS: POLE DIMENSIONS: OVERALL LENGTH: 34' - 9" BURIAL DEPTH: 5'-3"	* AMERON	MEO-9 (6P3A) POLE DWG.# SK105801 REV. E
** POLE COLOR: BLACK/BLACK (6P3A), EXPOSED FINISH, W/ARCHITECTURAL (ACRYLIC) GLOSS COATING WEIGHT: 1,300 LBS. EACH		

* POSSIBLE SUPPLIER:
JAG LIGHTING SOLUTIONS, INC.
JUDY GRADDY
1061 CHOKE CHERRY DRIVE
WINTER SPRINGS, FL 32708
PHONE: (407) 695-8547
FAX: (407) 696-3018

** **NOTE:**
PAINT HANDHOLE COVER AND TENON "BLACK" TO MATCH POLE.

GRU Lights, Poles and Brackets, cont.

35 Foot Black Standard LED Roadway Cutoff Lights Pole:



GRU Lights, Poles and Brackets, cont.

40 Foot Black Standard LED Roadway Cutoff Lights Pole:

See Illustration on page 25

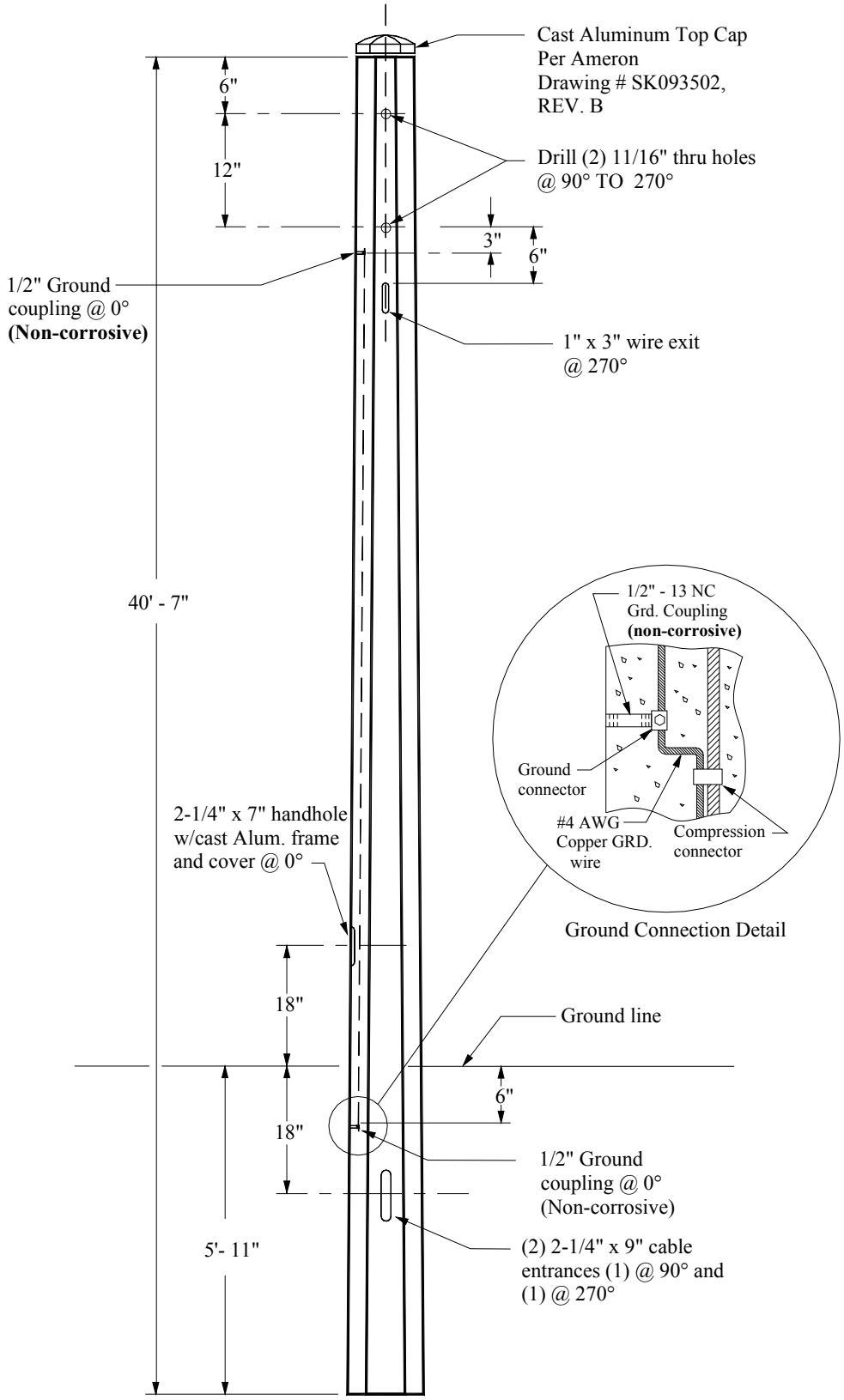
Description	Manufacturer	Catalog No.
DECORATIVE OCTAGONAL CONCRETE POLE WITH TOP CAP. TO BE USED FOR ROADWAY LIGHTING. SEE DRAWING ON PAGE 21, FOR POLE DRILLING SPECIFICATIONS AND OTHER DETAILS.		
POLE SPECIFICATIONS: POLE DIMENSIONS: OVERALL LENGTH: 40' - 7" BURIAL DEPTH: 5'-11" BUTT DIAMETER: 10” ** POLE COLOR: BLACK/BLACK (6P3A), EXPOSED FINISH, W/ARCHITECTURAL (ACRYLIC) GLOSS COATING WEIGHT: 1,600 LBS. EACH	* AMERON	MEOX-10.6 (6P3A) POLE DWG# SK093502 REV. B

* POSSIBLE SUPPLIER:
JAG LIGHTING SOLUTIONS, INC.
JUDY GRADDY
1061 CHOKE CHERRY DRIVE
WINTER SPRINGS, FL 32708
PHONE: (407) 695-8547
FAX: (407) 696-3018

**** NOTE:**
PAINT HANDHOLE COVER AND TENON "BLACK" TO MATCH POLE.

GRU Lights, Poles and Brackets, cont.

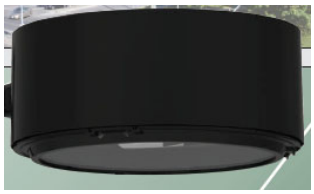
40 Foot Black Standard LED Roadway Cutoff Lights Pole:



LED Round Roadway Light - (Black)
(Light Type L51; Pole Type P11)

GRU Lights, Poles and Brackets, cont.

LED Round Roadway (Black) Light:



Description		Manufacturer	Catalog No.
LED "ROUND" DECORATIVE ROADWAY LUMINAIRE, WITH 7 PIN P.E. RECEPTACLE AND MOUNTING ARM.			
WATAGE RANGE:	120 TO 230	CYCLONE LIGHTING	CD20S2A-FGC-3-120W-3K-120V-PTDR-BK-TX CP4323
COLOR TEMPERATURE:	3000K		
LUMEN OUTPUT RANGE:	13,500 TO 14,500		
LIGHT COLOR:	BLACK		
DIAMETER:	25"		
DISTRIBUTION:	TYPE III		
PHOTO CONTROL RECEPTACLE:	NEMA TWIST STYLE - 7 PIN (ANSI C136.41)		
VOLTAGE:	120V.		

REV.

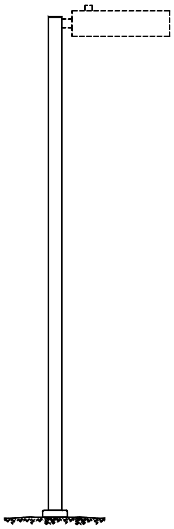
REV.

CYCLONE LIGHTING *CD20SR45-GAL-3-120W-3K-120V-PTR-CP4323-RAL-9005TX*

THIS CATALOG NUMBER HAS BEEN REVISED (SEE ABOVE)

GRU Lights, Poles and Brackets, cont.

LED Round Roadway (Black) Light Pole:



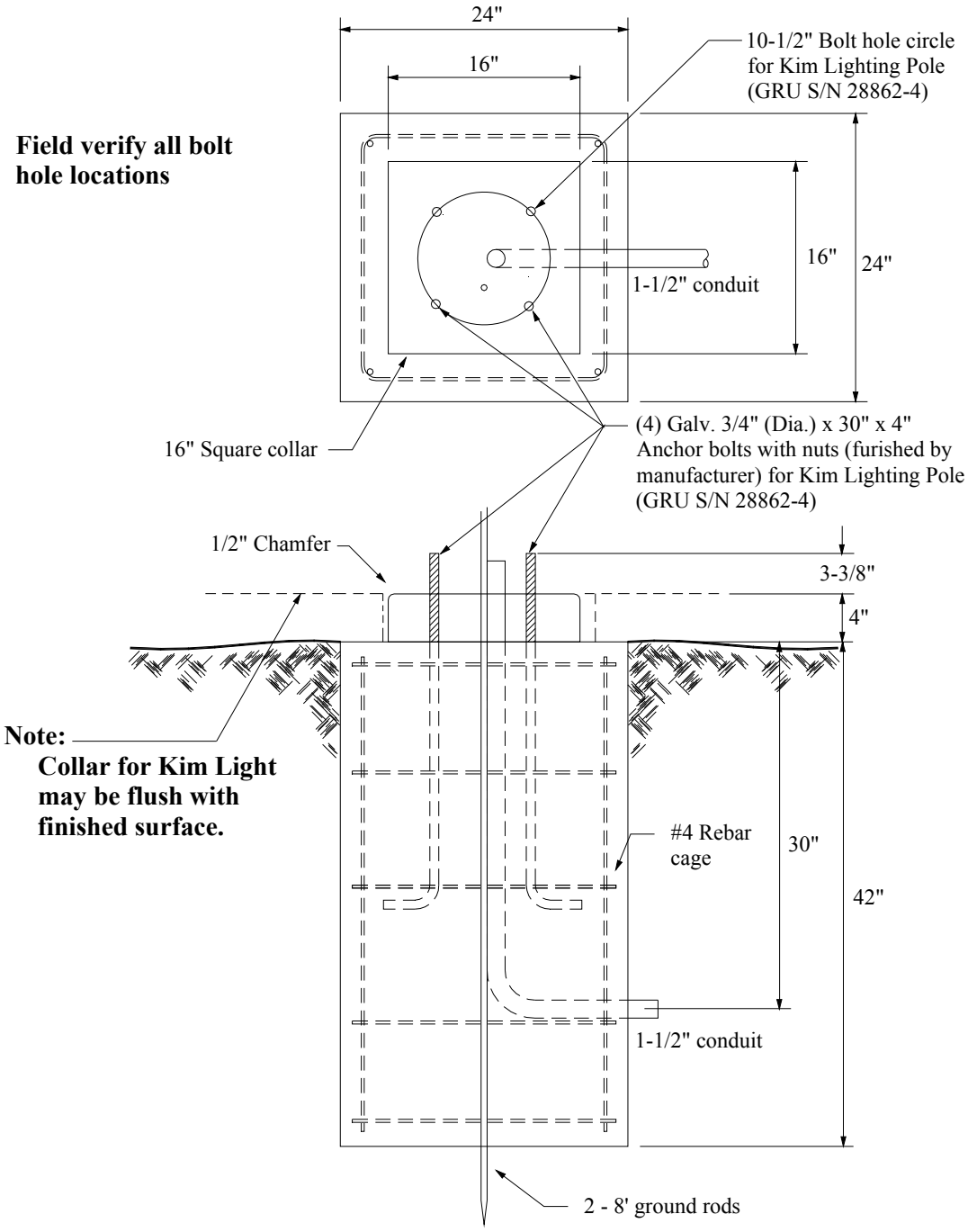
ALUMINUM POLE USE
WITH THE ROUND BLACK "KIM LIGHTING"
LUMINAIRE

Description	Manufacturer	Catalog No.
NON-TAPERED ROUND ALUMINUM 30 FOOT (MOUNTING HEIGHT) POLE. COLOR: BLACK		
NON-TAPERED ROUND ALUMINUM POLE	KIM LIGHTING	PRA30-6250-BL-P
REV.	NOVA POLES	NP60D30AB-BK-TX-GRU

THIS POLE REQUIRES A CONCRETE FOUNDATION FOR INSTALLATION PROVIDED BY CUSTOMER. SEE FOUNDATION DRAWINGS ON PAGES 35 AND 36 OF THIS DOCUMENT

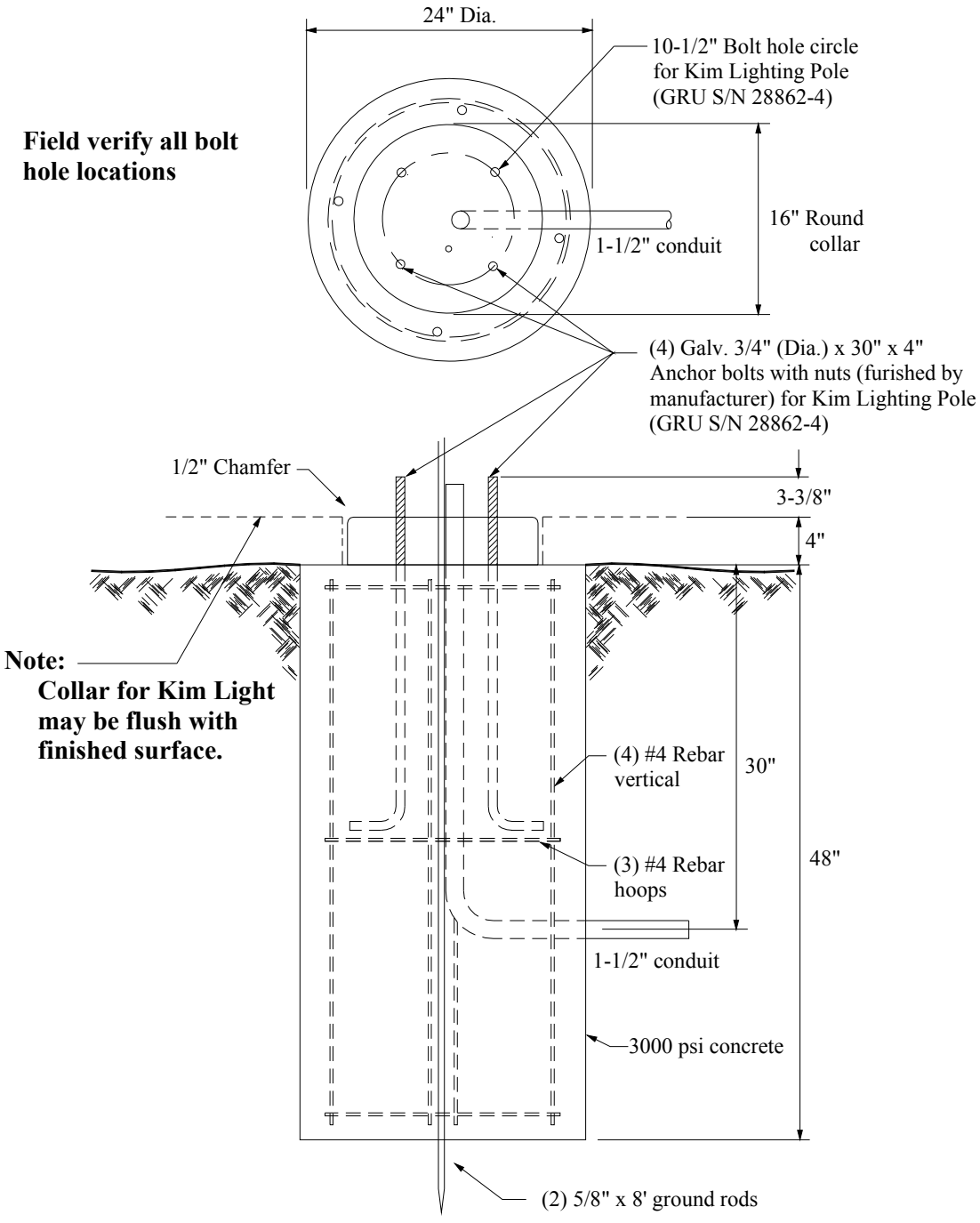
GRU Lights, Poles and Brackets, cont.

Square Concrete Foundation for PLED Round Roadway (Black) Light Pole:



GRU Lights, Poles and Brackets, cont.

Round Concrete Foundation for LED Round Roadway (Black) Light Pole:



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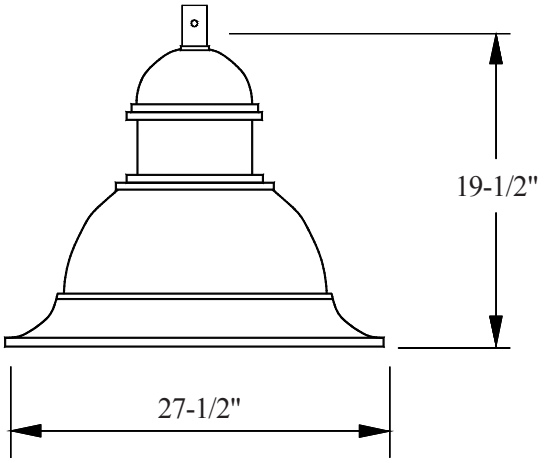
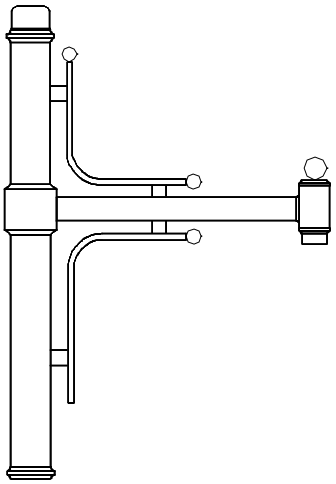
LED Pendant Roadway Light
(Light Type L55; Pole Type P5)

GRU Lights, Poles and Brackets, cont.

LED Pendant Roadway Light:





REV. **PENDANT LIGHT** REV. **MOUNTING ARM (BRACKET)**

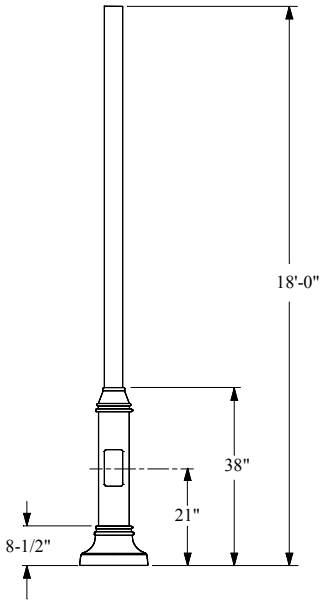
Description		Manufacturer	Catalog No.
LED "PENDANT" DECORATIVE ROADWAY LUMINAIRE. TO BE USED IN RESIDENTIAL AREAS.			
LUMINAIRE SPECIFICATIONS:			
WATTAGE RANGE:	40 TO 60	*CYCLONE LIGHTING (MODEL DOMIA)	CY55P1B-GAL-3-40W-3K-120-3F-RAL9005TX REV.
LUMEN OUTPUT RANGE:	4,000 TO 5,000		
COLOR TEMERATURE:	3000K		
PHOTO CONTROL:	MOUNTED ON MOUNTING BRACKET	*CYCLONE LIGHTING (MODEL DOMIA)	CY55P1B-FGC-3-40W-3K-120-BK-TX
OPTICAL ASSEMBLY:	IES TYPE III		
FINISH COLOR:	BLACK		
WEIGHT:	---------		
		REV. * PEMCO LIGHTING PRODUCTS	WIN-W1-NL-40W-3K-U-3-SMS-120-BK-TX
REV. PENDANT MOUNTING ARM (BRACKET)		CYCLONE LIGHTING	M205-C1-T-45-CP3952-3M-PTDR-BK-TX
		NOVA POLE	NPP-MM-24-PTR7-BK-TX

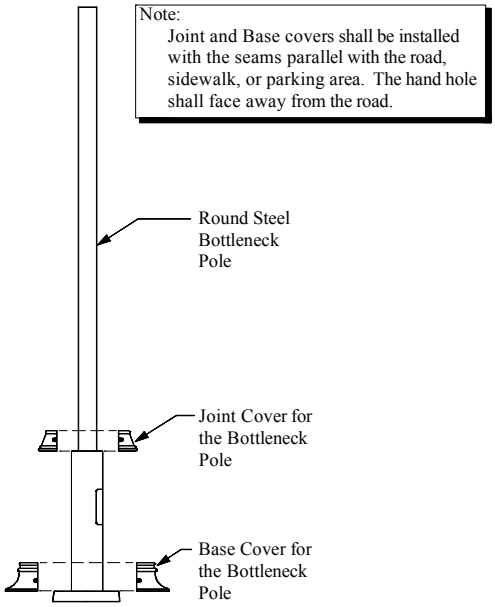
ADAPTER BRACKETS LISTED ON PAGE L-75.26 GRU ELECTRIC MATERIALS MANUAL

*** NOTE:**
THE CYCLONE LUMINAIRE REQUIRES AN ADAPTER BRACKET WHEN INSTALLED ON A LUMEC MOUNTING ARM BRACKET. (SEE ELECTRIC PAGE L-75.26)

GRU Lights, Poles and Brackets, cont.

LED Pendant Roadway Light Pole:





Description	Manufacturer	Catalog No.
ROUND STEEL BOTTLENECK POLE WITH BASE AND JOINT COVERS MADE OF TWO PIECES OF CAST ALUMINUM MECHANICALLY FASTENED TO THE BASE AND POLE WITH STAINLESS STEEL SCREWS. THIS POLE IS USED WITH THE 100 W. HIGH PRESSURE SODIUM "LUMEC" LUMINAIRE LISTED ON PAGE L-74.50, IN THIS MANUAL.		

SPECIFICATIONS:

SIZE:	4' DIAMETER X 18 FEET ROUND	LUMEC (PHILIPS)	SM6F-18-BK-TX
MATERIAL:	STEEL		
BASE PLATE:	13"		
BOLT CIRCLE:	10-1/2"		
ANCHOR BOLTS:	3/4" DIA. X 27"		
WEIGHT:	135 LBS.		
COLOR:	BLACK		

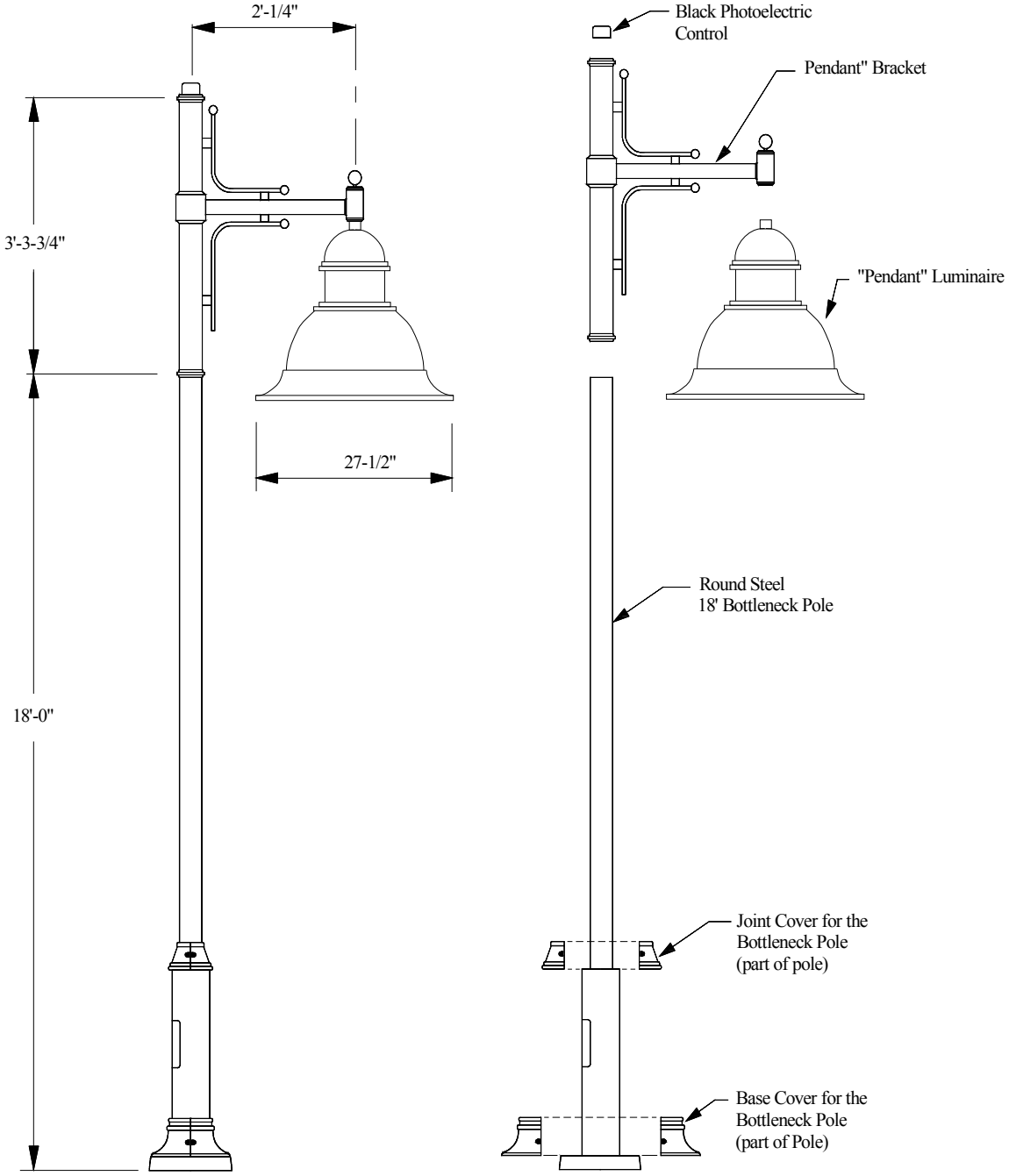
PARTS LIST:

1 - 4" X 18'-0" ROUND "BLACK" STEEL POLE
1 - TWO (2) PIECE JOINT COVER - BLACK
1 - TWO (2) PIECE BACE COVER - BLACK
MOUNTING HARDWARE (SCREWS)

THIS POLE REQUIRES A CONCRETE FOUNDATION FOR INSTALLATION PROVIDED BY CUSTOMER. SEE FOUNDATION DRAWINGS ON PAGES 42 AND 43 OF THIS DOCUMENT

GRU Lights, Poles and Brackets, cont.

LED Pendant Roadway Light Pole:

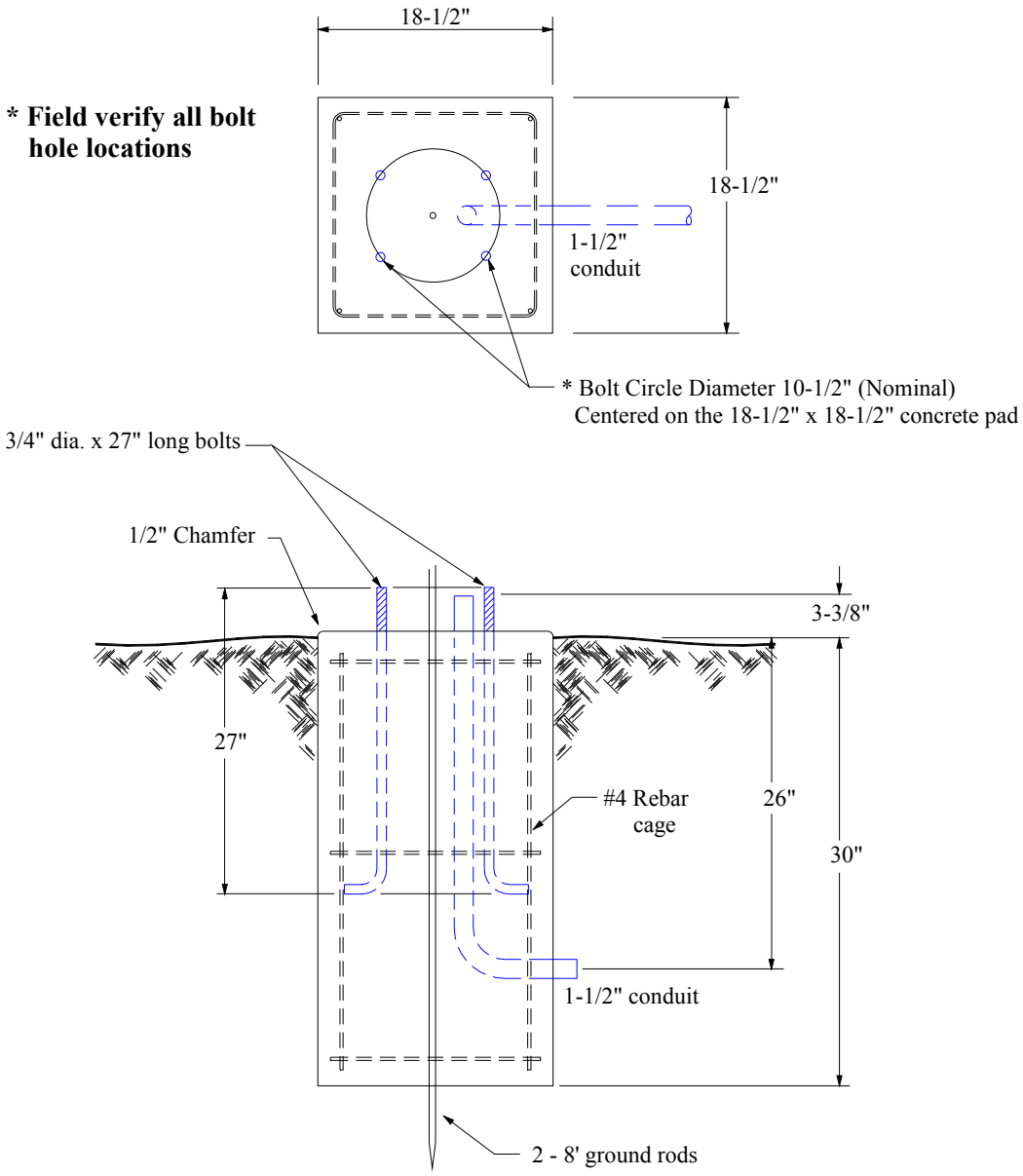


Pendant Luminaire
Assemblied

THIS POLE REQUIRES A CONCRETE FOUNDATION FOR INSTALLATION PROVIDED BY CUSTOMER. SEE FOUNDATION DRAWINGS ON PAGES 42 AND 43 OF THIS DOCUMENT

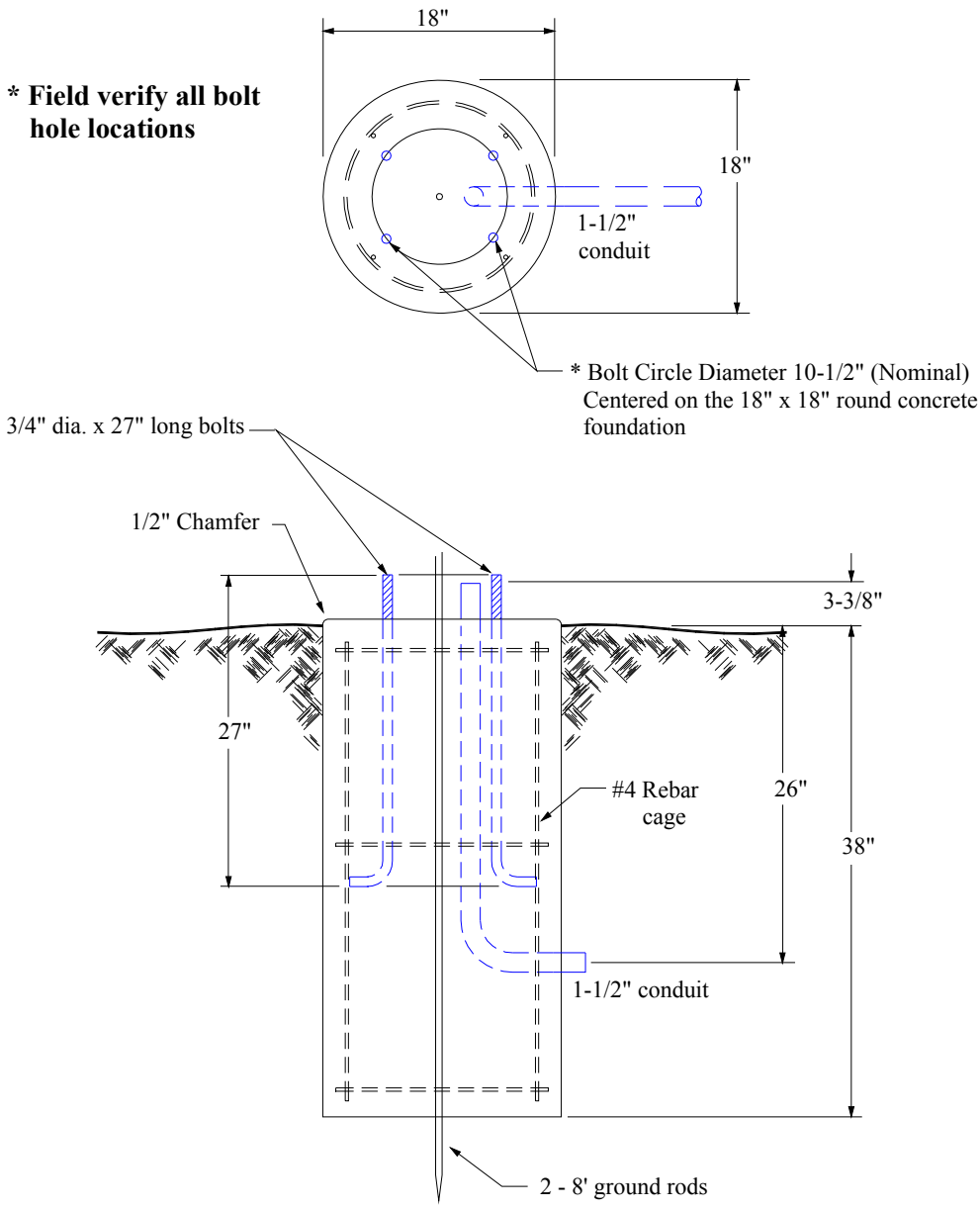
GRU Lights, Poles and Brackets, cont.

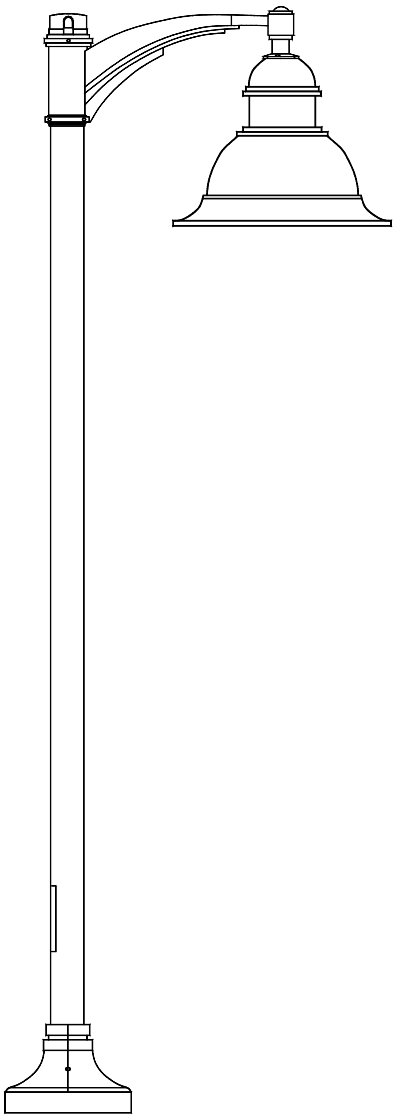
Square Concrete Foundation for LED Pendant Roadway Light Pole:



GRU Lights, Poles and Brackets, cont.

Round Concrete Foundation for LED Pendant Roadway Light Pole:



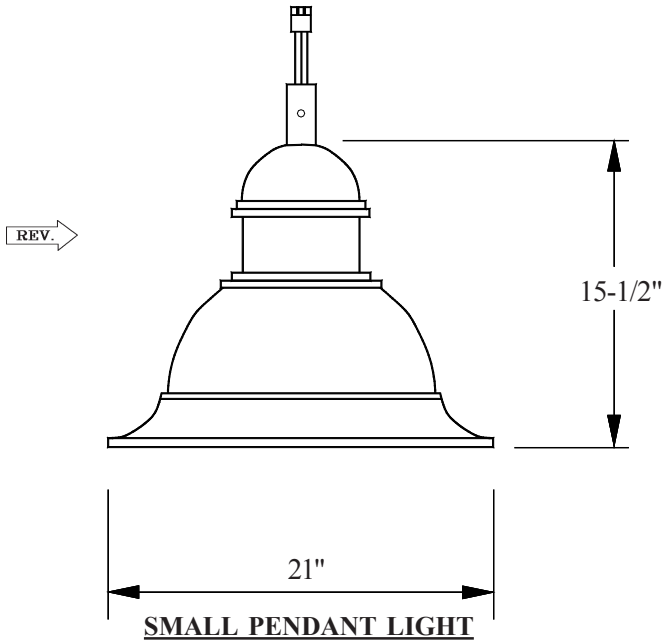


LED Small Pendant Pedestrian Light

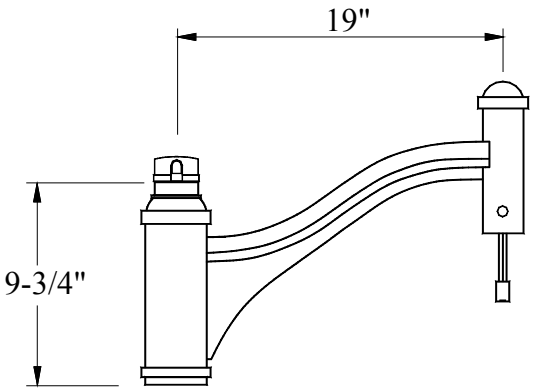
(Light Type L56; Pole Type P21)

GRU Lights, Poles and Brackets, cont.

LED Small Pendant Pedestrian Light:



SMALL PENDANT LIGHT



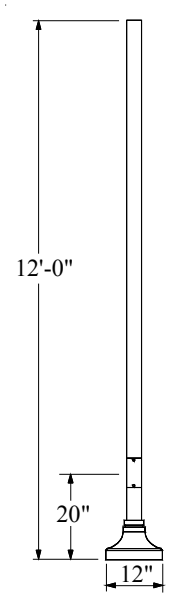
MOUNTING ARM (BRACKET)

Description		Manufacturer	Catalog No.
LED "SMALL PENDANT" DECORATIVE PEDESTRIAN LUMINAIRE.			
LUMINAIRE SPECIFICATIONS:			
WATTAGE RANGE:	40 TO 60	CYCLONE LIGHTING	SY21P1-FGC-2-40W-3K-120-3F-CP4120-RAL9005TX REV.
LUMEN RANGE:	4,000 TO 5,000		
COLOR TEMPERATURE:	3000K		
PHOTO CONTROL:	PHOTOCONTROL MOUNTING ON BRACKET		
OPTICAL ASSEMBLY:	IES TYPE II		
FINISH COLOR:	BLACK		
WEIGHT:	------ (LUMINAIRE & BRACKET)		
EPA:	1.10 SQ. FT.		
LUMINAIRE MOUNTING ARM (BRACKET):			
ALUMINUM WITH CAST-IN POLE ADAPTER. SLIP-FITS A 3" (OUTSIDE DIAMETER) X 6" LONG TENON WITH PHOTO CONTROL RECEPTACLE		REV. CYCLONE LIGHTING	M206-C1-T35-PTDR-BK-TX-CP3933
COLOR:	BLACK		
		REV. *LUMEC (PHILIPS)*	*DBC-1A-RC/120-BK-TX*
		THIS MANUFACTURE HAS BEEN DELETED	

~~* NOTE:~~
~~THE CYCLONE LUMINAIRE REQUIRES AN ADAPTER BRACKET WHEN INSTALLED ON A LUMEC MOUNTING ARM BRACKET. (SEE ELECTRIC PAGE L-75.26)~~

GRU Lights, Poles and Brackets, cont.

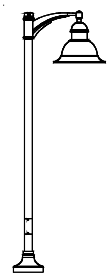
Pole for the LED Small Pendant Pedestrian Light:



Anchor Base and Bolt Details

Pole Height (x)	Pole Diamter (Y)	Bolt Circle Dia.	Anchor Bolt Projection	Anchor Bolts Sizes	Base Cover Size	Conduit Opening
12"	3"	10-1/2"	5-1/2" to 6 - 1/2"	3/4" x 17" x 3"	12"	2' X 4-1/2"

STEEL POLE
USE WITH THE ROUND BLACK "SMALL DOMUS" LUMINAIRE



POLE AND LUMINAIRE

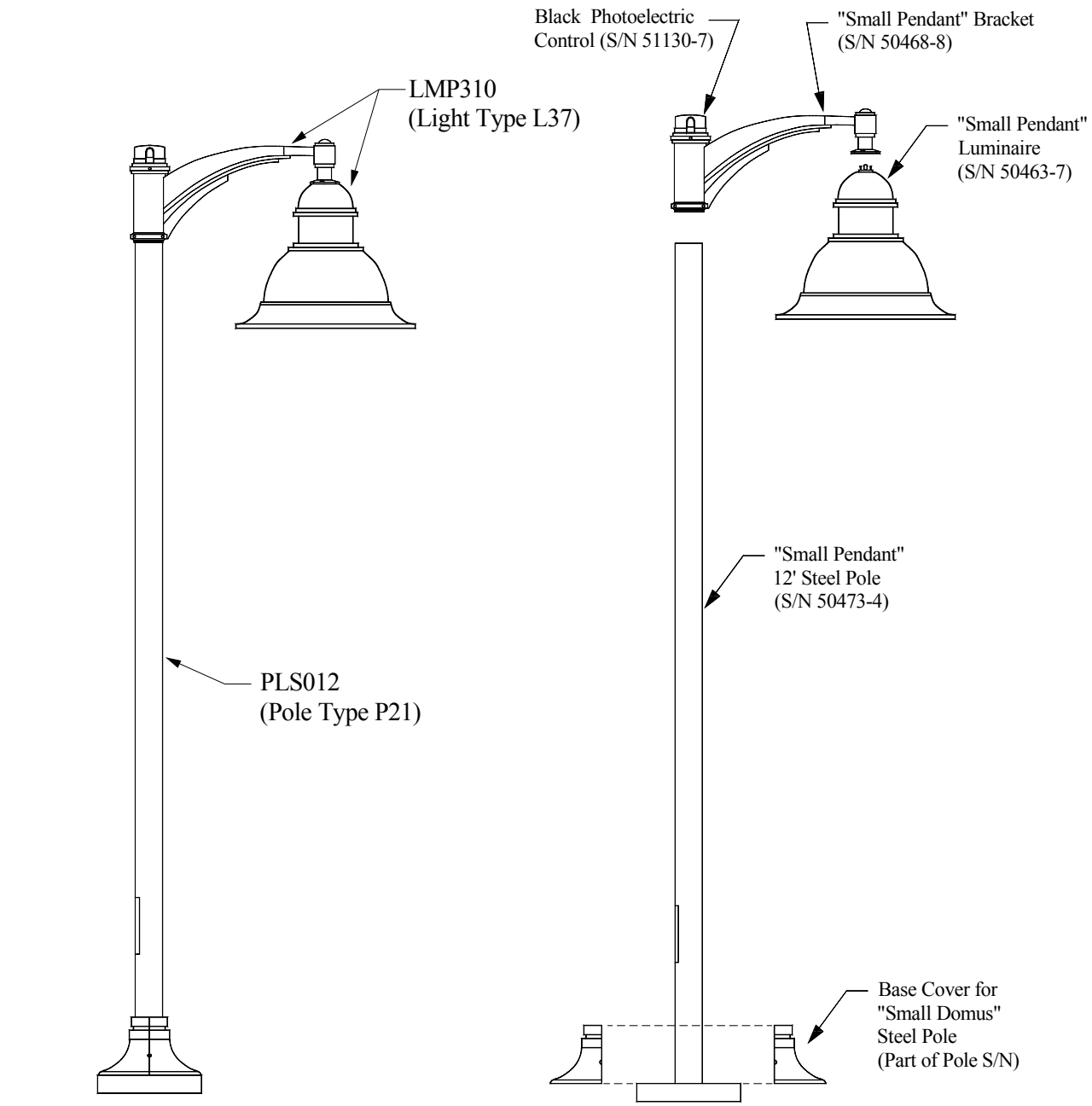
Description	Manufacturer	Catalog No.
NON-TAPERED ROUND STEEL 12 FOOT POLE. THIS POLE IS USED WITH THE 100 W. METAL HALIDE LUMINAIRE LISTED ON PAGE L-74.75, IN THIS MANUAL. COLOR: BLACK SIZE: 12' HEIGHT X 3" DIAMETER * ANCHOR BOLTS PROVIDED BY MANUFACTURER: (4) 3/4" X 17" X 3" (STEEL) (8) NUTS (8) WASHERS	LUMEC (PHILIPS)	SM3J-12-BK -TX

* NOTE:
IMPORTANT, DO NOT OBSTRUCT SPACE BETWEEN ANCHOR PLATE ANS CONCRETE BASE.

THIS POLE REQUIRES A CONCRETE FOUNDATION FOR INSTALLATION PROVIDED BY CUSTOMER. SEE FOUNDATION DRAWING ON PAGE 48 OF THIS DOCUMENT

GRU Lights, Poles and Brackets, cont.

Pole for the LED Small Pendant Pedestrian Light:



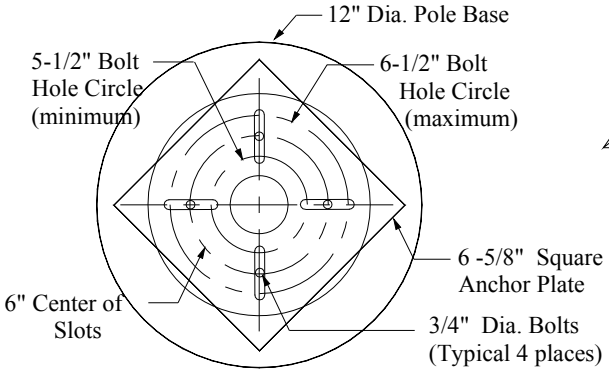
Small Pendant Luminaire Assemblied

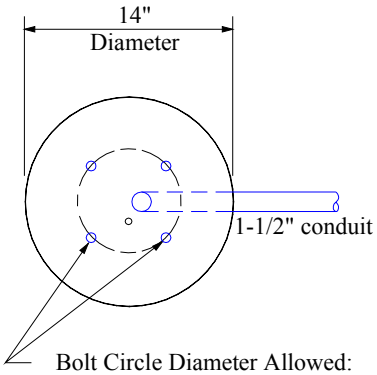
THIS POLE REQUIRES A CONCRETE FOUNDATION FOR INSTALLATION PROVIDED BY CUSTOMER. SEE FOUNDATION DRAWING ON PAGE 48 OF THIS DOCUMENT

GRU Lights, Poles and Brackets, cont.

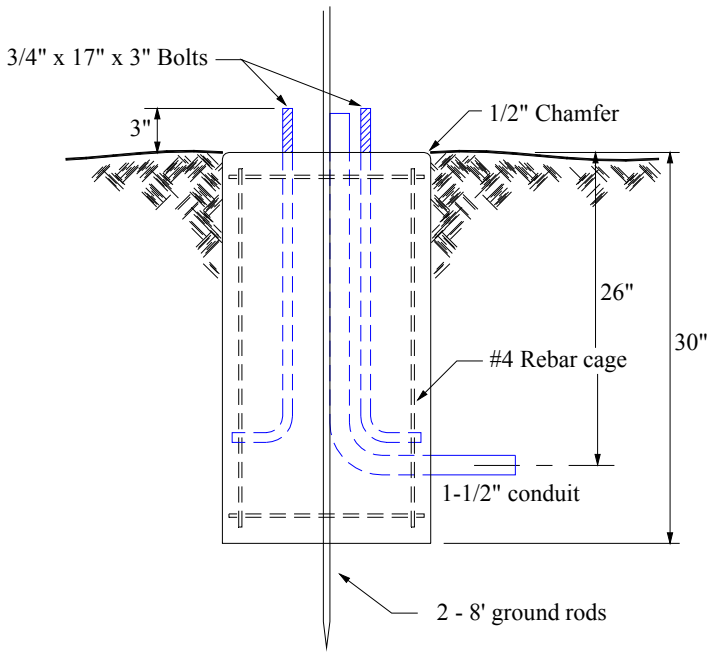
Round Concrete Foundation for LED Small Pendant Pedestrian Light Pole:

Field verify all bolt circle dimensions on Pedestrian Fixtures





Bolt Hole Template for S/N 50463-7



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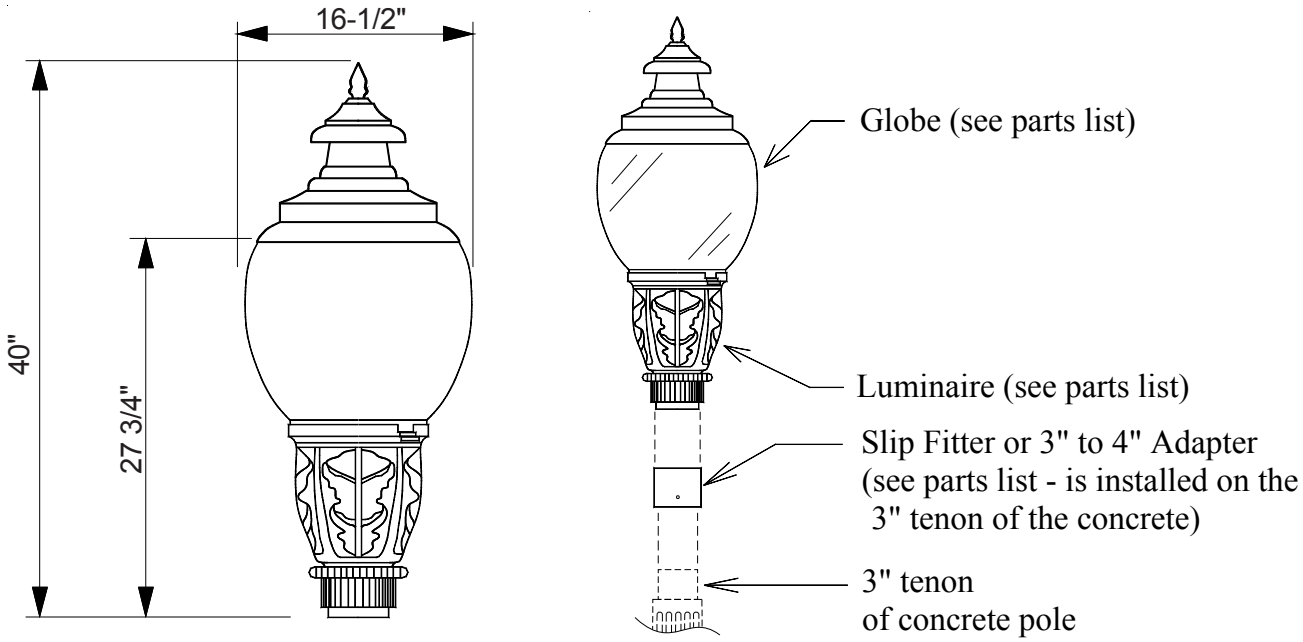
LED Acorn Pedestrian Light

(Light Types L52; Pole Type P1)

GRU Lights, Poles and Brackets, cont.

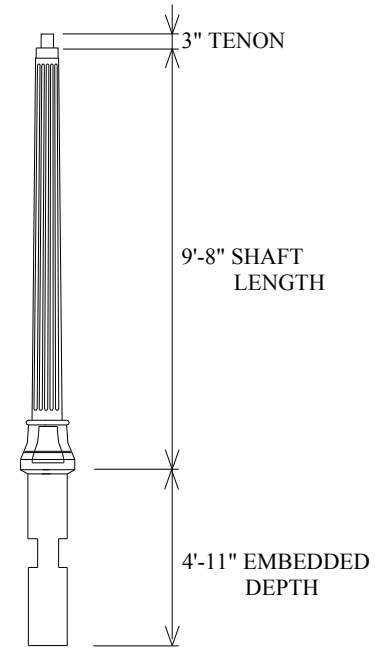
LED Acorn Pedestrian Light:



Description	Manufacturer	Catalog No.
LED PEDESTRIAN DECORATIVE "ACORN" CUTOFF TYPE LUMINAIRE. LUMINAIRE SPECIFICATIONS: WATTAGE: 67 LUMEN OUTPUT: 4731 TENON MOUNT ADAPTER TO CONVERT 3" NOMINAL OD FITTERS FOR USE WITH THE 4" TENON FITTER. PHOTO CONTROL RECEPTACLE: NEMA TWIST STYLE - 7 PIN (ANSI C136.41) OPTICAL ASSEMBLY: IES TYPE III FROSTED CLEAR ACRYLIC GLOBE WITH SPUN ALUMINUM BLACK HOOD AND A CAST ALUMINUM DECORATIVE FINIAL MECHANICALLY ASSEMBLED ON THE TOP OF THE GLOBE. DECORATIVE POLE TOP MOUNTING ADAPTER BLACK TEXTURED POWDER COAT (RAL9005TX) PARTS INCLUDE: 1 - LUMINAIRE 1 - GLOBE 1 - TENON MOUNT ADAPTER (3" TO 4")	REV. CYCLONE LIGHTING	AG10T4C-VS3AR-3-50W-3K-120-F30-PTDR-BK-TXCP6115
	CYCLONE LIGHTING	*CG42T4-AGAF-SKY3-50W-3K-120-EF2-F2AP-PTDR-R30-CP4026-RAL9005TX*
	REV. **THIS CATLOG NUMBER HAS BEEN REVISE (SEE NEW CATALOG NUMBER ABOVE)**	

GRU Lights, Poles and Brackets, cont.

LED Acorn Pedestrian Light Pole:



Description	Manufacturer	Catalog No.
DECORATIVE EMBEDED CONCRETE POLE WITH TENON ATTACHMENT. TO BE USED IN THE RESIDENTIAL AREAS.		
POLE SPECIFICATIONS:		
POLE DIMENSIONS (PER CATALOG):		
TENON: 3" O.D. x 3" HIGH		
SHAFT LENGTH:: 9'-8"		
BURIAL DEPTH: 4'-11"		
OVERALL LENGTH: 14-10"		
LAMP CENTER: 11'-6"		
** POLE COLOR: BLACK	* AMERON	FLUTED VICTORIAN STYLE II POLE: ** VEF-3.0 (6P3) WITH ACRYLIC
WEIGHT: 430 LBS. MINIMUM	TRADITIONAL CONCRETE, INC.	D120X-MS-EA-3T-BC OR D1210X-MS-EA-3T-BC

* POSSIBLE SUPPLIER:
JAG LIGHTING SOLUTIONS, INC.
JUDY GRADDY
1061 CHOKE CHERRY DRIVE
WINTER SPRINGS, FL 32708
PHONE: (407) 695-8547
FAX: (407) 696-3018

** **NOTE:**
PAINT HANDHOLE COVER AND TENON "BLACK" TO MATCH POLE.

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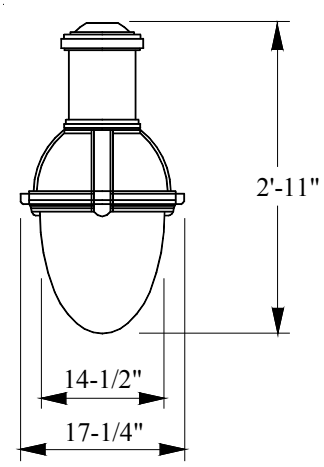
LED Teradrop Roadway Light
(Light Types L53, L54; Pole Type P7)

GRU Lights, Poles and Brackets, cont.

LED Teradrop Roadway Light:



Description		Manufacturer	Catalog No.
LED "REARDROP" ROADWAY LUMINAIRE.			
LUMINAIRE SPECIFICATIONS:			
WATTAGE RANGE:	100 to 120	** CYCLONE LIGHTING (MODEL - TEARDROP)	CO12P1UF-DP3GR-GAL-3-102W-3K-120-3F-RAL9005TX
LUMEN OUTPUT RANGE:	8,500 TO 11,500		
COLOR TEMPERATURE:	3000K		
PHOTO CONTROL RECEPTACLE:	NEMA TWIST STYLE - 7 PIN (ANSI C136.41)		
OPTICAL ASSEMBLY:	IES TYPE III		
GLOBE:	BOROSILICATE GLASS		
FINISH COLOR:	BLACK		
WEIGHT:	34 LBS.		

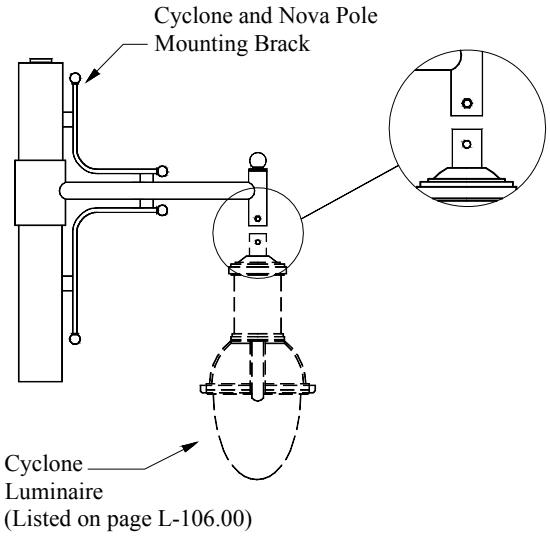
LUMINAIRE MOUNTING ARM BRACKETS:
LISTED ON PAGE L-75.27 & L-75.28

ADAPTER BRACKETS:
LISTED ON PAGE L-75.26

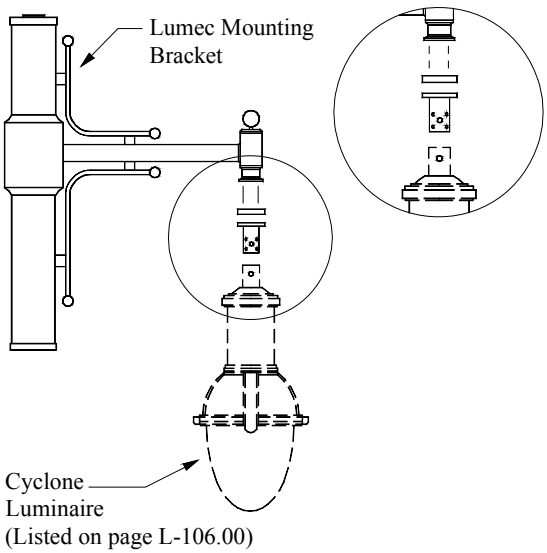
NOTES:
**1) ADAPTER BRACKET IS REQUIRED WHEN INSTALLED WITH A LUMEC MOUNTING BRACKET.

GRU Lights, Poles and Brackets, cont.

2’-0” & 4’-0” Mounting Arm Brackets For LED Teradrop Roadway Light:



2’-0” MOUNTING ARM BRACKET



4’-0” MOUNTING ARM BRACKET

Description	Manufacturer	Catalog No.
200 W. HIGH PRESSURE SODIUM "RENAISSANCE" ROADWAY LUMINAIRE.		
LUMINAIRE MOUNTING BRACKETS:		
2'-0" X 2-3/8" ROUND ALUMINUM ARM WELDED. 9" SLIP-FITS OVER 5-9/16" O.D. POLE TENON. COLOR: BLACK	CYCLONE LIGHTING	M205-C1-T60-CP3952/2-3M-PTDR-BK-TX
	NOVA POLE	NPP-MM-5S-24-PTR7-BK-TX
4'- 0" 2-3/8" ROUND ALUMINUM ARM WELDED. 9" SLIP-FITS OVER 5-9/16" O.D. POLE TENON. COLOR: BLACK	CYCLONE LIGHTING	M205-C1-T60-CP3952-3M-PTDR-BK-TX
	NOVA POLE	NPP-MM-5S-48-PTR7-BK-TX

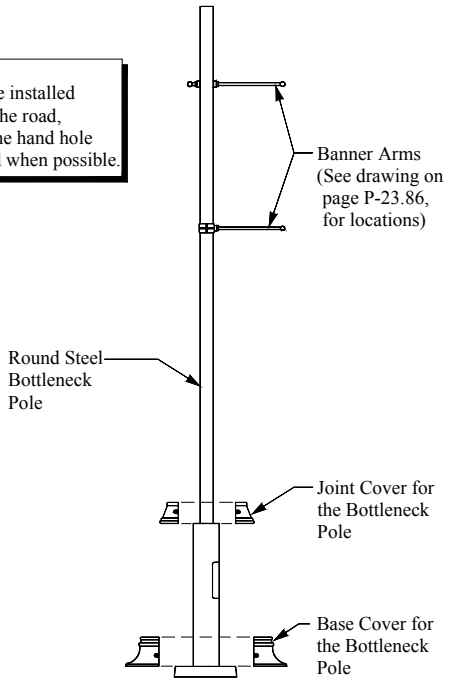
REPLACEMENT PARTS:

LISTED IN GRU ELECTRIC MATERIALS MANUAL

GRU Lights, Poles and Brackets, cont.

LED Teradrop Roadway Light Pole:

Note:
Joint and Base covers shall be installed with the seams parallel with the road, sidewalk, or parking area. The hand hole shall face away from the road when possible.



THIS POLE REQUIRES A CONCRETE FOUNDATION FOR INSTALLATION PROVIDED BY CUSTOMER. SEE FOUNDATION DRAWING ON PAGE 60 OF THIS DOCUMENT

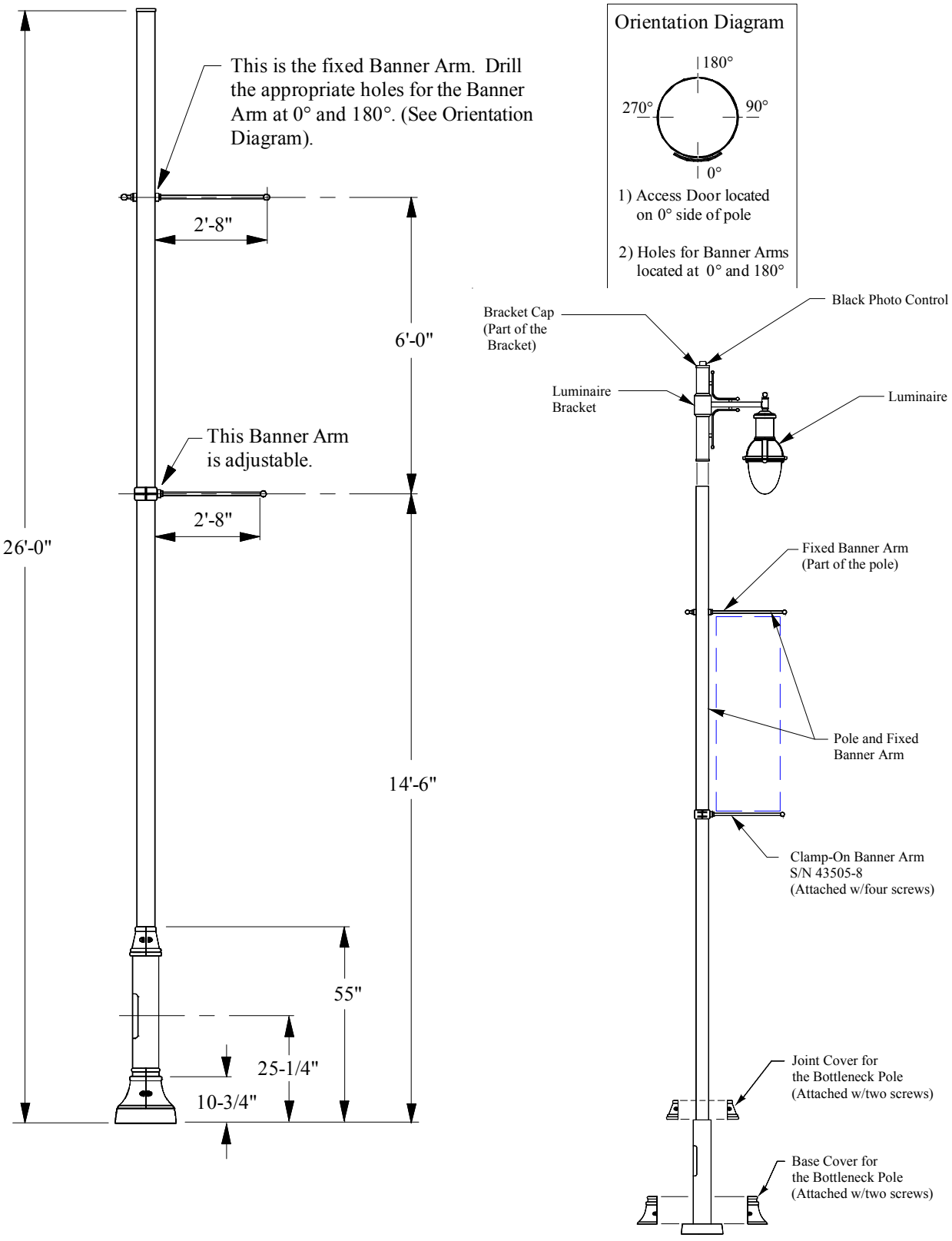
Description		Manufacturer	Catalog No.
ROUND STEEL BOTTLENECK POLE WITH BASE AND JOINT COVERS MADE OF TWO PIECES OF CAST ALUMINUM MECHANICALLY FASTENED TO THE BASE AND POLE WITH STAINLESS STEEL SCREWS. THIS POLE IS USED WITH THE 200 W. HIGH PRESSURE SODIUM "RENAISSANCE" LUMINAIRE LISTED ON PAGE L-75.25, IN THIS MANUAL.			
SPECIFICATIONS:			
SIZE:	5-9/16"' DIA. X 26 FEET ROUND WITH UPPER ARM	LUMEC (PHILIPS)	#SSM8V-26-BK-TX-BAS32-LMS20392A
MATERIAL:	STEEL		
COLOR:	BLACK		
BASE PLATE:	15"		
BOLT CIRCLE:	12-1/2"		
ANCHOR BOLTS:	1" DIA. X 36"		
WEIGHT:	372 LBS.		
WITH (1) CLAMP-ON LOWER BANNER ARM FOR 5-9/16" OD POLE		LUMEC (PHILIPS)	#BAA1-32-SSM8V-BK-TX

PARTS LIST:

1 - 5-9/16"' X 26'-0" ROUND "BLACK" STEEL POLE
1 - TWO (2) PIECE JOINT COVER - BLACK
1 - TWO (2) PIECE BACE COVER - BLACK
MOUNTING HARDWARE (SCREWS)
1 - UPPER BANNER ARM
1 - CLAMP-ON LOWER BANNER ARM

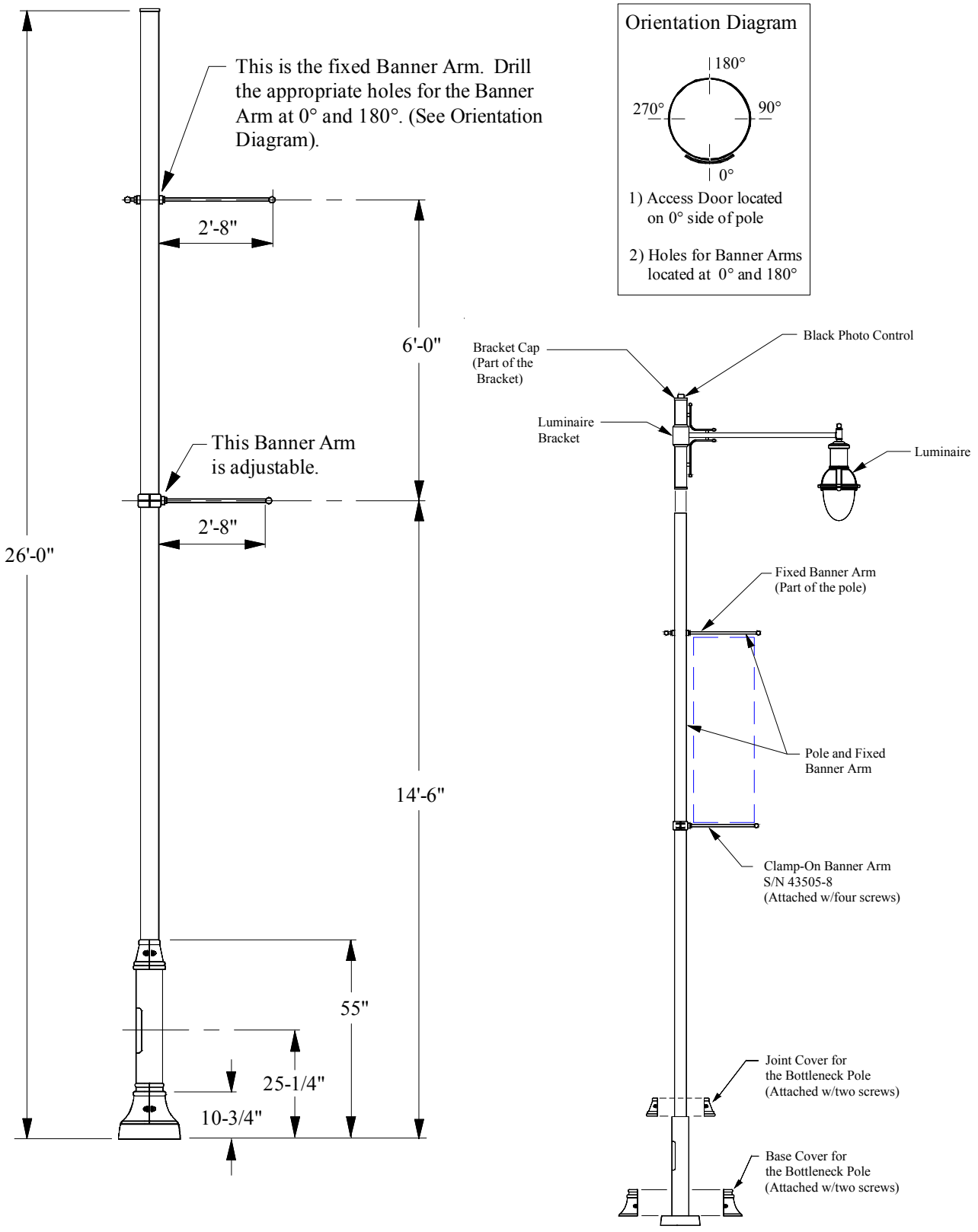
GRU Lights, Poles and Brackets, cont.

LED Teradrop Roadway Light Pole w/2'-0" Mounting Arm Bracket cont.:



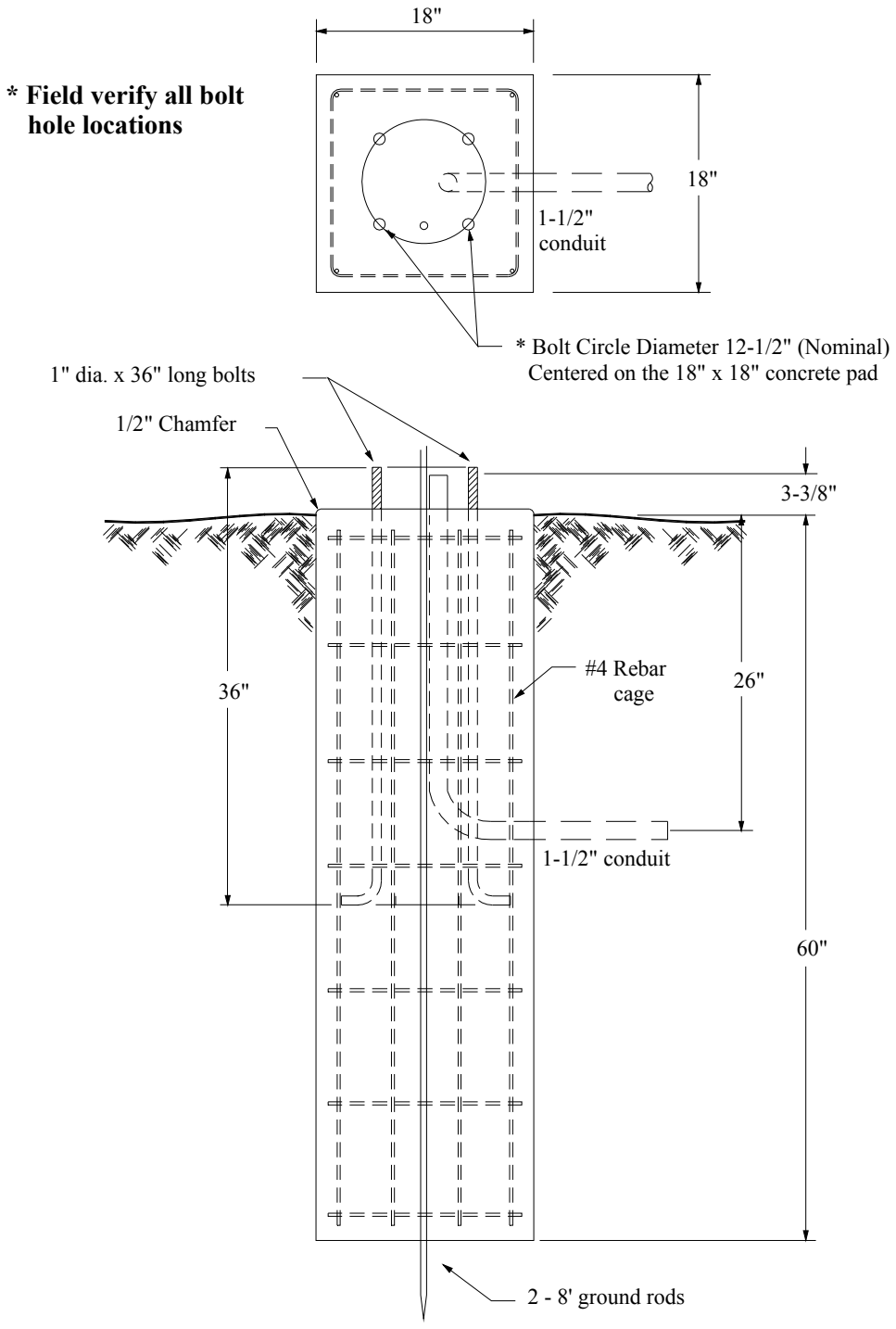
GRU Lights, Poles and Brackets, cont.

LED Teradrop Roadway Light Pole w/4'-0" Mounting Arm Bracket cont.:



GRU Lights, Poles and Brackets, cont.

Square Concrete Foundation for LED Teradrop Roadway Light Pole:



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Floodlights

(Light Types L57, L58 and L59; Pole Types P9, P13, P16, P19, P8, P12, P15, P18)

GRU Lights, Poles and Brackets, cont.

LED Floodlight 1 (Backyard):

*YOKE/TRUNNON

THIS FLOODLIGHT IS TO BE USED IN RESIDENTIAL APPLICATIONS
(TO REPLACE A 100W. HPS ROADWAY LIGHTS IN BACKYARDS)

Description	Manufacturer	Catalog No.
LED FLOODLIGHT 1, DIE-CAST ALUMINUM HOUSING, WITH GALVANIZED STEEL *YOKE/TRUNNON BRACKET AND ** TOP AND SIDE SHIELDS.		

SPECIFICATIONS:

LAMP WATTAGE RANGE:	15 TO 25 WATTS
LUMEN RANGE:	2,500 TO 3,000
VOLTAGE:	120 - 277 VOLTS (WIRED FOR 120V.)
LIGHT DISTRIBUTION (IES):	6 X 6 OR 7 X 6
CCT:	3,000 K.
COLOR RENDERING INDEX:	70
OPERATING TEMPERATURE:	-4 TO 122 F.
SURGE PROTECTION (MIN.):	10kV/5kA
PHOTO CONCTROL RECEPT:	ANSI C136.41 7-PIN
CORD TYPE AND LENGTH:	3 #14, 3 FT. (MIN.)
COLOR:	GRAY
WEIGHT:	13 LBS.

EATON LIGHTING — REV. — UFLD-S-C70-D-U-66-T-AP-7030-4N7-10MSP-C1405
WITH
** TS2LW/NFFLD-AP

NOTES:

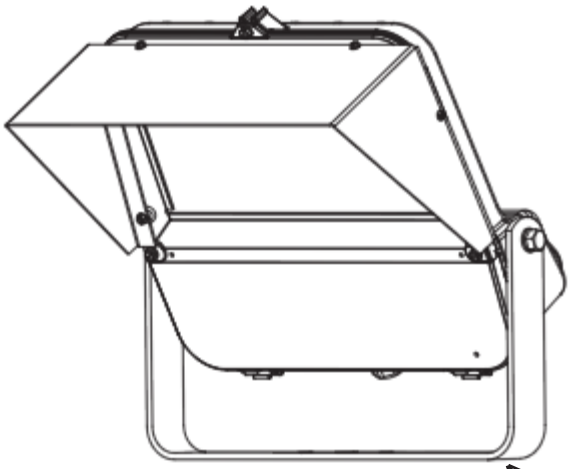
*1) THE YOKE/TRUNNON WILL BE AS SHOWN IN THE ILLUSTRATION ON THIS PAGE.

2) 20 YEAR PHOTOCONTROL LISTED ON ELECTRIC STANDARDS PAGE P-5.45, S/N 58131-3

** 3) TOP AND SIDE SHIELDS SHALL BE PAINTED GRAY OR ALUMINUM (NOT PAINTED) AND BE INCLUDED WITH THE FLOOD LIGHT. SIDE SHIELDS OR VISORS **MUST BE SHIPPED AT THE SAME TIME AS THE FLOODLIGHT AND APPEAR ON THE SAME INVOICE.** (SIDE SHIELDS OR VISORS SHALL BE INSTALLED IN THE FIELD).

GRU Lights, Poles and Brackets, cont.

LED Floodlight 2:



NOT ALL MANUFACTURERS LIGHT WILL LOOK THE SAME

Description		Manufacturer	Catalog No.
LED FLOODLIGHT 2, DIE-CAST ALUMINUM HOUSING, WITH GALVANIZED STEEL *YOKE/ TRUNNON BRACKET AND **TOP AND SIDE SHIELDS.			
SPECIFICATIONS:			
LAMP WATTAGE RANGE:	95 TO 125 WATTS	GENERAL ELECTRIC REV.	EFM1-01-0-CC-66-7-30-A-A-T1-GRAY-R-067 WITH ** TSVGRAY-EFM
LUMEN RANGE:	14,000 TO 15,000		
VOLTAGE:	120 - 277 VOLTS (WIRED FOR 120V.)		
LIGHT DISTRIBUTION:	6 X 6 OR 7 X 6		
CCT:	3,000 K.		
COLOR RENDERING INDEX:	70	HOWARD LIGHTING REV.	UFAMD73YG2R7LA-2-193 WITH ** UF-GS
OPERATING TEMPERATURE:	-4 TO 122 F.		
SURGE PROTECTION (MIN.):	10kV/5kA		
PHOTO CONCTROL RECEPT:	ANSI C136.41 7-PIN		
CORD TYPE AND LENGTH:	3 #14, 3 FT. (MIN.)	EATON REV.	UFLD-C40-D-U-66-Y-AP-7030-4N7-10K-C1405-U94906 WITH ** TS2/UFLD-AP
COLOR:	GRAY		
WEIGHT:	20 TO 30 LBS.		

NOTES:

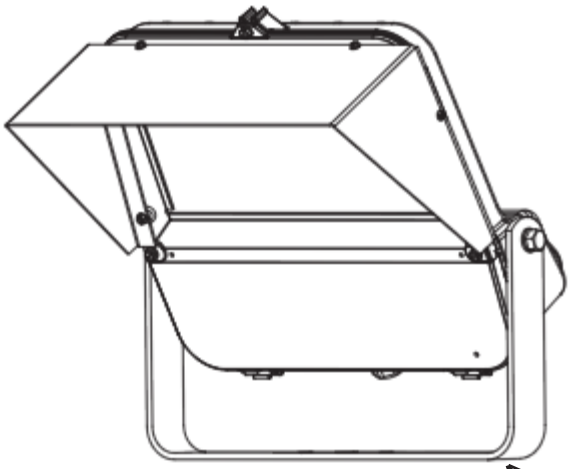
*1) THE YOKE/TRUNNON WILL BE AS SHOWN IN THE ILLUSTRATION ON THIS PAGE.

2) 20 YEAR PHOTOCONTROL LISTED ON ELECTRIC STANDARDS PAGE P-5.45, S/N 58131-3

** 3) TOP AND SIDE SHIELDS SHALL BE PAINTED GRAY OR ALUMINUM (NOT PAINTED) AND BE INCLUDED WITH THE FLOOD LIGHT. SIDE SHIELDS OR VISORS **MUST BE SHIPPED AT THE SAME TIME AS THE FLOODLIGHT AND APPEAR ON THE SAME INVOICE.** (SIDE SHIELDS OR VISORS SHALL BE INSTALLED IN THE FIELD).

GRU Lights, Poles and Brackets, cont.

LED Floodlight 3:



NOT ALL MANUFACTURERS LIGHT WILL LOOK THE SAME

Description	Manufacturer	Catalog No.
LED FLOODLIGHT 3, DIE-CAST ALUMINUM HOUSING, WITH GALVANIZED STEEL *YOKE/ TRUNNON BRACKET AND ** TOP AND SIDE SHIELDS.		
GENERAL ELECTRIC REV.		EFM1-01-0-EE-66-7-30-A-A-T1-GRAY-R-068 WITH ** TSVGRAY-EFM
EATON LIGHTING REV.		UFLD-C70-D-U-66-Y-AP-7030-4N7-10-K-C1405-U100859 WITH ** TS2/UFLD-AP

SPECIFICATIONS:

LAMP WATTAGE RANGE:	175 TO 200 WATTS
LUMEN RANGE:	21,000 TO 23,200
VOLTAGE:	120 - 277 VOLTS (WIRED FOR 120V.)
LIGHT DISTRIBUTION (IES):	6 X 6 OR 7 X 6
CCT:	3,000 K.
COLOR RENDERING INDEX:	70
OPERATING TEMPERATURE:	-4 TO 122 F.
SURGE PROTECTION (MIN.):	10kV/5kA
PHOTO CONCTROL RECEPT:	ANSI C136.41 7-PIN
CORD TYPE AND LENGTH:	3 #14, 3 FT. (MIN.)
COLOR:	GRAY
WEIGHT:	20 TO 30 LBS.

NOTES:

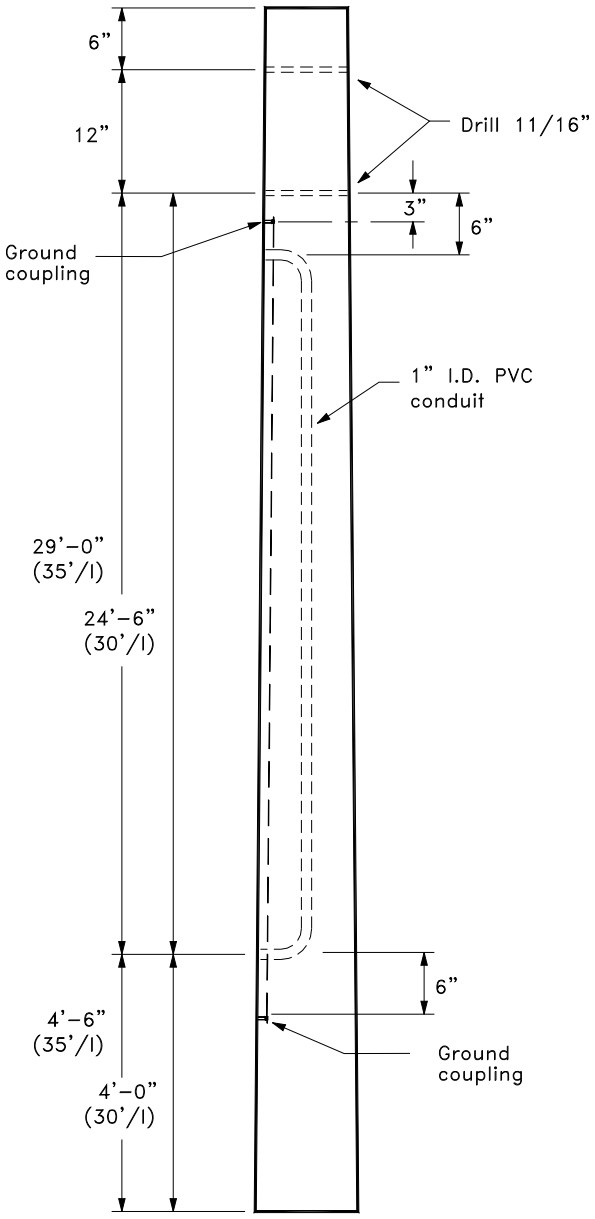
*1) THE YOKE/TRUNNON WILL BE AS SHOWN IN THE ILLUSTRATION ON THIS PAGE.

2) 20 YEAR PHOTOCONTROL LISTED ON ELECTRIC STANDARDS PAGE P-5.45, S/N 58131-3

** 3) TOP AND SIDE SHIELDS SHALL BE PAINTED GRAY OR ALUMINUM (NOT PAINTED) AND BE INCLUDED WITH THE FLOOD LIGHT. SIDE SHIELDS OR VISORS **MUST BE SHIPPED AT THE SAME TIME AS THE FLOODLIGHT AND APPEAR ON THE SAME INVOICE.** (SIDE SHIELDS OR VISORS SHALL BE INSTALLED IN THE FIELD).

GRU Lights, Poles and Brackets, cont.

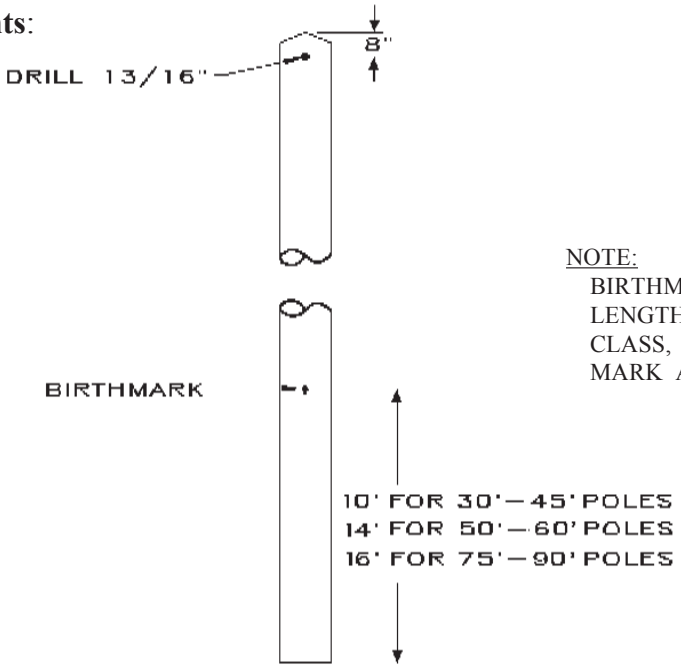
Concrete Pole for Flood Lights:



Description	Manufacturer	Catalog No.
CONCRETE POLE	ACCORD INDUSTRIES, PRESTRESSED POLE DIV.	
HEIGHT/TYPE (APR. WEIGHT):	DURA-STRESS, INC.	
30'/I (1,360 LBS.)		
35'/I (1,800 LBS.)		

GRU Lights, Poles and Brackets, cont.

Wood Poles for Flood Lights:



NOTE:
BIRTHMARK INCLUDES LENGTH IN FEET, POLE CLASS, MANUFACTURER'S MARK AND YEAR PR0DUCED.

Description	Manufacturer	Catalog No.
CCA TREATED WOOD POLE, SOUTHERN PINE	NOTE: MANUFACTURERS ARE LISTED BELOW	
HEIGHT/CLASS (APPROXIMATE WEIGHT:)		
30'/6 (606 LBS.)		NONE
35'/5 (888 LBS.)		NONE
40'/5 (1,104 LBS.)		NONE

APPRIVED MANUFACTURERS:

1. T. R. Miller Mill Co., Inc.
   P.O. Box 708
   Brewton, Al. 36427 Phone: (205) 867-4331

2. Atlantic Wood Industries, Inc.
   P. O. Box 1608
   Savannah, Ga. 31498 Phone: (912) 964-1234

3. Swift Lumber, Inc.
   P. O. Box Drawer 1298
   Atmore, Al. 36502 Phone: (205) 368-2138

4. Apalachee Pole Company, Inc.
   P. O. Box 7
   Graceville, Fl. 32440 Phone: (904) 643-2121
   (Send RFQ To:
   P.O. Box 68
   Bristol, Fl. 32321)

5. Ace Pole Co., Inc.
   Waycross Hwy. 82E
   P. O. Box 1323
   Waycross, Ga. 31501 Phone: (912) 449-4011

6. Langdale Forest Products Co.
   P.O. Box 1088
   Valdosta, GA 31603

APPENDIX D

GRU Light Fixture and Pole Rental Rates

GRU℠

More than Energy

Official Public Lighting Catalog

October 1, 2022

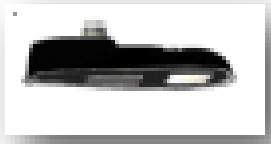
Public Light Rate Class (Non-Contributed):

This class of light rates are lights used by a governmental body, mainly the City of Gainesville or Alachua County Board of Commissioners (Public Works) which pays the monthly rental rate. The monthly Public Street Light Rate includes all materials including wire, the cost of installation, maintenance and energy of the light(s). The rental rate for lights does not include the rental rate of a **pole to support the light. If a pole is necessary to support a rental light, a separate pole rental rate shall be charged in addition to the rental rate for the light. The monthly Pole Rental Rate includes all materials including wire, the cost of installation and maintenance of the pole(s). The pole shall also be rented under this same class. GRU owns all lights and poles.

NOTE: Monthly Rates DO NOT include Fuel Adjustment Charges, Fees, or Taxes

LIGHT TYPE	CODE	*RATE
LED ROADWAY 1 GRAY	L38	$ 13.10
LED ROADWAY 2 GRAY	L39	$ 16.76
LED ROADWAY 3 GRAY	L40	$ 18.51
LED ROADWAY 4 GRAY	L41	$ 24.35
LED ROADWAY 2 BLACK	L42	$ 17.73
LED ROADWAY 3 BLACK	L43	$ 19.49
LED ROADWAY 4 BLACK	L44	$ 25.33
LED ROADWAY 5 GRAY	L45	$ 23.58
LED ROADWAY 5 BLACK	L46	$ 24.56
LED ROADWAY 2N GRAY	L47	$ 16.76
LED ROADWAY 2N BLACK	L48	$ 17.73
LED ROUND ROADWAY	L51	$ 42.31
LED ACORN PEDESTRIAN	L52	$ 31.19
LED TEARDROP ROADWAY 2FT	L53	$ 43.10
LED TEARDROP ROADWAY 4FT	L54	$ 44.29
LED PENDANT ROADWAY	L55	$ 36.92
LED SMALL PENDANT PEDESTRIAN	L56	$ 30.50
LED FLOODWAY1	L57	$ 12.60
LED FLOODWAY2	L58	$ 19.20
LED FLOODWAY3	L59	$ 22.26

L38, L39, L40, L41



L42, L43, L44, L45, L46

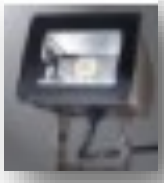
L51

L52

L53, L54

L55

L56



L57

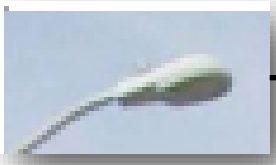
L58, L59

***PUBLISHED RATES CAN BE FOUND IN THE CITY OF GAINESVILLE-CODE OF ORDINANCES-APPENDIX A**

Public Pole Rate Class (Non-Contributed):

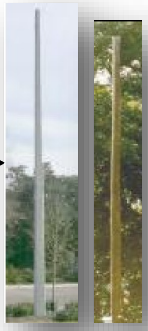
POLE TYPE	CODE	*RATE
10FT DECO BLACK CONC POLE	P01	$15.34
10FT BLACK FIBERGLASS POLE	P02	$ 17.75
12FT ALUMINUM POLE	P03	$ 7.50
18FT ALUMINUM POLE	P04	$ 8.50
18FT BLACK DOMUS POLE	P05	$ 23.07
19FT BLACK FIBERGLASS POLE	P06	$ 3.75
26FT BLACK RENAISSANCE POLE	P07	$ 37.31
30FT WOOD POLE	P08	$ 7.20
30FT CONCRETE POLE	P09	$ 9.80
30FT GRAY FIBERGLASS POLE	P10	$ 19.13
30FT BLACK ALUMINUM POLE	P11	$ 25.65
35FT WOOD POLE	P12	$ 7.49
35FT CONCRETE POLE	P13	$ 9.98
35FT BLACK OCT CONC POLE	P14	$ 20.64
40FT WOOD POLE	P15	$ 8.34
40FT CONCRETE POLE	P16	$ 12.33
40FT BLACK OCT CONC POLE	P17	$ 27.89
45FT WOOD POLE	P18	$ 18.15
45FT CONCRETE POLE	P19	$ 12.92
12FT BLACK STEEL POLE	P21	$ 18.88

***PUBLISHED RATES CAN BE FOUND IN THE CITY OF GAINESVILLE-CODE OF ORDINANCES-APPENDIX A**



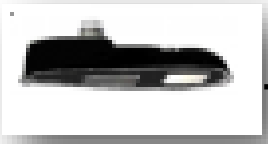
L38, L39, L40, L41

L57



P8, P9, P12, P13, P15, P16, P18, P19

L58, L59

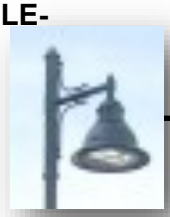


L42, L43, L44, L45, L46

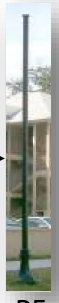
P14, P17

L51

P11



L55



P5

L56

P21

L53, L54

P7

L52

P1

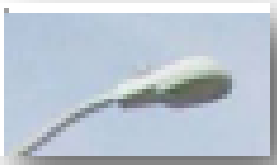
10/24/2022

Public Agency Light Rate Class (Contributed):

This class of light rates are lights used by a governmental body, mainly the City of Gainesville or Alachua County Board of Commissioners (Public Works), and the monthly rental rate is paid for by the Public Agency. The Public Agency monthly rate, which allows the agency to "Buy Down" the rental rate, includes the energy charge and normal maintenance cost ONLY. The rates for lights do not include the installation of **poles. The installation cost (materials, including wire, GRU engineering, construction cost and overheads) for lights and poles (if needed) shall be paid for up front by the governmental body responsible for the monthly rental charges prior to installation by GRU. The ownership of the lights and poles remains with GRU.

NOTE: Monthly Rates DO NOT include Fuel Adjustment Charges, Fees, or Taxes

LIGHT TYPE	CODE	*RATE
LED ROADWAY 1 GRAY	L38	$ 3.03
LED ROADWAY 2 GRAY	L39	$ 4.93
LED ROADWAY 3 GRAY	L40	$ 6.34
LED ROADWAY 4 GRAY	L41	$ 10.19
LED ROADWAY 2 BLACK	L42	$ 4.93
LED ROADWAY 3 BLACK	L43	$ 6.34
LED ROADWAY 4 BLACK	L44	$ 10.19
LED ROADWAY 5 GRAY	L45	$ 9.33
LED ROADWAY 5 BLACK	L46	$ 9.33
LED ROADWAY 2N GRAY	L47	$ 4.93
LED ROADWAY 2N BLACK	L48	$ 4.93
LED ROUND ROADWAY	L51	$ 14.50
LED ACORN PEDESTRIAN	L52	$ 7.33
LED TEARDROP ROADWAY 2FT	L53	$ 10.49
LED TEARDROP ROADWAY 4FT	L54	$ 10.49
LED PENDANT ROADWAY	L55	$ 7.25
LED SMALL PENDANT PEDESTRIAN	L56	$ 6.23
LED FLOODWAY1	L57	$ 2.41
LED FLOODWAY2	L58	$ 6.01
LED FLOODWAY3	L59	$ 8.92



L38, L39, L40, L41

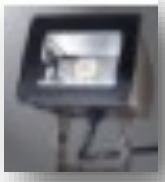
L42, L43, L44, L45, L46

L51

L52

L53, L54

***PUBLISHED RATES CAN BE FOUND IN THE CITY OF GAINESVILLE-CODE OF ORDINANCES-APPENDIX A**



L57

L58, L59

L55

L56

NOTE: A POLE RENTAL IS NOT PART OF THE AGENCY (CONTRIBUTED) PROGRAM

Parker, Tiffany

From: Parker, Tiffany
Sent: Wednesday, March 15, 2023 4:02 PM
To: Delinski, Christopher D; Rose, Kelly Ann
Cc: Knight, Chase
Subject: FW: Contributed Rates for the City of Gainesville Lighting Study

Hi Chris,

I realized after we spoke on the phone last month that my summary email was sitting in my outbox. Please see below for a summary of our phone conversation in red. Thanks for your help on this!

Phone call summary with Chris on 2/21/23 at 2:00 PM

In preparation for our phone call, here is a list of items needed to finish up the lighting study:

1. We need to estimate "Contributed" rates for the following fixtures, i.e. we need some information from GRU regarding upfront construction costs:
    a. We need a cost estimate per unit distance for several fixtures at different spacing scenarios. If I provide you the information in yellow highlight from the email below, I'm afraid it could get complex due to the number of fixture & spacing combinations. How accurate do you think "contributed" rates will be if you gave us a per mile estimate for fixtures and poles at 100' spacing, and then we can back calculate what that comes out to "per pole" to apply to our different spacing scenarios?

       Here are the GRU fixtures we need contributed rates per mile at 100' spacing for: Upfront construction costs are below in a per pole format:
        i. Acorn Pedestrian (on a P01 pole) $1872 per pole
        ii. Pendant Pedestrian (on a P21 pole) $1713 per pole
        iii. GE Evolve Roadway Light (LED Roadway 3 in GRU's External Lighting Catalog on P14 pole) $2728 per pole
        iv. Capella Light (no pole needed) $2078 per light

2. How does the "contributed" rate schedule handle pole costs? The GRU Official Public Lighting Catalog (October 1, 2022) that was used in this project says that a pole rental is not part of the contributed program.
   Pole cost is included in the upfront construction cost.
3. Can you confirm that the "non-contributed" rates mean that the City of Gainesville will not pay any upfront construction costs?
   Correct - no upfront construction cost will be associated with this payment structure.
4. We also need a "non-contributed" rate for the Capella Light Fixture.
   Around $31.83 (non-contributed) per month, around $550 (contributed) using a 35W Capella fixture.
5. The City is interested in the Autobahn ATB Micro (37W, 3000K) fixture. Is there any way to estimate monthly rates (contributed & non-Contributed) for this fixture?
   Will require some research.

Thank you,

Tiffany Parker

From: Knight, Chase <KnightC1@cityofgainesville.org>
Sent: Wednesday, November 9, 2022 12:38 PM

APPENDIX E

Capella Light Fixture Specification Sheet

LUMEC by signify

Roadway

Capella

CPLS (small)

Lumec **Capella LED** roadway luminaires blend seamlessly into soft architectural urban and roadway surroundings, as well as more rectilinear settings. With graceful curves and sweeping lines, it contributes to the beautification of any environment and enhances the visual impact of any project.

Project:

Location:

Cat.No:

Type:

Lamps: Qty:

Notes:

Ordering guide

Example: CPLS-72W32LED3K-G3-LE2F-UNV-DMG-GY3

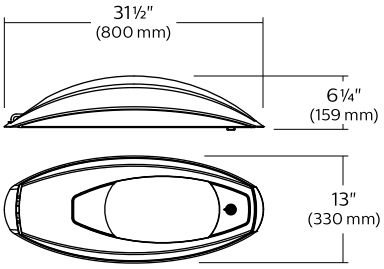
Series	LED module	Generation	Optical system	Lens	Voltage	Driver options	Luminaire options	Accessories	Finish
CPLS		G3							
CPLS Small	**3000K** **14W16LED3K** **20W16LED3K** **25W16LED3K** **30W16LED3K** **35W32LED3K** **55W32LED3K** **55W48LED3K** **72W32LED3K** **80W48LED3K** **4000K** **14W16LED4K** **20W16LED4K** **25W16LED4K** **30W16LED4K** **35W32LED4K** **55W32LED4K** **55W48LED4K** **72W32LED4K** **80W48LED4K**	**G3** Generation 3	**LE2** Type II (ASYM) **LE3** Type III (ASYM) **LE4** Type IV (ASYM) **LE5**[1] Type V (SYM)	**F** Flat lens **S** Sag lens	**UNV** 120-277VAC **HVU** 347-480VAC	**AST**[2] Pre-set driver for progressive start-up **CDMGE25**[2,4] 8 hrs. 25% reduction **CDMGE50**[2,4] 8 hrs. 50% reduction **CDMGE75**[2,4] 8 hrs. 75% reduction **CDMGM25**[2,4] 6 hrs. 25% reduction **CDMGM50**[2,4] 6 hrs. 50% reduction **CDMGM75**[2,4] 6 hrs. 75% reduction **CDMGS25**[2,4] 4 hrs. 25% reduction **CDMGS50**[2,4] 4 hrs. 50% reduction **CDMGS75**[2,4] 4 hrs. 75% reduction **CLO**[2] Pre-set driver to manage lumen depreciation **DMG**[2,4,5] 0-10V **DALI**[4] Digitally Adressable Lighting Interface **OTL**[2] Pre-set driver to signal end of life of the lamp	**API** Factory Installed NEMA label, ANSI C136.15 compliant **HS** House Side Shield, 1 per 16 LED light engine **PH**[6] Button type Photoelectric Cell **RCD**[3] Receptacle for twist-lock photocell or shorting cap, 5-pin (standard) **RCD7**[3] Receptacle for twist-lock photocell or shorting cap, 7-pin (optional) **SP2** 20kV/20kA surge protector	**PH8**[2] Twist-lock Photoelectric Cell, UNV (120-277VAC) **PH8/347** Twist-lock Photoelectric Cell, (347VAC) **PH8/480** Twist-lock Photoelectric Cell, (480VAC) **PHXL**[2] Twist-lock Photoelectric Cell, extended life, UNV (120-277VAC) **PH9** Shorting cap	**BK** Black **BR** Bronze **GY3** Grey **WH** White

1. Not available with HS option.
2. 347V and 480V not available.
3. Use of photoelectric cell or shorting cap is required to ensure proper illumination.
4. Dimming choices: Select either DMG,DALI or one of the CDMG options.
5. Please note this integrated feature come standard with Capella.
6. One of the following voltage need to be specified with this option: 120,208,240,277,347 or 480.

CPLS Capella LED (small)

Roadway

Dimensions



CPLS (flat lens)

EPA: 0.47 sq. ft.
Weight: 30 lbs (13.6 kg)

LED Wattage and Lumen Values: for CPLS with Flat lens

Ordering Code: Flat lens (3000K)	Total LEDs	LED current (mA)	Average System Wattage[1] (W)	LE2F			LE3F			LE4F			LE5F		
				Lumen Output[2]	Efficacy (LPW)	BUG Rating	Lumen Output[2]	Efficacy (LPW)	BUG Rating	Lumen Output[2]	Efficacy (LPW)	BUG Rating	Lumen Output[2]	Efficacy (LPW)	BUG Rating
14W16LED3K-G3-x	16	250	13	1439	111	B1-U0-G0	1407	108	B0-U0-G0	1407	108	B0-U0-G1	1419	109	B1-U0-G0
20W16LED3K-G3-x	16	350	20	2441	122	B1-U0-G1	2387	119	B1-U0-G0	2388	119	B1-U0-G1	2407	120	B2-U0-G1
25W16LED3K-G3-x	16	450	24	3051	127	B1-U0-G1	2983	124	B1-U0-G1	2984	124	B1-U0-G1	3008	125	B2-U0-G1
30W16LED3K-G3-x	16	530	29	3473	119	B1-U0-G1	3414	117	B1-U0-G1	3340	114	B1-U0-G1	3318	113	B2-U0-G1
35W32LED3K-G3-x	32	350	37	4595	124	B1-U0-G1	4493	121	B1-U0-G1	4494	121	B1-U0-G1	4530	122	B3-U0-G1
55W32LED3K-G3-x	32	530	54	6591	122	B2-U0-G1	6444	119	B1-U0-G1	6446	119	B1-U0-G2	6498	120	B3-U0-G2
72W32LED3K-G3-x	32	700	73	8314	114	B2-U0-G2	8128	111	B2-U0-G2	8130	111	B2-U0-G2	8195	112	B3-U0-G2
55W48LED3K-G3-x	48	350	55	6893	125	B2-U0-G1	6739	122	B1-U0-G2	6741	122	B1-U0-G2	6795	123	B3-U0-G2
80W48LED3K-G3-x	48	530	81	9888	123	B2-U0-G2	9666	120	B2-U0-G2	9670	120	B2-U0-G2	9748	121	B4-U0-G2

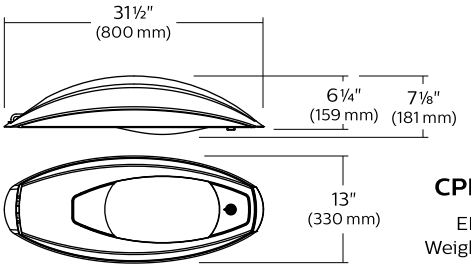
Ordering Code: Flat lens (4000K)	Total LEDs	LED current (mA)	Average System Wattage[1] (W)	LE2F			LE3F			LE4F			LE5F		
				Lumen Output[2]	Efficacy (LPW)	BUG Rating	Lumen Output[2]	Efficacy (LPW)	BUG Rating	Lumen Output[2]	Efficacy (LPW)	BUG Rating	Lumen Output[2]	Efficacy (LPW)	BUG Rating
14W16LED4K-G3-x	16	250	13	1552	119	B1-U0-G0	1518	117	B0-U0-G0	1518	117	B0-U0-G1	1530	118	B1-U0-G0
20W16LED4K-G3-x	16	350	20	2633	132	B1-U0-G1	2575	129	B1-U0-G1	2575	129	B1-U0-G1	2596	130	B2-U0-G1
25W16LED4K-G3-x	16	450	24	3291	137	B1-U0-G1	3218	134	B1-U0-G1	3218	134	B1-U0-G1	3244	135	B2-U0-G1
30W16LED4K-G3-x	16	250	29	3746	128	B1-U0-G1	3663	125	B1-U0-G1	3664	125	B1-U0-G1	3693	126	B2-U0-G1
35W32LED4K-G3-x	32	350	37	4956	134	B1-U0-G1	4846	131	B1-U0-G1	4847	131	B1-U0-G1	4886	132	B3-U0-G1
55W32LED4K-G3-x	32	530	54	7109	132	B2-U0-G1	6951	129	B1-U0-G2	6953	129	B1-U0-G2	7009	130	B3-U0-G2
72W32LED4K-G3-x	32	700	73	8966	123	B2-U0-G2	8766	120	B2-U0-G2	8769	120	B2-U0-G2	8839	121	B4-U0-G2
55W48LED4K-G3-x	48	350	55	7435	135	B2-U0-G1	7269	132	B1-U0-G2	7271	132	B1-U0-G2	7329	133	B3-U0-G2
80W48LED4K-G3-x	48	530	81	10664	132	B2-U0-G2	10426	129	B2-U0-G2	10429	129	B2-U0-G2	10513	130	B4-U0-G2

Actual performance may vary due to installation variables including optics, mounting/ceiling height, dirt depreciation, light loss factor, etc.; highly recommended to confirm performance with a layout.
Note: Some data may be scaled based on tests on similar but not identical luminaires.

CPLS Capella LED (small)

Roadway

Dimensions



CPLS (sag lens)

EPA: 0.47 sq. ft.
Weight: 30 lbs (13.6 kg)

LED Wattage and Lumen Values: for CPLS with Sag Lens

Ordering Code: Sag lens (3000K)	Total LEDs	LED current (mA)	Average System Wattage[1] (W)	LE2S			LE3S			LE4S			LE5S		
				Lumen Output[2]	Efficacy (LPW)	BUG Rating	Lumen Output[2]	Efficacy (LPW)	BUG Rating	Lumen Output[2]	Efficacy (LPW)	BUG Rating	Lumen Output[2]	Efficacy (LPW)	BUG Rating
14W16LED3K-G3-x	16	250	13	1470	113	B1-U0-G0	1450	112	B0-U0-G0	1424	110	B0-U0-G1	1475	113	B1-U0-G0
20W16LED3K-G3-x	16	350	20	2494	125	B1-U0-G1	2460	123	B1-U0-G1	2416	121	B1-U0-G1	2503	125	B2-U0-G1
25W16LED3K-G3-x	16	450	24	3117	130	B1-U0-G1	3075	128	B1-U0-G1	3020	126	B1-U0-G1	3128	130	B2-U0-G1
30W16LED3K-G3-x	16	530	29	3542	121	B1-U0-G1	3493	119	B1-U0-G1	3416	117	B1-U0-G1	3439	117	B2-U0-G1
35W32LED3K-G3-x	32	350	37	4695	127	B1-U0-G1	4631	125	B1-U0-G1	4548	123	B1-U0-G1	4711	127	B3-U0-G1
55W32LED3K-G3-x	32	530	54	6734	125	B2-U0-G1	6643	123	B1-U0-G2	6524	121	B1-U0-G2	6758	125	B3-U0-G2
72W32LED3K-G3-x	32	700	73	8493	116	B2-U0-G2	8378	115	B2-U0-G2	8228	113	B1-U0-G2	8521	117	B4-U0-G2
55W48LED3K-G3-x	48	350	55	7043	128	B2-U0-G1	6948	126	B1-U0-G2	6823	124	B1-U0-G2	7066	128	B3-U0-G2
80W48LED3K-G3-x	48	530	81	10101	125	B2-U0-G2	9965	124	B2-U0-G2	9786	121	B2-U0-G2	10135	126	B4-U0-G2

Ordering Code: Sag lens (4000K)	Total LEDs	LED current (mA)	Average System Wattage[1] (W)	LE2S			LE3S			LE4S			LE5S		
				Lumen Output[2]	Efficacy (LPW)	BUG Rating	Lumen Output[2]	Efficacy (LPW)	BUG Rating	Lumen Output[2]	Efficacy (LPW)	BUG Rating	Lumen Output[2]	Efficacy (LPW)	BUG Rating
14W16LED4K-G3-x	16	250	13	1586	122	B1-U0-G0	1565	120	B0-U0-G0	1537	118	B0-U0-G1	1592	122	B1-U0-G0
20W16LED4K-G3-x	16	350	20	2691	135	B1-U0-G1	2654	133	B1-U0-G1	2607	130	B1-U0-G1	2700	135	B2-U0-G1
25W16LED4K-G3-x	16	450	24	3363	140	B1-U0-G1	3317	138	B1-U0-G1	3258	136	B1-U0-G1	3374	141	B3-U0-G1
30W16LED4K-G3-x	16	250	29	3821	130	B1-U0-G1	3769	129	B1-U0-G1	3702	126	B1-U0-G1	3834	131	B2-U0-G1
35W32LED4K-G3-x	32	350	37	5064	137	B1-U0-G1	4996	135	B1-U0-G1	4907	133	B1-U0-G2	5082	137	B3-U0-G1
55W32LED4K-G3-x	32	530	54	7264	135	B2-U0-G1	7165	133	B1-U0-G2	7038	130	B1-U0-G2	7289	135	B3-U0-G2
72W32LED4K-G3-x	32	700	73	9161	125	B2-U0-G2	9037	124	B2-U0-G2	8876	122	B2-U0-G2	9193	126	B4-U0-G2
55W48LED4K-G3-x	48	350	55	7596	138	B2-U0-G1	7493	136	B1-U0-G2	7360	134	B1-U0-G2	7623	138	B3-U0-G2
80W48LED4K-G3-x	48	530	81	10896	135	B2-U0-G2	10748	133	B2-U0-G2	10557	131	B2-U0-G2	10934	136	B4-U0-G2

Actual performance may vary due to installation variables including optics, mounting/ceiling height, dirt depreciation, light loss factor, etc.; highly recommended to confirm performance with a layout.
Note: Some data may be scaled based on tests on similar but not identical luminaires.

CPLS Capella LED (small)

Roadway

Specifications

Housing

Made of cast 356 Aluminum alloy 0.180 (4.6mm) minimum thickness. The mounting means includes one bracket made of stamped galvanized-steel (12ga.). Fits on a 2" (51mm) to 2 3/8" (60mm) OD by 9" (229mm) minimum long tenon, fixed by 3/8-16 UNC steel zinc plated bolts. The housing is complete with a ground lug and a terminal block that accepts (#8 max.) wires from the primary circuit.

Access-Mechanism: Quarter-turn pressure locking system made of die cast aluminum. Offers tool-free access to the inside of the luminaire. An embedded memory-retentive gasket ensure weatherproofing.

Light Engine

Composed of 5 main components: Heat Sink, Lens, LED Module, Optical System, Driver. Electrical components are RoHS compliant. LEDs tested by ISO 17025 2005 accredited lab in accordance with IESNA LM 80 guidelines in compliance with EPA ENERGY STAR, extrapolations in accordance with IESNA TM 21. Metal core board ensures greater heat transfer and longer lifespan.

Heat Sink: Made of cast aluminum optimising the LEDs efficiency and life. Product does not use any cooling device with moving parts (only passive cooling device).

Lens: Made of soda-lime clear tempered glass curved or flat lens, mechanically assembled and sealed onto the lower part of the heat sink.

LED Module: Composed of high performance white LEDs. Color temperature as per ANSI/NEMA bin Neutral White, 4000 Kelvin nominal (3985K +/ 275Kor 3710K to 4260K), CRI 70 Min. 75 Typical. 3000 Kelvin also available.

Optical System: Composed of high performance optical polymer refractor lenses to achieve desired distribution optimized to get maximum spacing, target lumens and a superior lighting uniformity. System is rated IP66. Performance shall be tested per LM 63, LM 79 and TM 15 (IESNA) certifying its photometric performance. 0% uplight and U0 per IESNA TM-15. Dark Sky compliant when 3000K and Flat lens are used.

Driver: High power factor of 95%. Electronic driver, operating range 50/60 Hz. Auto adjusting universal voltage input from 120 to 277 VAC or 347 to 480 VAC rated for both application line to line or line to neutral, Class I or II, THD of 20% max. Driver comes with dimming compatible 0-10 volts. The current supplying the LEDs will be reduced by the driver if the driver experiences internal overheating as a protection to the LEDs and the electrical components. Output is protected from short circuits, voltage overload and current overload. Automatic recovery after correction. Standard built in driver surge protection of 2.5kV (min).

Surge Protector: Surge protector tested in accordance with ANSI/IEEE C62.45 per ANSI/IEEE C62.41.2 Scenario I Category C High Exposure 10kV/10kA waveforms for Line Ground, Line Neutral and Neutral Ground, and in accordance with U.S. DOE (Department of Energy) MSSLC (Municipal Solid State Street Lighting Consortium) model specification for LED roadway luminaires electrical immunity requirements for High Test Level 10kV / 10kA.

Driver Options

AST: Pre-set driver for progressive start-up of LED module(s) to optimize energy management and enhance visual comfort at start-up.

CLO: Pre-set driver to manage the lumen depreciation by adjusting the power given to the LEDs offering the same lighting intensity during the entire lifespan of the LED module.

DALI: Pre-set driver compatible with the DALI control system.

OTL: Pre-set driver to signal end of life of the LED module(s) for better fixture management.

CDMG: Dynadimmer standard dimming functionalities including pre-programmed scenarios to suit many applications and needs from safety to maximum energy savings.

Safety Mode:
CDMGS25: 4 hours, 25% power dimming
CDMGS50: 4 hours 50% power dimming
CDMGS75: 4 hours 75% power dimming

Median Mode:
CDMGM25: 6 hours 25% power dimming
CDMGM50: 6 hours 50% power dimming
CDMGM75: 6 hours 75% power dimming

Economy Mode:
CDMGE25: 8 hours 25% power dimming
CDMGE50: 8 hours 50% power dimming
CDMGE75: 8 hours 75% power dimming

Luminaire Options

HS: House side shield, 1 per 16 LED light engine.

SP2: 20kV / 20kA surge protection device that provides extra protection beyond the SP1 10kV/10kA level.

RCD*: (standard) Receptacle with 5 pins enabling dimming and additional functionality (to be determined), can be used with a twist lock Starsense node or photoelectric cell or a shorting cap.

RCD7*: (optional) Receptacle with 7 pins enabling dimming and additional functionality (to be determined), can be used with a twist lock Starsense node or photoelectric cell or a shorting cap.

PH: (optional) Button type photo-cell.

Please note: Additional hardware will be required to utilize the additional 2 pins on this receptacle.

* Use of photoelectric cell or shorting cap is required to ensure proper illumination.

Accessories

PH8: Twist-lock Photoelectric Cell, UNV (120-277VAC).

PH8/347: Twist-lock Photoelectric Cell, HVU (347VAC).

PH8/480: Twist-lock Photoelectric Cell, HVU (480VAC).

PHXL: Twist-lock Photoelectric Cell, extended life, UNV (120-277VAC).

PH9: Shorting cap.

Luminaire Useful Life

Refer to IES files for energy consumption and delivered lumens for each option. Based on ISTMT in situ thermal testing in accordance with UL1598 and UL8750, System Reliability Tool, Advance data and LED manufacturer LM-80/TM-21 data, expected to reach 100,000 + hours with >L70 lumen maintenance @ 25°C. Luminaire Useful Life accounts for LED lumen maintenance AND all of these additional factors including: LED life, driver life, PCB substrate, solder joints, on/off cycles, burning hours and corrosion.

Wiring

The connection of the luminaire is done using a terminal block connector 600V, 85A for use with #2-14 AWG. wires from the primary circuit, located inside the housing. Due to the inrush current that occurs with electronic drivers, recommend using a 10Amp time delay fuse to avoid unwanted fuse blowing (false tripping) that can occur with normal or fast acting fuses.

Hardware

All exposed screws shall be complete with Ceramic primer-seal basecoat to reduce seizing of the parts and offers a high resistance to corrosion. All seals and sealing devices are made and/or lined with EPDM and/or silicone and/or rubber.

Finish

In accordance with the AAMA 2603 standard. Application of polyester powder coat paint (4 mils/100 microns) with ± 1 mils/24 microns of tolerance. The Thermosetting resins provides a discoloration resistant finish in accordance with the ASTM D2244 standard, as well as luster retention in keeping with the ASTM D523 standard and humidity proof in accordance with the ASTM D2247 standard. The surface treatment achieves a minimum of 3000 hours for salt spray resistant finish in accordance with testing performed and per ASTM B117 standard.

CPLS Capella LED (small)

Roadway

Specifications (continued)

LED products manufacturing standard

The electronic components sensitive to electrostatic discharge (ESD) such as light emitting diodes (LEDs) are assembled in compliance with IEC61340 5 1 and ANSI/ ESD S20.20 standards so as to eliminate ESD events that could decrease the useful life of the product.

Vibration Resistance

The CPLS meets the ANSI C136.31, American National Standard for Roadway Luminaire Vibration specifications for Normal applications (Tested for 1.5G over 100 000 cycles by an independent lab).

Certifications and Compliance

cULus Listed for Canada and USA. Luminaire meets DOE and MSSLC Model Specification for LED Roadway Luminaires. RoadStar LED roadway luminaires are DesignLights Consortium qualified. Luminaire complies with or exceeds the following ANSI C136 standards: .2, .3, .10, .14, .15, .22, .25, .31, .37, .41.

Limited Warranty

10-year limited warranty.
See Signify.com/warranties for details and restrictions.

LED Performance

Predicted lumen depreciation data[1]				
Ambient Temperature (°C)	Driver mA	Calculated L_{70} hours[1,2]	L_{70} per TM-21[2,3]	Lumen Maintenance % @ 60,000 hours
25°C	700 mA	>100,000	>60,000	93%

1. Predicted performance derived from LED manufacturer's data and engineering design estimates, based on IESNA LM-80 methodology. Actual experience may vary due to field application conditions.
2. L_{70} is the predicted time when LED performance depreciates to 70% of initial lumen output.
3. Calculated per IESNA TM21-11. Published L_{70} hours limited to 6 times actual LED test hours.

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