



**Overview of Project**

City of Raleigh Department of Transportation staff is requesting the replacement of 114 leased high pressure sodium (HPS) Teardrop style street light fixtures located in or within close proximity to the Capitol Square and Moore Square Historic Overlay Districts. This replacement will be done in conjunction with repainting many black decorative poles in downtown Raleigh which are in disrepair. The proposed LED replacement fixtures are identical to the current Teardrop fixtures aside from the light source. See the attached map of these street light locations.

**Background**

In 2016, City of Raleigh Department of Transportation staff stressed to Duke Energy the need to repaint many black decorative signal and street light poles located in downtown Raleigh for maintenance purposes. All of the poles and signal mast arms selected to be repainted are extremely weathered, many of which are exhibiting signs of rust.

Duke Energy has agreed to have a contractor repaint the selected poles (Duke owned) and mast arms (City owned) in the coming months, with the City funding the cost of repainting the mast arms.

**Proposed Modifications**

In conjunction with the proposed repainting project, City staff is recommending the replacement of all 114 decorative Teardrop style fixtures mounted to these black poles, in lieu of repainting them. Most of these existing Teardrop light fixtures were installed along with the poles over 20 years ago, thus the paint applied to the fixture housing is in a similar weathered condition as that applied to the poles.

The existing decorative Teardrop style lighting in downtown Raleigh is high pressure sodium (HPS) technology leased from Duke Energy. HPS street lighting sources are quickly being replaced by more energy efficient LED technology throughout the Duke Energy service area and beyond.

The City recommends replacing the existing HPS Teardrop fixtures with LED Teardrop fixtures that are identical in appearance. See the attached Duke Energy specification brochure detailing the LED Teardrop fixture lease option.

The Teardrop LEDs will produce a 4000 Kelvin (K) color temperature light, which is currently the only LED color option available for lease. This is a whiter light than that produced by HPS light sources. This LED light source will match the color of the existing lighting on the State Capitol grounds, the lighting along Fayetteville Street, and the approximately 30,000 LED roadway fixtures now leased throughout most of the City. Unlike the LED roadway style fixtures installed along the majority of the City's public streets, these Teardrop fixtures have a globe (drop lens) to help diffuse the LED light source.

The roadways illuminated by Teardrop style fixtures in downtown Raleigh are primarily in commercial and governmental areas. City staff believes these areas will benefit from the improved color rendering and uniformity produced by the LED Teardrop lighting.

As mentioned above, the only LED street lighting currently offered by Duke Energy Progress produces 4000 K temperature light. Further innovations in LED lighting technology in conjunction with evolving market conditions may result in Duke Energy Progress offering yellow-toned 3,000 K temperature street lighting options in the future. However, due to the obsolescence and deteriorated condition of the existing HPS street lighting fixtures, it is important that replacement of these fixtures occur as soon as possible.

Because replacement fixtures will be subject to a 20-year equipment lease, the City is reluctant to replace the existing fixtures with obsolete HPS technology. HPS street lighting is being phased out, and it is unlikely that Duke Energy Progress will be able to sustain maintenance support for new HPS fixtures over the next 20 years. As a result, if the City is required to enter into a 20-year equipment lease for new HPS street lighting fixtures, it is foreseeable that replacement ballasts and other replacement parts will be unavailable before expiration of the lease term. This will force the City to replace any inoperable fixtures piece-meal with whatever technology is then available while also incurring early lease termination penalties. Due to the rapid obsolescence of HPS street lighting, the fact that the Duke Energy Progress holds the electric utility franchise in the City, and the lengthy lease terms required by Duke Energy Progress, denial of the City's request for a Certificate of Appropriateness would cause an unusual and unnecessary hardship beyond that which faces other property owners in the HOD.

In order to address concerns regarding the color/temperature of the proposed LED lighting, the City requests that it be permitted to adopt LED street lighting technology, but remains willing to make modifications to the color/temperature as additional options become available. Therefore, if permitted to initiate replacement of the existing HPS street lighting fixtures with LED fixtures, the City will agree to initiate further replacement of the 4,000 K LED bulbs with 3,000 K LED bulbs when such an option becomes available through Duke Energy Progress and within 60 days of the RHDC's request. The City will further agree to request that Duke Energy Progress provide notice to the City when such an option becomes available, and forward this information to the RHDC in a timely fashion.



Figure 1: Night view of an existing Teardrop fixture located at the intersection of Edenton Street and Salisbury Street with the State Capitol shown in the background



Figure 2: Night view of existing Teardrop street lighting looking south along Wilmington Street in comparison with the existing lighting on the State Capitol grounds



Figure 3: Night view of an existing Teardrop fixture at the intersection of Salisbury Street and Hillsborough Street with the State Capitol shown in the background



Figure 4: Day view of existing Teardrop fixture at the intersection of Salisbury Street and Hillsborough Street with the State Capitol shown in the background

APPLICATION FOR A CERTIFICATE OF APPROPRIATENESS – STAFF REPORT

022-17-CA      MULTIPLE IN MOORE AND CAPITOL SQUARE RIGHTS-OF-WAY  
Applicant:      CITY OF RALEIGH DEPARTMENT OF TRANSPORTATION  
Received:      2/3/2017      Meeting Date(s):  
Submission date + 90 days: 5/4/2017      1) 3/23/2017      2) 7/27/17      3)

INTRODUCTION TO THE APPLICATION

Historic District: CAPITOL SQUARE AND MOORE SQUARE HISTORIC DISTRICTS

Zoning: General HOD

Nature of Project: Programmatic COA to replace existing high pressure sodium teardrop style street light fixtures with new light emitting diode teardrop style light fixtures.

Amendments: A color temperature chart of Kelvin (K) values has been provided by staff and is attached.

Staff Notes:

- Cases referenced in the staff report are available for review.

APPLICABLE SECTIONS OF GUIDELINES and DESCRIPTION OF PROJECT

<u>Sections</u>	<u>Topic</u>	<u>Description of Work</u>
2.1	Public Rights-of-Way and Alleys	Replace existing high pressure sodium teardrop style street light fixtures with new light emitting diode teardrop style light fixtures
2.7	Lighting	

STAFF REPORT

Based on the information contained in the amended application, testimony from March, and staff's evaluation:

- A. Replacing existing high pressure sodium (HPS) teardrop style street light fixtures with new light emitting diode (LED) teardrop style light fixtures is not incongruous in concept according to *Guidelines* 2.1.10, 2.1.11, 2.7.4, 2.7.5, 2.7.11, and the following suggested facts:
- 1\* The proposal is for 114 leased street light fixtures to be replaced, primarily within the Capitol Square and Moore Square HODs. A map is attached to the application. The existing poles and fixture arms will be repainted to match the current black painted finish.
  - 2\* The proposed light fixture is a teardrop style that matches the existing fixtures. Photos of both the existing and proposed fixtures are included.
  - 3\* The existing fixtures hold HPS lamps which are being phased out throughout the Duke Energy service area for more energy efficient LED lamps.

- 4\* The existing HPS lamps have a golden yellow color. The new lamps have a brighter white color, with a color temperature of 4000 Kelvin. The LED fixtures have a globe to help diffuse the intensity of the light emitted. Evidence to support this claim was/was not provided.
- 5\* The new lumen level will be relatively the same, but the perceived light will be much more effective and may even seem a bit brighter to the eye. This is due mainly to the clearer, whiter light produced by LED fixture heads.
- 6\* LED bulbs have been approved by the committee provided the light color is of a warm tone. The proposed LED has a color temperature of 4000 Kelvin; this is considered a neutral white.
- 7\* New LED street lights have been installed in other areas of the city, and the color temperature of the proposed new lighting will match that around the State Capitol grounds, along Fayetteville Street and in approximately 30,000 other fixtures throughout the city.
- 8\* The lighting changes are primarily affecting governmental and commercial areas.
- 9\* The *Design Guidelines* on page 20 states: "Depending on their location, streetlights ranged from elaborate designs, such as translucent globes mounted on cast-iron poles capped with decorative finials, to simple, bracketed globes mounted on utility poles. The light cast by these early fixtures was described as a soft yellow-toned glow rather than the harsher bluish-tone light cast by contemporary mercury vapor streetlights. Lighting manufacturers today [2001] offer high-pressure sodium vapor fixtures that produce a softer glow." And "Considerations in reviewing any proposed lighting fixture for compatibility should include location, design, material, size, color, scale, and brightness."
- 10\* In 2016 a COA application for street lighting changes was denied (175-15-CA). The applicant, Raleigh Public Works Department, had proposed street light fixtures of a more contemporary design than that being proposed now, but also proposed using 4000 K LED lamps.
- 11\* In 1995 a COA application for street lighting changes was denied (120-95-CA). The applicant, The Society for the Preservation of Historic Oakwood, had proposed street light fixtures that were determined to be an anachronistic marriage of a "plain, contemporary pole" contrasted "with a finialed luminaire and fluted mounting suggestive of late 19th or early 20th century design."
- 12\* **An amendment from the applicant offers a proposal that the applicant be allowed to install the 4000 K lamps that are currently available from Duke Energy if they agree to**

**replace them with 3000 K lamps when that option becomes available from Duke Energy. From their application: "Further innovations in LED lighting technology in conjunction with evolving market conditions may result in Duke Energy Progress offering yellow-toned 3000 K temperature street lighting options in the future."**

Staff suggests that the committee approve the application, with the following conditions:

1. That City of Raleigh Department of Transportation staff communicate annually with RHDC staff on the availability of 3000 K lamps from Duke Energy Progress.
2. That this COA application also approve the installation of 3000 K lamps when available.

**Tully, Tania**

---

**From:** Brice, Dustin  
**Sent:** Thursday, April 27, 2017 12:01 PM  
**To:** Tully, Tania  
**Cc:** Choi, Hunt; Robb, Melissa; Niffenegger, Jed; Duffy, Rebecca  
**Subject:** RE: COA Decision Letters - 022-17-CA, 023-17-CA  
**Attachments:** mitchell-top-hat-led-with-ribs-dep.pdf; teardrop led dep.pdf; Hillsborough LED.PDF; Capital Square 50 LED.PDF; Capital Square 150.pdf; Capital Square Existing.pdf; Hillsborough Existing HPS.PDF

Tania,

Duke Energy will only provide manufacturer information on what they have available in their product line. The 2 specification sheets attached are all that we have been given.

In addition, Duke Energy has produced lighting plans for the existing conditions and proposed LED options for both Hillsborough Street and the streets surrounding the Capitol. I believe this was requested by the committee during the meeting.

Please note that Duke Energy prefaced the drawings showing existing conditions stating, "Please take in to consideration that the light levels on the drawings for existing lights reflect the levels at time of installation, and do not consider light depreciation, so the current status is much less than depicted."

Let me know if you need more information.

**Dustin Brice**  
**Street Light Coordinator**

**City of Raleigh**  
**Department of Transportation**  
 PO Box 590  
 Raleigh, NC 27602

Office: (919) 996-4045  
 Fax: (919) 996-7638

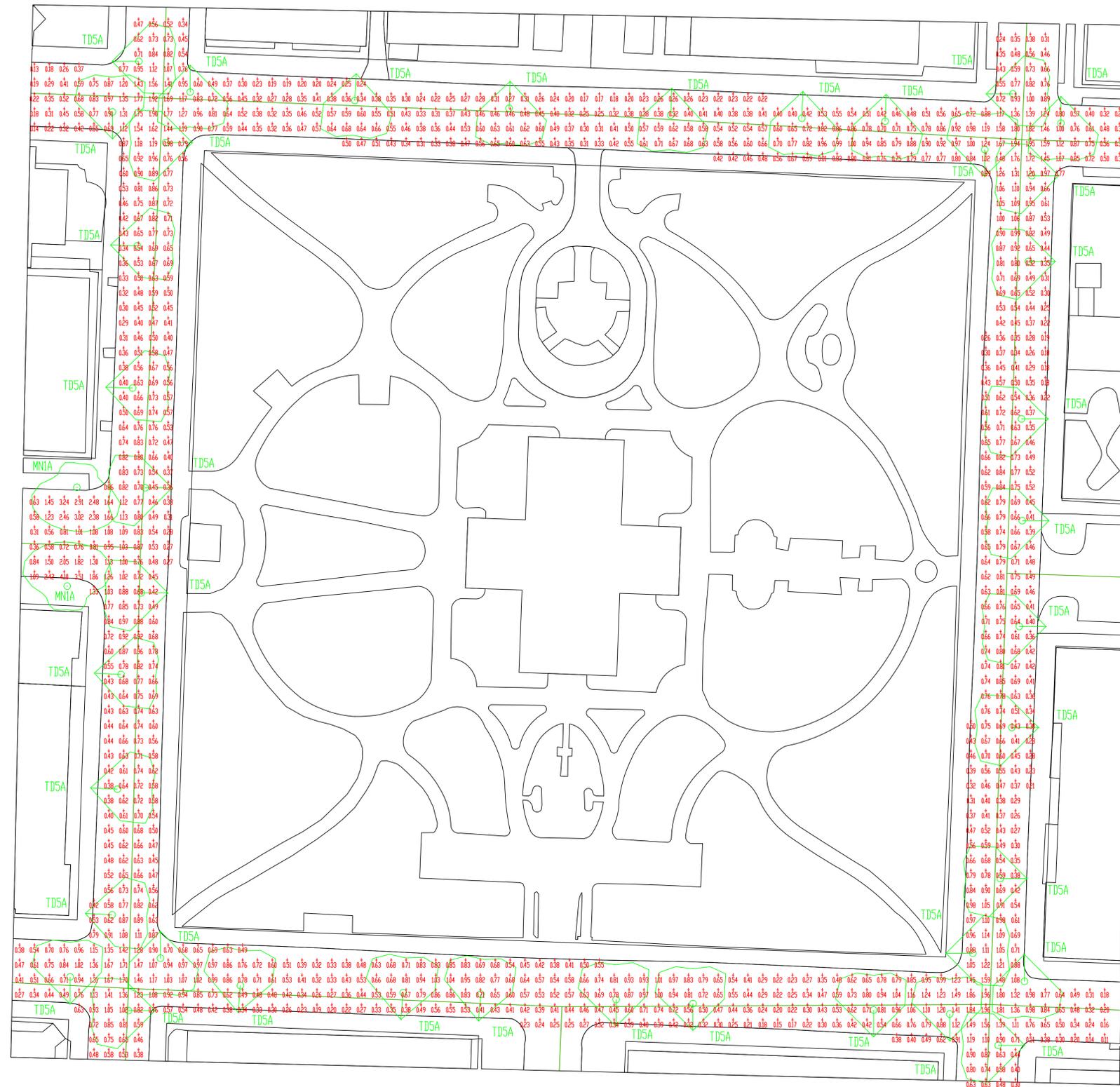
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**From:** Tully, Tania  
**Sent:** Thursday, April 20, 2017 1:39 PM  
**To:** Brice, Dustin  
**Cc:** Choi, Hunt; Robb, Melissa  
**Subject:** RE: COA Decision Letters - 022-17-CA, 023-17-CA

All –

Attached are the adopted minutes from the 3/23 COA meeting.

The application deadline for new cases for the May 25 meeting was April 12. Note that with the new process staff reports will be distributed with the agenda. Is there additional information that you wish to be included in the staff report? If so, please provide ASAP.



CALCULATION SUMMARY									
AREA NAME	DIMENSIONS	GRID / TYPE	# FT'S	SPAC.	GROUP	Avg	MAX	MIN	MAX/MIN
New Area	1147.25x1004.06ft	Roadway	1176	10.00	(*)	0.68	4.10	0.11	38.51

RALEIGH CAPITAL SQUARE (17-0071) LUMINAIRE SCHEDULE						
TYP	SYMBOL	DESCRIPTION	LAMP	LUMENS	MOUNTING/BALLAST	LLF
MNJA	○	Holophane NMTLED_DPN3 (3) "MNO" NMTLED_DPN3	(1) LED 4000K	4286	16' HT HT 75W LED	0.85
TDSA	△	Holophane TDL050_1/POLE (1) "TDSO" TORPLEISO_1-2/POLE	(1) 2 LED ARRAY	4065	30' HT HT 50W LED	0.85

**LIGHTING DESIGN TOLERANCE**

The calculated footcandle light levels in this lighting design are predicted values and are based on specific information that has been supplied to Duke Energy Progress. Any inaccuracies in the supplied information, differences in luminaire installation, lighted area geometry including elevation differences, reflective properties of surrounding surfaces, obstructions (foliage or otherwise) in the lighted area, or lighting from sources other than listed in this design may produce different results from the predicted values. Normal tolerances of voltage, lamp output, and ballast and luminaire manufacture will also affect results.

Customer approval \_\_\_\_\_ Date \_\_\_\_\_



**PROPRIETARY & CONFIDENTIAL**

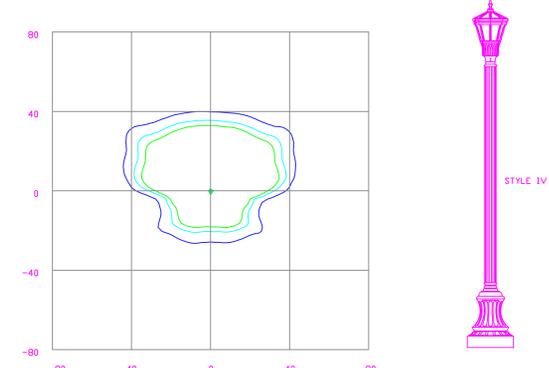
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CAPITAL SQUARE	
RALEIGH, NC	
SITE LIGHTING PLAN	
Designed by DEP LIGHTING SOLUTIONS	
Reviewed by T. Ferguson	Scale 1" = 40'
Date 03/30/2017	Size "Arch D"
Description LED 50 Teardrop	
Drawing No. 17-0071A	Sht. 1 OF 1

ISOFOOTCANDLE CURVES

FIXTURE: MONTICELLO OPEN LED ASSY # L43LED07MNTOP3C  
 MOUNTING HEIGHT: 12 FT  
 LAMP: 75W LED'S 4000K  
 PATTERN: TYPE III, B1-U0-G1 (zero light at or above 90 degrees)

NOTE: THE FOOTCANDLE READINGS BELOW ARE MAINTAINED AND HAVE BEEN DEPRECIATED FOR LAMP LUMEN DEPRECIATION AND LUMINAIRE DIRT DEPRECIATION. FOR INITIAL FOOTCANDLES, DIVIDE THE READINGS BELOW BY .85.

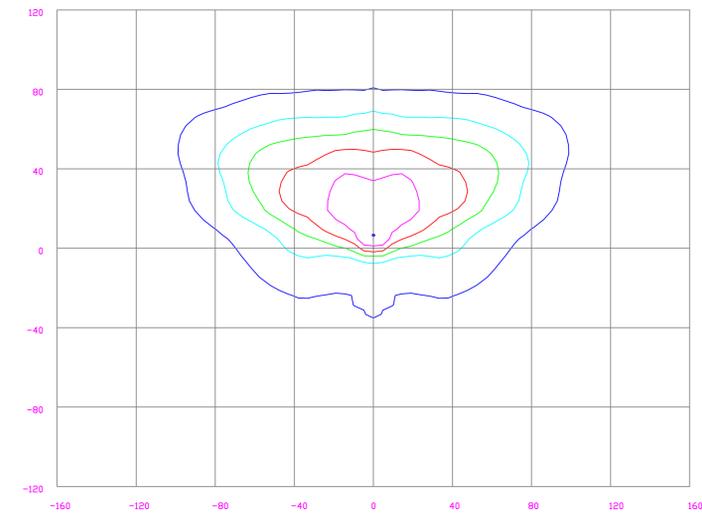


LEGEND (OUTER to INNER): 0.100 , 0.200 , 0.300

ISOFOOTCANDLE CURVES

FIXTURE: TEARDROP LED 2016 ASSY # L85LED15TDLBLC (BLACK)  
 MOUNTING HEIGHT: 29 FT  
 LIGHT SOURCE: 150W LED'S, 4000K, 70 CRI  
 PATTERN: TYPE III, B2-U3-G4

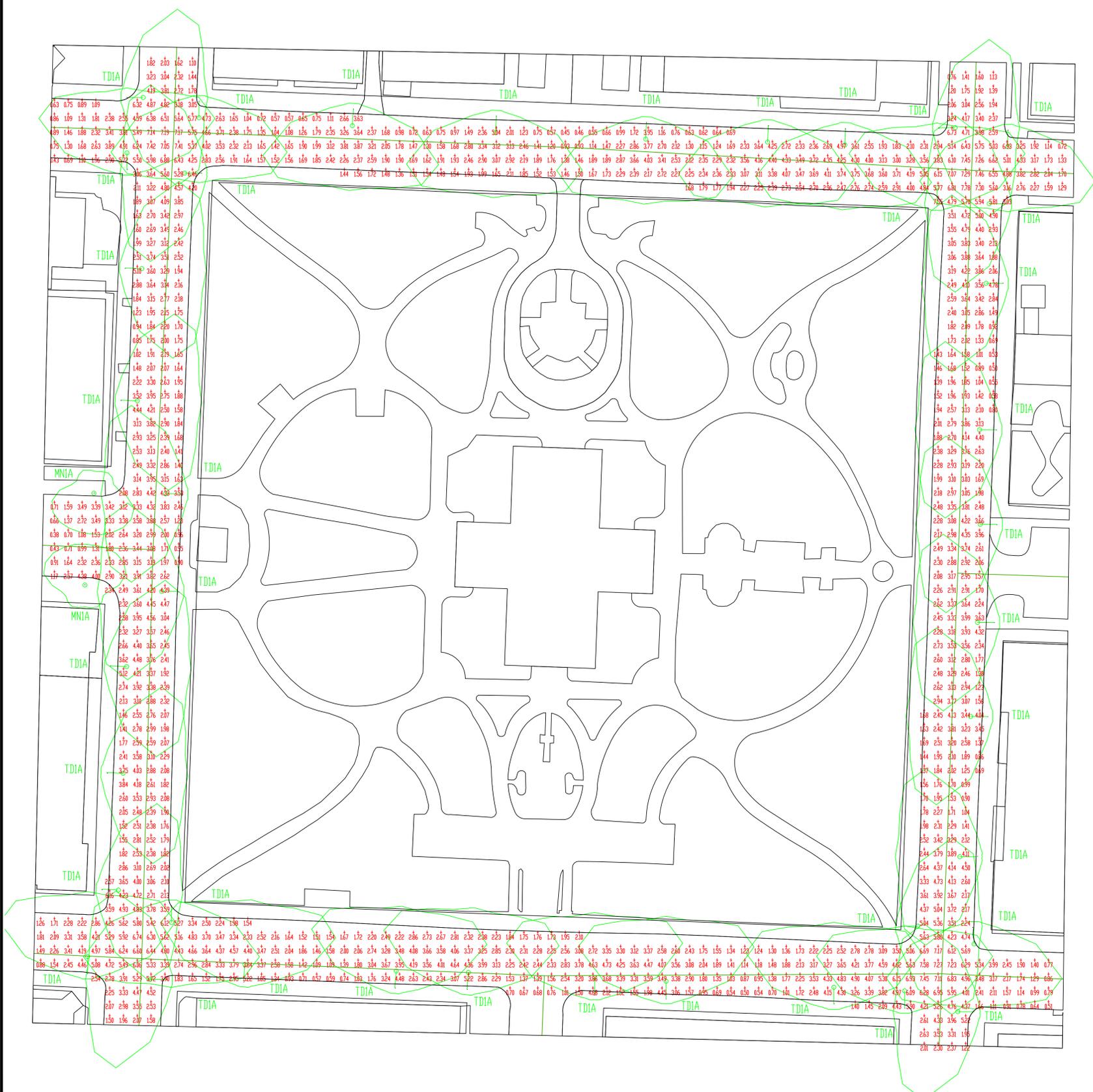
NOTE: THE FOOTCANDLE READINGS BELOW ARE MAINTAINED AND HAVE BEEN DEPRECIATED FOR LAMP LUMEN DEPRECIATION AND LUMINAIRE DIRT DEPRECIATION. FOR INITIAL FOOTCANDLES, DIVIDE THE READINGS BELOW BY .85.



LEGEND (OUTER to INNER): 0.100 , 0.250 , 0.500 , 1.00 , 2.00

CALCULATION SUMMARY									
AREA NAME	DIMENSIONS	GRID / TYPE	# PTS	SPAC	GROUP	AVE	MAX	MIN	MAX/MIN   AVE/MIN
New Area	1147.25x1004.06ft	Roadway	1176	10.00	(+)	2.87	7.78	0.38	20.26   7.48

Raleigh Capital Square (17-0071) LUMINAIRE SCHEDULE						
TYP	SYMBOL	DESCRIPTION	LAMP	LUMENS	MOUNTING/BALLAST	LLF QTY
MNIA	o	Holophone MNTLED_OPN3 (1) 'MN01' MNTLED_OPN3	(1) LED 4000K	4286	12' MT HT 75W LED	0.85 2
TDIA	↓	Holophone TDRPLED_1/POLE (1) 'TD15' TDRPLED_1-2/POLE	(1) 15377 lumens	15377	29' MT HT 150W LED	0.85 39



**LIGHTING DESIGN TOLERANCE**

The calculated footcandle light levels in this lighting design are predicted values and are based on specific information that has been supplied to Duke Energy Progress. Any inaccuracies in the supplied information, differences in luminaire installation, lighted area geometry including elevation differences, reflective properties of surrounding surfaces, obstructions (foliage or otherwise) in the lighted area, or lighting from sources other than listed in this design may produce different results from the predicted values. Normal tolerances of voltage, lamp output, and ballast and luminaire manufacture will also affect results.

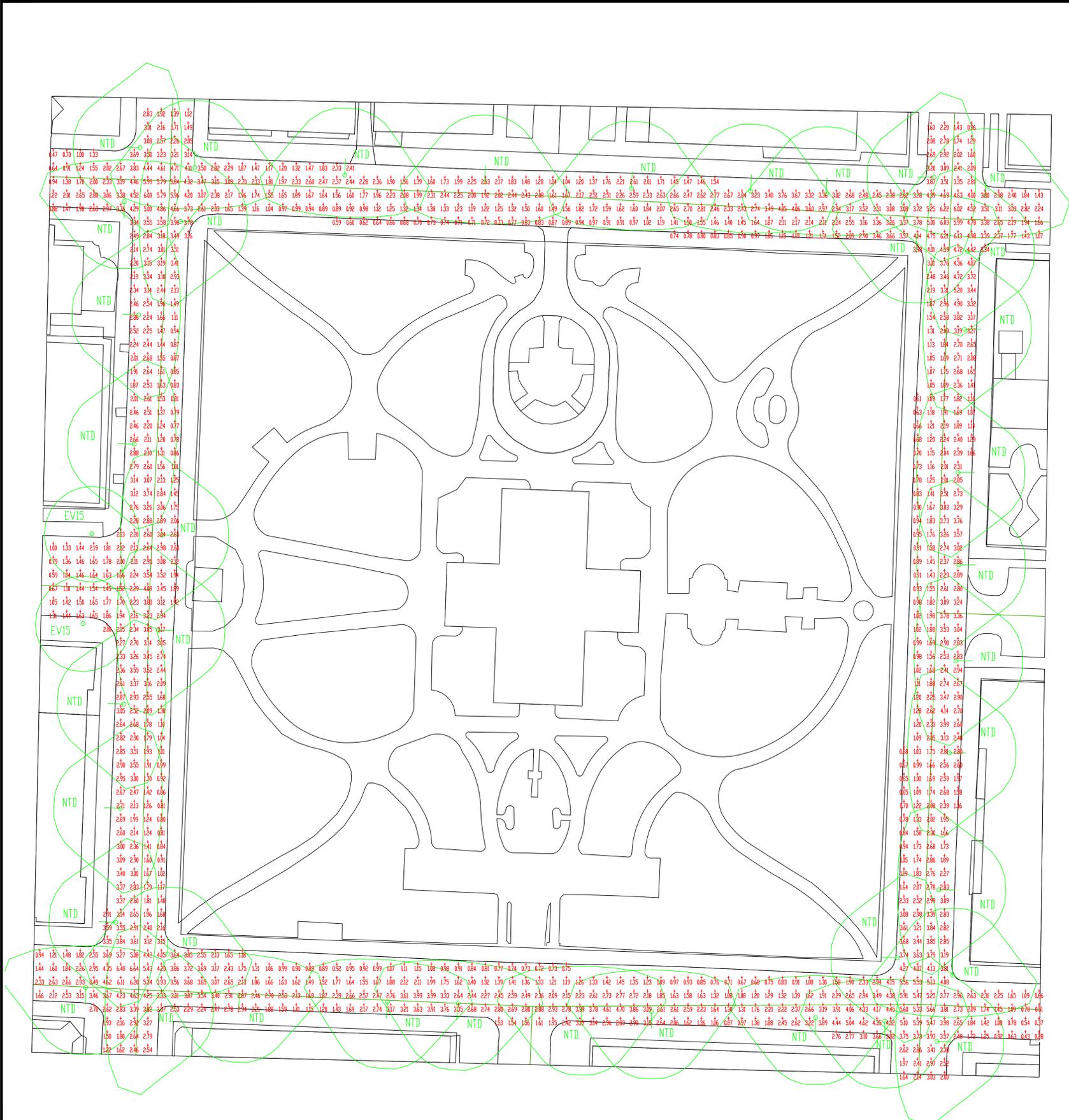
Customer approval \_\_\_\_\_ Date \_\_\_\_\_



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CAPITAL SQUARE	
RALEIGH, NC	
SITE LIGHTING PLAN	
Designed by	DEP LIGHTING SOLUTIONS
Reviewed by	T. Ferguson Scale 1" = 40'
Date	03/30/2017 Size "Arch D"
Description	LED 150 Teardrop
Drawing No.	17-0071A Sht. 1 OF 1



CALCULATION SUMMARY										
AREA NAME	DIMENSIONS	GRID / TYPE	# PTS	SPAC	GROUP	AVE	MAX	MIN	MAX/MIN	AVE/MIN
New Area	1147.25x1004.06ft	Roadway	1180	10.00	(+)	2.35	6.64	0.28	23.54	8.34

Raleigh Capital Square (17-0071) LUMINAIRE SCHEDULE						
TYP	SYMBOL	DESCRIPTION	LAMP	LUMENS	MOUNTING/BALLAST	LLF QTY
EV15	⊕	EVAN150_1/POLE (1) "E150" Evanston 150_1-1/Pole	(1)	16000	12' MT HT 150W HPS	0.85 2
NTD	⊕	NTDRO22_1/POL (1) "N022" New Orleans 22_1-1/Pole	(1)	22000	30' MT HT 200W HPS	0.83 39

**LIGHTING DESIGN TOLERANCE**

The calculated footcandle light levels in this lighting design are predicted values and are based on specific information that has been supplied to Duke Energy Progress. Any inaccuracies in the supplied information, differences in luminaire installation, lighted area geometry including elevation differences, reflective properties of surrounding surfaces, obstructions (foliage or otherwise) in the lighted area, or lighting from sources other than listed in this design may produce different results from the predicted values. Normal tolerances of voltage, lamp output, and ballast and luminaire manufacture will also affect results.

Customer approval \_\_\_\_\_ Date \_\_\_\_\_

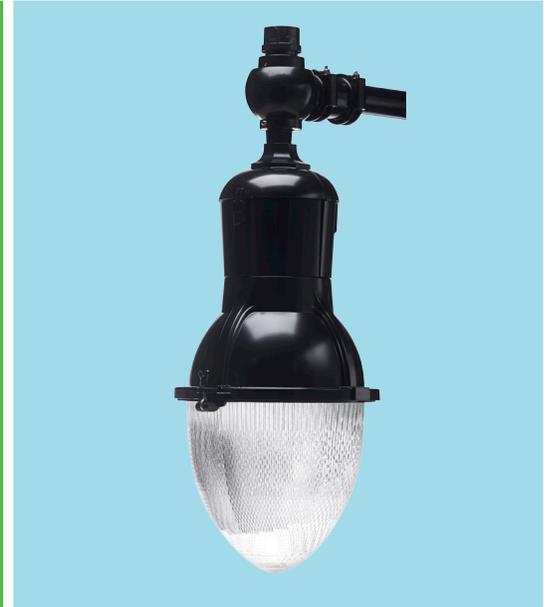


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CAPITAL SQUARE	
RALEIGH, NC	
SITE LIGHTING PLAN	
Designed by <u>DEP LIGHTING SOLUTIONS</u>	
Reviewed by <u>T. Ferguson</u>	Scale <u>1" = 40'</u>
Date <u>04/06/2017</u>	Size <u>"Arch D"</u>
Description <u>HPS New Orleans Teardrop</u>	
Drawing No. <u>17-0071A</u>	Sht. <u>1 OF 1</u>

Outdoor Lighting  
**Teardrop LED**



Subject to variance from manufacturer. Contact us for region-specific details.

The Teardrop LED has a historic appearance with a nostalgic feel and can enhance any municipal downtown or historic district. Efficiency is combined with turn-of-the-century appeal to provide an image that is attractive and distinctive. Mount on new black concrete poles or existing approved metal poles that are painted black.

<b>LED</b>	150 watts
<b>Mounting height</b>	27.5'
<b>Color</b>	Black
<b>Pole</b>	Black concrete <i>(additional monthly cost)</i>

*Note: The black fixtures and poles are not stocked by Duke Energy Progress. They must be special-ordered and require up to 8 weeks of lead time for arrival.*

For additional information, visit us at [duke-energy.com/OutdoorLighting](http://duke-energy.com/OutdoorLighting) or call us toll free at 866.769.6417.

## Outdoor Lighting

# Teardrop LED

Light source: LED (*white*)

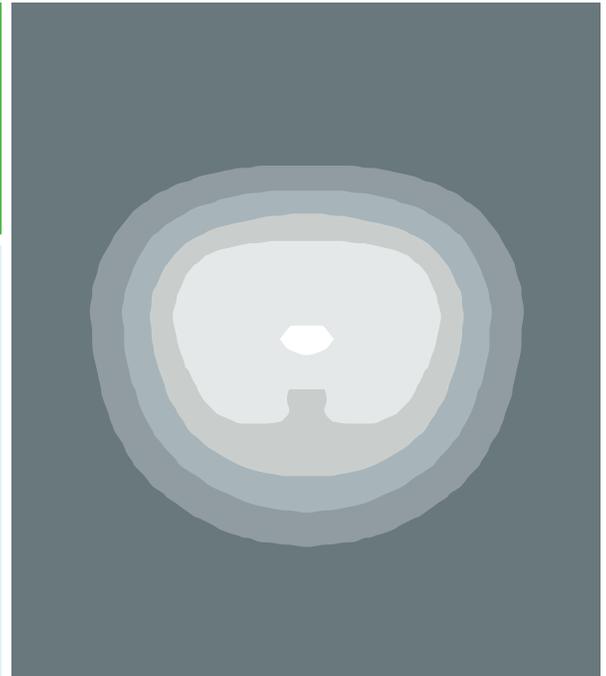
Wattage: 150

Lumens: 15,377

Light pattern: IESNA Type III (*oval*)

IESNA Backlight – Uplight – Glare (BUG) Rating: B2-U3-G4

Color temperature: 4,000K



*light distribution pattern*

### Pole available:

<i>Name</i>	<i>Mounting height</i>	<i>Color</i>
Concrete	27.5'	Black ( <i>additional monthly cost</i> )

### Features

Little or no installation cost

Design services by lighting professionals included

Maintenance included

Electricity included

Warranty included

One low monthly cost on your electric bill

Turnkey operation

Backed by over 40 years of experience

### Benefits

Frees up capital for other projects

Meets industry standards and lighting ordinances

Eliminates high and unexpected repair bills

Less expensive than metered service

Worry-free

Convenience and savings for you

Provides hassle-free installation and service

A name you can trust today ... and tomorrow

*Note: These black fixtures and poles are not stocked by Duke Energy Progress. They must be special-ordered and require up to 8 weeks of lead time for arrival.*

## INDEX OF EXHIBITS

CERTIFICATE OF APPROPRIATENESS COMMITTEE AGENDA  
Thursday, March 23, 2017 - 4:00 P.M.

MULTIPLE IN MOORE AND CAPITOL SQUARE RIGHTS-OF-WAY  
MOORE AND CAPITOL SQUARE HISTORIC DISTRICTS (HOD-G)  
(RHDC File No. 022-17-CA)

MULTIPLE IN HILLSBOROUGH STREET RIGHT-OF-WAY  
CAPITOL SQUARE HISTORIC DISTRICT (HOD-G)  
(RHDC File No. 023-17-CA)

No.	Description	Pages
1	<i>Affidavit of Dustin Brice</i> , Street Light Coordinator, City of Raleigh, Department of Transportation, March 23, 2017.	1-7
2	Excerpts from <i>Part 10A: Unified Development Ordinance</i> , City of Raleigh, Adopted February 18, 2013.	8-12
3	Excerpts from <i>Designing a 21st Century City: The 2030 Comprehensive Plan for the City of Raleigh, Volume 1: Comprehensive Plan</i> , Adopted October 7, 2009.	13-33
4	Excerpts from <i>A Roadmap to Raleigh's Energy Future, City of Raleigh Climate/Energy Action Plan</i> , City of Raleigh, Office of Sustainability, November 2012.	34-43
5	Excerpts from <i>Design Guidelines for Raleigh Historic Districts</i> , City of Raleigh, Raleigh Historic Districts Commission, Adopted by Raleigh Historic District Commission June 19, 2001, Adopted by Raleigh City Council June 19, 2001.	44-56
6	Excerpts from <i>Design Guidelines for Raleigh Historic Districts (PROPOSED)</i> , City of Raleigh, Raleigh Historic Districts Commission, Adopted by Raleigh Historic District Commission January 19, 2016.	57-61
7	<i>RHDC Certificate of Appropriateness Committee Meeting Minutes</i> , Raleigh Historic Districts Commission, February 1, 2016.	62-70
8	<i>High-Intensity Discharge Lighting Basics</i> , US Dept. of Energy, Office of Energy Efficiency & Renewable Energy, August 15, 2013.	71-73

9	<i>About the Solid-State Lighting Program</i> , US Dept. of Energy, Office of Energy Efficiency & Renewable Energy.	74-76
10	<i>LEDs: The Future of Lighting is Here</i> , US Dept. of Energy, Office of Energy Efficiency & Renewable Energy, February 27, 2012.	77-78
11	<i>Energy Savings Forecast of SSL in General Illumination</i> , US Dept. of Energy, Office of Energy Efficiency & Renewable Energy. September 2016.	78-80
12	<i>Discontinuation of Metal Halide Luminaires</i> , Correspondence from General Electric Corporation, August 31, 2016.	81
13	<i>Lighting Fixture Transition to LED Technology</i> , Correspondence from Duke Energy Progress, August, 2016.	82
14	Excerpts from <i>Energy Efficient Lighting Guidance Document for New Construction and Retrofits: The State of North Carolina</i> , NC Dept. of Environmental Quality and NC Dept. of Administration, State Construction Office, May 2016.	83-85
15	Excerpts from <i>City of Raleigh Municipal Garage LED Lighting Pilot Project</i> , City of Raleigh, May 24, 2007.	86-89
16	<i>Light-Emitting Diodes in Raleigh</i> , City of Raleigh, Office of Sustainability, Last updated Feb. 04, 2016.	90-91
17	<i>Maps of Downtown reflecting prior street lighting plan.</i>	92
18	<i>Maps of Capitol Square and Moore Square Historic Districts showing street lights at issue in City's COA application.</i>	93-94
19	<i>Photos of NC Capitol Building</i> , Prior HPS lighting.	95-96
20	<i>Photos of NC Capitol Building</i> , Existing Metal Halide lighting.	97
21	<i>Maps of Downtown reflecting potential street lighting</i> (scenario 1)	98-100
22	Selection from <i>Powell Bill Map</i> , City of Raleigh Transportation Department, 2016.	101-102
23	North Carolina General Statutes § 143-345.5.	103
24	<i>Maps of Downtown reflecting potential street lighting</i> (scenario 2)	104-105
25	Excerpts from <i>Learning About LED Our Experience in Raleigh, NC</i> ,	

	Daniel A. Howe, Assistant City Manager, 2009.	107-109
26	<b><i>Get the Facts: LED Street Lighting</i></b> , US Dept. of Energy, Office of Energy Efficiency & Renewable Energy, June 21, 2016.	110-111
27	<b><i>Email from Tony Ferguson</i></b> , Business Development Sales Manager, Duke Energy Progress, March 22, 2017.	112
28	<b><i>Email from Tony Ferguson, Business Development Sales Manager</i></b> , Duke Energy Progress, March 23, 2017.	113-117

STATE OF NORTH CAROLINA

COUNTY OF WAKE

**AFFIDAVIT OF DUSTIN BRICE**

Dustin Brice, being first duly sworn, deposes and states as follows:

1. I am over eighteen years of age and am competent to testify as a witness. The facts contained in this affidavit are based on my personal knowledge.

2. I have been employed by the City of Raleigh (hereinafter, the "City") for the past twelve (12) years, and have held the position of Street Light Coordinator in the City of Raleigh's Department of Transportation for the past six (6) years. Prior to my employment with the City of Raleigh, I was employed for three (3) years as a GIS Technician for the City of Wilson, North Carolina – Electric Division. During my employment with the City of Wilson, I gained a great deal of knowledge and experience with electrical power distribution systems and street lighting. I graduated from North Carolina State University in 1999 with a Bachelor of Science in Natural Resources.

3. As the City's Street Light Coordinator, I am responsible for managing the City's public street light system consisting of approximately 30,000 street light locations. My duties include reviewing and authorizing any and all installations, upgrades, and removals of street lighting equipment; managing the \$5.8 million street light operating budget in the most cost effective manner possible; and initiating new lighting projects along currently unlit thoroughfares throughout the City. In addition, I provide oversight over Duke Energy, the City's energy provider, to ensure that installations, modifications, and repairs are completed in a timely manner.

4. The City of Raleigh provides street lighting as a public service, much like police or fire protection. The goal of street lighting is to provide citizens with safety and security within the public right of way for all modes of transportation.

5. Street lighting is installed on most public streets within the City. The majority of street lighting and infrastructure is installed within the public right of way. Any equipment or facilities located on private property are located within a Duke Energy easement.

6. All street lighting equipment in the City, including fixtures, poles, and all related electrical power facilities are owned by Duke Energy.

7. The City leases all street lighting equipment from Duke Energy and pays a flat monthly rate for each installed fixture. Each of the City's street lights are leased for a term of twenty (20) years from the date of installation. The cost of the lease includes power consumption, maintenance, and replacement due to failure or damage. Duke Energy or its appointed contractor provides all maintenance for the City's street lighting.

8. Prior to the expiration of the 20-year lease term, any City-initiated change to a street light fixture incurs a \$50.00 fee per fixture. Likewise, any City-initiated change to a street light pole during the lease term incurs a \$500.00 fee per pole. In addition, each time that the City initiates a change to a fixture or pole, the 20-year lease term begins anew.

9. With the exception of the 100 through 500 blocks, Hillsborough Street is lit by LED street lighting. Partially located within the Capitol Square Historic District, the 100 through 500 blocks of Hillsborough Street are serviced by high pressure sodium (HPS) post-top street lighting. The existing post-top HPS street lighting equipment along the 100 through 500 blocks of Hillsborough Street is in poor condition and obsolete. Moreover, the lighting quality

along the 100 through 500 blocks of Hillsborough Street is extremely poor and markedly dim compared to that of surrounding streets with more modern street lighting equipment.

10. In late 2016, Duke Energy notified City staff that they would be unable to adequately service the HPS post-top street lights on Hillsborough Street. City staff have been informed that replacement parts and other hardware required to repair and restore these HPS post-top street lights is no longer available for the existing fixtures and poles.

11. Due to their deteriorated condition and lack of replacement parts, numerous post-top HPS street lighting fixtures along the 100 through 500 blocks of Hillsborough Street are inoperable. The 20-year lease term on these post-top lights has expired. Therefore, any equipment change initiated by the City will result in a new 20-year lease term. Once installed, the new fixtures and poles will be subject to the \$50.00 and \$500.00 change-out fees respectively, until the end of the lease.

12. In addition to the post-top street lighting fixtures in the Capitol Square Historic District, the City also leases HPS teardrop street light fixtures in the Capitol Square Historic District and the Moore Square Historic District. These teardrop street light fixtures remain operable, but are in need of repair or replacement. In addition, the existing street light poles supporting the existing HPS teardrop street light fixtures are in need to painting and restoration.

13. The obsolescence and maintenance issues described herein have been the subject of public criticism. In a December 2015 newspaper article regarding downtown Raleigh development, then-Governor Pat McCrory was quoted stating, “[t]he infrastructure needs to be vastly improved – your curb and gutter and sidewalks, and your lighting.”

14. In order to begin addressing the deteriorating condition of the existing HPS light fixtures in the Capitol Square and Moore Square Historic Districts, the City’s Department of

Transportation has begun scheduling repainting of many of the decorative street light poles around the downtown area. In conjunction with this initiative, the City has proposed improvements and upgrades to the existing street lighting equipment.

15. In response to Duke Energy's inability to continue servicing and maintaining the HPS post-top street lights on Hillsborough Street, the City has applied for a Certificate of Appropriateness (RHDC Application Number 023-CA-17) seeking authorization to update these HPS post-top street lights. In its proposal, the City recommends a full scale replacement of the lighting along the 100 through 500 blocks of Hillsborough Street. The style of the existing poles and fixtures are no longer manufactured and no identical LED light street light fixture is available for lease. In order to match the existing poles and fixtures as closely as possible, the City proposes using Mitchell LED Top Hat with Ribs, Bands, and Medallions fixtures mounted on Style VI poles.

16. Due to the age and deteriorating condition of the existing HPS teardrop street lighting equipment in the Capitol Square Historic District and the Moore Square Historic District, the City has applied for a Certificate of Appropriateness (RHDC Application Number 022-CA-17) seeking authorization to update the existing HPS teardrop street light fixtures with low maintenance LED fixtures and to restore the existing street lamp poles. Under the City's proposal, the replacement LED teardrop fixtures will be identical in appearance to the current HPS teardrop fixtures. The existing street light poles will be painted, but will not be otherwise changed.

17. Implementation of both of the City's proposals will result in leasing equipment which is much more energy efficient, more reliable, and expected to be nearly maintenance free for 10-20 years. Moreover, in addition to taking advantage of the numerous benefits associated

with upgrading to LED technology, the City's proposals will provide improved light quality consistent with that in other areas around the downtown area and beyond.

18. In both of its Certificate of Appropriateness proposals, City staff have taken care to maintain the historic character of the Capitol Square Historic District and the Moore Square Historic District. Replacements for the existing post-top fixtures will closely match the appearance of the existing fixtures. Replacements for the existing tear-drop fixtures are identical in appearance. While the replacement fixtures proposed by the City will be likely indistinguishable from the existing fixtures during daylight hours, the light color produced by the proposed LED fixtures will be whiter than that produced by the existing HPS fixtures.

19. While the quality of light produced by LED street lighting equipment differs from that produced by high-pressure sodium equipment, the same quality of light is already being used in the Capitol Square Historic District. Upon information and belief, the Capitol Grounds were previously lit using high-pressure sodium equipment. When the State of North Carolina upgraded the lighting on the Capitol Grounds, the high-pressure sodium lighting equipment was replaced with Metal halide lighting equipment.

20. Metal Halide lighting equipment produces white colored 4,000 Kelvin light which closely matches the color temperature produced by LED lighting equipment. Therefore, while the right-of-way bordering Capitol Square is currently lit by HPS street lighting, the Capitol Grounds themselves are lit by Metal halide lighting that matches the LED street lighting present throughout the majority of the City of Raleigh.

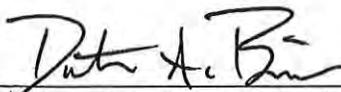
21. Replacement of existing obsolete street lighting equipment in the Capitol Square and Moore Square Historic Districts is consistent with the City's mission and policy goals. In 2012, the City's Office of Sustainability produced a document entitled [A Roadmap to Raleigh's](#)

Energy Future, City of Raleigh Climate/Energy Action Plan November 2012 which was described as “Framework and implementation strategies to reduce the City’s dependence on fossil fuels”.

22. In developing its Climate/Energy Action Plan, the City identified thirty-four (34) potential future projects, programs, and strategies to achieve further reductions in energy use. The list of potential future projects was then prioritized using the following criteria: financially responsible, minimization of operational impacts, realistic /implementable, coordinates with other projects, and carbon reduction potential. Among the potential future projects identified, “replace all street lights with LEDs” was ranked as number 12.

23. The City’s Public Works Department has begun implementation of strategy #12 (replacement of all street lights with LEDs). As of July 2016, approximately 29,000 of the City’s 30,000 street lights have been replaced with LEDs. As a result, the City’s taxpayers currently save approximately \$400,000.00 annually due to reduced costs associated with street lighting costs.

I declare under penalty of perjury that the foregoing is true and correct. Further the affiant sayeth not, executed on this the 23<sup>rd</sup> day of March, 2017.

  
\_\_\_\_\_  
Dustin Brice, Street Light Coordinator  
City of Raleigh, Department of Transportation

Sworn to and subscribed before me this the 23<sup>rd</sup> day  
of March, 2017.

Connie J. Bragg  
Signature of Notary Public

Connie J. Bragg  
Printed Name of Notary Public

My commission expires: 5/19/2020



STATE OF NORTH CAROLINA

COUNTY OF WAKE

**AFFIDAVIT OF DUSTIN BRICE**

Dustin Brice, being first duly sworn, deposes and states as follows:

1. I am over eighteen years of age and am competent to testify as a witness. The facts contained in this affidavit are based on my personal knowledge.

2. I have been employed by the City of Raleigh (hereinafter, the “City”) for the past twelve (12) years, and have held the position of Street Light Coordinator in the City of Raleigh’s Department of Transportation for the past six (6) years. Prior to my employment with the City of Raleigh, I was employed for three (3) years as a GIS Technician for the City of Wilson, North Carolina – Electric Division. During my employment with the City of Wilson, I gained a great deal of knowledge and experience with electrical power distribution systems and street lighting. I graduated from North Carolina State University in 1999 with a Bachelor of Science in Natural Resources.

3. As the City’s Street Light Coordinator, I am responsible for managing the City’s public street light system consisting of approximately 30,000 street light locations. My duties include reviewing and authorizing any and all installations, upgrades, and removals of street lighting equipment; managing the \$5.8 million street light operating budget in the most cost effective manner possible; and initiating new lighting projects along currently unlit thoroughfares throughout the City. In addition, I provide oversight over Duke Energy, the City’s energy provider, to ensure that installations, modifications, and repairs are completed in a timely manner.

4. The City of Raleigh provides street lighting as a public service, much like police or fire protection. The goal of street lighting is to provide citizens with safety and security within the public right of way for all modes of transportation.

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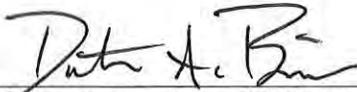
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\_\_\_\_\_  
Dustin Brice, Street Light Coordinator  
City of Raleigh, Department of Transportation

Sworn to and subscribed before me this the 23<sup>rd</sup> day  
of March, 2017.

Connie J. Bragg  
Signature of Notary Public

Connie J. Bragg  
Printed Name of Notary Public

My commission expires: 5/19/2020



ADOPTED: FEBRUARY 18, 2013



# RALEIGH, NORTH CAROLINA PART 10A: UNIFIED DEVELOPMENT ORDINANCE

INCLUDES 2ND SUPPLEMENT, OCTOBER 2016



EFFECTIVE DATE: SEPTEMBER 01, 2013

## Article 1.1. Legal Provisions

### Sec. 1.1.1. Title

The official title of this document is Part 10A: Unified Development Ordinance for the City of Raleigh, North Carolina and is referred to throughout this document as "this UDO."

### Sec. 1.1.2. Applicability

- A. This UDO applies to all land, buildings, structures and uses located within the corporate limits and the extraterritorial jurisdiction of the City of Raleigh, North Carolina.
- B. To the extent allowed by law, the provisions of this UDO apply to all land, buildings, structures and uses owned, leased or otherwise controlled by any district, County, State or Federal government agencies.

### Sec. 1.1.3. Effective Date

This UDO was adopted on February 18, 2013 and became effective on September 1, 2013 by Ordinance No. 2013 151 TC 357 (TC-3-12).

### Sec. 1.1.4. Purpose and Intent

This UDO is adopted to preserve, protect and promote the public health, safety and general welfare of residents and businesses in the City. More specifically, this UDO is adopted to achieve the following objectives:

- A. Implement the policies and goals contained within officially adopted plans, including the Comprehensive Plan;
- B. Improve the built environment and human habitat;
- C. Conserve and protect the City's natural beauty and setting, including trees, scenic vistas and cultural and historic resources;
- D. Ensure that new development conserves energy, land and natural resources;
- E. Protect water quality within watershed critical areas, the general watershed areas of designated water supply watersheds and other watershed districts;
- F. Encourage environmentally responsible development practices;
- G. Promote development patterns that support safe, effective and multi-modal transportation options, including auto, pedestrian, bicycle and transit and

therefore minimize vehicle traffic by providing for a mixture of land uses, walkability and compact community form;

- H. Provide neighborhoods with a variety of housing types to serve the needs of a diverse population;
- I. Promote the greater health benefits of a pedestrian-oriented environment;
- J. Reinforce the character and quality of neighborhoods;
- K. Remove barriers and provide incentives for walkable projects;
- L. Protect and promote appropriately located commercial and industrial activities in order to preserve and strengthen the City's economic base;
- M. Encourage compact development;
- N. Ensure that adequate facilities are constructed to serve new development;
- O. Provide for orderly growth and development of suitable neighborhoods with adequate transportation networks, drainage and utilities and appropriate building sites;
- P. Save unnecessary expenditures of funds by requiring the proper initial construction of transportation networks, sidewalks, drainage facilities and utilities; and
- Q. Provide land records for the convenience of the public and for better identification and permanent location of real estate boundaries.

### Sec. 1.1.5. Relationship to the Comprehensive Plan

The Comprehensive Plan serves as the basic policy guide for development under this UDO. The policies and action items of the Comprehensive Plan may be amended from time to time to meet the changing requirements of the City in accordance with the standards and procedures in Sec. 10.2.2.

### Sec. 1.1.6. Minimum Requirements

The requirements of this UDO are considered to be the minimum requirements for the promotion of the public health, safety and general welfare.

### Sec. 1.1.7. Conflicting Provisions

- A. If any provisions of this UDO are inconsistent with similar provisions of State or Federal law, the more restrictive provision shall control, to the extent permitted by law.

## Article 5.4. Character Protection Overlays

### Sec. 5.4.1. General Historic Overlay District (-HOD-G)

#### A. Applicability

This section applies to all individual Historic Landmarks and each General Historic Overlay District (-HOD-G) designated by the City Council.

#### B. Purpose and Objectives

1. The -HOD-G is intended to preserve the historic significance of properties that are formally designated by the City. Locally designated historic districts are areas which are deemed to be of special significance in terms of their history, prehistory, architecture, archeology or culture, and to possess integrity of design, setting, materials, feeling and association. The -HOD-G seeks to preserve the overall historic character of the district, as well as the key, character-defining details of each of the contributing resources, and to assure that new construction is compatible with this historic context.
2. The -HOD-G has the following objectives:
  - a. To promote the preservation and continued use of individual properties and districts of historic significance;
  - b. To preserve the integrity of historically significant resources;
  - c. To support sustainability by reusing existing built resources; and
  - d. To assure that new construction is compatible with the historic context of landmark properties and historic districts.

#### C. Certificate of Appropriateness Required

1. In addition to all other approval processes, within the -HOD-G and for any Historic Landmark, no portion of the exterior features of any building or other structure (including walls, fences, light fixtures, steps, pavement, path or any other appurtenant features), trees, or above ground utility structure nor any type of outdoor advertising sign, or portion of the designated interior features of a Historic Landmark is to be erected, altered, restored, demolished or moved unless and until after an application for a Certificate of Appropriateness as to the exterior features, or portion of the designated interior features of a Historic Landmark, has been submitted and approved.

2. A Certificate of Appropriateness shall be issued prior to any application for a building permit or other permit granted for the purpose of constructing, altering, moving or demolishing structures or appurtenant features being made, and shall be issued or denied, subject to such reasonable conditions as the Historic Development Commission may impose, according to such procedures as may be set forth elsewhere in this UDO or adopted by the Historic Development Commission.
3. A Certificate of Appropriateness shall be required for all activities specified in this section whether a building permit or other permit is otherwise required or not; except that no Certificate of Appropriateness shall be required for:
  - a. The ordinary maintenance or repair of any features that do not involve a change in:
    - i. Design;
    - ii. Material;
    - iii. Color; or
    - iv. Outer appearance.
  - b. The construction, reconstruction, alteration, restoration, moving or demolition of any feature which the Deputy Inspections Director certifies is required by the public safety because of an unsafe or dangerous condition.
  - c. In the event of equipment failure, accidental damage or natural occurrences (such as electrical storms, tornadoes, ice storms and the like), the ordinary maintenance or repair of:
    - i. Streets;
    - ii. Sidewalks;
    - iii. Pavement markings;
    - iv. Above-ground utility service lines; or
    - v. Street signs, traffic signs or replacement of streetlight fixtures.
4. All of the provisions of this section are applicable to construction, alteration, restoration, moving and demolition by the State of North Carolina, its political subdivisions, agencies, instrumentalities and public utilities.
5. Individual certificates of appropriateness for each change may be requested, or if the activity is of the same character and involves a number of objects, as is the case with utility pole replacement, a programmatic certificate of appropriateness may be requested.

**D. Prohibited Activities**

1. Prohibited activities within a -HOD-G or Historic Landmark include the following when conducted without an approved Certificate of Appropriateness:
  - a. The erection, alteration, changing, restoration, moving or demolition of:
    - i. Any entire building or structure;
    - ii. Any exterior features of a building or structure;
    - iii. Any site features (including walls, fences, light fixtures, steps, pavement, paths or any other appurtenant features);
    - iv. Trees;
    - v. Any above-ground utility structure;
    - vi. Any type of outdoor advertising sign; or
    - vii. Any portion of the designated interior features of a Historic Landmark.
  - b. The demolition by neglect (*Article 11.8. Demolition by Neglect of Historic Landmarks and Structures Within Historic Overlay Districts*) of:
    - i. Any contributing building or structure;
    - ii. Any exterior features of a contributing building or structure;
    - iii. Site features (including walls, fences, light fixtures, steps, pavement, paths or any other appurtenant features); or
    - iv. Any contributing outdoor advertising sign.
2. The demolition of any entire building, site or structure within a pending -HOD-G or pending Historic Landmark is prohibited when conducted without an approved Certificate of Appropriateness:
  - a. Any demolition during the pending designation may be delayed for a period up to 180 days from the date of issuance (unless the Historic Development Commission votes to waive or shorten it) or until the City Council takes final action, whichever occurs first.
  - b. Should the City Council approve the designation prior to the expiration of the 180 day delay period, a new application for a certificate of appropriateness for demolition must then be filed; however, the maximum period of delay for such demolition certificate shall be reduced

by the Historic Development Commission equal to the period of delay while the designation was pending.

**E. Setbacks**

1. The minimum and maximum setbacks within the -HOD-G and for Historic Landmarks shall be congruous with the setbacks of any typical well-related nearby building and structure within 1½ blocks and in the overlay district, and congruous with the character of the Historic Landmark, as set forth in the historic development standards below or as defined in the designation documents or nomination.
2. Where the setbacks or allowed encroachments of the underlying district conflict with these setback requirements, the setbacks of the historic development standards shall control.

**F. Height**

1. Buildings and structures shall be congruous with the height of typical well-related nearby buildings and structures in the overlay district, and congruous with the character of the Historic Landmark, as set forth in the historic development standards below or as defined in the designation documents or nomination.
2. Where the height regulations or allowed height encroachments of the underlying district conflict with these height requirements, the height requirements of the historic development standards shall control.

**G. Signs**

No sign shall be erected, altered, restored or moved except in compliance with a Certificate of Appropriateness.

**H. Historic Development Standards**

1. See documents entitled: "Design Guidelines for Raleigh Historic Districts," "The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings," and "The Secretary of the Interior's Standards for the Treatment of Historic Properties and the Guidelines for the Treatment of Cultural Landscapes." These documents are incorporated by reference as authorized by N.C. Gen. Stat. §160A-76, are made a part of this UDO and are on file with Planning and Development. These documents contain architectural guidelines and design standards that will be applied

in considering applications for Certificates of Appropriateness to ensure as far as possible that the exterior features of buildings, structures and their associated features located within a -HOD-G, and designated as a Historic Landmark, remain in harmony with other buildings, structures and appurtenant features in the overlay district, and the character of the Historic Landmark.

2. The current edition of "The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings" shall be the sole standards and guidelines used in reviewing applications submitted by the State of North Carolina for a Certificate of Appropriateness.
3. The issuance of a Certificate of Appropriateness shall not be prohibited in situations where, owing to special conditions affecting the structure (such as topography, availability of materials, and lot size) but not affecting the -HOD-G or Historic Landmarks generally, compliance with the historic development standards would cause an unusual and unnecessary hardship on the property owner beyond that which other property owners in the -HOD-G or of Historic Landmarks would meet.

**Sec. 5.4.2. Streetside Historic Overlay District (-HOD-S)**

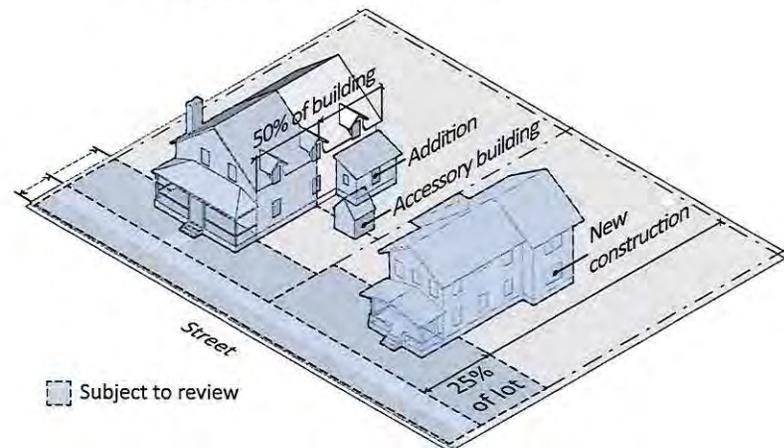
**A. Purpose and Objectives**

1. The -HOD-S is established to provide for protection of the traditional development patterns of an area and to preserve historic resources found in it. The focus is on maintaining that character and on preserving those key character-defining features of individual historic resources within the district, as viewed from the street right-of-way, excluding alleys (as further defined below).
2. A -HOD-S consists of areas that are deemed to be of special significance in terms of their history, prehistory, architecture, archeology or culture, and to possess integrity of design, setting, materials, feeling, and association.
3. The -HOD-S has the following objectives:
  - a. To promote the preservation and continued use of areas that contain a number of properties of historic significance;
  - b. To preserve the integrity of historically significant resources found in the area;
  - c. To support sustainability by reusing existing built resources; and

- d. To assure that new construction is compatible with the broader characteristics of the historic context of area, as viewed from the street.

**B. Applicability**

1. This section applies to each -HOD-S designated by the City Council.
2. The provisions of Sec. 5.4.1.C through 5.4.1.H., with the exception of Sec. 5.4.1.C.3.iii., govern the administration of a -HOD-S, but apply only to the following areas within the boundaries of each -HOD-S:
  - a. The public right-of-way for primary and side streets;
  - b. The lot area between the public rights-of-way and the facade of any existing primary building or structure;
  - c. 25% of the depth of the lot area adjacent to the public right-of-way for vacant lots;
  - d. The first 50% of the depth of any existing principal building from the facade adjacent to a public right-of-way;
  - e. Any addition to a building or structure that projects beyond an existing building's maximum front and side wall and roof plane envelope regardless of distance from the public right-of-way;
  - f. The entirety of any new principal building construction on a vacant lot;
  - g. The entirety of any new accessory building construction located in whole or in part in areas Sec. 5.4.2.B.2.b. through Sec. 5.4.2.B.2.d. above; and
  - h. The entirety of any Historic Landmark and its designated boundary area that may be located within a -HOD-S.



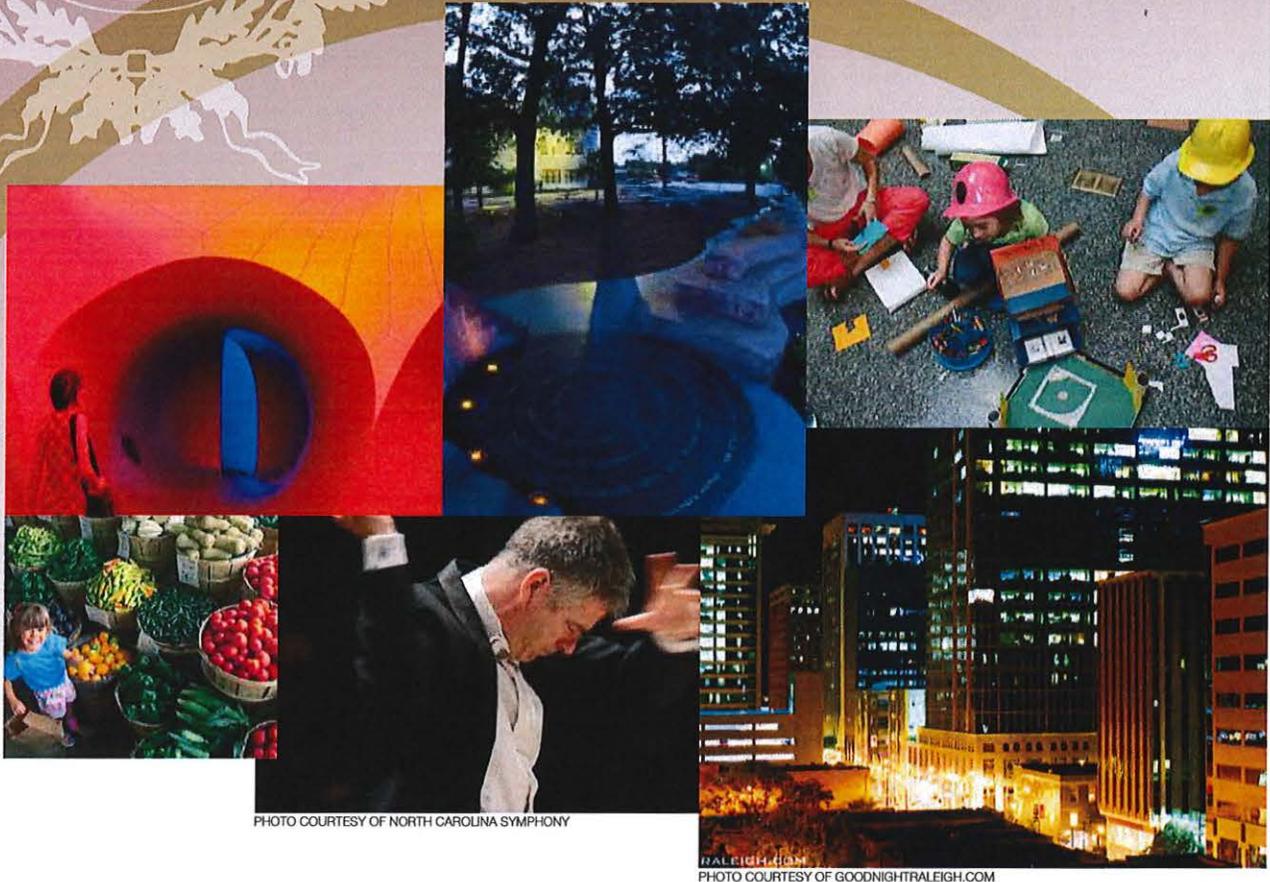
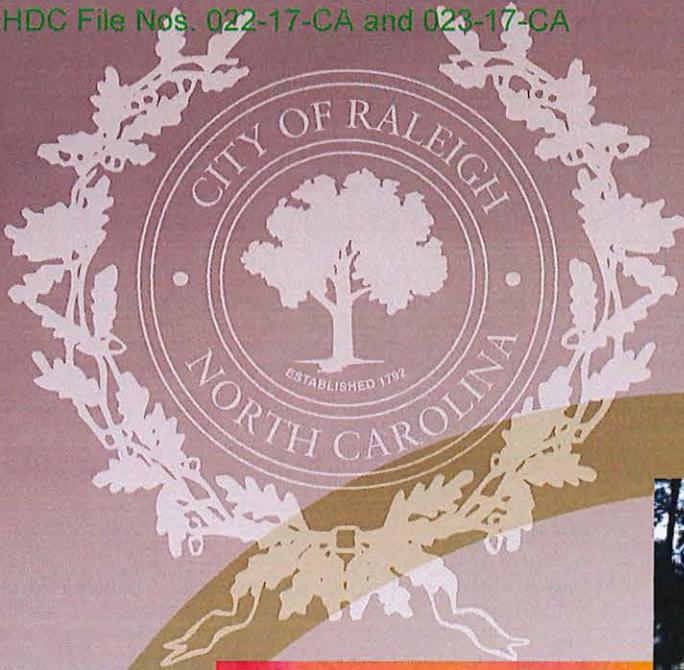


PHOTO COURTESY OF NORTH CAROLINA SYMPHONY

PHOTO COURTESY OF GOODNIGHTRALEIGH.COM

Designing a 21st Century City:

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# The 2030 Comprehensive Plan for the City of Raleigh

## Volume I: Comprehensive Plan



## I. Introduction

Raleigh, the capital of North Carolina, is a fast-growing city located in the fastest-growing region of the State, the Research Triangle. Home to nearly 390,000 people, the City is expected to grow to almost 600,000 by the year 2030. Since the last Comprehensive Plan was written in 1989, Raleigh's population has increased by 72 percent. Growth of this magnitude is not incidental. Raleigh's innumerable assets, including a strong and diversified economy, a highly-educated populace and a great education system, plentiful parks, and its resurgent Downtown are major factors in attracting new residents and businesses from around the country and the world. The transformation has made Raleigh one of the 50 largest cities in the United States.

Raleigh's growth and relative prosperity make planning for the City's future critically important. In fact, the need for good city planning has never been greater as Raleigh addresses its growth and development challenges. How do we accomplish growth while maintaining Raleigh's outstanding quality of life and retaining the assets that make Raleigh special? How do we add to the community while preserving its past? How do we manage growth and make our land use more supportive of transit and walkable neighborhoods? How do we sustain our environment for the present and renew

it for the future? How do we provide decent and affordable housing options? How do we position Raleigh to remain nationally competitive with a strong economy?

The Comprehensive Plan is the key policy document that helps make the city workable, livable, and prosperous. This 2030 Comprehensive Plan provides the Vision and strategies for Raleigh to prosper and grow as a modern, 21st century city. The Plan provides an integrated approach to all aspects of Raleigh's physical development and related economic and social issues, with an emphasis on environmental, economic, and social sustainability; enhancing land use and transportation coordination; and developing attractive and prosperous neighborhoods for all. The Comprehensive Plan seeks to:

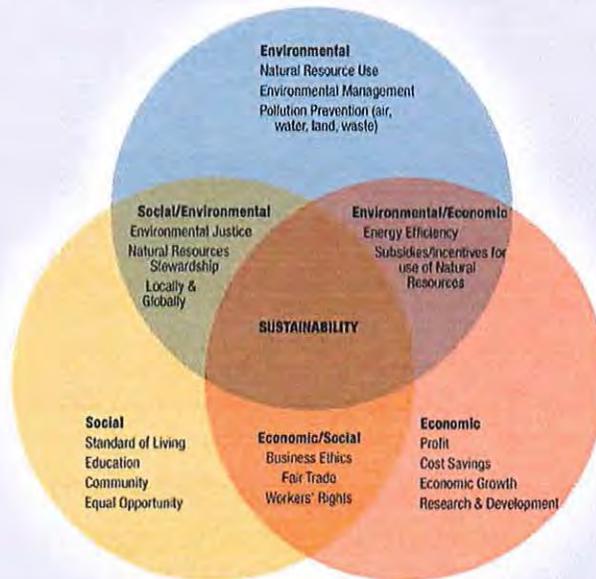
- Inspire with bold ideas to help shape development today and tomorrow;
- Provide the basis for orderly, consistent, and predictable land use decision-making;
- Facilitate quality development throughout Raleigh;
- Provide a "greenprint" for more sustainable growth patterns; and
- Build on the ideas and guidance from the many participants in the Planning Raleigh 2030 process.

### Raleigh's Commitment to Sustainability

Raleigh's commitment to sustainability is a cornerstone of its vision for the future. That vision is broad and comprehensive and focuses on the interdependent relationships of environmental stewardship, economic strength, and social integrity. These three elements, referred to as the "triple bottom line" of sustainability, define the vision and will serve to guide the choices and decisions Raleigh will need to make as a 21st Century City of Innovation.

Consistent with this vision, the City has created a citizens Environmental Advisory Board, established full time Sustainability Initiatives Manager and Energy Manager positions, adopted a fossil fuel reduction goal, enacted an energy efficient buildings standard of LEED Silver for City buildings, and has endorsed the U.S. Mayors Climate Protection Agreement to develop a greenhouse gas emissions reduction strategy for the City.

There are many other sustainability initiatives on-going in the City including LED lighting, greening the City’s vehicle fleet, supporting the creation of green jobs, a teleworking program, renewable energy projects, rainwater harvesting, water reuse, tiered water rates, sustainable purchasing policies, employee health and wellness programs, innovative financing strategies, and public-private collaboration, among others. Many of these are described in greater detail in the Plan elements.



## 1.1 Purpose of the Comprehensive Plan

### Legal Basis, Role, and Content

Although the State’s zoning enabling statute establishes that “zoning regulations shall be made in accordance with a comprehensive plan,” North Carolina’s cities are not required by state law to prepare a comprehensive land use plan, and the nature of such a plan is not defined by statute. However, Raleigh has a long history of using a comprehensive planning document to establish policies that respond to the requirements and aspirations of the City’s residents, and accordingly influence social, economic, and physical development. Past comprehensive plans have been used to promote economic growth and jobs

and guide private and public investment. To achieve its vision for the future, Raleigh needs a revised and updated Plan that will promote sustainability, while maintaining and enhancing the natural and architectural assets of the City, and promoting the social and economic welfare of its residents.

### History of Planning in Raleigh

Raleigh has a tradition of developing comprehensive plans dating back to 1913. The City’s last plan, adopted in 1989 and subsequently amended, is 20 years old. Much has changed in that time, with the most significant change being the rate at which the City’s land area has grown, exceeding the rate of population growth. Since 1980, the City’s population



has more than doubled from approximately 150,000 to nearly 390,000, and the City's land area has almost tripled in size from approximately 55 to 140 square miles. This 2030 Comprehensive Plan strives to ensure that green and sustainable principles such as improved transit and transportation, the coordination of land use and infrastructure, the conservation of existing neighborhoods and thoughtful development of new communities, and the renaissance and growth of downtown, are incorporated into the City's plans and actions for the next twenty years.

### Relationship to the 1989 Comprehensive Plan

The 1989 Comprehensive Plan introduced new tools to manage and shape growth, including Urban Form elements, various guidelines, and Small Area Plans. However, the 1989 Plan grew cumbersome over time, as numerous amendments and additions added length and complexity. The Plan's framework, focused heavily on the specific issues of suburban commercial corridors, did not adequately address new growth challenges. Area-specific plans grew to account for two-thirds of the plan's length, containing very detailed guidance for specific areas while the citywide policies remained far more general. Given its age and these considerations, the City decided the 1989 Plan no longer met the present and future challenges facing the City. In addition, the 1989 Plan did not articulate a set of priorities or specific actions that were to be undertaken to implement its recommendations.

As part of this comprehensive planning process, a "policy audit" of Raleigh's long-range plans, including the 1989 Comprehensive Plan and related Area Plans, District Plans, Corridor Plans, and System Plans was conducted. More than 100 documents were reviewed and over five thousand policy statements were cataloged, organized by topic, and analyzed for their relevancy. The audit provides a baseline for the development of the 2030 Comprehensive Plan's policies and actions, providing a means of identifying which existing planning policies should be carried forward, deleted, updated, merged, or redirected to other documents. Policies remaining relevant to today's context were

then included in updated form in this Plan.

This 2030 Comprehensive Plan is based on the long heritage of city planning in Raleigh and brings the Plan into the modern era of plan-making. It provides guidance for policy implementation and outlines a process for tracking progress through an Implementation Element—the absence of such an element was a notable deficiency in the 1989 Comprehensive Plan.

### Relationship to the Capital Improvement Program

The Comprehensive Plan provides guidance on the need to manage growth and development and to continue investment in the City's physical infrastructure and buildings. The Plan recommends enhancing the capital improvement planning and budgeting process by implementing more explicit ties between the Comprehensive Plan and the development of the Capital Improvement Program (CIP) as well as the establishment of priorities among various potential capital investments. In addition, for each recommended action in this 2030 Raleigh Comprehensive Plan, the Implementation Element identifies whether capital dollars are required to implement that action. There are about 77 such actions in the Plan where the need for capital funds is indicated.

#### The Capital Improvement Program

The Capital Improvement Program (CIP) is a ten year, two phase plan adopted by City Council that serves as a statement of city policy regarding the timing, location, and funding of major public facilities in the City of Raleigh. The CIP is developed by analyzing public facility needs, projecting fiscal resources, establishing priorities, and developing schedules for their implementation. Six programmatic categories are included: Transportation, Public Utilities, Parks, Stormwater Utility and Neuse Basin Environmental, Housing, and General Public Improvements. The Phase I program,

encompassing the first five years of the CIP, includes schedules and budget estimates for projects approved by Council in previous editions of the CIP, as well as additional projects recommended as the result of planning processes. The first two years of the CIP serve as the basis for the capital portion of the annual operating budget and biannual budget projection. The Phase II program, spanning the second five year period, provides a more general review of projects and capital maintenance needs necessary for the continuation of services to the citizens of the City.

The intent of this Plan is to make it easy to read and accessible to all. Key issues are described with data to make the purpose of policies more apparent. Graphics, maps, photos, and charts have been used to illustrate major points and improve the legibility of the text. Text boxes are used to present background information or highlight issues.

As the City's primary policy and planning document addressing the physical development of the City, the Comprehensive Plan is of particular interest to elected officials who must adopt it and fund its implementation, appointed officials who will use it as a guide to discretionary decisions, as well as City agency heads who are charged with its implementation and the update of other plans to conform with it.

## 1.2 How the Comprehensive Plan is to be Used

This document has been designed for use by elected and appointed officials, City government administration and staff, residents, businesses and developers, and others with an interest in the future of Raleigh.

This Comprehensive Plan will be used to:

- Establish the vision for what Raleigh can achieve and aspires to achieve by 2030;
- Consolidate and coordinate in one comprehensive document the policies that relate to the City's physical and economic growth and development for all City departments;
- Guide decision-making and evaluation of zoning map and text amendments and discretionary development approvals;
- Coordinate capital investment by linking the Capital Improvement Program to the Comprehensive Plan; and
- Identify short to long-term strategic actions for the City to undertake. These actions will be monitored annually to ensure implementation and accountability.

The Comprehensive Plan is also an important source of information and guidance to private sector actors involved in development. The Land Use Element and Future Land Use Map provide clear guidance on preferred zoning classifications for particular properties, which will assist in the preparation of rezoning petitions. Many policies describe desired development outcomes, and consistency with these policies will be a factor in the review of many discretionary development applications such as conditional use rezoning petitions and preliminary site plans and subdivisions (1). The Plan will help the private sector anticipate future public investment priorities. It will also bring more predictability to the zoning and development review and approval process for developers, property owners, and concerned citizens alike.

Finally, the Comprehensive Plan is also a resource for those who seek general information on how the City may change over the next 20 years, as well as those who want or need to understand how the City plans to respond to particular issues and problems.

The Comprehensive Plan's Future Land Use Map is incorporated as part of the document and provides the foundation for decisions regarding land use and zoning. This map appears as a poster-sized foldout. It is supplemented by the Growth Framework Map,

1 The City has available a stand-alone guide highlighting those policies most relevant to conditional-use zoning petitions and preliminary development applications.



## C.1 Energy Security and Climate Change Preparedness

Globally, cities are taking the lead in preparing for climate change by proactively conserving energy, using renewable energy resources, and improving air quality. Having the foresight to make investments in energy security by preparing residents, businesses, and local infrastructure will be a hallmark of successful cities in the 21st century. As energy prices rise from the combined effects of fossil fuel depletion and public policies aimed at avoiding climate change, those cities and regions that can be the most productive with the least amount of energy input will be best positioned to prosper.

The policies and actions of this section are included not only because of the City of Raleigh's responsibility to the health, safety, and welfare of constituents, but also because they represent a move towards the responsible use of limited resources in a growing world—and a desire to leave a better world for future generations. In practical terms, adoption and enforcement of the following policies could also translate to lower energy bills and cleaner air for local residents.

As with all urban areas, Raleigh's 'carbon footprint' (amount of greenhouse gases produced) depends primarily upon the ways our built environment and our modes of transportation are designed, constructed, and used. Therefore, the following policies and actions concentrate on how best to approach these practices.

### Policy EP 1.1

#### Greenhouse Gas Reduction

Promote best practices for reducing greenhouse gas emissions as documented through the U.S. Mayors' Climate Protection Agreement, the International Council for Local Environmental Initiatives (ICLEI), and the Sierra Club's Cool Cities Program. (3, 4, 5) *See the Community Inventory Report for additional information on these programs.*

### Policy EP 1.2

#### Vehicle Electrification

Promote the electrification of transportation, both public and private. (5)

### Policy EP 1.3

#### Total Cost of Ownership Analysis

Use Total Cost of Ownership (TCO), life-cycle analysis, and/or payback analysis on all energy saving proposals. (5)

### Policy EP 1.4

#### Green Building

Advance green building practices in the public and private sectors by encouraging LEED Gold-level certification and LEED-ND, or their respective equivalents. (5)

### Policy EP 1.5

#### LEED Certification for Public Buildings

All new or renovations of existing City of Raleigh buildings encompassing 10,000 gross square feet or more of building area should achieve a Silver level certification of the U.S. Green Building Council's LEED Green Building Rating System for New Construction (LEED-NC) and Existing Buildings (LEED-EB), or their respective equivalents. A higher equivalent rating (Gold or Platinum) should be sought where practical and as funding is available. (5) *See text box: LEED Certification for New and Existing Municipal Buildings*

**Policy EP 1.6****LEED and Development Agreements**

Require any public-private project that includes a development agreement to apply LEED (or the equivalent) certification standards as appropriate to the project and consistent with other Comprehensive Plan policies. (5)

**Policy EP 1.7****Sustainable Development**

Promote the adaptive use of existing buildings, infill development, and brownfield development as effective sustainability practices that take development pressure off undeveloped areas. (*See also Element J: 'Historic Preservation' for more on this topic.*) (2, 3, 5, 6)

**Policy EP 1.10****Alternative Energy Sources**

Support the development and application of renewable energy technologies such as active, passive, and photovoltaic solar energy, fuel cells, and other sustainable sources. Such technology should be used to reduce the dependence on imported energy, provide opportunities for economic and community development, and benefit environmental quality. (5)

**Policy EP 1.8****Sustainable Sites**

Encourage the use of environmentally-friendly site planning and landscape design approaches and techniques such as those developed by the Sustainable Sites Initiative. (5)

**Policy EP 1.11****Renewable Energy**

By 2030, increase the use of renewable energy to meet 20 percent of Raleigh's peak electric load, or maximum electric demand that is typically reached during normal business hours. This target will be re-evaluated as additional research and information becomes available. (5) *See text box: NC GreenPower.*

**Policy EP 1.9****Sustainable Public Realm**

Incorporate sustainable technology and materials into public realm projects. (5, 6)

certification but would be designed and built to be eligible for Silver certification, plus meet requirements for energy and water efficiency as follows:

- i. **Energy**  
Achieve minimum energy efficiency of 30% better than code required by the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) 90.1-2004 (ASHRAE 90.1 version required in the 2006 NC Building Code).
- ii. **Water**  
Achieve a 30 percent water use reduction as quantified by LEED water efficiency standards.

**Existing Buildings**

(3) All existing City of Raleigh buildings and facilities should use the US Green Building Council’s LEED Green Building Rating System for Existing Buildings (LEED—EB) as a guide. The application of these standards is intended to maximize sustainability benefits within existing resources and provide a means of benchmarking environmental and financial performance improvements in City practices.

Certification of existing buildings under LEED—EB should be evaluated for technical and economic feasibility and pursued at the highest feasible level of certification on a case by case basis as funding and resources are available.

**Action EP 1.1**

**Reserved**

**Action EP 1.2**

**Reserved**

**Action EP 1.3**

**Energy Retrofits**

Implement a retrofitting program for public buildings based on the “Public Facility Energy Audit” to maximize sustainability benefits within existing resources.

**Action EP 1.4**

**LEED-EB**

Evaluate the certification of existing public buildings under LEED-Existing Buildings (EB) (or the equivalent) for technical and economic feasibility and pursue the highest feasible level of certification on a case-by-case basis as funding and resources are available.

**Action EP 1.5**

**LEED-ND**

Explore adopting the U.S. Green Building Council’s Leadership in Energy and Environmental Design for Neighborhood Development (LEED-ND), or the equivalent, as a City standard.



**Action EP 1.6**

**LEED Incentives**

Encourage and provide incentives for buildings that would qualify for Gold or Platinum LEED certification, or the equivalent.

**Action EP 1.10**

**Community Supported Energy**

Explore opportunities to develop Community Supported Energy (CSE) options which allow homeowners, landowners, farmers, co-operatives, schools, and others to install renewable energy projects up to 10 megawatts in size and to sell power to the grid for a fixed price.

**Action EP 1.7**

Reserved

**Action EP 1.11**

**Rooftop Energy**

Explore using the rooftops of public facilities and parking garages for renewable micro-power generation, such as solar and wind. Also explore the appropriateness and feasibility of instituting solar access regulations.

**Action EP 1.8**

**Solar and Co-generation Incentives**

Study and consider financial incentives to encourage homebuilders and home owners to install solar and other co-generation technologies.

**Action EP 1.12**

**Charging Stations**

When viable, install charging stations for electric automobiles in public parking lots and garages.

**Action EP 1.9**

**Energy Efficient Construction**

Study and adopt LEED-like energy efficient construction standards that can be used when older buildings are renovated or adapted for new uses, since it may be difficult for older buildings to meet LEED standards.

**C.2 Design with Nature**

The State of North Carolina is known for its natural beauty. As the capital city of North Carolina, Raleigh should aspire to conserve and preserve the natural resources that define the City's "sense of place" and green infrastructure. The design of the City should reflect Raleigh's commitment to protecting and enhancing its environment. Design with nature is more than the development and stewardship of a first-class park and greenway

## C.8 Light and Noise Pollution Controls

Excessive, poorly designed outdoor lighting wastes electricity, disturbs natural habitats, and increasingly deprives many of us of a direct relationship with the night-time sky. The City of Raleigh seeks to minimize light pollution, glare, light trespass; conserve energy and resources while maintaining night time safety, utility, security, and productivity; and curtail the degradation of the night-time visual environment. Similarly, noise pollution from highway and airport traffic disturbs quality of life, and should be mitigated appropriately.

### Policy EP 8.1

#### Light Pollution

Reduce light pollution and promote dark skies by limiting the brightness of exterior fixtures and shielding adjacent uses from light sources, provided safety is not compromised. Minimize flood lighting and maximize low level illumination. Promote the use of efficient, full cut-off lighting fixtures wherever practical. Full cut-off fixtures emit no light above the horizontal plane. (5, 6)

### Policy EP 8.2

#### Light Screening

Prohibit unshielded exterior lamps and limit the lighting of trees and other vegetation through the use of shielded fixtures and footcandle limits. (5, 6)

### Policy EP 8.3

#### Night-time Light Impacts

Uses that can turn off outdoor lighting during night hours are to be encouraged in areas with uses sensitive to night-time light impacts. Uses which require all-night illumination are to be discouraged in these areas, while ensuring that actual and perceived night-time safety is maintained. (5, 6)

### Policy EP 8.4

#### Noise and Light Impacts

Mitigate potential noise and light pollution impacts from new development on adjoining residential properties. (3, 5, 6)

### Policy EP 8.5

#### Airport Overlay Zone

Keep the boundaries of the Airport Overlay District zone current with the future expansion plans of Raleigh-Durham International Airport to protect residents from impacts of increased flight patterns and activity. (3, 5, 6)

### Policy EP 8.6

#### Expressway Noise

Protect residents from excessive roadway noise by requiring appropriate mitigation measures, such as landscaped buffers or noise walls, for all new expressways that generate excessive levels of noise. (5, 6)



**Policy EP 8.7**

**Noise Codes and Regulations**

Maintain and enforce the building codes, regulations, and other applicable standards that mitigate noise impacts. (5, 6)

**Action EP 8.1**

Reserved

**Policy EP 8.8**

**Noise and Environmental Justice**

Ensure that residents of all income levels throughout the City of Raleigh are equally protected from excessive roadway noise. (1, 4, 6)

**Action EP 8.2**

**Dark Sky Incentives**

Develop a package of incentives and/or credits to promote the utilization of energy-efficient, full cut-off lighting fixtures that minimize glare and light pollution.

**Policy EP 8.9**

**LED Lighting**

Use high-efficiency Light-Emitting Diode (LED) lighting for outdoor illumination where feasible; newer technologies should be considered as they become available. (1, 5)

**C.9 Environmental Education, Awareness and Coordination**

One of the most important efforts that the City of Raleigh should undertake to protect, conserve, and steward the environment is to offer residents access to comprehensive environmental education programs and activities. According to the North American Association for Environmental Education, "The goal of environmental education is to develop a world population that is aware of and concerned about the environment and its associated problems and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones."

**Policy EP 8.10**

**Airport Noise Protection for Residential Uses**

Rezoning of properties within the defined 65 dnl level of Raleigh Durham Airport Authority composite noise contour line and outside the Airport Overlay District, that propose to increase residential density or create new residential zoning is strongly discouraged. Exceptions to such rezoning may occur through a conditional use rezoning that adopts Raleigh Durham Airport Authority recommended noise mitigation measures.



**Action PU 5.4**

**Green Infrastructure Study**

Undertake a green infrastructure study that identifies landscapes where stormwater can be absorbed naturally. Model both watersheds and sub-watersheds for the amount of green infrastructure that is present to perform this function.

**Action PU 5.5**

**Stormwater Basin Solids Removal**

Pursue collaborative opportunities with the academic and regulatory communities to begin characterization of solids to be removed from stormwater basins, and develop a plan for their utilization or safe ultimate disposal as governing regulations evolve.

with a focus on renewables<sup>(4)</sup> Growth in distributed micro-power requires smarter electricity grids, net metering, and other modernizations. Distributed power generation also presents the opportunity for cogeneration—the capture of otherwise lost heat to warm buildings and perform other functions. As generating technology rapidly evolves, the City’s land use and building codes must keep pace to make sure such innovations can be accommodated in new development and redevelopment.

**Policy PU 6.1**

**Energy and Telecommunications Planning**

Work with regional and private organizations to plan for adequate future energy and telecommunications facilities and service delivery. (3)

**Policy PU 6.2**

**Alternative Energy Sources**

Foster alternative energy sources within the region and state to mitigate rising energy costs and associated environmental impacts. (3, 5)

**Policy PU 6.3**

**Visual Impacts of Utility Infrastructure**

Consider ways to affect the placement and appearance of utility infrastructure—including substations, transmission towers and lines, and switching boxes—to minimize visual disruption and negative effects on quality of life, and to enhance streetscapes in pedestrian-oriented districts. (6)

**G.6 Energy and Telecommunications**

While the City’s energy and telecommunications infrastructure is privately owned, there is still significant public sector involvement with these services. Transmission lines occupy public rights-of-way, and the City regulates telecommunications towers to promote public safety and manage impacts.

As the City looks at ways to cut its greenhouse gas emissions, power generation and consumption must be an important part of any strategy. Coal is currently the cheapest and most widely used source of baseline power generation. It is also the most carbon-intensive. Utilities are increasingly supplementing their power generation infrastructure with decentralized natural-gas power peaking plants and, increasingly, distributed micro-power sources

4 Renewables are any energy source generated by natural resources that are not subject to depletion over a meaningful period of time and are naturally replenished. Examples include sunlight, wind, rain, tides, and geothermal heat.



**Policy PU 6.4**

**Undergrounding in Downtown and along Major Corridors**

Work with utility providers to place utilities underground in the downtown and along major road corridors, with a particular priority on those streets identified as retail streets in the Downtown Element. (6)

**Policy PU 6.5**

**Undergrounding in Pedestrian Business Districts**

Work with utility providers to place utilities underground as part of streetscape projects undertaken in pedestrian-oriented business districts. (6)

**Policy PU 6.6**

**Cogeneration**

Partner with local electricity providers to explore the potential for cogeneration (power+heat) in future projects. (3, 5)

**Policy PU 6.7**

**Removing Barriers in Renewable Energy**

Remove prohibitions and reduce barriers that impede the installation of solar panels, the use of clotheslines, and other renewable technologies in neighborhoods governed by overlay districts, restrictive covenants, and homeowner associations while allowing for appropriate oversight in historic overlay districts. (5, 6)

**Action PU 6.1**

**Distributed Generation Pilot Project**

Incorporate a distributed generation project as part of a significant City capital project, such as installation of photovoltaics over a parking facility, provision of a wind-turbine as part of a tall building, or other similar concept.

**Action PU 6.2**

**Cogeneration Pilot Project**

Identify an opportunity for using cogeneration either downtown or as part of a significant public facility.

**Action PU 6.3**

**Coordination with Utilities**

Convene regular meetings with utility companies to compare growth projections and to discuss other long-range planning issues.

## I. Urban Design

Good design ensures attractive, usable, durable, and adaptable places and is a key element in achieving sustainable development. Good design is indivisible from good planning.

Urban design influences the physical form of the City and how residents experience public spaces such as streets, parks, plazas, or squares. The policies and actions of municipal government and the motivation of private developers largely determine the physical form of the City. While individual buildings may be attractive in themselves, there are numerous other design elements that contribute to the organization of a space including architectural design, building placement, height, scale, and open space. The cumulative interaction of these design elements and adjacent buildings in organizing public space is vital for achieving an environment that supports and promotes social interaction.

Raleigh has many of the physical components that contribute to a successful and vibrant city, but it continues to grapple with issues of walkability and identity. The transit network planned for Raleigh's future will be the principal driver of change in the urban form and function of the City. Its effects will be most apparent around proposed rail transit stations, where high-density, mixed-use development will be required by the City. With the transit station as the focal point, additional design considerations that promote walkability, such as small block lengths, wide sidewalks, mid-block crossings, retail and restaurant uses on the ground floor, and parking garages with wrap-around retail, will be encouraged.

### Frontage and Urban Design

Frontage refers to the approach a commercial, mixed-use or multifamily development takes towards the street. The parameters of frontage include the placement of the building on the site, the location of primary entrances, landscaping provided along the front of the property, and the location of parking. Frontage is a fundamental urban design attribute, as it governs the relationship between private investment on private land, and the public's investment in the public realm.

The suburban approach to frontage, seen throughout Raleigh, emphasizes streetyard landscaping and, for retail, an abundance of front door parking. In urban settings where land is scarce and pedestrians abundant, buildings are often located at or near the front property line(s) and the quality of the frontage depends more on architecture than landscaping. A hybrid approach to frontage combines allowance for front door parking with smaller setbacks and quality pedestrian connections.

As Raleigh continues to develop and redevelop, a more urban and pedestrian-friendly approach to frontage is desired, consistent with the movement towards multimodal transportation solutions. While pedestrian-friendly designs are always welcomed, not all sites are appropriate for an urban approach to frontage. An Urban Form Map has been adopted to provide guidance as to when frontage should be directly shaped by zoning. The map is based upon the following principles:

- **Urban frontage** should be used in urban locations, such as downtown, pedestrian business districts, and Transit Oriented Development (TOD) areas to create streetwalls and a pedestrian-oriented environment. In these contexts, vehicular access and front door parking is accommodated on-street. Off-street parking is located at the sides or rear of buildings, but never between the building and the street.
- **Hybrid frontage** should be used in intensifying suburban areas, particularly where multi-modal investments are programmed to occur, and where on-street parking is not an option for front-door access. In such areas urban frontage, if used at all, would be confined to side or interior streets where on-street parking is an option. Elsewhere, off-street front door parking would be available but limited in depth so that pedestrian connections remain convenient and direct.
- **Suburban frontage** is an acceptable solution where densities are low and multi-modal access is not anticipated to be significant within the time horizon of the plan, or where other frontage approaches are not feasible or practical. While pedestrian access and circulation must still be accommodated, prescriptive standards for building location are not required, and front door parking is an acceptable design solution.

- **Transit Emphasis Corridors:** A subset of the Multi-Modal corridors on the Growth Framework Map, these corridors are identified in the Wake County Bus plan and programmed for a much higher level of bus-based service, including frequent buses, amenities at every stop, the completion of the pedestrian network, and potentially traffic signal priority for transit. As these corridors are major streets, a hybrid approach to frontage is recommended.
- **Urban Thoroughfares:** A subset of Multi-Modal and Urban corridors on the Growth Framework Map, these areas are planned or programmed for public investments such as bike lanes and or pedestrian-oriented streetscapes that encourage multiple modes. An urban or hybrid frontage approach is recommended, based on context.
- **Parkway Corridors:** These are corridors where multi-modal access is not emphasized, and a heavily landscaped approach to street frontage is either called for in adopted plans, or represents the prevailing character of the area. A suburban approach to frontage is recommended.

### Primary Urban Design Issues

The Urban Design Element provides broad recommendations to address some of the primary issues that the City needs to focus on:

- Need for quality architecture to define the public realm and road network;
- Need for a connected and usable pedestrian circulation system throughout the City;
- Visual clutter and the lack of an urban identity along Raleigh's major streets;
- Need for connectivity between individual development sites;
- Commercial site design with large parking lots separating business uses from the street;
- Design needs of alternate travel modes such as transit, bicycle and walking;
- Transit accommodations, such as bus shelters, benches, trash receptacles, and landscaping. Raleigh should design a standard style for these elements to create a unique brand identity for the City;
- Obsolete provisions within the zoning code; and
- Design guidelines that do not meet the requirements or provide adequate direction for higher-density, mixed-use, and pedestrian-oriented urban development.

In addressing these issues and embracing the principal tenets of urban design and placemaking—such as creating compact and walkable

neighborhoods with distinctive focal points, a mix of land uses with access to transit, and shared public spaces that are the center of community activity—Raleigh will be fulfilling all six of its vision themes.

Distinct neighborhoods with civic centers and complete streets<sup>5</sup> will help achieve the theme *Growing Successful Neighborhoods and Communities*. Coordinating new mixed-use development with the transportation and transit network will ease the burden of congestion on city streets, contributing to the vision themes of *Managing Our Growth and Coordinating Land Use and Transportation*. Encouraging diverse and varied neighborhoods will advance the goal of *Expanding Housing Choices*. This will also improve the variety of jobs available, and will help achieve *Economic Prosperity and Equity*. Finally, focusing on creating mixed-use neighborhoods will reduce the dependency on fossil fuels by reducing travel demand. It will also eliminate the need for extending infrastructure networks further from the center of the City, helping to preserve valuable land and natural resources.

Ensuring that new buildings are energy-efficient will also go a long way towards fulfilling the vision theme of *Greenprint Raleigh*.

For more information about the underlying issues and existing urban design conditions, please consult the City of Raleigh Community Inventory Report, the companion background data volume for the Comprehensive Plan.

5 For more about 'complete streets', refer to B.3 'Complete Streets: Hierarchy and Design' in Element B: 'Transportation'.



Policies and actions in this Element appear below. Numbers indicate their relationship to the vision themes, as follows:

1. Economic Prosperity and Equity
2. Expanding Housing Choices
3. Managing Our Growth
4. Coordinating Land Use and Transportation
5. Greenprint Raleigh
6. Growing Successful Neighborhoods and Communities

## 1.1 Raleigh's Identity

A more memorable identity for Raleigh will be created in the future by enhancing the aesthetic qualities of Raleigh's corridors with a high-quality built environment, greenway network, and preserving its natural landscapes and scenic resources.

Downtown Raleigh's five local historic districts — Blount Street, Boylan Heights, Capitol Square, Moore Square, and Oakwood — represent unique residential, commercial, and institutional districts. East Raleigh - South Park, one of downtown Raleigh's national historic districts, also contributes to Raleigh's unique sense of place. This national historic district contains many residential buildings that provide integrity to downtown. It offers a window into the architectural heritage of the City's residential development.

Outside of downtown, many stable residential neighborhoods still exist along streets, such as Halifax, New Bern, and Hillsborough, with streetside planting areas and sidewalks on the axial streets. Buildings and their entrances are oriented toward the sidewalk and formal architectural elements organize the public street spaces. Early suburbs such as Cameron Park and Glenwood/Brooklyn also have very distinctive characteristics that are worth preserving and could help in establishing Raleigh's identity. Suburban residential areas are the core residential neighborhoods of the City, and additional attention to their desired form and density is required to distinguish them as Raleigh neighborhoods.

See also Element A: 'Land Use' for policies related to land use or mixed-uses.

### Policy UD 1.1

#### Protecting Neighborhood Identity

Use Neighborhood Conservation Overlay Districts (NCOD), Historic Overlay Districts (HOD), or rezonings to retain the character of Raleigh's existing neighborhoods and strengthen the sense of visual order and stability. (1, 2, 3, 5, 6)

### Policy UD 1.2

#### Architectural Features

Quality architecture should anchor and define the public realm. Elements of quality architecture include architectural accents and features conducive to pedestrian scale and usage, such as a distinct base, middle, and top (for high-rise buildings); vertical and horizontal articulation; rooflines that highlight entrances; primary entrances on the front façade; transparent storefront windows and activated uses on the ground floor; and corner buildings with defining landmark features. (1, 6) See also Section 1.2.7: Design Guidelines for additional policies and actions.

**Policy UD 1.3****Creating Attractive Facades**

Well-designed building facades, storefront windows, and attractive signage and lighting should be used to create visual interest. Monolithic or box-like facades should be avoided to promote the human quality of the street. (1, 6) *See also C.8 'Light and Noise Pollution Controls'.*

**Policy UD 1.4****Maintaining Facade Lines**

Maintain the established facade lines of neighborhood streets by aligning the front walls of new construction with the prevailing facades of adjacent buildings, unless doing so results in substandard sidewalks. Avoid violating this pattern by placing new construction in front of the historic facade line unless the streetscape is already characterized by such variations. Where existing facades are characterized by recurring placement of windows and doors, new construction should complement the established rhythm. (3, 6)

**Policy UD 1.5****Pedestrian Wayfinding**

Support the creation of a unified and comprehensive system of pedestrian wayfinding signs, kiosks, and other environmental graphics to provide directions to the pedestrian. (4, 6)

**Policy UD 1.6****City Gateways**

Create more distinctive and memorable gateways at points of entry to the City, and points of entry to individual neighborhoods and neighborhood centers. Gateways should provide a sense of transition and arrival, and should be designed to make a strong and positive visual impact. (6)

**Policy UD 1.7****Scenic Corridors**

Retain and enhance our visual and natural assets including vistas, boulevard medians, tree-lined streets, forested hillsides, wetlands, and creeks along scenic corridors into and through Raleigh, including designated Parkway Corridors on the Urban Form Map. (3, 4, 5)

**Policy UD 1.8****Tree Planting and Preservation**

Enhance Raleigh's image as a city of trees with a comprehensive tree planting program for every major roadway, and by protecting and preserving significant stands of existing trees along or adjacent to major roadways. (3, 4, 5) *See also C.6: 'Tree Canopy Conservation and Growth' in Element C: 'Environmental Protection'.*



**Policy UD 2.6**

Reserved

**Action UD 2.2**

Reserved

**1.3 Appearance and Function of Raleigh's Corridors**



The appearance of Raleigh's commercial corridors, especially U.S. 1, New Bern, U.S. 70, Hillsborough, and South Saunders, has been detrimental to the City's image. As primary entry corridors for visitors to the City, it is essential that these roadways convey a positive impression. There is also a need to mitigate air and noise pollution. The creation of boulevards with landscaped medians, street trees, and sidewalks will greatly improve the appearance of Raleigh's corridors, mitigate air and noise pollution, and address the needs of pedestrians and transit users. Raleigh's existing streets must be retrofitted to accommodate the needs of pedestrians, bicyclists, motorists, and transit users of all ages and abilities.

*For more information about complete streets, refer to B.3 'Complete Streets: Hierarchy and Design' in Element B: 'Transportation'.*

**Policy UD 2.7**

**Public Open Space**

Usable and well-appointed urban public open space should be provided within mixed-use centers to serve as focal points and community gathering spots. (6)

**Policy UD 3.1**

**Gateway Corridor Design Quality**

Promote high quality development along gateway corridors to improve aesthetics and encourage higher levels of investment. Design of new development should contribute to the overall visual quality of the corridor and define the street space. (1, 4, 6)

**Action UD 2.1**

Reserved

**Policy UD 3.2****Highlighting Important Intersections**

Promote the use of gateways and landmarks to highlight access points and important intersections along key corridors. Examples include the places where roadways split to become one-way pairs entering and exiting downtown (Blount-Person, Wilmington-Salisbury, McDowell-Dawson); the proposed roundabouts along Hillsborough Street at Rosemary, Pullen, and Morgan streets; and places where key streets merge (Louisburg-Capital, Wake Forest-Falls of Neuse, etc.). (4, 6)

**Policy UD 3.3****Strip Shopping Centers**

Ensure that zoning and parking standards discourage strip commercial shopping centers and auto-oriented building designs along Main Street and Transit Emphasis Corridors, and in City Growth, TOD and Mixed-Use Centers on the Urban Form Map. (3, 4, 6)

**Policy UD 3.4****Enhanced Streetwalls**

Promote a higher standard of storefront design and architectural detail in Downtown and along the City's Main Street corridors. Along walkable shopping streets, create streetwalls with relatively continuous facades built to the front lot line to provide a sense of enclosure and improve pedestrian comfort. (4, 6)

**Policy UD 3.5****Visually Cohesive Streetscapes**

Create visually cohesive streetscapes using a variety of techniques including landscaping, undergrounding of utilities, and other streetscape improvements along street frontages that reflect adjacent land uses. (5, 6)

**Policy UD 3.6****Median Plantings**

Median plantings should be used where feasible and appropriate to preserve and enhance the visual character of corridors and boulevards. (5, 6)

**Policy UD 3.7****Parking Lot Placement**

New parking lots on designated Main Street and Transit Emphasis corridors on the Growth Framework Map should be located at the side or rear of buildings when on-street parking is available, with only limited front door parking provided elsewhere. Where feasible, parking lots abutting these corridors should be landscaped to create a pedestrian-friendly streetscape with business visibility. (1, 4, 5, 6) See also B.6 'Parking Management' in Element B: 'Transportation' for additional policies and actions.

## I.4 Creating Inviting Public Spaces

The network of public spaces – streets, squares, plazas, parks, and sidewalks – that connect residents in their daily lives most clearly define a city. The character of public spaces is formed by the arrangement and details of the elements that define them such as building edges, public squares, and storefronts along a commercial street or dwellings that line a residential avenue.

City-owned parks and greenways are considered to be the key public spaces designed to be used by the broader community. Their role has been central to the vision of the City of Raleigh. However, smaller gathering spaces such as plazas, streets, and sidewalks have not been used to their best capacity, and can be improved to better serve the community.

### Policy UD 4.1

#### Public Gathering Spaces

Encourage the development of public gathering spaces within all developments. Such spaces should be designed to attract people by using common and usable open space, an enhanced pedestrian realm, streetscape activation, and retail uses. (1, 4, 5, 6)

### Policy UD 4.2

#### Streets as Public Spaces

Design streets as the main public spaces scaled for pedestrian use within City Growth, TOD, and Mixed-use Centers as designated on the Urban Form Map. (6)

### Policy UD 4.3

#### Improving Streetscape Design

Improve the appearance and identity of Raleigh's streets through the design of street lights, paved surfaces, landscaped areas, bus shelters, street "furniture," and adjacent building facades. (1, 4, 6)

### Policy UD 4.4

#### Management of Sidewalk Space

Manage Raleigh's sidewalk space in a way that promotes pedestrian safety, efficiency, and comfort and provides adequate space for tree boxes. Sidewalks should enhance the visual character of streets, with landscaping and buffer planting used to reduce the impacts of vehicle traffic. (6)

### Policy UD 4.5

#### Improving the Street Environment

Create attractive and interesting commercial streetscapes by promoting ground level retail and desirable street activities, making walking more comfortable and convenient, ensuring that sidewalks are wide enough to accommodate pedestrian traffic, minimizing curb cuts and driveways, and avoiding windowless facades and gaps in the street wall. (4, 6)

## N. Implementation

The adoption of this Comprehensive Plan is the first step in the implementation process. It is the product of considerable effort on the part of the City of Raleigh and its City Council, Planning Commission, Department of City Planning, as well as many other municipal departments, community leaders, and concerned citizens. Continuing action to implement the Plan will be needed for it to have lasting impact. Working with a range of implementation partners, the Department of City Planning will be the lead facilitator to implement the Plan and coordinate consistency reviews among municipal departments.

This Implementation Element describes how the policies and actions in the Comprehensive Plan should be carried out. It provides recommendations for administering the planning process and enhancing linkages between the Comprehensive Plan and the Capital Improvement Program (CIP); identifies actions to be considered during the update of the City’s development regulations. It recommends steps to be taken to monitor, evaluate, and update the Plan on a regular basis. In the Action Plan section and the Action Plan Matrix, each of the Plan’s action items is assigned to an agency and given a timeframe and priority ranking. Ties to the Capital Improvement Program are made explicit. All of the actions listed in the Action Plan Matrix are excerpted from the elements of the Plan and the reader is advised to consult the relevant element for more information and context.

The Comprehensive Plan is used to guide private and public development. The City uses the Plan to assess the appropriateness of proposed development cases including zoning actions, and special exceptions. All the Elements of the Comprehensive Plan are used to assess development applications, including both the narrative policies and applicable maps. The Plan is also used to assess the appropriateness of public development actions, proposed CIP items, and the siting of public facilities.

## N.I Zoning Regulations and Consistency

This section provides guidance on how the zoning regulations should be amended and updated after the Comprehensive Plan is adopted. Zoning is the primary tool for implementing the Comprehensive Plan’s policies, particularly the Future Land Use Map. The zoning regulations themselves need substantial revision and reorganization, ranging from new definitions to updated development and design standards, and even new zoning districts. Therefore, the City plans to undertake a major overhaul of the zoning regulations beginning in 2009.

### Policy IM 1.1

#### Consistency of the Comprehensive Plan and Development Code

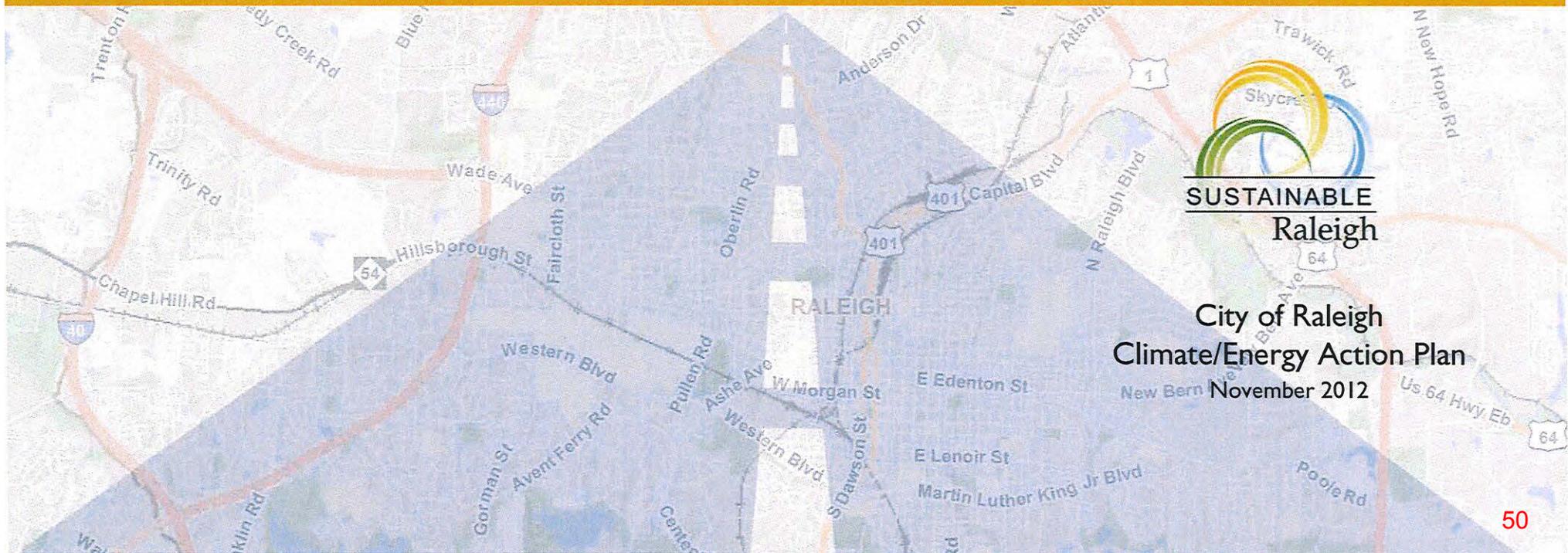
Maintain consistency between the City’s development regulations and the Comprehensive Plan, such that regulations facilitate, and do not inhibit, the implementation of Plan policies. (1, 2, 3, 4, 5, 6)

### Action IM 1.1

Reserved



# A Roadmap to Raleigh's Energy Future



SECTION 1

# Setting the Vision

**T**he City of Raleigh is already recognized as the Nation's Most Sustainable Mid-Size Community by the US Chamber of Commerce Business Civic Leadership Center for its outstanding local-level efforts to achieve complementary economic, environmental, and quality-of-life goals.

The City Council affirmed in 2011 its mission statement for the City of Raleigh as a "21st Century City of Innovation focusing on environmental, cultural and economic sustainability..." Raleigh has a long history of innovative thinking and creative problem solving particularly in times of limited resources and budgetary constraints.

## Energy-wise is Fiscally Smart

The aggregated energy accounts for the City of Raleigh represent the second largest operating expense, surpassed only by personnel-related expenses.



This Roadmap to Raleigh's Energy Future comes at a critical time in our city's and our nation's future as cities are seeking to reduce their dependence on fossil fuels, building energy systems that can support economic and social development goals while lowering emissions of local pollutants and climate-altering greenhouse gases.

This document is intended to prepare the City of Raleigh for the future. Difficult decisions may need to be made, but only after careful evaluation of both the short and long-term consequences. Operational changes may also need to be made and the way business was conducted in the past may no longer meet Raleigh's needs. Innovative strategies that may not be fully understood today may be on the road to Raleigh's energy future.

The Climate Energy Action Plan focuses on the creation and adoption of an integrated implementation/action plan. The purpose is to give the City a roadmap for not only implementing projects, but also for developing programs, capacity and capital to institutionalize these values, goals and processes across all departments, thereby extending them well into the future. This is a fundamental cornerstone of the City of Raleigh's approach to its rapid growth, prudent development, quality of life, and continued focus on maintaining a vibrant and healthy community/economy.

Climate and energy planning is an emerging and increasingly important topic for local governments. Climate change is the distinct, measurable changes (i.e., temperature, rainfall, snow, or wind) in climate over a long period of time, which may be a result of natural factors and/or human activities. Energy

2006  
Environmental  
Advisory Board  
Created

2006  
Became First  
LED City  
with Cree

2007  
Council Mission  
Statement  
Adopted

2007  
Fossil Fuel  
Reduction  
Policy  
Adopted

2007  
NC General Assembly  
Enacts Renewable  
Energy Portfolio Standard

2008  
Creation of  
the Office of  
Sustainability  
and Energy  
Manager Position

2007  
US Mayors Sign  
GHG Strategy  
Agreement

2008  
First  
Interdepartmental  
Strategic Energy  
Session

2007  
LEED Silver  
Policy  
Adopted

2009  
City's 2030  
Comprehensive  
Plan Adopted

2010  
EM Johnson  
Solar Array  
Dedication

2010  
GHG Inventory  
for Municipal  
Operations

2011  
Most Sustainable  
Community  
Award from U.S.  
Chamber of  
Commerce

2010  
Installed Public  
Electric Vehicle  
Charging Station

2012  
Completed  
CEAP – Roadmap  
to Raleigh's  
Energy Future

insecurity from our dependence on foreign oil and environmental and human health concerns have created a new set of challenges. However, these challenges are coupled with tremendous opportunities to rethink energy usage, protect environmental and human health all while expanding the local economy through energy efficiency and innovation. The reliance on fossil fuels for energy may change as energy interdependence and energy security become more important. This also has come at a time when the entire infrastructure in this country must be updated and improved. The emergence of the smart grid, distributed energy, demand response and other technologies will only hasten the need for energy innovation, which will also require collaboration and education across the entire organization.

Energy costs for the nation have steadily increased over time. The City of Raleigh has experienced this same trend in energy expenses. The aggregated energy accounts for the City of Raleigh represent the second largest operating expense – second only to the personnel related expenses. Long-term savings in operating and capital budgets will be realized for the citizens and taxpayers with thorough total cost of ownership and business case evaluations.

Strategies that have been identified to date are just the beginning of the process for implementing existing and potential programs that address building energy

efficiency, transportation, renewable energy, urban forestry and agriculture, and education and outreach.

Therefore, to meet the Sustainability Goals of the City of Raleigh as articulated in the Council's mission statement, this Roadmap or Climate Energy Action Plan provides the framework and strategies for our energy future. This project began as a simple climate energy action plan and has matured into the Roadmap to Raleigh's Energy Future. While the direction of the Roadmap has been set in this document, the trip down this road is not yet complete. This project is the beginning of a transformative change for the City of Raleigh.

SECTION 5

# Work of the Buildings Team

**T**he Buildings Team's work included:

- ◆ **Raleigh Convention Center**
- ◆ **Raleigh Memorial Auditorium** (Progress Energy Center for the Performing Arts)
- ◆ **Buildings under the management of the Buildings Superintendent**
- ◆ **Public Utilities Department (PUD) Operations** – PUD operations

buildings/facilities throughout their service area, which includes six neighboring communities in addition to the City of Raleigh

- ◆ **Solid Waste Services (SWS) Department Operations** – SWS operations building/facilities
- ◆ **Outdoor City lighting** including traffic lights, street lights, parking structure lights, and lights at parks and ball fields

## Existing Projects

The Team began by identifying projects and programs their departments had put in place since the original greenhouse gas inventory of municipal operations was performed in 2007. This allowed the Team to track progress from the established emissions baseline, evaluate what worked well, and share lessons learned. The strategies highlighted in this section represent some of the City's successes to date and contributed to the impressive 10% reduction in energy use and carbon emissions realized since the 2007 inventory.

### Team Leaders

Billy Jackson, Buildings Superintendent, *Division of Facilities and Operations*  
 Suzanne Walker, Energy Manager, *Division of Facilities and Operations*

### Team Members

Michael Barbour, *Raleigh Convention Center*  
 Kermit Chapman, *Public Utilities*  
 Richard Kelly, *Public Works*  
 Mike Kennon, *Public Works*

Michele Mallette, *Public Utilities*  
 Paula Thomas, *Office of Sustainability*  
 Cindy Holmes, *Office of Sustainability*  
 Steve Burr, *Office of Sustainability*



## Existing Strategies Since 2007 – BUILDINGS Team

<b>Energy Management Software (Periscope) and Climate Control System</b>	Installations at 38 facilities including the City's administrative buildings, police training center, community centers, pools, ball fields and tennis centers
<b>Silver LEED Buildings</b>	14 Silver LEED buildings including the Raleigh Convention Center, Neuse River WWTP Operations Building, D. E. Benton WTP Operations Building, Buffalo Road Aquatics Center, remote operations centers, fire station, and park, community and nature centers
<b>Platinum LEED Buildings</b>	Platinum LEED buildings include the Wilders Grove Remote Operations Facility and Transit Operations Facility
<b>Building Glass Enhancement</b>	Installed new glazing to reduce heat radiation at 10 community buildings
<b>Interior / Exterior Lighting Replacement</b>	Replacements at 44 facilities including Memorial Auditorium with more energy efficient lighting and/or automated controls
<b>LED Interior and Exterior Lights</b>	Replacements at 27 locations from the Municipal Building Complex to community parks
<b>LED Traffic Lights</b>	Replaced all traffic lighting in the City with LED lights
<b>LED Parking Structure Lighting</b>	Installed 141 fixtures at City Municipal Building Parking Deck; replaced Convention Center Parking Deck lighting
<b>Roofing Upgrades</b>	10 buildings roofed with white, opaque, and/or reflective materials to increase R-factor
<b>Green Roofs</b>	Installed green roofs at a fire station, 2 community centers and Buffalo Road Aquatics Center
<b>Equipment Replacement</b>	Replaced HVAC systems, boilers, chillers and other mechanical system upgrades at 9 City facilities
<b>Computer Upgrades</b>	Emergency Communications replaced CRT monitors with LEDs and replaced with more efficient power supply units
<b>Raleigh Television Network Lighting Replacement</b>	Changed 2kW spotlights to 1kW spotlights

## Future Strategies

The Team next identified potential future projects, programs, and strategies to achieve further reductions. In the prioritized ranking of projects, 11 of the top 34 were generated by the Buildings Team.

Rank	Top Proposed Future Strategies – BUILDINGS Team	
#1	<b>Building Climate Controls and Technology Interface</b>	Load-shedding/demand-response algorithms using building automation infrastructure and Periscope; smart buildings; building-wide thermostats with motion sensors and smart schedulers
#3	<b>Building Envelope Improvements</b>	Building weather-proofing, glazing improvements, etc.
#4	<b>Raleigh Convention Center Preventative Maintenance Plan Implementation</b>	Implement plan for the Convention Center
#5	<b>Building Interior Light Controls</b>	Control based on ambient light level and motion detection
#9	<b>LED Lighting in Parking Decks</b>	Install LED lights in all City parking decks ( <i>Business Case Evaluation conducted for this strategy</i> )
#12	<b>LED Street Lighting</b>	Replace all street lights with LEDs
#13	<b>Lighting Replacements by PUD</b>	Lighting replacement in PUD operating facilities (induction lighting, CFL, motion-detection)
#15	<b>Energy Efficiency Policy for City LEED Buildings</b>	Policy for LEED to concentrate points for energy efficiency
#16	<b>Energy-Efficient Vending Machines</b>	Procure energy-efficient vending machines; update contract terms for vending machines to require Energy Star rating
#18	<b>Elevator Fan/Light Controls and LED Conversion</b>	Elevator controllers to reduce energy usage when not in use; convert lighting to LED
#19	<b>City-wide CIP for Energy Efficiency</b>	Implement capital improvement plans for City buildings

SECTION 10

# Summary of CEAP Strategies

This section provides a summary of all the strategies developed by each of the Strategic Teams. This listing includes Future (proposed) and Existing Strategies, as well as potential “Policies & Best Practices”.

## Top 34 Proposed Strategies

On the following page, the top 34 strategies are highlighted, shown in the order of their ranking as scored by the Prioritization Team. The criteria for prioritization included Financially Responsible, Minimization of Operational Impacts, Realistic /

Implementable, Coordinates with Other Projects, and Carbon Reduction Potential.

Key features of the Top Proposed Strategies are listed in the adjacent chart. Initial Capital Cost, Annual Carbon Reduction potential, and

### Top Proposed Strategies

34 of the most promising strategies – summarized in the chart here – were identified using screening techniques. These strategies were evaluated in more detail by the Prioritization Team.

Potential Payback Period are shown by tiers, as defined by the Finance Team. The ranges for each tier are listed in the following tables.

Estimate of Capital Cost (Initial Cost)		
Low	\$0 to \$200,000	\$
Medium	\$200,000 to \$2 million	\$\$
High	Greater than \$2 million	\$\$\$

Estimated Annual Carbon Reduction		
Low	Less than 400 tonnes of CO <sub>2e</sub>	
Medium	400 to 1400 tonnes of CO <sub>2e</sub>	
High	Greater than 1400 tonnes of CO <sub>2e</sub>	

Potential Payback Period	
Short-term	1 to 5 years
Mid-term	5 to 15 years
Long-term	Greater than 15 years

## Moving Forward

Where merited, City staff have taken the initiative and begun planning on some of the most promising strategies. In several cases – such as “LED Lighting in Parking Decks” and “Building Climate Controls” – early implementation phases are already underway.

Rank/ID	Team	Top 34 Proposed Strategies	Initial Cost	O&M Impact	Carbon Impact	Payback
#1 EE-1-11		<b>Building Climate Controls and Technology Interface</b>	Load-shedding/demand-response algorithms using automation infrastructure and Periscope; smart buildings; building-wide thermostats with motion sensors and smart schedulers	\$\$\$	Decrease in Costs	Mid-Term
#2 FLT-1-29		<b>Consolidate Collection of Recyclables and Outdoor Solid Waste from City Parks</b>	Pick up recyclables and waste from Parks in same trip ( <i>Business Case Evaluation conducted for this strategy</i> )	\$\$\$	Decrease in Costs	Mid-Term
#3 EE-1-53		<b>Building Envelope Improvements</b>	Building weather-proofing, glazing improvements, etc.	\$ <sup>2</sup>	Decrease in Costs	Short-Term
#4 EE-1-72		<b>Raleigh Convention Center Preventative Maintenance Plan Implementation</b>	Implement plan for the Convention Center	\$\$	Decrease in Costs	Mid-Term
#5 EE-1-35		<b>Building Interior Light Controls</b>	Control based on ambient light level and motion detection	\$ <sup>2</sup>	Decrease in Costs	Short-Term
#6 EE-1-63		<b>Solar Thermal for Heating City Pools</b>	Pre-heat pool water at aquatics centers with solar	\$	Decrease in Costs	Short-Term
#7 CR-1-02		<b>Increase Recycling Container Size</b>	Reduce number of trucks and trips, and increase volume of recyclables to be processed	\$\$	Decrease in Costs; Revenue Neutral	Mid-Term
#8 FLT-1-10		<b>Fleet Alternative Fuel Vehicles</b>	Continue to replace fleet with alternative fuel and hybrid vehicles	\$\$	No Change	Mid-Term
#9 EE-1-36		<b>LED Lighting in Parking Decks</b>	Install LED lights in all City parking decks ( <i>Business Case Evaluation conducted for this strategy</i> )	\$\$	Decrease in Costs	Mid-Term
#10 CR-1-32		<b>Future Water Efficiency</b>	Continued water efficiency programs and efforts	\$	Decrease in Costs	Mid- to Long-Term
#11 CR-1-28		<b>Real Time Energy Management Operations Optimization Project</b>	Water distribution system pumping optimization project	\$\$	Decrease in Costs	Mid-Term
#12 EE-1-33		<b>LED Street Lighting</b>	Replace all street lights with LEDs	\$ <sup>1</sup>	Decrease in Costs	Short-Term
#13 EE-1-32		<b>Lighting Replacements by PUD</b>	Lighting replacement in PUD operating facilities (induction lighting, CFL, motion-detection)	\$ <sup>1</sup>	Decrease in Costs	Mid-Term
#14 CR-1-13		<b>Alternative to Methanol Use at Neuse River WWTP</b>	Use alternative, green carbon sources for the denitrification process at the wastewater treatment plant	\$\$\$	No Change	n/a
#15 EE-1-21		<b>Energy Efficiency Policy for City LEED Buildings</b>	Policy for LEED to concentrate points for energy efficiency	\$	Decrease in Costs	Mid-Term
#16 EE-1-52		<b>Energy-Efficient Vending Machines</b>	Procure energy-efficient vending machines; update contract terms for vending machines to require Energy Star rating	\$	Decrease in Costs; No New Revenues	Short-Term
#17 CR-1-08		<b>Tree Planting Programs</b>	Carbon sequestration through several tree planting programs (Trees Across Raleigh, NeighborWoods); plant over 3,000 trees per year	\$	Increase in Costs	n/a

<sup>1</sup> Assumes strategy is accomplished through end-of-service-life light fixture replacement

<sup>2</sup> Assumes strategy is implemented as part of annual building maintenance

## SECTION 11

# Following the Roadmap

Implementing the City of Raleigh Operations Climate/Energy Action Plan will require sustained commitment and must be consistent with the City's values of environmental, cultural and economic sustainability. The Interdepartmental Team was guided by these principles throughout the development of the CEAP and as it formulated strategies to increase energy efficiency and reduce carbon emissions in City Operations. The projects, strategies and best practices identified in the CEAP support these values by providing:

- ◆ Economic sustainability through increasing operational and energy efficiency

## Using Business Case Evaluations

The Business Case Evaluations and project prioritization program that have been utilized in the CEAP development process are complimentary to and should be included as part of the on-going CIP process improvement initiative that is being developed by City staff.

- ◆ Environmental stewardship and improved quality of life for its citizens through the reduction of carbon emissions
- ◆ Opportunities to build the City's culture of implementing sustainable solutions that are fiscally sound and financially responsible

Implementing the Plan will also increase the City's resiliency and ability to respond to unpredictable futures that may bring changes in:

- ◆ Energy availability
- ◆ Energy costs
- ◆ Climate variability
- ◆ Air quality and public health
- ◆ Economic and financial markets

While the CEAP process resulted in a prioritized list of projects, the City must carefully determine which projects to implement through further review, consideration of total cost of ownership, and consideration of the potential for changing futures.

## Short-term Action Plan (within the next year)

The following actions are recommended to be started promptly:

1. **Evaluate and implement a robust system to track, document, and report** advances in energy efficiency and reductions in carbon emissions for current operations and as strategies are

implemented. Specific data must be gathered and reported in a uniform manner to ensure both its integrity and that values will be comparable to each other over time.

2. **Conduct Business Case Evaluations for additional top Future Strategies** to provide the framework for making financially justifiable decisions – based on the total cost of ownership – that are correlated to both energy and carbon reduction. It is recommended that BCEs be conducted soon for the following projects that can potentially offer significant contributions to carbon reductions but with costs that range from high to low. The BCE process is complimentary to, and should be included as part of, the on-going CIP process improvement initiative that is being developed by City staff.

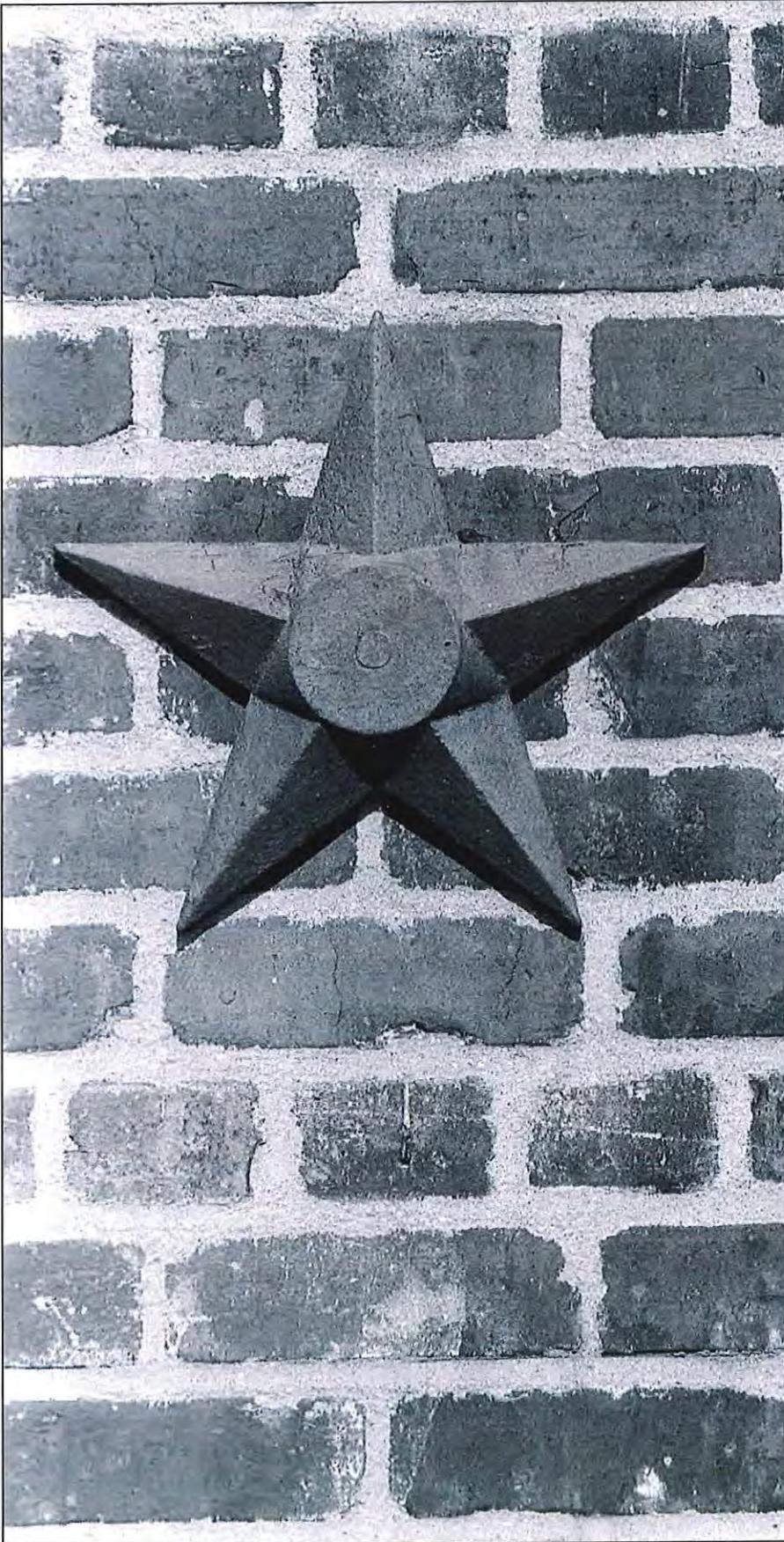
3. **Develop a Comprehensive Fleet Transformation Strategy**, which is a combination of the top CEAP strategies. Under the Fleet Alternative Fuel Vehicles strategy, the City’s fleet would continue to be replaced with alternative fuels and/or hybrid vehicles. Integration with Raleigh’s existing fleet management program is needed to determine the optimal time to retire, repair, or replace vehicles in favor of cleaner, more efficient options.

To lower operating costs and emissions, this “Carbon-Optimized” fleet management program would evaluate the full life-cycle of vehicles to determine at which point in time – either now or

### Proposed Future Strategies Recommended for BCEs

#1		<b>Building Climate Controls and Technology Interface</b>	high carbon reduction potential; high cost
#3		<b>Building Envelope Improvements</b>	high carbon reduction potential; high cost for capital project to implement at one time, but potentially low cost if part of annual maintenance program for the buildings
#4		<b>Convention Center Preventative Maintenance Plan Implementation</b>	medium carbon reduction potential; medium cost (note that a clear scope of work must first be defined)
#5		<b>Building Interior Light Controls</b>	medium carbon reduction potential; medium cost for capital project to implement at one time, but potentially low cost if part of annual maintenance program for the buildings
#6		<b>Solar Thermal for Heating City Pools</b>	medium carbon reduction potential; low cost assuming a third party will provide, install and maintain the solar panels
#12		<b>LED Street Lighting</b>	medium-high carbon reduction potential; high cost for capital project to implement at one time, but potentially low cost if replacement occurs as lights reach end of service life

in the future – would be best to replace a vehicle to maintain its optimal life-cycle while minimizing overall emissions. The strategy involves evaluating many data points for individual vehicles including the average life, emission factors, and cost of a vehicle over its life-cycle. Another factor is the



# Design Guidelines for Raleigh Historic Districts



RALEIGH HISTORIC DISTRICTS COMMISSION



## 1.1 Raleigh Historic Districts

A Raleigh Historic District is a distinctive area, a place of singular historical flavor characterized by its streets and squares, buildings and trees, architectural design and landscape features. It may be monumental or simple, residential or commercial. A historic district is also a legacy, linking present and future generations with their heritage and providing a diversity vital to the city's future quality of life.

Development that enhances the character of Raleigh Historic Districts is encouraged. The Code of Ordinances (§10-2052), under which the districts are legally established as an overlay zoning district, recognizes that they are valuable assets to the identity of the city. It also recognizes that change is an important element in the city's evolution, indicating a healthy, vital neighborhood and reflecting the pride of residents in their community. Historic district overlay zoning identifies a historic area and provides the mechanism of a design review process for exterior changes; however, it does not affect the uses of properties as permitted by the existing zoning.

Raleigh Historic Districts are established by the City Council after action has been proposed by a neighborhood organization, a preservation group, or the city, and after careful research and evaluation. As of 2001, five areas have been designated as Raleigh Historic Districts: Blount Street, Boylan Heights, Capitol Square, Moore Square, and Oakwood. These districts represent residential neighborhoods, downtown commercial and institutional districts, and a primarily institutional district that incorporates many formerly residential buildings now adapted to meet institutional needs. Maps of these districts are included in the appendix.

Historic district designation is designed to protect and enhance the existing character of a community. Through historic district overlay zoning, a neighborhood is protected from unmanaged change by a review process based on established design guidelines. Additionally, rehabilitation of a qualified historic property may be eligible for significant tax benefits. Federal law and state statutes provide for sizable income tax credits on rehabilitation work done to eligible historic properties. There are also federal tax advantages in the form of charitable contribution deductions for owners who donate a historic preservation easement to a charitable organization. To obtain contact information for more specific details on either of these programs, call the Raleigh Historic Districts Commission at 919/832-7238.

It is anticipated that additional Raleigh neighborhoods will seek designation as local historic districts. Public comment is an important part of the designation process. By law, property owners in a proposed historic district must be notified of the proposal so that they may appear and comment on it during the public hearings before the Planning Commission and the City Council. Neighborhood forums, including both owners and tenants, are usually sponsored by the commission before the public hearings.



*The Executive Mansion and its grounds are a dominant feature of the Blount Street Historic District, which also includes a number of high-style residences from the late nineteenth century now adapted to institutional uses.*



*The Capitol Square Historic District centers on the State Capitol and its prominent square surrounded by churches and government buildings.*



## 1.2 Raleigh Historic Districts Commission

The Raleigh Historic Districts Commission (RHDC) serves the public both as a steward for the districts and as a facilitator to people fortunate enough to own properties in these areas. It provides assistance to owners and tenants, helps them plan the alterations that they are considering for their properties, and guides owners through the application process necessary to implement those changes.

The commission consists of twelve members appointed by the City Council for overlapping two-year terms. A majority of commission members must have demonstrated special interest, experience, or education in history, architecture, archaeology, or related fields. Also, all members of the commission must reside within the city's corporate limits or within its extraterritorial jurisdiction, and at least one-third of the commission's membership must either reside or own property in a Raleigh Historic District.

The commission has several powers and responsibilities, including recommending to the City Council the designation, or the removal, of historic district overlay zoning; granting requests for proposed changes within the historic district that in its determination are congruous with the special character of the district; conducting educational programs on historic districts; cooperating with state, federal, and local governments in pursuance of its responsibilities; and conducting meetings or hearings necessary to carry out these purposes.

## 1.3 The Design Review Process

Historic districts are not created to prevent changes. Rather, the RHDC offers assistance to the property owner in shaping changes while meeting the requirements of the Code. The Code provides for a process that ensures that property changes are within the spirit and the character of the historic district. In this special design review process, plans are examined and evaluated before work is begun. The process does not require property owners to make changes to their properties, and it does not apply to interior alterations or routine maintenance that does not affect exterior appearance. However, any exterior alterations, new construction, demolition, significant landscape changes, or moving of buildings must be evaluated. In the case of demolition the Code provides for a delay of up to 365 days during which alternatives to demolition can be explored.

One of the purposes of the RHDC is to assist and consult with property owners about proposed changes to properties in the historic districts. In the early planning stages of a project, property owners should call the RHDC staff with any questions or concerns. The staff can assist by interpreting the Code, suggesting solutions to problems, and explaining the review process. They can also make on-site consultations and provide technical assistance in solving problems (such as persistently peeling paint). In addition, the RHDC has a library of preservation resource materials that property owners may consult or borrow. For assistance, call 832-7238.

### Certificates of Appropriateness

Design guidelines for reviewing the compatibility of changes in the districts with the existing character of the districts were adopted in the 1970s, revised in 1983, and updated again in this document. These guidelines are based on a common-sense approach to the enhancement of historic structures and districts.



*Moore Square, the heart of the Moore Square Historic District, is one of two surviving four-acre parks included in the original City of Raleigh plan. The commercial character of the district today dates back to the early 1900s.*



*The Boylan Heights Historic District is an early twentieth century suburb composed of bungalows and colonial and classical revival residences built along a curving street grid.*



*The Oakwood Historic District has the most diverse collection of architecture among Raleigh's historic districts. It includes the city's most intact collection of Victorian-era styles.*



## 2.1 Public Rights-of-Way and Alleys

The overall character of Raleigh Historic Districts is defined not only by the historic buildings and their sites, but also by the network of streets, sidewalks, planting strips, and alleys that connect and relate those buildings and sites. The surface materials, dimensions, topography, and pattern of streets, sidewalks, and alleys in the historic districts all play a role in establishing the district character. Public right-of-way features such as trees, streetlights, benches, ground cover, sidewalk paving patterns, curbs, and gutters contribute to a district's character, as do necessary transportation and communication features, such as utility lines and poles, transformers, traffic signs, vending machines, transit stops, and parking booths. Consequently, maintaining the distinctive visual ambiance of a district requires attention to its streets and alleys and their features.



*The original patterned brick pavers still line many of the sidewalks in the Blount Street Historic District.*



*Retaining the granite curbing that edges so many district streets is important in preserving their historic character.*



*The curvilinear street grid of Boylan Heights was designed to follow the natural topography of the site.*



*Alleys like this one provide access to garages and storage buildings along the rear property lines of most properties in Boylan Heights and some properties in Oakwood.*

Right-of-way characteristics vary from district to district; some vary within districts. For example, the curvilinear streets of Boylan Heights contrast sharply with Moore Square's strong rectilinear street grid. On the other hand, the distinctive brick sidewalks in the Blount Street district are also found intermittently within Oakwood. The presence of tree canopies and alleys varies within districts, as do topography and sidewalk placement. Streets in the commercial historic districts incorporate broader sidewalks, a more formal spacing of street trees, and substantially fewer planting strips than those in the residential districts. One unifying characteristic of the districts is their pedestrian-friendly nature. Maintaining this quality requires thoughtful accommodation of current vehicular traffic needs in ways that continue to encourage rather than discourage pedestrian traffic.

### Things to Consider As You Plan

Routine maintenance and repair of the public rights-of-way and alleys should be undertaken with an understanding of the importance of preserving a district's distinctive features. For example, care should be taken to prune street trees appropriately, retain granite curbing, and preserve original brick and concrete sidewalks.

**Downtown Raleigh and its early neighborhoods were the first in the city to be supplied with utilities, street lamps, and the related wiring. Although these elements are an inherent part of the districts, the proliferation of cables, lines, equipment, and poles, as well as the sometimes uncoordinated efforts of various utility and service companies, can result in visual clutter that bears little resemblance to the original appearance and clearly diminishes the historic character of the districts. Underground cables may be an option for reducing such visual noise.**

Certainly, the introduction of large transformers, utility equipment, dumpsters, and other intrusive elements should be kept to a minimum, and if they must be introduced, they should be unobtrusively located and screened by plantings or fencing. In reviewing proposed new or replacement features, such as streetlights, street furniture, street signs, and walkways, compatibility with the character of the historic district should be considered in terms of location, design, materials, color, and scale.

The preservation and the replenishment of contributing street trees is critical to the historic character of many districts. Beyond monitoring existing trees for disease or damage and protecting them from nearby construction work, achieving this goal will require long-term planning and thoughtful selection of replacement species in consultation with the City's Urban Forester.



## 2.1 Public Rights-of-Way and Alleys: Guidelines

- .1 Preserve and maintain the topography, patterns, features, materials, and dimensions of streets, sidewalks, alleys, and street plantings that contribute to the overall historic character of the historic districts.
- .2 If repair or construction work in the public-right-of-way is necessary, protect and retain historic features such as granite curbing, brick gutters, and street plantings. Replace in kind any damaged or deteriorated historic features. Repair or replace sidewalks, curbs, and paving where needed, to match adjacent historic materials in design, color, module, pattern, texture, and tooling.
- .3 Repair and retain historic bridges whenever possible. Design new bridges to be compatible in design, material, color, and scale with the historic character of the district.
- .4 Prune and trim trees in the public right-of-way in a manner that preserves the existing tree canopies in the historic districts.
- .5 In consultation with the City's Urban Forester, introduce new and replacement plantings to ensure that existing tree canopies will be preserved.
- .6 Limit signage in the public-right-of-way to that necessary for traffic and pedestrian safety. Locate necessary signage so that the historic character of the district is least obscured.
- .7 Introduce necessary street furniture, trash receptacles, mailboxes, newspaper racks, and other similar elements in locations that do not compromise the historic character of the district. Keep such elements to a minimum so that pedestrian traffic is not disrupted. Select street furniture, such as benches, that is compatible in design, material, and scale with the district's historic character.
- .8 Maintain existing planting strips between the curb and the sidewalk. It is not appropriate to pave over existing planting areas.
- .9 Introduce new plantings in the public right-of-way that are compatible with the historic character of the district and coordinated with any overall landscape plan for the district.
- .10 Keep the introduction of additional utility poles, transformers, cables, and wires in the public right-of-way and alleys to a minimum. Seek alternative, less intrusive locations when possible so that the historic character of the district is not compromised by a proliferation of overhead lines, poles, and transformers. Consider introducing new utility lines underground to reduce their impact on the street character.
- .11 Select street lighting compatible in design, materials, and scale with the character and the pedestrian scale of the historic district.
- .12 It is not appropriate to introduce new paving materials, lighting, and streetscape features and furniture in the historic districts in an attempt to create a false historical appearance.
- .13 It is not appropriate to remove, obscure, or conceal granite curbing and granite or brick gutters in the process of repaving streets.



*Wide sidewalks characterize commercial districts.*



## 2.7 Lighting

Electric lighting was first introduced in Raleigh in 1885 and by the turn of the century had become commonplace, replacing the gaslight fixtures introduced thirty years earlier. The styles of the exterior and interior fixtures reflected the styles of the buildings as well as the economic strata of the occupants. Early twentieth century photographs reveal that porch lighting was minimal or nonexistent.

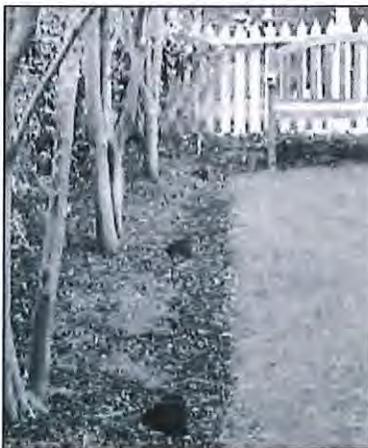
Depending on their location, streetlights ranged from elaborate designs, such as translucent globes mounted on cast-iron poles capped with decorative finials, to simple, bracketed globes mounted on utility poles. The light cast by these early fixtures was described as a soft yellow-toned glow rather than the harsher bluish-tone light cast by contemporary mercury vapor streetlights. Lighting manufacturers today offer high-pressure sodium vapor fixtures that produce a softer glow.



*Historic streetlights like this early gaslight with its translucent globe should be preserved.*



*Capital Square's pole-mounted fixtures are of an appropriate scale for that pedestrian-oriented public space.*



*Site lighting in residential districts can often be increased unobtrusively through the introduction of carefully located footlights and floodlights.*

### Things to Consider As You Plan

Today, issues of light pollution, safety, and security require careful forethought about the quantity and the location of exterior lighting. Considerations in reviewing any proposed lighting fixture for compatibility should include location, design, material, size, color, scale, and brightness. For major lighting proposals, such as those for large parking areas or streetlights, installing a sample fixture may be warranted.

It is always preferable to retain and maintain original lighting fixtures; however, if fixtures are missing or damaged, alternatives exist. Antique or reproduction lighting fixtures of a similar design and scale may be installed, or reproduction fixtures that reflect the design of the building may be selected. For example, it would be appropriate to select a pendant or a bracketed fixture with a stylized scrollwork or a floral motif for an Eastlake cottage. Fixtures for a bungalow from the era of the Craftsman movement or the Art Deco period could also reflect those designs. Selecting a fixture style in contrast to the building style is not recommended. In the 1950s, reproduction fixtures designed in colonial Williamsburg motifs became popular, but such fixtures are anachronistic and not compatible with early Raleigh buildings.

Contemporary fixtures that are inconspicuous or that complement the style and the character of the building may be selected for historic buildings. Simple, discreet styles and materials are usually successful. If more illumination is desired than the original fixtures provide, unobtrusively located contemporary recessed lights may be appropriate.

Additional lighting may be desirable on a particular site because of concerns for safety or security. Careful consideration should be given to where supplemental lighting is needed and in what quantity. Adequate lighting can often be introduced through lights on residential-scale posts, recessed lights, footlights, or directional lights mounted in unobtrusive locations. Such solutions are far more in keeping with the historic character of the districts than harsh floodlights and standard security lights mounted on tall utility poles. However, even compatible fixtures may compromise a building or a site if they are improperly spaced or located. For example, lining a front walk with multiple footlights may create a runway effect that detracts from the character of the house and the district.

When selecting specific fixtures and locations, it is also important to consider the impact of site lighting on adjacent properties. The introduction of motion sensors or indiscriminate area lighting on one site may result in the undesired lighting of surrounding sites. To minimize the intrusion of lighting for institutional or commercial buildings and related parking areas in primarily residential neighborhoods, and to save energy, the lighting may be connected to timers that automatically shut it off when it is not needed.



## 2.7 Lighting: Guidelines

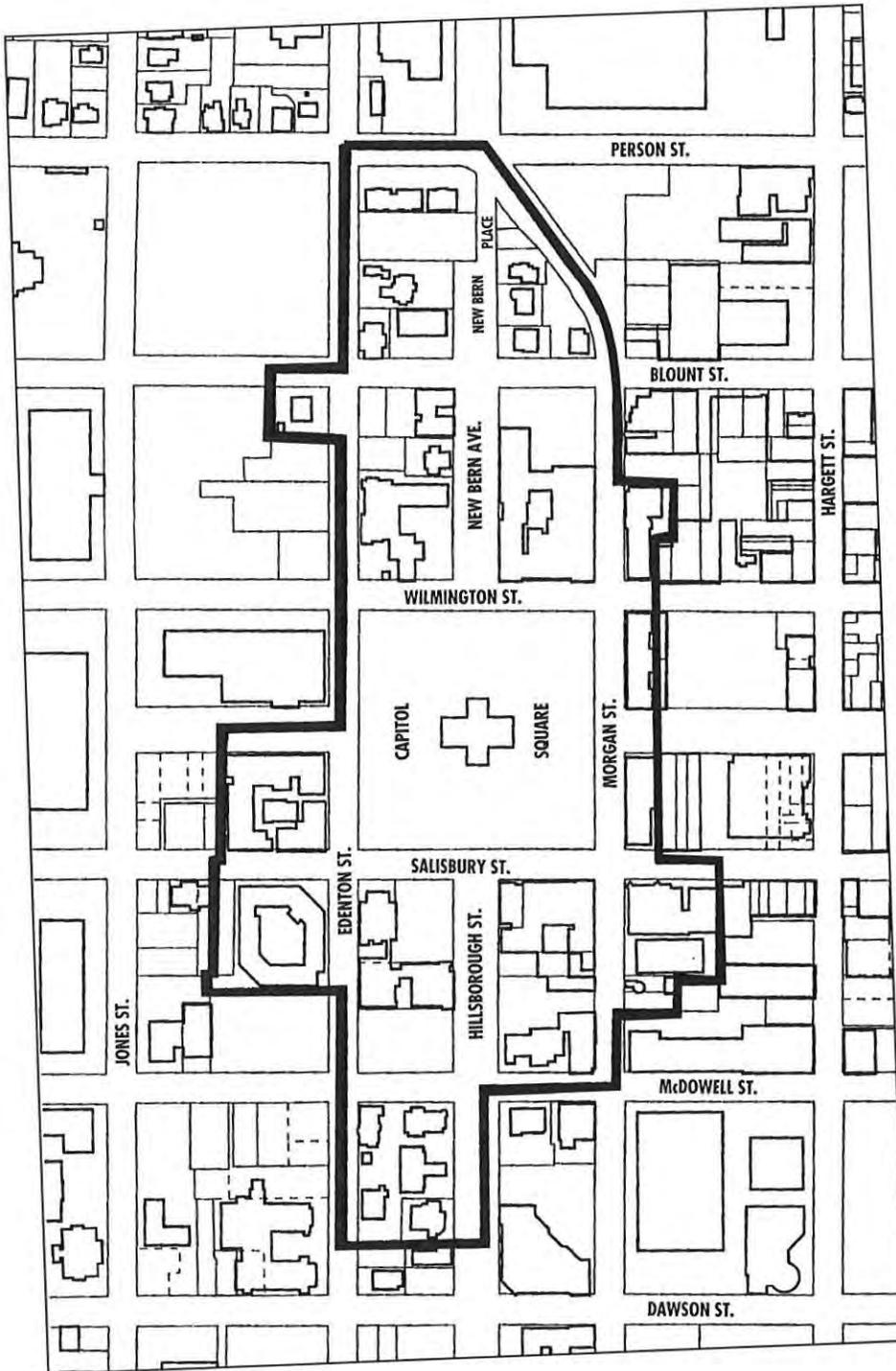
- .1 Retain and preserve exterior lighting fixtures that contribute to the overall historic character of a building, site, or streetscape.
- .2 Maintain and repair historic exterior lighting fixtures through appropriate methods.
- .3 If replacement of a missing or deteriorated historic exterior lighting fixture is necessary, replace it with a fixture that is similar in appearance, material, and scale to the original, or with a fixture that is compatible in scale, design, materials, color, finish, and historic character with the building and the streetscape.
- .4 Introduce new site and street lighting that is compatible with the human scale and the historic character of the district. Consider the location, design, material, size, color, finish, scale, and brightness of a proposed fixture in determining its compatibility.
- .5 In the residential historic districts, introduce low-level lighting to provide for safety and security where needed. Install recessed lights, footlights, lights on posts of human scale, or directional lights in unobtrusive locations.
- .6 Locate low-level or directional site lighting and motion detectors with care to ensure that the light does not invade adjacent properties.
- .7 It is not appropriate to introduce indiscriminate area lighting in the historic districts.
- .8 It is not appropriate to introduce new security lighting on standard-height power poles in the residential historic districts.
- .9 It is not appropriate to illuminate the facades of houses in the residential historic districts with harsh floodlights.
- .10 It is not appropriate to introduce or eliminate exterior lighting fixtures if doing so will detract from the overall historic character of the building, site, or streetscape.
- .11 It is not appropriate to introduce period lighting fixtures from an era that predates the structure in the historic district in an attempt to create a false historical appearance, or that are stylistically inappropriate or anachronistic.
- .12 It is not appropriate to diminish the historic character of a site by introducing incongruous lighting, such as creating a runaway effect with multiple footlights along front walks.



*Compatible replacement streetlighting pole and fixture.*



# Capitol Square Historic District





## The Special Character of the Capitol Square Historic District

Designated in 1976, the Capitol Square Historic District stretches for five blocks along an east/west axis that follows the ridge between the Crabtree Creek and Walnut Creek basins. The district's centerpiece is the granite Greek Revival-style Capitol (1840, National Historic Landmark).

The district's form is largely defined by its relationship to the original city plan of 1792, platted by surveyor (and state senator) William Christmas. Distinguished by wide streets and five public squares, the primary square of Christmas's plan, Union Square, was reserved for the State Capitol. Leading toward the four compass points from Union Square were four main streets, ninety-nine feet wide; the east and west streets, Hillsborough Street and New Bern Avenue, compose the east/west spine of the district. All other streets in the plan were sixty-six feet wide, including Edenton and Morgan streets, which define the north and south sides of the district and of Union Square. The primary north/south streets of the district include Salisbury and Wilmington streets, which define the west and east sides of Union Square, and Person Street.

The street pattern is regular, with streets intersecting at right angles as laid out in the original city plan. The one exception is at the east end of the district, where contemporary traffic engineering concerns for one-way traffic patterns led to the curving connection of Morgan Street to New Bern Avenue, creating a cul-de-sac at New Bern Place. Original granite curbstones remain in much of the district, with some concrete curbs introduced, as well as some sections of new granite curbing installed in association with city streetscape improvement programs. Special period streetlighting fixtures, reminiscent of the fixtures that lined the streets at the turn of the century, have been installed in the core areas of the district; other fixtures are the standard modern cobrahead design. Sidewalks are typically wide, extending from building to curb, with Hillsborough Street and New Bern Avenue the primary exceptions. Sidewalk materials vary: concrete is the dominant material; red-tone concrete unit pavers are found in many areas, primarily along Hillsborough Street, with gray concrete pavers encircling the Capitol Square perimeter.

The landscape found at Capitol Square provides a green oasis in the heart of the urban area. The cool solidity of the granite Capitol is set off by the lush warm green of the lawns and majesty of the mature trees that fill the square. Gracefully curved aggregate-patterned concrete walks sweep across the park-like setting, with monuments arranged for the edification of strolling passers-by and numerous iron benches for those that have time to pause. Streets leading from the Capitol are lined with street trees that carry the green motif out into the downtown. In some parts of the district, surface parking interrupts the balance of green trees, shaded walks, and building facades that generally characterize the area.

The architectural character of the district is largely institutional in nature, dominated by state government buildings and church complexes. The general scale of two- and three-story buildings is punctuated by occasional taller buildings, a water tower, and church spires. A total of four churches, three of Gothic Revival influence, one of Romanesque design, front on Capitol Square, one near each of its four corners. The rest of the buildings facing the Capitol are state government office buildings, primarily in the Classical Revival style, with more recent structures exhibiting an understated Art Deco flair. Their weightiness physically charts the increasing complexities of public administration in the twentieth



century. Stone is the material of choice for most of these structures, lending a decidedly strong impression of solidity, formality, and permanence. However, providing relief and contrast at three corners of the square are the deep red brick facades of two churches and a state building. Further west from Capitol Square are two additional church complexes that maintain this institutional sense; yet their lawns, landscaping and some domestically-scaled accessory buildings begin to soften the powerful impression that is felt in the immediate area of the Capitol.

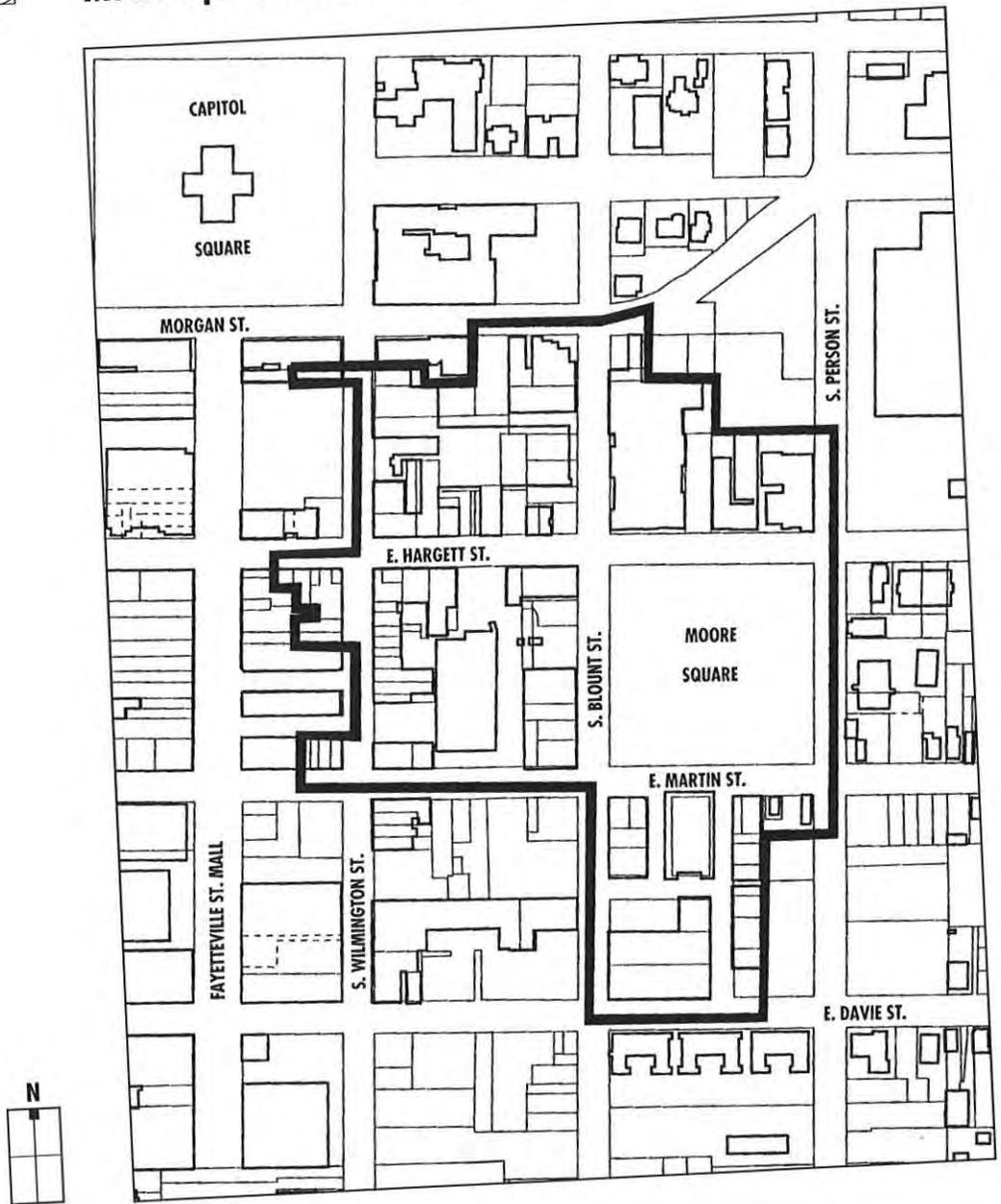
To the east of the Capitol, however, awaits a surprise of domestic delight unusual in the heart of an urban setting. Owing to the landscape and architectural qualities displayed in the two blocks of New Bern Avenue, this area departs from the strongly institutional character of the rest of the district. The lush courtyard of Christ Episcopal Church (1854, National Historic Landmark), the dignified double porticos of the State Bank (1813), and the urban residential form of the Capital Apartments (1917) lead one east from the Capitol toward New Bern Place, a city redevelopment project with a strong historic preservation emphasis. Here, Haywood Hall (ca. 1799), a residence and garden constructed for John Haywood, State Treasurer, is buttressed by four other residential-style structures. The White-Holman House (ca. 1799) and the Montgomery House (ca. 1906) were relocated to New Bern Avenue to ensure their preservation; while the New Bern Place condominium development (1985) is larger in scale, its modern interpretation of Queen Anne styling imparts a decidedly residential character. The cul-de-sac that terminates this portion of New Bern is paved in granite-colored unit pavers edged by granite curbing, and is flanked with landscaped spaces and brick walls. The lack of through-traffic creates a calm ambiance of repose in an otherwise bustling downtown scene. On the northern periphery of this area, along Edenton Street at Blount Street, the Richard B. Haywood House (1854) and the Bailey Apartments (ca. 1924) also contribute to the domestic feeling of the eastern portion of the district.

Capitol Square Historic District represents the heritage of the city's institutions of work, worship, and home, wrapped in a landscape of surprising diversity: from the wooded square, to tree-lined city walks, to side yard gardens and courtyards. Here, one can sense the silhouette of the early decades of Raleigh's small village setting, of its ante-bellum residential character—a devout town whose major industry was governance—against the dominant elements of the large, present day government operations discharging their duties behind the tall, solemn classical facades of the early twentieth century.

RALEIGH HISTORIC DISTRICTS COMMISSION



# Moore Square Historic District





## The Special Character of the Moore Square Historic District

East of the Fayetteville Street Mall and south of the Capitol, Moore Square Historic District, designated 1992, contains a concentration of early twentieth century commercial architecture. Moore Square itself is one of only two surviving four-acre public parks from the original 1792 town plat; the other two have been built upon, and the fifth public square, the six-acre Union Square, was always reserved for the State Capitol.

William Christmas's original city plan provides the form for the district's rectilinear grid of streets. Residing on a ridge of land between Crabtree and Walnut creeks, the topography of the district is largely level, evenly and gently sloping toward the south and east. The approximate center of the district is defined by the intersection of South Blount and East Hargett streets. In the southeast corner of the district, the grid of original streets from the 1792 town plat is supplemented by three smaller, narrower streets that were created to serve the 1914 City Market complex. The effect of this system of smaller streets is to create within the district a sub-area of greater intimacy, a finer scale especially suited to pedestrian amenity.

Additionally, Moore Square Station, a mid-1980s city project to provide a parking deck and centralized bus transit transfer facility, has an internal circulation system that accommodates buses, auto parking, and pedestrian traffic. The entire complex is carefully integrated within the historic building fabric, nestled into the center of the block behind the earlier structures that front onto Hargett, Blount, Martin and Wilmington streets.

Asphalt streets throughout the district intersect at right angles in a regular rectangular pattern; however, portions of the streets at City Market have been stripped of asphalt to display their original cobblestone surface. Original granite curbstones remain in much of the district, with a few concrete curbs introduced, as well as some sections of new granite curbing installed in association with city streetscape improvement programs.

Special period streetlighting fixtures, reminiscent of the fixtures that lined the streets at the turn of the century, have been installed within the district.

Sidewalk materials vary; almost all sidewalk areas in the district have been reconstructed through city streetscape improvement programs. Concrete is the dominant material, scored into two-foot squares, accented by red concrete unit paver strips. Street trees with cast iron tree grates establish a regular pattern and rhythm along the district's sidewalks.

In addition to the landscape defined by the urban street setting, Moore Square provides a tree-shaded activity center. It serves the downtown community in many ways. The square is often used as a focal point for many downtown festivals and events; the park's mature trees and lawn also provide an inviting setting for casual strolling and relaxation.

The square is largely open and unimpeded in order to accommodate crowds of people; there are, however, several raised planters that provide seasonal color. Additional urban landscape amenities, associated with Moore Square Station, are found east of Moore Square across Blount Street. A series of cascading fountains, constructed of brick and overlooked by pedestrian walkways and bridges, flank a lawn-covered sunken courtyard behind the Montague Building.

The architectural scale of the district is pleasingly suited to the pedestrian. The vast majority of buildings in the district are simple, vernacular brick



“shoe-boxes,” two to three stories in height, narrow and deep. Past attempts to modernize the pedestrian level of the shops with aluminum panels and flat aluminum awnings contribute to a discontinuity that contrasts with the frequently related repetitive elements and details of the second and third floors of these buildings.

Above the “new” facades, one finds well-defined string courses and the large single light, double hung sash windows characteristic of late 19th and early 20th century architecture of this scale. Frequently jack or rounded arches of projecting bricks define window heads above deep sills and jambs. A flat parapet with occasional corbelling, decorative panels or raised block for name and date make up the skyline. The appearance of a projecting cornice with brackets alludes to a continuing Italianate influence in the usually plain commercial forms of the district.

Wilmington Street presents the most intact example of this commercial rhythm of small shop fronts. Hargett Street, Raleigh’s “Black Main Street” during the first five decades of the 20th century, has suffered the most, with several buildings lost to fire and urban decay, leaving gaps in the streetscape filled with unscreened, unlandscaped surface parking. Yet these gaps, while intrusive, are not frequent enough to disrupt the overall pedestrian quality of the district.

A few architectural landmarks punctuate the dominant pattern of vernacular commercial facades. Most notable are the Mission-style City Market (1914), Italianate-style Early Store Building (ca. 1875, Heilig-Levine Furniture), Neoclassical/Commercial-style Montague Building (1912), and Gothic Revival-style Tabernacle Baptist Church (1881-1909). The two recent parking decks constructed in the centers of blocks, the previously mentioned Moore Square Station, and the Wilmington Street Station (1992, one block north of Moore Square Station) are of a much larger scale than other structures in the district, but their mid-block locations and setback from the street help mitigate the scale, while careful detailing architecturally integrates them into the district. On the south side of Moore Square, adjacent to City Market, is the Norwood House. Relocated in 1997 from nearby Person Street, the ca. 1880 Italianate dwelling rests on the site of another house demolished in 1989, and speaks to the era prior to the commercialization of the Moore Square area when the square was surrounded by homes and the focus of a residential neighborhood.

In spite of its commercial focus, the symbolic heart of the district is the green space of Moore Square. It has remained a permanent feature of the area from its beginnings in the 18th century. The grove of trees, grass, and flowers emphasizes what is still a pedestrian scale, a scale created by the buildings and felt in spite of the widened streets and gap sites.

## The Special Character of the Oakwood Historic District

Developed primarily during a fifty-year period from 1880-1930, the Oakwood Historic District (designated in 1975) has the most diverse collection of architecture among Raleigh’s historic districts. The neighborhood was built in the dense woods of northeast Raleigh known as “Mordecai Grove” and sold off in parcels after the Civil War. It developed incrementally, bit by bit, often lot by lot, with streets extended as needed, in contrast to Boylan Heights, which was platted in a single subdivision.



# Design Guidelines

for Raleigh Historic Districts and Landmarks



[rhdc.org](http://rhdc.org)





*The City of Raleigh uses the following definition of sustainability from the President's Council on Sustainable Development: "Sustainable communities encourage people to work together to create healthy communities where natural and historic resources are preserved, jobs are available, sprawl is contained, neighborhoods are secure, education is lifelong, transportation and health care are accessible, and all citizens have opportunities to improve the quality of their lives."*

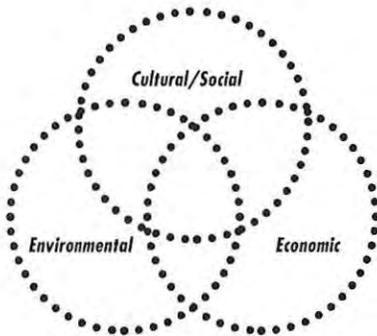
## Historic Preservation and Sustainability

The Secretary of the Interior's Standards for Rehabilitation (see preceding page) emphasize a hierarchical approach to the built environment with the three R's: retain, repair, or replace. The sustainability movement parallels this approach through its four R's: reduce, reuse, recycle, and repair. Indeed, retaining and repairing our historic buildings is affirmed by both camps as is reusing historic buildings by adapting them for new uses. Historic Preservation and sustainability are inextricably linked through their shared values of good stewardship, the revitalization of neighborhoods, and the ongoing use of the built environment. Both advocate a culture of reuse, community reinvestment, and appreciation of our heritage. The guiding principles of preservation resonate with the three fundamental principles of sustainability: economic strength, environmental stewardship, and social equity. Together they speak to the wise use of resources to sustain our communities.

The City of Raleigh believes a sustainable community is a thriving community; one that provides opportunities for all residents, cares for the environment, and has a long term vision for a prosperous future. In its mission statement, the Raleigh City Council affirmed its commitment to sustainability stating explicitly that it welcomes "growth and diversity through policies and programs that will protect, preserve, and enhance Raleigh's existing neighborhoods, natural amenities, rich history, and cultural and human resources for future generations." To this end, they promote the conservation and protection of environmental resources through best practices and cutting edge conservation and stewardship, land use, infrastructure, and building technologies.

The RHDC design guidelines build upon the shared values of historic preservation and sustainability to explicitly relate them in meaningful ways. The touchstones of good practice for both movements clearly overlap. Throughout the RHDC guidelines an accepting and encouraging tone toward sustainability is established and the text and illustrations include specific examples and references to sustainable practices. Particular attention is given to proactive maintenance, adoption of effective energy conservation strategies, and thoughtful consideration of the lifespan of building materials and their inherent embodied energy. In a pragmatic three-step approach, the guidelines advocate the following:

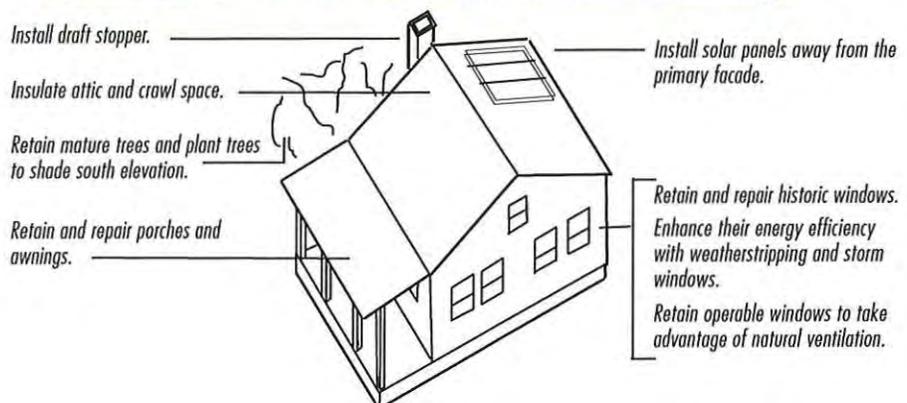
- Optimize existing sustainable features of historic buildings and neighborhoods.
- Enhance sustainability through energy conservation strategies, lifecycle of materials considerations, and landscape design decisions.
- Promote the sensitive introduction of new sustainable technology.



**Sustainability Diagram**

*Sustainability is often described as having three inter-related spheres: cultural/social, environmental, and economic. Each of these aspects of sustainability is also an integral component of historic preservation.*

*The diagram on the right illustrates energy conservation strategies that also retain the historic integrity of a historic residence.*





*Historic streetlights like this early gaslight with its translucent globe should be preserved.*



*Capitol Square's pole-mounted fixtures are of an appropriate scale for that pedestrian-oriented public space.*



*Site lighting in residential districts can often be increased unobtrusively and controlled through the introduction of carefully located directional lighting fixtures.*

## 1.7 Lighting

Electric lighting was first introduced in Raleigh in 1885 and by the turn of the century had become commonplace, replacing the gaslight fixtures introduced thirty years earlier. The styles of the exterior fixtures reflected the styles of the buildings as well as the economic strata of the occupants. Early-20th century photographs reveal that porch lighting was minimal or nonexistent. Depending on their location, streetlights ranged from elaborate designs, such as translucent globes mounted on cast-iron poles capped with decorative finials, to simple, bracketed globes mounted on utility poles. The light cast by these early fixtures was described as a soft yellow-toned glow rather than the harsher bluish-tone light cast by contemporary mercury vapor streetlights. **Lighting manufacturers today offer metal halide fixtures that produce a softer and less distorted light color.**

### Things to Consider As You Plan

**Today, issues of light pollution, energy conservation, dark sky codes, safety, and security require careful forethought about the quantity and the location of exterior lighting.** Considerations in reviewing any proposed lighting fixture for compatibility should include location, design, material, size, color, scale, and brightness. For major lighting proposals, such as those for large parking areas or streetlights, installing a sample fixture may be warranted. New lighting must also comply with the City of Raleigh lighting ordinance.

It is always preferable to retain and maintain original lighting fixtures; however, if fixtures are missing or damaged, alternatives exist. Antique or reproduction lighting fixtures of a similar design and scale may be installed, or reproduction fixtures that reflect the design of the building may be selected. For example, it would be appropriate to select a small, decorative pendant fixture for a Victorian cottage. Bracketed fixtures for a bungalow from the era of the Craftsman movement or the Art Deco period could also reflect those design eras. Selecting an oversized fixture or a style in contrast to the building style is not recommended. Reproduction fixtures designed in colonial Williamsburg motifs that became popular in the 1950s are anachronistic and not compatible with early Raleigh buildings, but such fixtures may be appropriate for postwar neighborhoods.

**Contemporary fixtures that are inconspicuous or that complement the style and the building's character may be selected for historic buildings.** Simple, discreet styles and materials are usually successful. If more illumination is desired than the original fixture provides, unobtrusively located contemporary recessed lights may be appropriate. If additional lighting is desired because of safety or security concerns, careful consideration should be given to where supplemental light is needed and in what quantity. **LEDs are long-lasting, energy-efficient fixture choices.** Adequate lighting can be introduced through pedestrian-scaled lightposts, recessed lights, footlights, or directional lights mounted in unobtrusive locations. Such solutions are far more in keeping with the historic character of local landmarks and districts than multiple energy-consuming floodlights that illuminate an entire facade in harsh light or non-directional standard security lights mounted on tall utility poles. However, even compatible fixtures may compromise a building or a site if they are improperly spaced or located. For example, multiple footlights lining a front walk may create a runaway effect that detracts from the character of the house and the district.

When selecting specific fixtures and locations, it is also important to consider the impact of site lighting on adjacent properties. The introduction of motion sensors or indiscriminate area lighting on one site may result in the undesired lighting of surrounding sites. To minimize the intrusion of lighting in primarily residential neighborhoods, and to also save energy, the lighting may be connected to timers or motion detectors that automatically shut it off when it is not needed.



## Section 2 Changes to the Building Exterior

*New architectural products are constantly being introduced and sorting out their appropriateness for historic buildings can be complex. Beyond visual compatibility, the selection and evaluation of alternative materials should include their effect on the underlying historic material, durability, sustainability in terms of material product and associated manufacturing, short term and long term costs, and changes in current technology or availability.*



*During the summer, dormers with operable windows and lowered gable vents can help cool a house by allowing rising hot air to escape.*



*These solar collector panels are located on the roof of an inconspicuous accessory building at the rear of the property.*



*This mechanical unit was installed on a rear side facade and further screened from view by a low, wooden picket fence and foundation plantings.*

## 2.10 Sustainability and Energy Retrofit

Sustainability, energy conservation, replacement or upgrading of inadequate utility service, and introduction or upgrading of mechanical systems are typical concerns of property owners today. In the historic districts and for landmark buildings, it is important to ensure that such concerns are addressed in ways that do not damage or diminish the historic character of the building, the site, or the district. These guidelines advocate maintaining and maximizing existing sustainable features of historic buildings and neighborhoods. They also advise enhancing sustainability through landscape decisions and energy conservation strategies and promote the sensitive introduction of sustainable technology. Consult the RHDC staff to discuss best practices.

In Raleigh's early historic districts a variety of energy-conserving site and building features illustrate the sensibility of an earlier era regarding climate. Thoughtfully located shade trees buffer residences and sidewalks from the hot summer sun. Projecting porches provide shaded outdoor space and lessen the impact of harsh sunlight on the building's interior. Operable windows, shutters, and awnings allow occupants to control the introduction of sunlight and breezes within the building. Commercial buildings often capture daylight through storefront transoms, lightwells, and skylights. An understanding of how such historic features enhance energy efficiency is critical to maximizing the energy efficiency of historic buildings.

### Things to Consider As You Plan

In considering energy retrofit options, property owners should first be sure that the inherent energy-conserving features of the building are being used and maintained. Consideration should also be given to the replacement of lost shade trees or the introduction of other carefully located new shade trees. Beyond those steps, typical retrofit measures include introducing storm windows and doors, adding weatherstripping, caulking, insulation, and more efficient mechanical systems. All retrofit measures must be reviewed with their impact on the historic character of the building and district in mind. For example, adding insulation in the attic and basement or crawl space reduces energy costs more than adding it to exterior walls and is far less intrusive.

After any necessary repair of windows to ensure their weathertightness, significant additional energy efficiency (comparable to the introduction of double-glazed windows) can be achieved with the addition of storm windows—without the loss of historic features and for far less investment. Non-reflective energy films can also be applied to the interior window face. Narrow-profile exterior storm windows that do not obscure the window itself, carefully installed to prevent damage to the sill or the frame, and finished in a color compatible with the sash color are fairly common in the districts. To retain the opportunity to open windows, the property owner should select operable storm units that align with the meeting rails of the window. If interior storm windows are preferred, they should be tension-mounted with airtight gaskets. Storm window ventilating holes must be kept open to prevent condensation from damaging the window or the sill. Selection of new screen or storm doors should follow the guidelines for exterior storm windows. New mechanical systems, with outside units, ventilators, and solar collectors should be located and installed so that they do not damage or diminish the historic character of the building or site. Inconspicuously located units can be further screened by plantings or fences. Adding solar panels can be a challenge to optimize panel angle and orientation with sensitive placement. See the Appendix for a link to Raleigh solar charts.

Utility lines and poles have long been a part of the districts, consolidating old and new utility and communication lines where possible will avoid overpowering the landscape with additional overhead wires. If new or upgraded power will necessitate an additional pole or overhead wires, underground cables may provide less visual

**RALEIGH HISTORIC DEVELOPMENT COMMISSION**  
**CERTIFICATE OF APPROPRIATENESS COMMITTEE**  
 Minutes of the Meeting  
 February 1, 2016

**CALL TO ORDER**

Chair Elizabeth Caliendo called the Certificate of Appropriateness (COA) Committee meeting to order at 4:00 p.m.

**ROLL CALL**

Tania Tully, Preservation Planner, called the roll as follows:

**Present:** Elizabeth Caliendo, Sarah David, Don Davis, Laurie Jackson, Kaye Webb

**Alternate Present:** Caleb Smith, Miranda Downer

**Excused Absence:**

**Staff Present:** Tania Tully, Martha Lauer; Teresa Young; Francis P. Raspberry, Jr., Attorney

**Approval of the January 4, 2016 Minutes**

Mr. Smith moved to waive the reading of the minutes for the hearing and to adopt said minutes as submitted. Mr. Davis seconded the motion; passed 5/0.

**Minor Works**

There were no questions regarding the Minor Work report.

The following is a list indicating persons in attendance and whether they were affirmed. Ms. Martha Lauer, Notary Public, administered the affirmation.

<b><u>Visitor's/Applicant's Name and Address</u></b>	<b><u>Affirmed</u></b>
Gail Wiesner, 515 Euclid Street 27604	Yes
David Wiesner, 515 Euclid Street 27604	Yes
Paula Huot, 534 E Jones Street 27601	Yes
Jed Niffenegger, City of Raleigh	Yes
Rebecca Duffy, City of Raleigh	No
Dustin Brice, City of Raleigh	Yes
Don Becom, 308 N East Street 27601	Yes
Terri Becom, 308 N East Street 27601	Yes
Susan Thompson, 702 Dorothea Dr 27603	Yes
Matthew Brown, 601 E Lane Street 27601	Yes
Curtis Kasefang, 519 Polk Street 27604	Yes
Judy Payne, 1105 W Lenoir Street 27603	No
Robert Peacock, 1105 W Lenoir Street 27603	No
Matt Griffith, 111 Longview Lake Dr 27610	Yes
Matt Munoz, 322 E Davie Street 27601	Yes

**REVIEW OF SUMMARY PROCEEDINGS/APPROVAL OF AGENDA**

Mr. Davis moved to approve the agenda as printed. Ms. Webb seconded the motion; passed 5/0.

**SUMMARY PROCEEDINGS**

There were no Summary Proceedings.

**PUBLIC HEARINGS**

Chair Caliendo introduced the public hearing portion of the meeting. The committee heard the following cases in the following order for which the Certified Records are made part of these minutes: 175-15-CA, 128-15-CA, and 179-15-CA.

APPLICATION FOR A CERTIFICATE OF APPROPRIATENESS – CERTIFIED RECORD

175-15-CA      MULTIPLE LOCATIONS IN PUBLIC RIGHT-OF-WAY  
Applicant:      RALEIGH PUBLIC WORKS DEPARTMENT, DUSTIN BRICE  
Received:      11/25/2015      Meeting Date(s):  
Submission date + 90 days: 2/23/2016      1) 1/4/2016      2) 2/1/2016      3)

INTRODUCTION TO THE APPLICATION

Historic District: MULTIPLE HISTORIC DISTRICTS

Nature of Project: Programmatic COA to replace existing high pressure sodium street light fixture heads with new light emitting diode fixture heads.

Amendments: Additional information from the applicant was included in the commissioner packets.

Conflict of Interest: None noted. Ms. David noted that she received, but did not read a letter regarding the case. She stated her ability to remain impartial.

APPLICABLE SECTIONS OF GUIDELINES and DESCRIPTION OF PROJECT

<u>Sections</u>	<u>Topic</u>	<u>Description of Work</u>
2.1	Public Rights-of-Way and Alleys	Replace existing high pressure sodium street light
2.7	Lighting	fixture heads with new light emitting diode fixture heads

STAFF COMMENTS

Based on the information contained in the amended application:

- A. Replacement of existing high pressure sodium street light fixtures with new light emitting diode fixtures is not incongruous according to *Guidelines* 2.1.10, 2.1.11, 2.7.4, 2.7.5, 2.7.11, and the following findings:
- 1\* Only leased non-decorative fixtures are being replaced and there will be no new poles. The arms supporting the fixture heads are also not being replaced.
  - 2\* New LED street lights have been installed in other areas of the city. A map of areas installed is provided; the neighborhoods around Kaplan Drive, Athens Drive, and Melbourne Road provide the best example of how Oakwood and Boylan Heights may appear after replacement.
  - 3\* A map that locates the areas of existing brighter lights and where lower light levels may be allowed was provided.
  - 4\* Existing light fixture heads are "Cutoff Enclosed, flat glass cobra head." The high pressure sodium bulbs have a golden yellow color. A photo of the fixture head is included.
  - 5\* The proposed light fixture head, "Roadway" is a long flat unit of contemporary design. A photo of the proposed fixture head is included. The wattage and light pattern will vary

- based on what is already installed. The color temperature is 4,000 Kelvins. The LED fixture heads are designed to more effectively direct light where it is intended.
- 6\* The new lumen level will be relatively the same, but the perceived light will be much more effective and may even seem a bit brighter to the eye. This is due mainly to the clearer, whiter light produced by LED fixture heads.
  - 7\* The wattage of the new fixture head is based on a conversion guide that Duke Energy Progress has for replacing sodium vapor lighting with LED. The LED fixture head wattage will be based on what sodium vapor wattage currently exists. Most lightly traveled streets will have the lowest wattage LED installed. Streets such as Boylan Avenue, East Street, Bloodworth Street, Lane Street, and Jones Street in the historic districts currently have higher wattage sodium vapor fixture heads, thus they will receive higher wattage LEDs.
  - 8\* The lowest LED wattage available from Duke Energy is 50 watts and may be used on some City-maintained residential streets. Public Works cannot lower lighting levels on NC Department of Transportation maintained streets.
  - 9\* The Design Guidelines on page 20 states: "Depending on their location, streetlights ranged from elaborate designs, such as translucent globes mounted on cast-iron poles capped with decorative finials, to simple, bracketed globes mounted on utility poles. The light cast by these early fixtures was described as a soft yellow-toned glow rather than the harsher bluish-tone light cast by contemporary mercury vapor streetlights." And "Considerations in reviewing any proposed lighting fixture for compatibility should include location, design, material, size, color, scale, and brightness."
  - 10\* LED bulbs have been approved by the committee provided the light color is of a warm tone. The proposed LED has a color temperature of 4,000 Kelvins; this is considered a neutral white.
  - 11\* Information on the "teardrop" light fixture head was provided. The applicant is not proposing this option because of the higher light level, and the circular lighting pattern which puts light onto private property, not just the right-of-way.
  - 12\* Sodium vapor fixture heads are a technology being phased out of use.
  - 13\* Information on other styles of lighting fixtures and heads was provided by a speaker at the January 2016 hearing.

Staff recommends that the committee approve the application with the following conditions:

1. That the lowest level of light allowed by other laws and regulations be used for each installation location.

#### PUBLIC TESTIMONY

Staff Introduction: Tania Tully [affirmed] showed the location of the property on the map and noted highlights from staff comments. Ms. Tully clarified that the arm was not being replaced but just the light fixture head and that it was clarified in staff comments. Ms. Tully stated that staff recommendation is to approve since the lighting is going from non-historic to non-historic and the lights be the lowest amount of light needed by law.

Support:

Mr. Jed Niffenegger [affirmed] was present to speak in support of the application. Mr. Niffenegger stated he had brought along Mr. Dustin Brice [affirmed] who is the project manager. Mr. Niffenegger clarified these lights are being changed throughout the city and that over time Duke Progress Energy will no longer carry the sodium fixtures and that for the other options that have been presented the Public Works Department does not have the money. Mr. Niffenegger stated that the tear drop fixtures will also risk adding light pollution as opposed to the other fixtures which will be less intrusive.

Mr. Brice added that the lights around the capital are tear drop and are a lot brighter than what is in Oakwood and Boylan Heights.

Mr. Curtis Kasefang [affirmed] introduced himself to the committee as a professional lighting designer and former RHDC commissioner and stated that while he applauded the city going to LED lights, a 3,000 Kelvin fixture would be similar to what was originally in Raleigh and that the lights would be warmer than the 4,000 Kelvin ones that would look bluer. Incandescent lights are in the high 2,000 to low 3,000 Kelvins.

Opposition:

Ms. Gail Wiesner [affirmed] was present to speak in opposition to the application Ms. Wiesner distributed information to the committee regarding tear drop light fixtures and their specifications. She stated they could be purchased from a company called Acuity. Ms. Wiesner stated the pedestrian tear drop is 50% in surface area of the ones that are downtown already. Ms. Wiesner also provided a photograph of a historic light in Oakwood. Ms. Wiesner stated that the tear drop lights are less intrusive and would look better in the historic districts. Ms. Wiesner reiterated this was a great opportunity to get more historic lights and this opportunity will not come around again.

Mr. Don Becom [affirmed] introduced himself as a member of the Society for the Preservation of Historic Oakwood and is a board member. He read to the committee a cover letter and resolution the board passed recommending tear drop fixtures.

Mr. Matthew Brown [affirmed] commented on how he had seen the super bright lights that are already installed on roadways. Mr. Brown stated there shouldn't be uniform lights and the historic districts should have different fixtures since they are distinctive. Mr. Brown said that the original streetlights were gas and they started being replaced with electric in 1888. The teardrop fixtures were in place through the 1940s. The proposed fixture does not meet 2.7.4 or 2.7.10. Mr. Brown stated that the Historic Oakwood would be willing to chip in to pay for historic, alternative lighting that is pleasing. He urged the committee to deny the application.

Mr. David Wiesner [affirmed] went over 5 aspects of lighting. He stated the wattage just affects the price and moving to a LED will use lower wattage. The lumens are the brightness of the

light and the proposed lights are brighter than what is there. The light spread is oval now and proposed to be a medium oval. Mr. Wiesner added that in the application the lighting said it was a clear, white light but it is actually going into a blue range. Mr. Wiesner suggested that all city maintained roads in Oakwood have lower wattage. He added that the modern fixture appearance was not in keeping with 2.7.4.

Ms. Paula Huot [affirmed] said the replacement map was confusing and questioned if the tear drop lighting could be in all historic districts. Ms. Huot stated the roadway lights do not work and recommended denying the application or deferring it to consider all the implications.

Mr. Terry Becom [affirmed] urged the committee to deny the application.

Responses and Questions:

Mr. Niffenegger clarified that while the city is a large Duke customer, it is limited to the fixtures that are in Duke's catalog. Mr. Niffenegger also added that the map currently shows what lighting is currently, not proposed. Mr. Brice further clarified that red dots on the map show where the sodium lights are currently.

Ms. David asked if we have to go through the state and the Department of Transportation to get a lower wattage of light. Mr. Brice replied they would have to go through and change the state restrictions which are very strict. Ms. David responded that the state regularly applies for COAs in other areas. Mr. Brice countered that the regular projects are very strict.

Ms. Caliendo inquired about the color temperature of the lights. Mr. Brice answered that based on what they offer there is only the 4,000 Kelvin. Mr. Davis stated it was strange that Duke would not offer a 3,000 Kelvin light and Mr. Niffenegger stated they have asked Duke about that light but there was no recourse to get Duke to offer that light. Mr. Davis asked if they had requested the light and Mr. Brice stated that while there was one out there it did not meet their specifications.

Ms. Tully reiterated that the committee is looking at either approving the application or denying the application as submitted. Ms. Tully stated that the committee can defer and ask the applicant to come back with alternatives but that they cannot say they have to use another fixture. Ms. Tully stated the committee can approve it for a 3,000 Kelvin fixture so that the requirements cannot be met or the application can outright be denied.

Ms. Wiesner clarified that the lighting she suggested can be used on the poles. Mr. Niffenegger once again stated that using LEDs will save money.

Ms. David asked if the application were denied would the applicants come back with another application. Ms. David noted that during the design guidelines public process it was made clear that the public preferred traditional, not modern. Mr. Niffenegger stated he would be happy to

work with staff on alternatives but as of right now Duke only offers the 4,000 Kelvin lights and if they have to wait until a few years down the road that is alright as well.

At Ms. Caliendo's suggestion Mr. Davis moved that the public testimony portion of the hearing be closed. Ms. Webb seconded; motion carried 5/0.

#### Committee Discussion

The following points were made in discussion [speaker indicated in brackets]:

The issues are the brightness (the lumens), the color temperature, the design and also the distribution of the light. [Caliendo]

Last month we had a discussion on wattage but it is really the color temperature that is the concern. You can have higher wattage in color. [Davis]

I appreciate the photo that was submitted of the historic light design. It is a more decorative fixture historically. [Caliendo]

What options do we have to facilitate further discussion as to what kind of lights? [Webb]

Nothing within the COA process. [Davis]

We are only here to discuss whether the proposal meets the guidelines. [Smith]

Do you want to talk about the new facts you heard? [Tully]

The new facts about the Kelvin. [Webb]

3,000 Kelvin is nice warm temperature. We heard that there is a pedestrian teardrop series available somewhere. [Smith]

I am not sure if the new fixture is relevant. [Davis]

The design guidelines have a standard for lighting and alternatives can be considered. You should not find that this application is denied just because there is a better looking option.

[Raspberry]

We can include it as a part of the evidence? [Caliendo]

Do not include that the tear drop as something that was crucial towards the finding of the committee. [Raspberry]

You heard that the lights were too bright based on personal experience. I would mention the tear drop photo that was submitted as showing a historic fixture and the fixture that was in place. [Tully]

#### Findings of Fact and Conclusions of Law

Mr. Davis moved that based upon the facts presented in the application and the public hearing, the committee finds staff comment A. (inclusive of facts 1-6, 8, 9, 11-13) to be acceptable as findings of fact, with the modifications and additions as listed below:

- A. Replacement of existing high pressure sodium street light fixtures with new light emitting diode fixtures is incongruous according to *Guidelines* 2.7.4, 2.7.5, 2.7.10, and the following findings:
- 1\* Only leased non-decorative fixtures are being replaced and there will be no new poles. The arms supporting the fixture heads are also not being replaced.
  - 2\* New LED street lights have been installed in other areas of the city. A map of areas installed is provided; the neighborhoods around Kaplan Drive, Athens Drive, and Melbourne Road provide the best example of how Oakwood and Boylan Heights may appear after replacement.
  - 3\* A map that locates the areas of existing brighter lights and where lower light levels may be allowed was provided.
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  - 6\* The new lumen level will be relatively the same, but the perceived light will be much more effective and may even seem a bit brighter to the eye. This is due mainly to the clearer, whiter light produced by LED fixture heads.
  - 7\* The wattage of the new fixture head is based on a conversion guide that Duke Energy Progress has for replacing sodium vapor lighting with LED. The LED fixture head wattage will be based on what sodium vapor wattage currently exists. Most lightly traveled streets will have the lowest wattage LED installed.
  - 8\* The lowest LED wattage available from Duke Energy is 50 watts. Public Works cannot lower lighting levels on NC Department of Transportation maintained streets.
  - 9\* The Design Guidelines on page 20 states: "Depending on their location, streetlights ranged from elaborate designs, such as translucent globes mounted on cast-iron poles capped with decorative finials, to simple, bracketed globes mounted on utility poles. The light cast by these early fixtures was described as a soft yellow-toned glow rather than the harsher bluish-tone light cast by contemporary mercury vapor streetlights." And "Considerations in reviewing any proposed lighting fixture for compatibility should include location, design, material, size, color, scale, and brightness."
  - 10\* LED bulbs have been approved by the committee provided the light color is of a warm tone. The proposed LED has a color temperature of 4,000 Kelvins; this is considered a neutral white. 3,000 Kelvin is a warmer color closer to incandescent and in keeping with the character of the district.
  - 11\* Information on the "teardrop" light fixture head was provided. The applicant is not proposing this option because of the higher light level, and the circular lighting pattern which puts light onto private property, not just the right-of-way.
  - 12\* Sodium vapor fixture heads are a technology being phased out of use.
  - 13\* Information on other styles of lighting fixtures and heads was provided by a speaker at the January 2016 hearing.

14\* A historic photo of a streetlight in Oakwood was provided.

The motion was seconded by Ms. David; passed 5/0.

Decision on the Application

Mr. David made a motion that the application be denied.

The motion was seconded by Ms. Webb; passed 5/0.

Committee members voting: Caliendo, David, Davis, Smith, Webb.

[Home](#) » High-Intensity Discharge Lighting Basics

# High-Intensity Discharge Lighting Basics

August 15, 2013 - 5:59pm



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High-intensity discharge (HID) lighting can provide high efficacy and long service life, and both HIDs and LEDs can save significant energy when they replace **incandescent** lighting. In a high-intensity discharge lamp, electricity arcs between two electrodes, creating an intensely bright light. Mercury, sodium, or metal halide gas acts as the conductor.

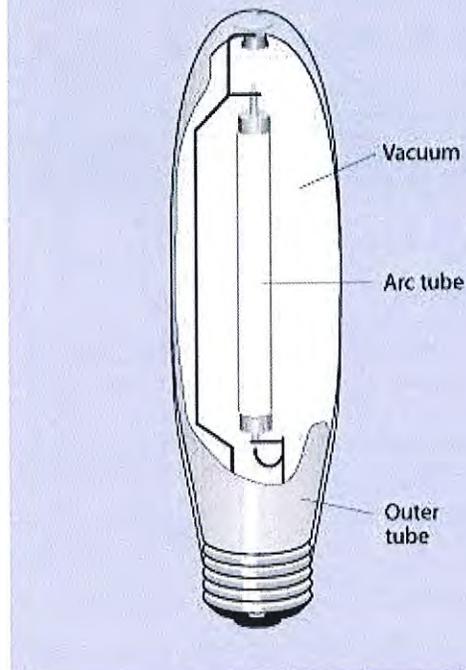
HID lamps use an electric arc to produce intense light. Like **fluorescent lamps**, they require ballasts. They also take up to 10 minutes to produce light when first turned on because the ballast needs time to establish the electric arc. Because of the intense light they produce at a high efficacy, HID lamps are commonly used for outdoor lighting and in large indoor arenas. Because the lamps take some time to produce light, they are most suitable for applications in which they stay on for hours at a time.

HID ballast technology is very old and often highly inefficient. Interfacing HID with advanced controls is difficult and dimming is not practical. LEDs are rapidly displacing many traditional HID lighting markets, such as stadium and roadway lighting, because they turn on instantly and are easily dimmed and controlled.

The three most common types of high-intensity discharge lamps are:

- [Mercury vapor lamps](#)

## High-Intensity Discharge (HID) Lamp



In a high-intensity discharge lamp, electricity arcs between two electrodes, creating an intensely bright light. Mercury, sodium, or metal halide gas act as the conductor.

- [Metal halide lamps](#)
- [High-pressure sodium lamps](#)

## MERCURY VAPOR LAMPS

Mercury vapor lamps—the oldest types of high-intensity discharge lighting—were formerly used for street lighting, but are now only rarely used for that purpose. Nearly all new lamps sold in North America today for street lighting are either metal halide or LEDs, which have also displaced mercury vapor lamps in sports arenas and gymnasiums. Mercury vapor lamps provide about 50 **lumens** per watt, but ballast loss can reduce the system efficacy to about 30 lumens per watt, which is not competitive with LEDs.

## METAL HALIDE LAMPS

Metal halide lamps produce a bright, white light with the best **color rendition** among high-intensity lighting types. They are used to light large indoor areas, such as gymnasiums and sports arenas, and outdoor areas, such as parking lots.

Metal halide lamps are similar in construction and appearance to mercury vapor lamps. The addition of metal halide gases to mercury gas within the lamp results in higher light output, more **lumens** per watt, and better color rendition than from mercury gas alone.

## HIGH-PRESSURE SODIUM LAMPS

High-pressure sodium (HPS) lighting is a type of high-intensity discharge lighting used for street and outdoor area lighting, parking garages, and some industrial applications. Although HPS lamps can be efficient and long-lasting, they typically have poor color rendering compared to other lamp types, and are being displaced by LEDs in many applications.



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The Energy Policy Act of 2005 (EPACT 2005) and the Energy Independence and Security Act of 2007 (EISA 2007) issued directives to the Secretary of Energy to carry out a Next Generation Lighting Initiative to support SSL R&D. The legislation directs DOE to support research, development, demonstration, and commercial application activities related to advanced SSL technologies. In order to effectively fulfill the directives in [EPACT 2005](#) and [EISA 2007](#), DOE developed a comprehensive national strategy to build collaborative efforts with the lighting industry and research community to guide SSL technology innovation. The DOE SSL program has been deeply involved in SSL R&D for over a decade—challenging industry with aggressive reach goals for efficacy and performance, and monitoring emerging products to identify performance issues early on, alerting manufacturers to needed improvements.

Despite rapid advances, SSL technology is actually in its early years. When it comes to U.S. energy savings, almost 95% of its potential remains untapped. Continued innovation and breakthroughs in materials, processes, product designs, control systems, and manufacturing are still needed to realize the full potential of the technology.

SSL products are now available for most lighting applications, from living room table lamps to high power sports stadium lights. Today's products can match or exceed the performance and energy efficiency of the most efficient conventional lighting technologies, including fluorescent and high intensity discharge sources. However, unlike conventional sources, SSL technology still has significant room for additional performance and efficiency improvements, through improved materials, optics, electronic design, system intelligence, and advanced controls.

DOE's role is to work closely with the industry and lighting user/specifier community to realize this **full potential**, rather than settling for "good enough." Potential benefits include cutting U.S. lighting-related energy use by 75% by 2035, along with related environmental protection, improved lighting quality and service, multi-use technology breakthroughs, economic savings, job creation, and U.S. technology leadership.

### RESEARCH AND DEVELOPMENT THRUSTS

SSL program R&D investments span the spectrum from core technology research and product development to manufacturing and technology application R&D.

- **Core technology research projects** focus on applied research for technology development, with

particular emphasis on meeting efficiency, performance, and cost targets. Conducted primarily by academia, national laboratories, and research institutions, this scientific research fills technology gaps, provides enabling data, and significantly advances the knowledge base.

- **Product development projects** use the knowledge gained from basic or applied research to develop or improve commercially viable materials, devices, or systems. Conducted primarily by industry, technical activities focus on a targeted market application with fully defined price, efficacy, and other performance parameters necessary for the success of the proposed product.
- **Manufacturing R&D projects** seek to reduce costs and enhance quality in SSL products, addressing the technical challenges that must be overcome to enable SSL to compete with existing lighting on a first-cost basis. Focus is on significant leaps forward in manufacturing equipment, processes, or monitoring techniques, and on fostering U.S. leadership in SSL manufacturing.
- **Technology application R&D projects** monitor SSL technology advances and provide field and laboratory evaluations of emerging products, particularly LED lighting systems that involve advanced controls. Impartial, trusted analysis from DOE identifies and characterizes technology problems early on, alerting manufacturers to needed improvements, and helping to put detailed information into the hands of buyers. In contrast to a single project focus, technology application R&D projects address broad issues related to technology performance, with a view that spans the entire industry. This approach creates highly effective feedback loops, inducing manufacturers to make technology improvements with their own funding, more quickly than would otherwise occur. It also feeds back into DOE planning for R&D priorities, allowing DOE to make better informed decisions on R&D investments.

## PARTNERSHIPS

DOE's SSL program strategically partners with private industry and industry associations to accelerate the development of SSL. DOE's partnership with the Next Generation Lighting Industry Alliance (NGLIA) enhances the manufacturing and commercialization focus of the DOE portfolio by utilizing the expertise of this organization of SSL manufacturers. DOE partners with the Illuminating Engineering Society of North America (IES) and the International Association of Lighting Designers (IALD) to provide their professional designers and specifiers with specific, actionable technical information they can use to ask tough questions of their vendors, and thereby exert significant influence on technology development. Together, DOE, IALD, and IES sponsor the [Next Generation Lighting Systems](#) competition to encourage innovation and education on leading-edge LED lighting solutions. [Learn more.](#)

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Home » LEDs: The Future of Lighting is Here

# LEDs: The Future of Lighting is Here

February 27, 2012 - 1:19pm



So, what does the little indicator light on your cell phone, a street light, an exit sign, and the common household light bulb have in common? If your answer is that light emitting diode (LED) technology can power all these things, then you're pretty bright.

LEDs are a form of **solid state lighting**. Once the **new kid on the block**, LEDs have emerged as one of today's most energy-efficient and rapidly growing technologies. There are a wide variety of **LED products** available in the market, with the technology found in automobiles, computers, televisions, **recessed downlights in the kitchen**, flashlights, and holiday lights. **LEDs are different than other types of lighting** in that they last longer and save more energy and money. They also emit almost no heat. By comparison, inefficient incandescent lighting gives off 90% of their energy as heat.

In **comparing energy-efficient light bulbs with incandescent bulbs**, if you pay \$8 to light a space in your home with a traditional bulb, you would pay about \$2 to light the same space with an LED. ENERGY STAR-qualified LEDs use only 20%–25% of the energy and last up to 25 times longer than the traditional incandescent bulbs they replace. While LED light bulbs are more expensive at this stage, as with other electronics, prices are coming down as more products enter the market.

In the outdoor lighting space, **LEDs are aiding in the sustainability initiatives of corporations and municipalities**. WalMart now uses LED technology to meet **voluntary energy-saving specifications** for high-efficiency parking lot lighting, and is upgrading more than 250 existing lots. The company reports energy savings of 58% compared with ASHRAE Standard 90.1-2010, a widely used commercial building code. **In comparing the performance of LED roadway lighting with high-pressure sodium (HPS) lighting in New York City**, LEDs showed energy savings from 26 to 57%. Other major organizations, such as Lowe's, MGM Resorts International, and the U.S. General Services Administration are also considering upgrading their lighting to cut costs, reduce energy use, and increase their competitiveness.

As the adoption of LEDs grows, their energy saving potential can be enormous for the nation. According to a recent DOE report, by 2030, energy savings nationally from LEDs can be up to 300 terawatt-hours, or the equivalent annual energy output of about 50, 1,000 megawatt power plants. These energy savings would also reduce greenhouse gas emissions by 210 million metric tons of carbon, and decrease the electricity consumption equivalent to powering 24 million homes.

For more information on LEDs, check out our [LED Lighting page](#) and the [Solid State Lighting](#) website.



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REPORT SUMMARY:

## Energy Savings Forecast of SSL in General Illumination

The U.S. Department of Energy (DOE) models adoption of light-emitting diodes (LEDs) in the U.S. general lighting market, along with associated energy savings, based on the full potential DOE has determined to be technically feasible over time. DOE's Solid-State Lighting Program is designed to achieve these technically feasible targets. The latest projections were released in September 2016, in the seventh edition of the biennial report, *Energy Savings Forecast of Solid-State Lighting in General Illumination Applications*.

### Key Takeaways

Here are highlights from the report, which uses an updated 2016 U.S. lighting market model and extends the forecast period to 2035 versus the 2030 limit used in past reports.

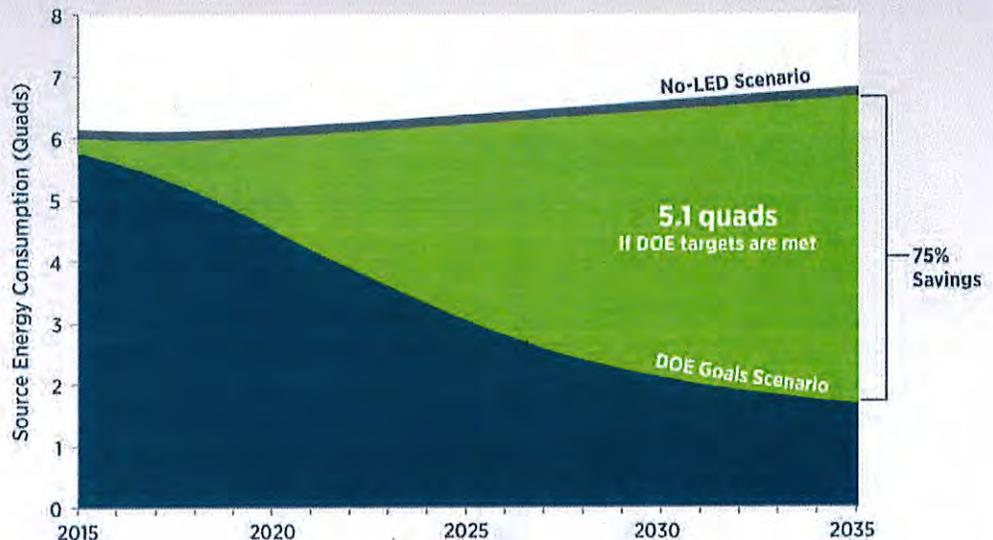
**Energy savings from LED lighting will top 5 quads annually by 2035.** SSL does not simply slow the rate of growth in energy consumption for lighting, it turns the consumption curve down, and that curve keeps going down through the extended forecast period. Annual savings by 2030 had been estimated at 4.5 quadrillion Btus (quads) in previous forecasts, essentially cutting U.S. lighting energy use in half compared to where it would have been if LED lighting had not entered the market. The newest projection steps up that estimated savings to 5.1 quads by 2035, representing a **75 percent** reduction in energy consumption versus a no-LED scenario. This savings of 5.1 quads is

equivalent to nearly the total annual energy consumed by 45 million U.S. homes today. Cumulative savings will amount to 62 quads between 2015 and 2035—equivalent to nearly \$630 billion in avoided energy costs.

**Energy savings in the near term also will be impressive.** Various forecasts conclude that LED lighting will have tremendous growth over the remainder of this decade, reaching anywhere from a quarter to upwards of 80 percent of lighting sales by 2020. DOE estimates that LEDs will constitute about 30 percent of U.S. lighting installations by 2020, which is on the conservative side compared to other forecasts. Regardless, the annual energy savings in 2020 estimated by DOE is substantial, topping 1.5 quads if DOE targets are met.

### TURNING DOWN LIGHTING ENERGY USE

U.S. energy savings attributable to LED lighting will reach 5.1 quads by 2035. Energy use for lighting in 2035 will be **75% lower** than it would have been if LEDs had not entered the market.



LED products will dominate every general lighting niche. By 2035, LED lamps and luminaires are anticipated to hold the majority of lighting installations in each of the niches examined, comprising 86 percent of installed stock across all categories. In 2015, LEDs represented only 6 percent of installed stock.

By far the biggest energy savings will come from four product categories plus connected lighting technology. As shown below, most of the 5.1 quads of projected energy savings by 2035 will be attributable to two

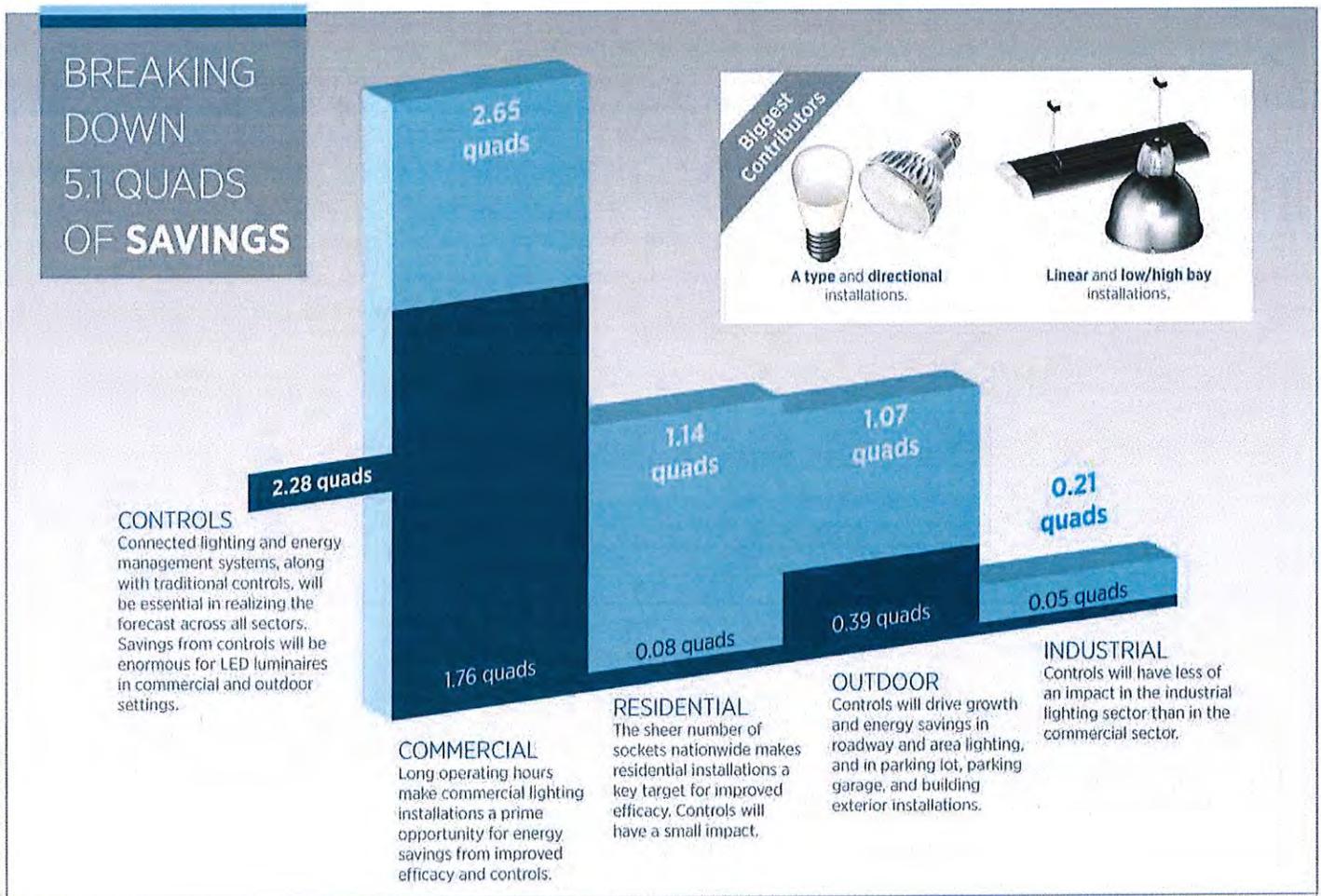
commercial lighting applications (linear and low/high-bay), one residential application (A-type), and one that crosses both residential and commercial (directional). Connected lighting and other control technologies will be essential in achieving these savings, accounting for almost 2.3 quads of the total.

it incorporates additional years of historical LED market share data. The enhanced model will be used not only in future Forecast reports, but also in DOE's biennial market-snapshot report, *Adoption of Light-Emitting Diodes in Common Lighting Applications*.

Read the full *Forecast* report at [energy.gov/eere/ssl/ssl-forecast-report](http://energy.gov/eere/ssl/ssl-forecast-report).

### Benefits of the Updated Model

The lighting market model used in this year's report is more finely calibrated and granular than previous models, since





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August 31, 2016

**Discontinuation of Metal Halide Luminaires**

Effective January 1, 2017, Current, powered by GE, will no longer supply metal halide luminaires. **This action does not impact metal halide replacement lamps nor does it affect HPS luminaires.** This discontinuation action is primarily due to national energy efficiency regulation changes that impact the sale of new metal halide luminaires effective in 2017 and the accelerated adoption of LEDs.

For customers traditionally using Metal Halide fixtures, we offer an extensive line of LED fixtures as energy-saving and low-maintenance alternatives. Please check our website at [www.currentbyge.com/products](http://www.currentbyge.com/products)

The new efficiency regulations do not eliminate replacement Metal Halide Lamps nor replacement Metal Halide Ballasts. For customers maintaining existing systems, replacement lamps will be available from our normal distribution channels. Typical fixture components such as replacement ballasts, capacitors and glass will continue to be offered, while supplies last (lead-times may vary). However, availability of all replacement parts cannot be guaranteed.

Lead-times for all high intensity discharge luminaires are 4-6 weeks.

Please feel free to contact your representative with your request or for additional information.

We value our relationship and thank you for your continued support.

Best Regards,

**Teresa Bair**  
Product GM - Outdoor & Industrial





## LIGHTING FIXTURE TRANSITION TO LED TECHNOLOGY

Duke Energy Progress (DEP) is a leader in providing quality outdoor lighting products and services to our customers. We work closely with our suppliers in order to provide long lasting products that can be maintained throughout their life cycle. When fixtures need to be replaced, our suppliers do their best to provide exact or equivalent replacement products that match both visually and functionally to the original. However, some of our product life cycles are coming to an end due to customer demand and legislative changes.

Customers may have noticed the rapid advancement and adoption of LED (Light Emitting Diode) lighting technology in recent years for home and business markets. This has happened for several reasons – product longevity and energy efficiency are only a few. As LED lighting products have increased in popularity, other lighting sources have become less attractive. These sources include High Pressure Sodium (HPS), Metal Halide (MH), and Fluorescent lighting. What about Mercury Vapor (MV) fixtures? MV products are being actively replaced on the DEP system with available LED equivalents for similar reasons.

Lighting manufacturers have evaluated the reduction in volume of HPS and MH products due to LED popularity and have begun discontinuing those product lines in response to higher LED engineering and production needs. These product phase outs affect DEP's ability to service or replace many of our popular HPS and MH lighting fixtures.

The Federal government has also played a part in changes taking place. The Energy Independence & Security Act (EISA) ruling in 2013 mandated higher efficiencies for Metal Halide lighting systems. This ruling will become effective February 10, 2017 and requires new ballast designs for most MH fixtures from 50 watts to 1500 watts. Design change costs and lower product demand could substantially increase the cost of these products. As a result, many lighting manufacturers have decided to stop offering MH products rather than redesign those systems to comply.

Based on the manufacturer and government decisions noted above, DEP Lighting is now offering equivalent LED products to replace most of the HPS and MH fixtures affected by these changes. We are working hard to provide a seamless transition for our customers to LED technology and will continue to support these new products for many years to come.

Thank you,

Duke Energy Progress Outdoor Lighting

August, 2016

March 2016

# Energy Efficient Lighting Guidance Document for New Construction and Retrofits: The State of North Carolina



## 1. BACKGROUND

These guidelines were developed to assist designers of public projects in the selection of solid-state lighting (SSL) products and installation techniques that, when properly chosen and implemented, will provide long-term reliable service and performance. This document collects information based on field experience and conveys best practices that should be considered in any solid state lighting design. The document is intended to be a general guideline and is not a standard or specification. However, all applicable state building codes and standards must be followed.

SSL luminaires and lamps, based on light-emitting diode (LED) light sources, have made tremendous inroads in the marketplace over the past several years and have saved building owners significant amounts of money in reduced energy bills, lower maintenance requirements, and longer lifetime or useful life. This technology will be referred to as LED lighting throughout this document. The cost to purchase and install LED lighting has plummeted over the past few years, making it a viable choice for designers and building owners. The technology has matured and is a wise choice for many projects. However, as with any new technology, there are growing pains. Many owner representatives of State buildings would like to include LED lighting in their projects, but have been hesitant to do so until guidelines were available to help them in the selection and specification so they can avoid problems reported by others. The purpose of this document is to take field experiences and apply scientific study into why they worked as expected and why they sometimes did not. In their ongoing efforts to encourage State buildings in North Carolina to lead by example, the Department of Environmental Quality (DEQ) Utility Savings Initiative and the State Construction Office (SCO), in collaboration with RTI International have teamed up to develop these guidelines that designers and owners can use to help them make informed decisions when selecting LED products and system designs.

This document is organized with a discussion of the basic principles of good lighting design and the basic principles of good building designs regarding LED lighting in new construction followed by a section on LED lighting in retrofit projects. The topics of good lighting design and building design apply to both. New construction offers more flexibility in providing infrastructure (e.g., wiring, branch circuits) more amenable to LED luminaires, whereas retrofits utilize existing infrastructure and may not have the same flexibility in system design.

This document also provides information on LED luminaires that could be used in indoor and outdoor lighting. Performance expectations for energy efficient indoor and outdoor luminaires are given in Appendix C.

applications it is also very important that the calculations be provided to avoid high max to min uniformity ratios.

## 2.2 Correlated Color Temperature (CCT) and Color Rendering Index (CRI)

The lower the CCT value, the warmer the perceived color of the light. Likewise, the higher the CCT value, the cooler the perceived color of the light. Daylight (CCT often greater than 5000 K) and moonlight (CCT ~ 4100K) are considered cool light sources, whereas incandescent lamps are warm white (2700K). The designer needs to make sure that the light color is appropriately chosen for the application. A CCT value of 3000K–3500K may be suitable for general use in residential space and dorm rooms or a casual eating establishment, whereas a CCT value of 3500K–4000K may be suitable for use in offices and classrooms. A CCT of 4000K or higher would be suitable for parking garages and other outdoor applications.

CRI is a metric that measures how accurately the lighting source reproduces colors in an object (red, blues, yellows etc.). The test color samples used for determining CRI are specified by CIE and consist of eight standard pastel colors (R1–R8 values). The CRI is an average of the color rendering properties of the eight pastels. In addition, saturated colors such as red, yellow, green, and blue have been added to the color rendering evaluation matrix, and the measurement values for these saturated colors are represented as R9, R10, R11, and R12, respectively. These additional color metrics were added to quantify the ability of a light source to render saturated colors. Incandescent lighting has a very high CRI (typically around 100), whereas high pressure sodium has a very low CRI (typically less than 30). LED light sources generally have good CRI. A CRI value of 80 or higher should be specified for indoor lighting and 70 or higher specified for outdoor lighting...

In evaluating LED sources, it is also important to evaluate the R9 (i.e., saturated red color) metric since some LED light sources can be deficient in red emissions. As a general rule, an R9 value of 20 or higher is acceptable for most indoor lighting applications, while values greater than 0 can be acceptable in most outdoor lighting installations. In instances where high visual acuity is needed, a higher CRI and R9 value may be required.

## 2.3 Luminance and Luminous Intensity

Individual LED light sources tend to produce an intense white light, and the fixtures using LED sources should have lenses, diffusers, and reflectors to shield or diffuse the light and minimize glare.

Consider local codes and standards when designing outdoor lighting systems. This is especially important in outdoor applications where glare and light trespass can be a problem.

# City of Raleigh Municipal Garage LED Lighting Pilot Project



Raleigh, NC  
May 24, 2007



## Municipal Garage Pilot Results

### Energy Usage and Savings

LEDs are semiconductor devices that are experiencing very rapid improvements in performance, both brightness and efficiency. Due to this rapid progress, LEDs now surpass the efficiency of most conventional light sources. In addition, the construction of packaged LED lamps allows light fixture manufacturers to optimize the light emitted by the devices in the fixture thereby increasing the efficiency of the fixture itself, and delivering more “useful” lumens to the application.

This inherent efficiency allows LED lighting solutions to provide significant energy savings in many lighting applications, such as the garage installation described above. To validate the energy savings provided by the municipal garage LED lighting installation, the City of Raleigh and Cree enlisted the participation of the local Raleigh electrical utility, Progress Energy, [www.progress-energy.com](http://www.progress-energy.com).

Progress Energy measured the total load of the HPS fixtures, at steady-state, using a Metrosonics POA9 Plus load meter. The steady-state load of the HPS fixtures was 120 watts each. They then measured the load of the LSG LED fixtures, and determined a steady-state load of 70 watts each. This shows a forty percent (40%) decrease in the power consumption of the fixtures in the municipal garage.

In addition, as shown in the load chart below, the power factor improved dramatically by using the solid-state power supplies in the LED fixtures.

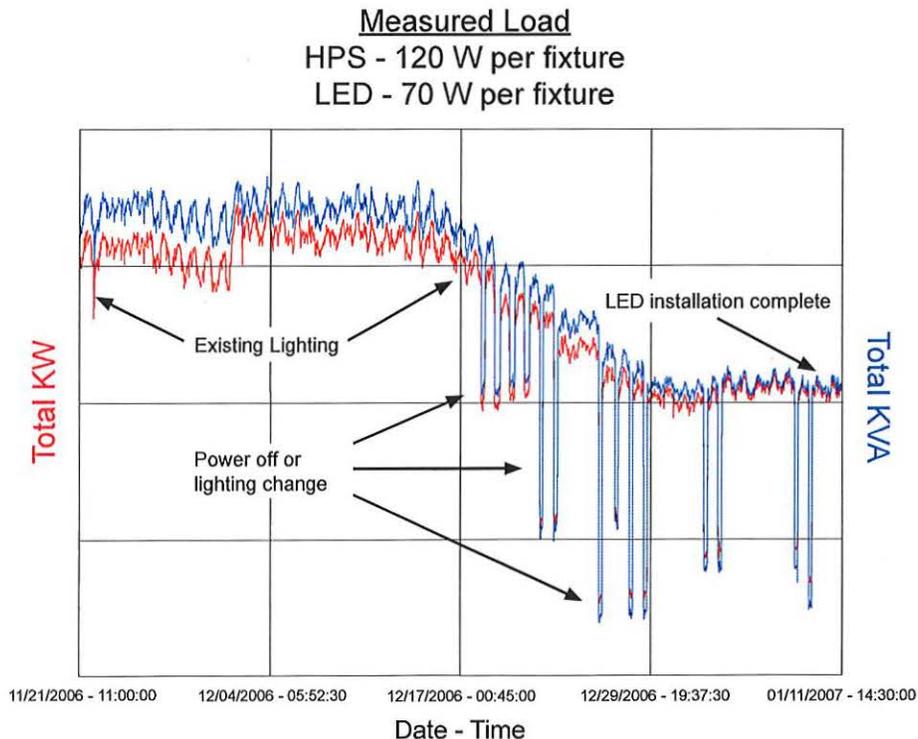


Figure 5

Based on Progress Energy’s measurements, each LED fixture is saving fifty watts (50W) of electricity over the HPS fixture it replaced. As described earlier, level three of the garage contains 141 fixtures, and assuming twenty-four-hour-a-day operation, this would result in approximately 170 kilowatt-hours (KWh) of savings per day.

The municipal garage, however, employs a photocell sensor and associated controls to turn a portion of the lights off during daylight hours. This reduces the power consumption during the day when ambient daylight reduces the need for the garage lights. This type of control is applicable for aboveground garage structures, but cannot be used in the underground portions of the garages.

Of the 141 fixtures in the garage, 69 fixtures are controlled via the photocell sensor, and hence operate an average of 12 hours-a-day year-round. Therefore, the projected reduction in electricity usage for level 3 of the garage is approximately 128 kWh per day, or 46,720 kWh per year.

As noted earlier, the performance of the LED technology employed in the LED fixtures used in this trial has been surpassed by LEDs introduced in the past six months. In fact, the efficiency of the current generation of Cree LEDs is over 75% higher than the LEDs used for the municipal garage installation. This improved efficiency and performance can help to deliver electrical savings of approximately 70% over the HPS fixtures originally installed in the garage.

Therefore, LED fixtures containing the current generation of LED technology could deliver electricity savings for level 3 of the municipal garage of up to 82,000 kWh per year.

#### Maintenance Savings

LEDs have very long service lifetimes, and are projected to maintain over 70% lumen maintenance after 50,000 hours of service. In a twenty-four hour-a-day application, this translates to 5.7 years, and in a twelve hour-a-day application, such as with the photocell control, it translates to 11.4 years. Moreover, after 100,000 hours of service, lumen maintenance is projected to be approximately 50%. This translates to 11.4 years assuming twenty-four hour-a-day operation and 22.8 years for twelve hour-a-day operation.

Due to the long service life, the use of LED fixtures can eliminate the need for bulb replacements for the service life of the fixture thereby saving not only the cost of the bulbs, but also the cost of the labor required to change them. Current solid-state power supplies are designed to last the life of the fixture. This also eliminates the equipment and labor costs of replacing ballasts, as is required with traditional fixtures.

LEDs, unlike many traditional light sources, are very tolerant of ambient temperature variations, vibrations and on/off cycles. In parking garage applications, traditional light sources often fail due to the inhospitable environment, necessitating frequent replacements.

Also, since LED light fixtures are not designed to allow traditional bulb replacement, the fixtures can be tightly sealed thereby preventing the accumulation of dirt, insects and moisture on the inside of the diffuser or lens cover. This serves to essentially eliminate the need for time-consuming disassembly and cleaning of the fixture lens as is usually required with traditional lighting fixtures. The only cleaning that may be required, depending upon the environment, is to clean the outside of the lens or diffuser.

From these observations, the City of Raleigh has estimated that they can save approximately 95% of the annual lighting maintenance budget allocated to this level of the parking garage. The labor savings from this reduction in required maintenance frees City employees to address other critical needs within the City.

for the fixtures that operate 24 hours a day and would allow the fixtures controlled by the photocell system to return energy savings for an additional five years of service. Of course, this analysis only considers the direct economic costs and does not account for the qualitative and environmental benefits of using LED lighting.

### Outlook

LED performance is improving rapidly each year, and LEDs are already commercially available that are 75% more efficient than those used in the municipal garage fixtures. In addition, manufacturers are only now beginning to explore volume production of commercial LED light fixtures. As the technology continues to improve, and the fixture volumes increase, we can expect to see lower prices for LED fixtures. These developments may yield a markedly improved economic business case for LED lighting deployment.

Based on the results of the Raleigh analysis, any new construction project or retrofit utilizing low bay lighting should consider LED fixtures competitively with standard technology (particularly in regions of the country where the cost of electricity is substantially higher than Raleigh's). Communities should also consider financing mechanisms that allow the full life-cycle cost to be considered in the up-front procurement decision process. It does not appear at this time that the cost savings utilizing LED fixtures justify retrofitting existing facilities where the current light source has not reached the end of its usable life, unless such a retrofit is to be done based on the quality of light, not the economics of operating the facility. As the pricing structure of these fixtures and the efficiency of the LEDs within them changes, retrofit may become an increasingly attractive alternative, particularly in underground parking or other applications where 24/7/365 lighting is essential.

### Conclusion

The Raleigh municipal garage pilot has been a successful test of LED lighting and has led to the City's decision to incorporate LED fixtures into a new 900+ space underground parking structure currently under construction. The expected electricity savings have been validated, as well as the significant improvement in the light quality over the incumbent HPS technology. As shown by the customer survey, the LED lighting also delivered a much improved user experience.

There is a rapidly-changing environment for LED lighting technology and products, as well as wide variations in electricity rates and maintenance costs between regions of the country and of the world. Because of this, individual project-by-project evaluations of potential LED lighting deployment in parking-structure applications should be undertaken.

That being said, it is clear from this pilot study that LED lighting provides very large opportunities today to save very significant amounts of electricity and maintenance costs. Beyond the economic considerations, deployment of LED lighting also reduces the impact on the environment of the City's parking operations, both by reducing the pollution from generating electricity and by reducing the waste from used light bulbs, improves the feeling of personal safety experienced by users of the garage and delivers higher quality light than the incumbent technology. In addition, unlike some traditional light bulbs, LEDs do not contain harmful lead or mercury, which further reduces the potential environmental impacts.

Last updated Feb. 04, 2016 - 2:43 pm

Thank you for printing this page from the City of Raleigh's Official Website ([www.raleighnc.gov](http://www.raleighnc.gov)).

## Light-Emitting Diodes in Raleigh

Light-Emitting Diodes (also known as LEDs) represent an emerging solid-state technology that has revolutionized lighting. LEDs produce light more efficiently than standard incandescent bulbs, fluorescent lights, and other technologies such as high pressure sodium lamps and metal halide lamps commonly used in outdoor lighting.

Manufacturing LEDs creates no toxic waste products due to their long lifetime and ability to dramatically reduce energy consumption; LEDs are an emerging energy saving technology for the future. LEDs are also directional lights with full cutoff and very little light spillover.

The City of Raleigh has developed a partnership with Cree, Inc. of Research Triangle Park to test this new technology in municipal settings. Cree is an innovator in the field and has been responsible for many of the technological leaps that have made LED lighting viable for a variety of interior and exterior lighting applications.

In 2006, Raleigh agreed to become the first LED City, a program that Cree has expanded to municipalities across the world. The purpose of LED City is to encourage municipal governments to test this emerging technology in real world settings and share their experience with others.

Since 2006, Raleigh has installed over 40 separate LED projects across the City, including outdoor lighting for City parks, interior lighting, solar LED lighting, streetlights, and lighting in parking decks. These projects are estimated to be generating approximately \$215,000 per year in energy and maintenance savings for the residents of Raleigh.

City Plaza is a showcase of LED lighting, with the four City of Oaks towers, the Art Screens at the southwest and northeast corners of the plaza, and the interactive fountain showing off decorative colored LED lighting, while the bollards and landscape lighting utilize white general lighting. Raleigh's and Cree's leadership in the LED field is dramatically illustrated by the iconic Cree Shimmer Wall adorning the west face of the Raleigh Convention Center.

Raleigh and the Research Triangle area represent a center for research into this emerging technology. The US Department of Energy is encouraging research into LED technology for use in general illumination.



*Cree Shimmer Wall at the Raleigh Convention Center*

### LED Streetlight Pilot Project

The most recent LED pilot project involves street lighting in five Raleigh neighborhoods.

[Learn more about LED Streetlight Pilot Project \(/environment/content/AdminServSustain/Articles/LEDStreetlightProject.html\)](http://environment/content/AdminServSustain/Articles/LEDStreetlightProject.html)

### Solar LED Lighting

Solar LED Lighting is a simple energy-saving system using solar panels directly attached to the tops of light fixtures. These panels collect the sun's rays during the day and use it to power lights at night, removing them from the local electric utility grid.

This efficient use of lighting has become a cost-effective and resourceful use of solar technology.

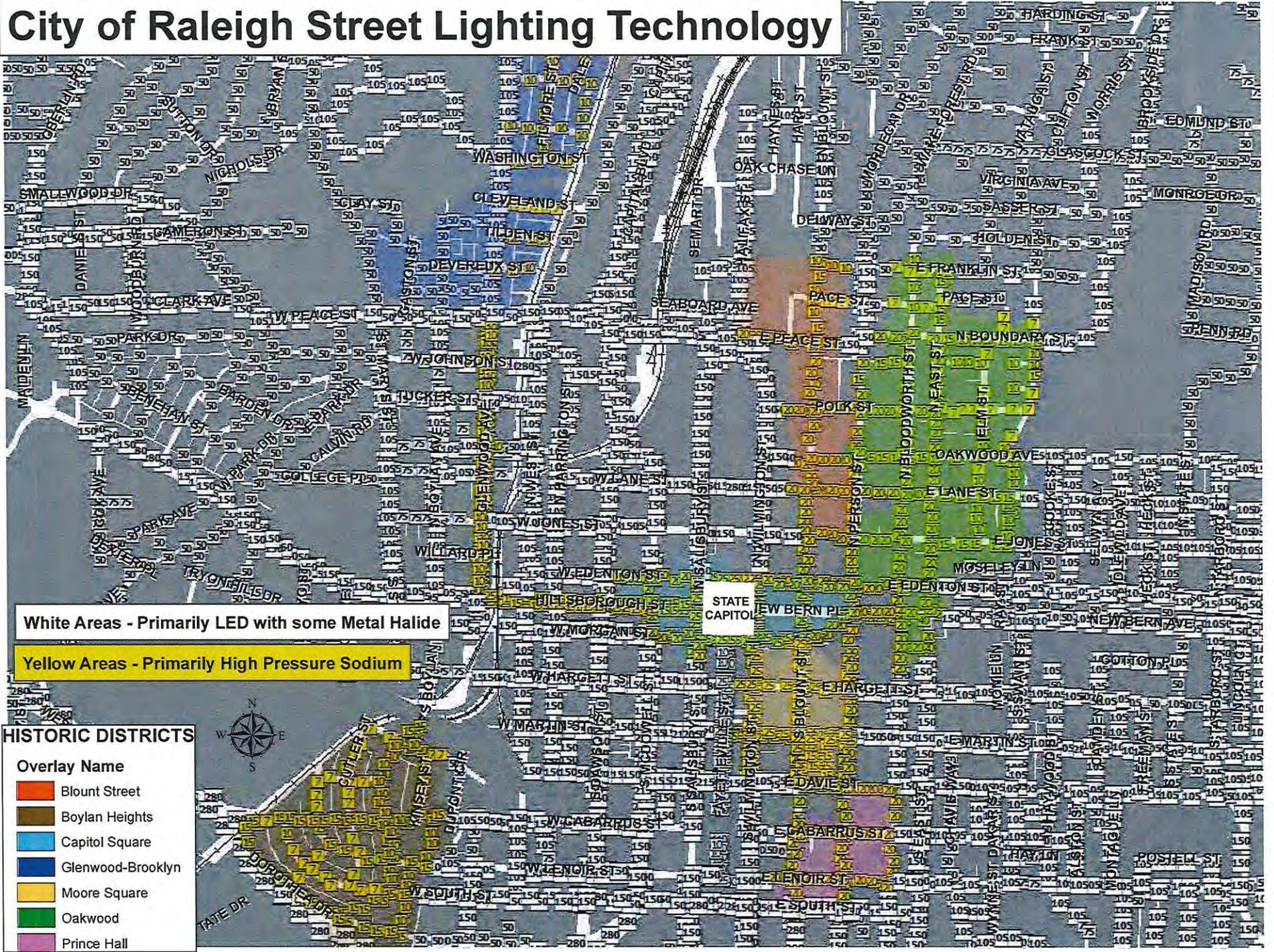
The City of Raleigh was the first North Carolina municipality to install solar-powered LED street lights in these locations:

- Marsh Creek Operations Center
- Campbell University Parking
- Raleigh Convention Center Amphitheater
- Brentwood Road Operations Center
- Wilkerson Park



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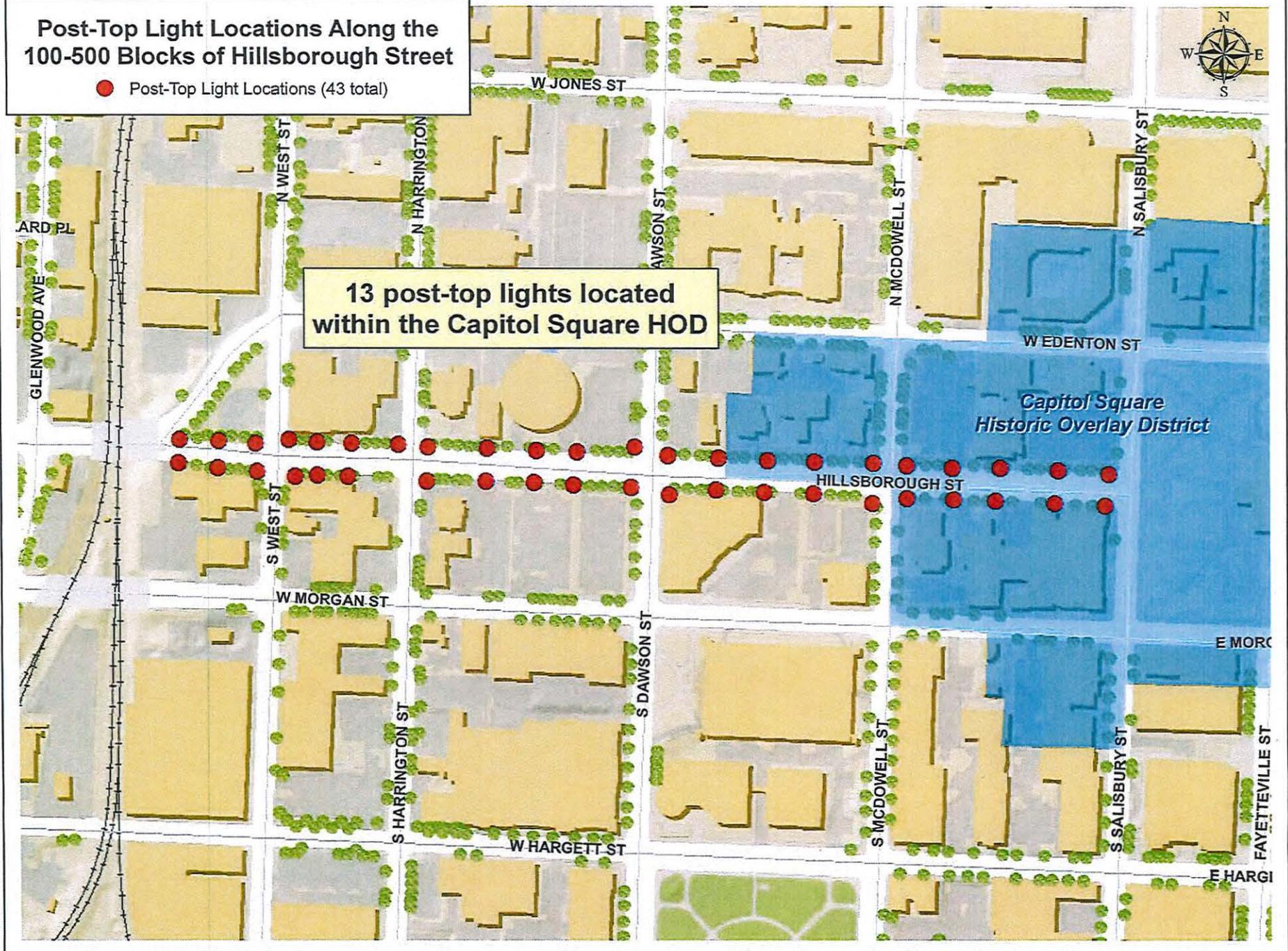
# City of Raleigh Street Lighting Technology

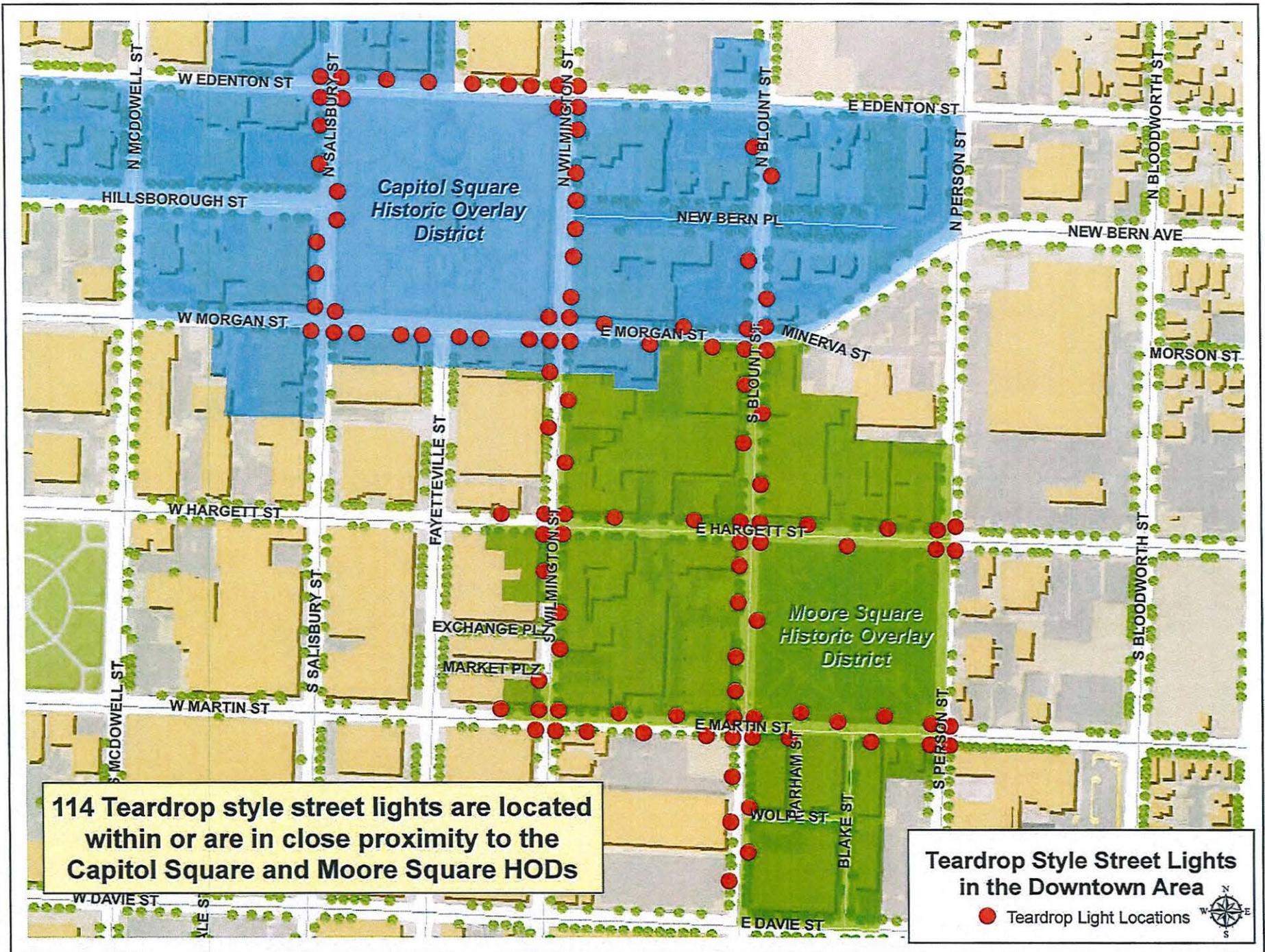


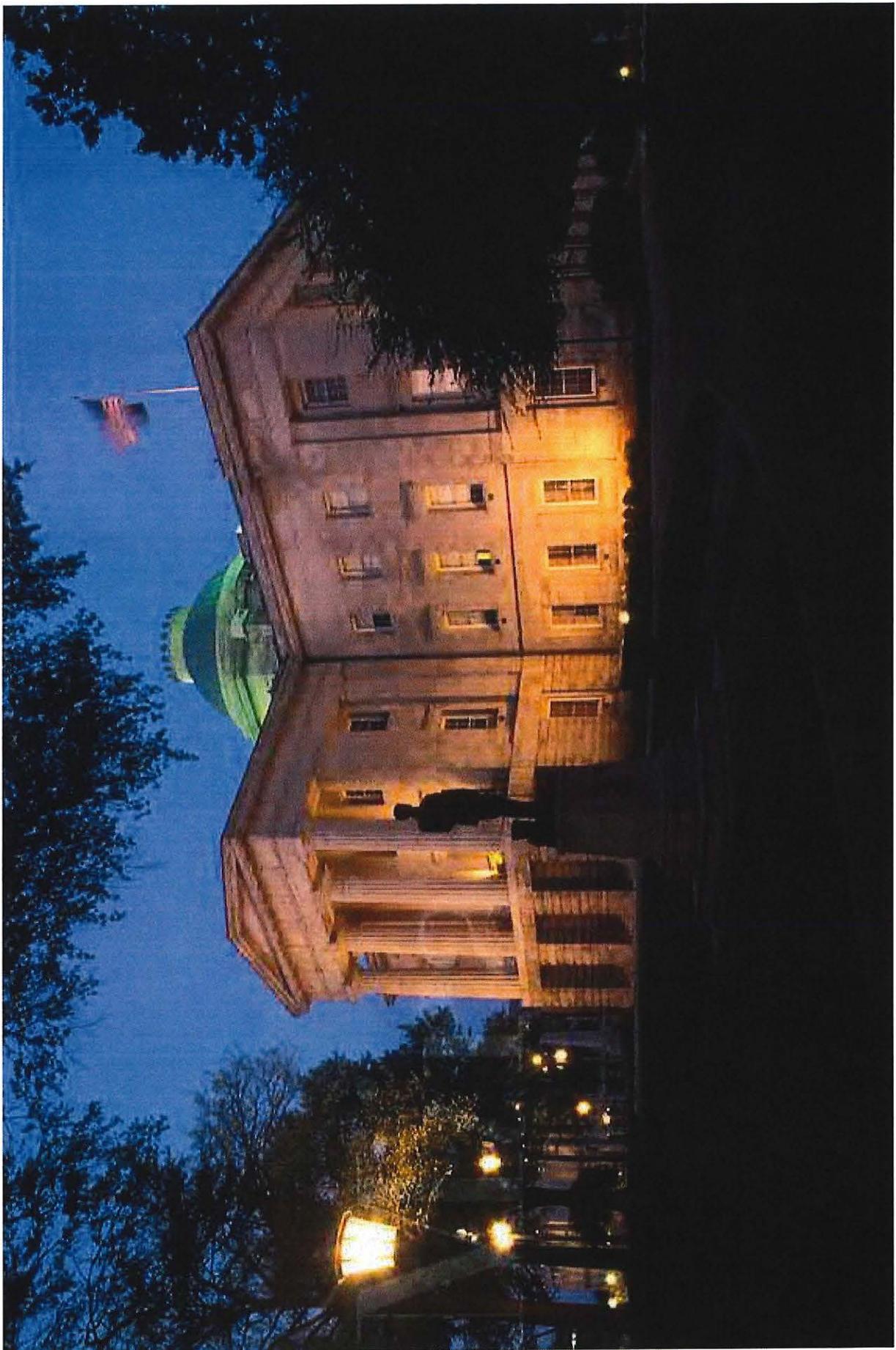
# Post-Top Light Locations Along the 100-500 Blocks of Hillsborough Street

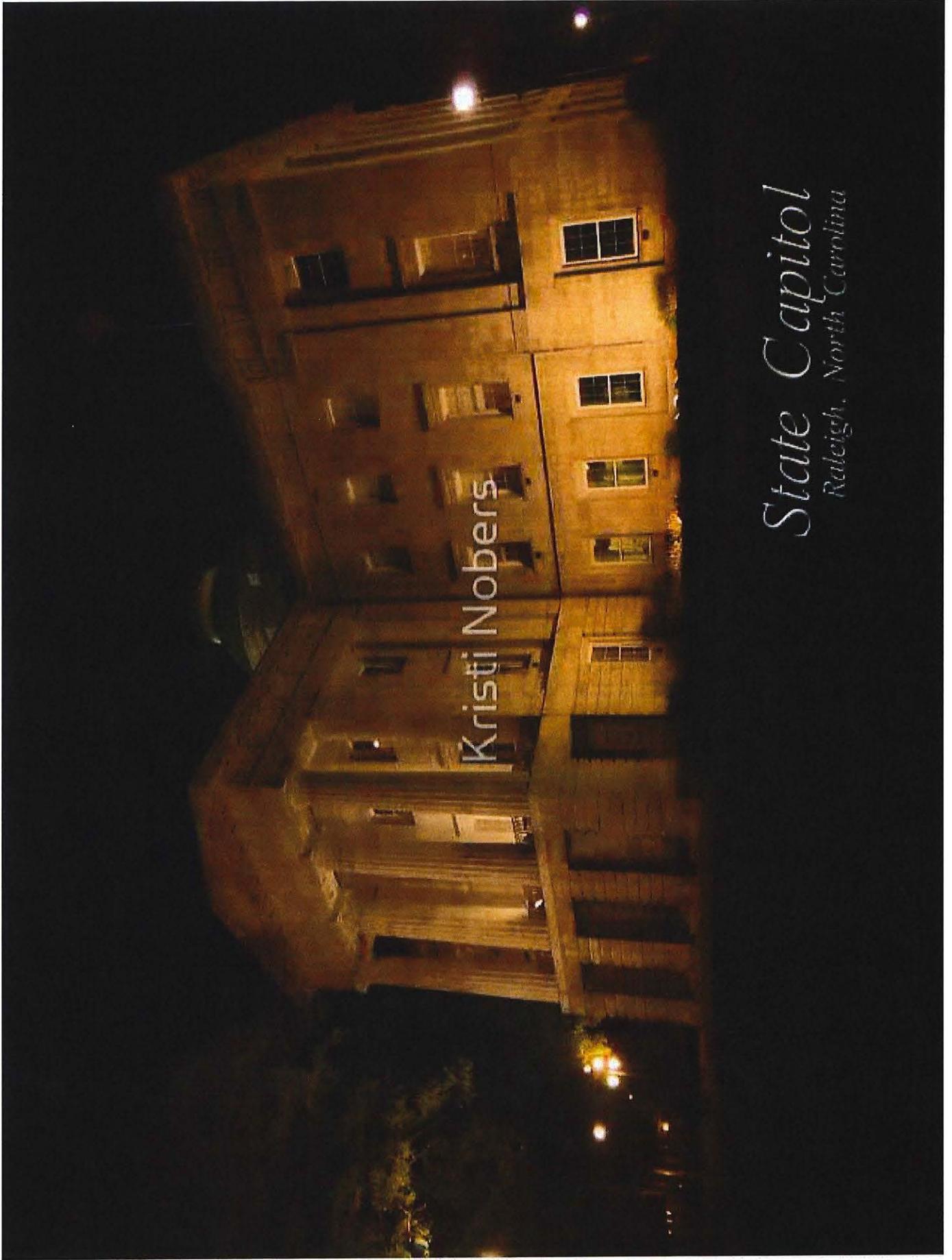
● Post-Top Light Locations (43 total)

13 post-top lights located within the Capitol Square HOD





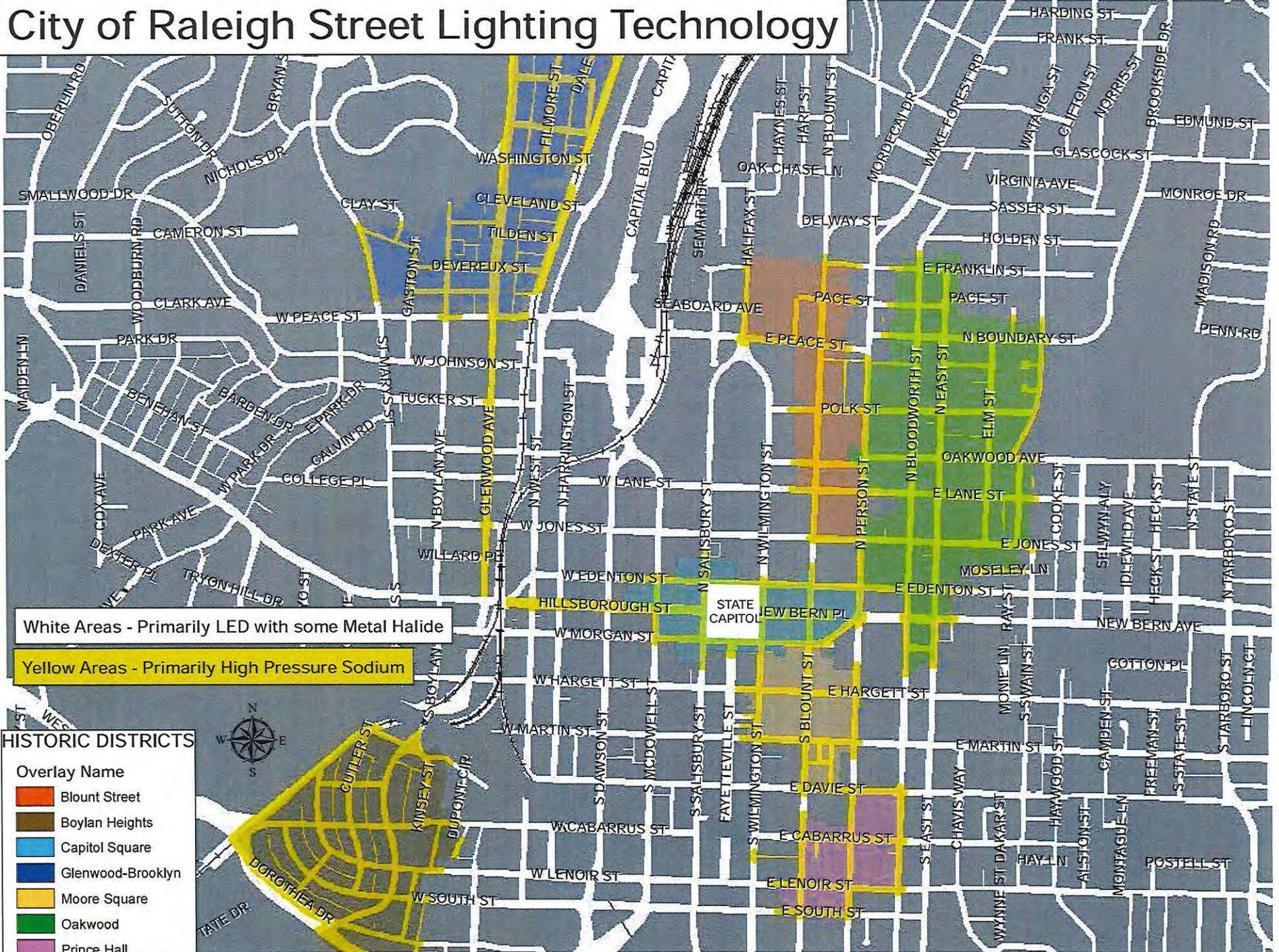




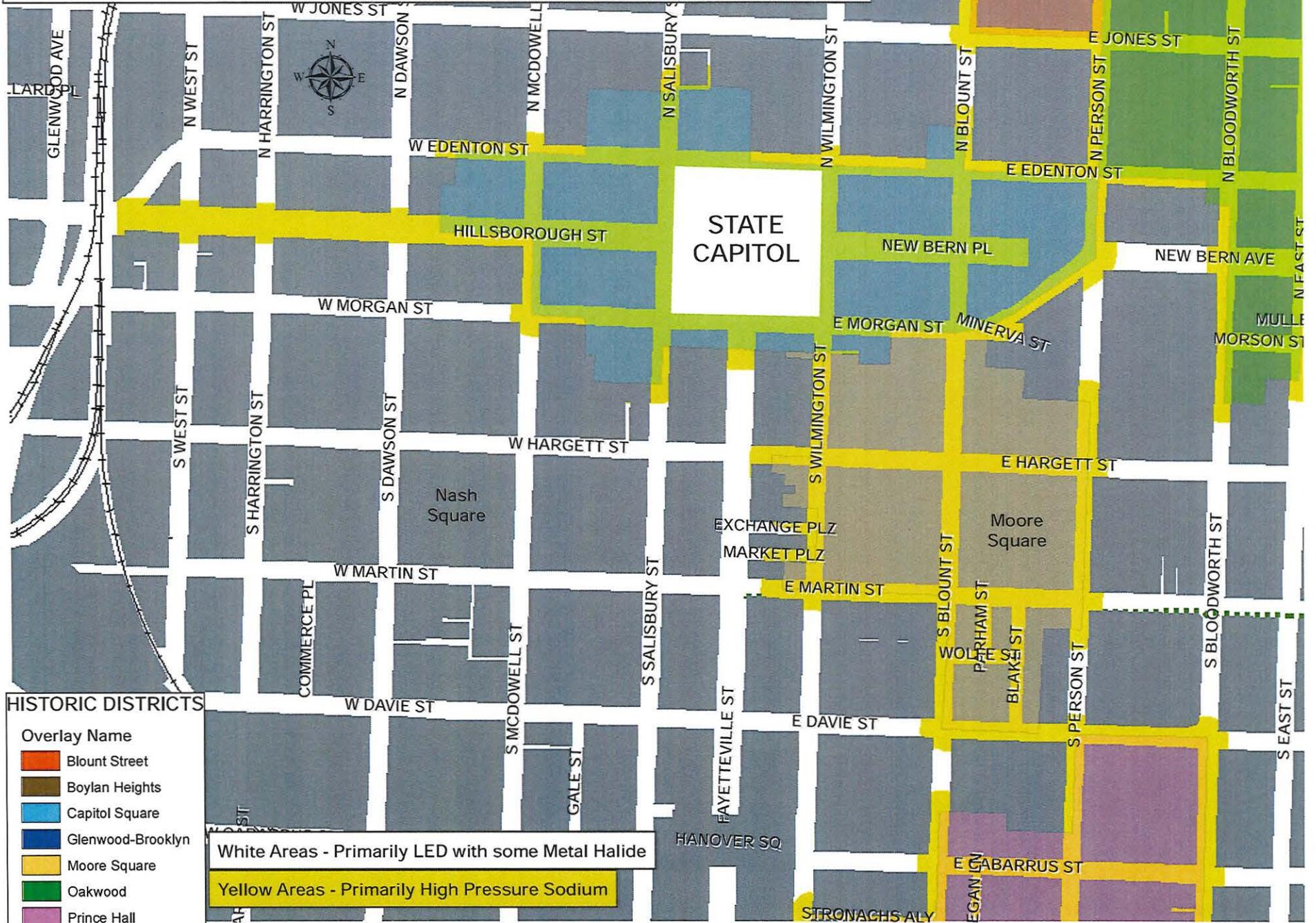


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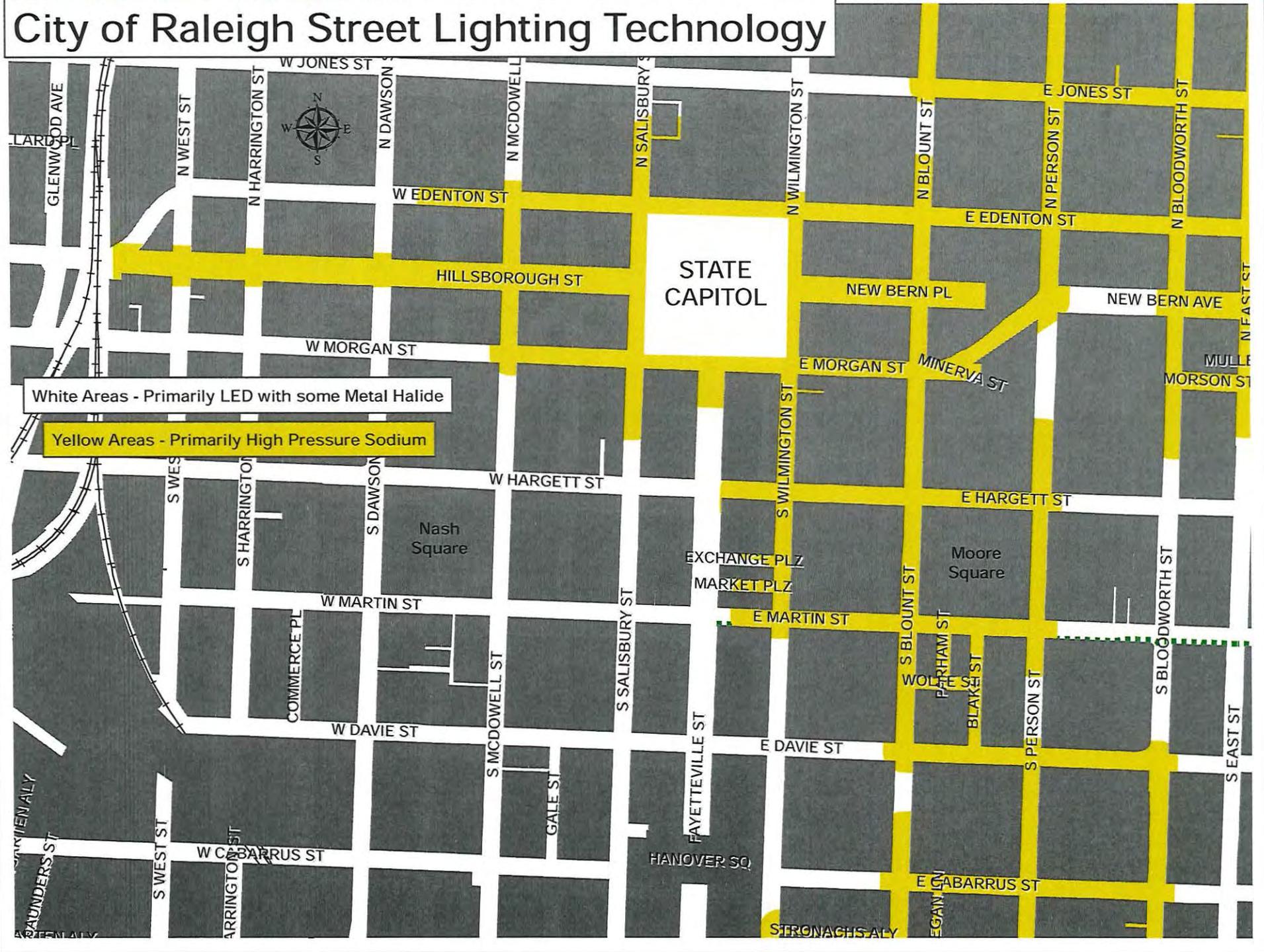
# City of Raleigh Street Lighting Technology



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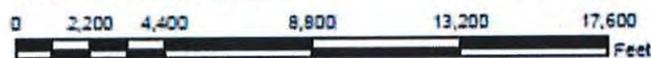
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  -  All Other Streets
  -  Wake County Line
  -  Raleigh City Limits
  -  Raleigh ETJ

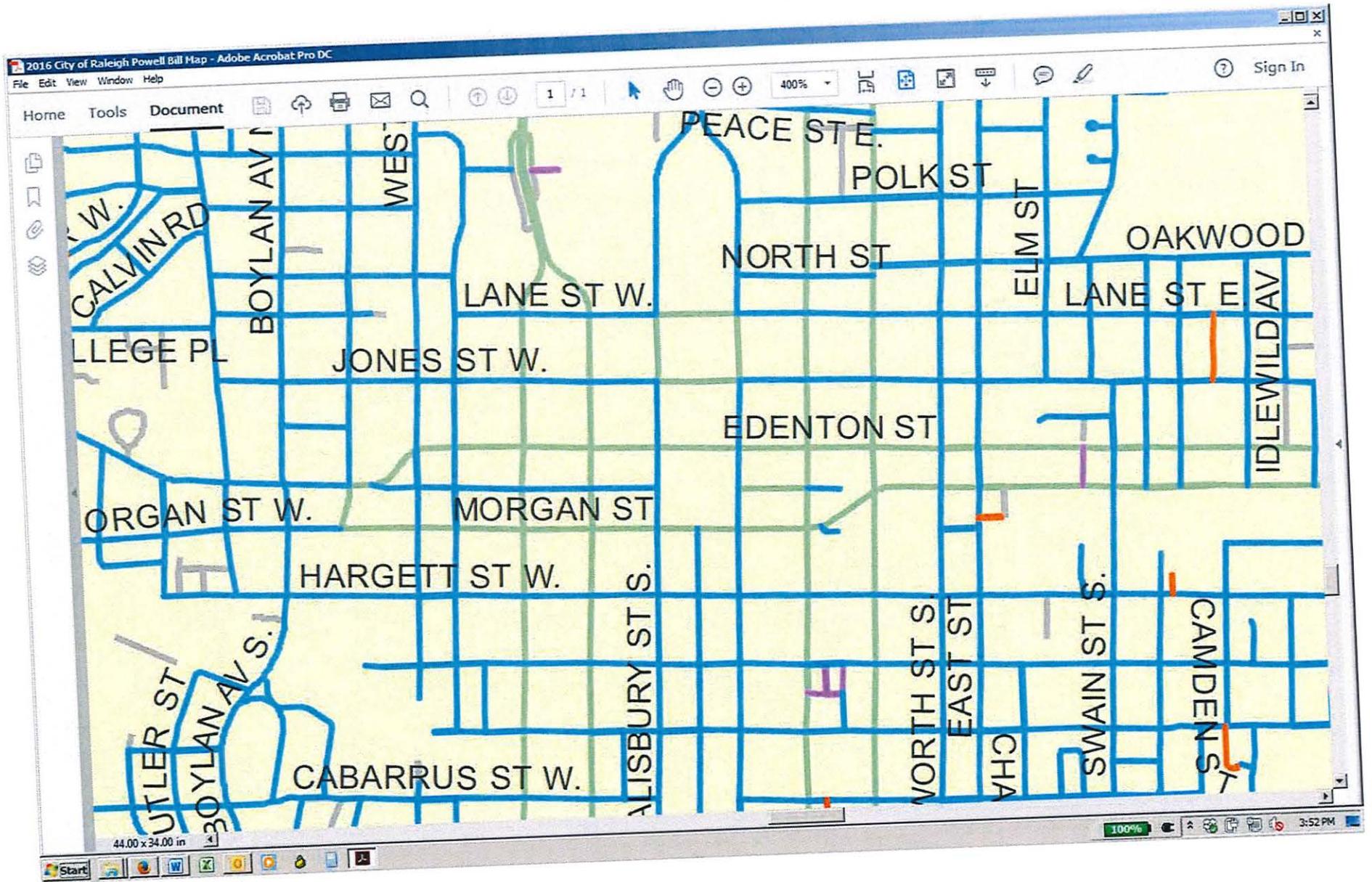
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Paved Streets	1085.61 Miles
Soil, Stone, or Gravel Surfaces	4.86 Miles
Total Miles	1090.47 Miles
State Streets in City Limits	264.69 Miles



1 Inch = 3,000 feet

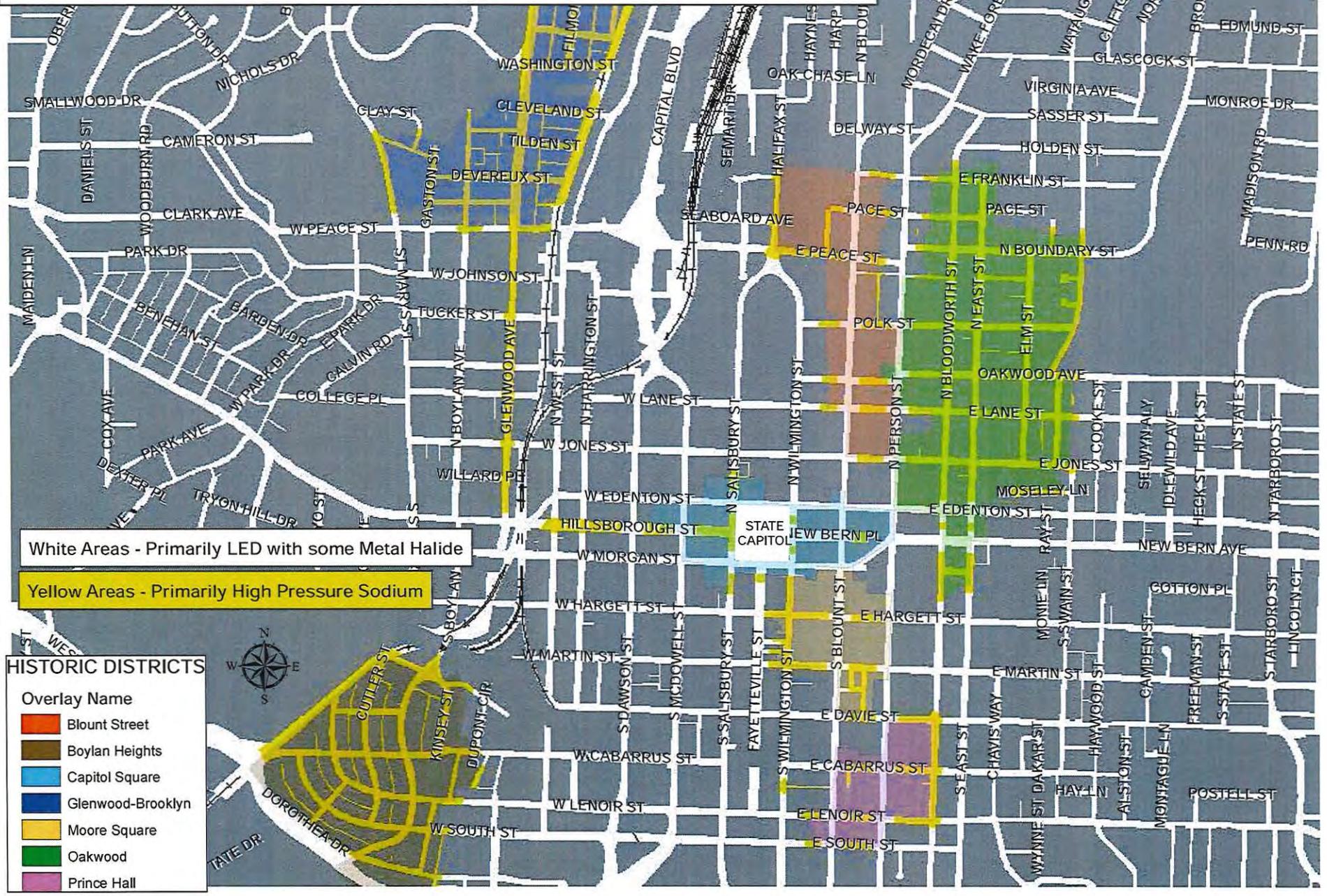
Transportation Field Services Division  
July 6, 2016



**§ 143-345.5. Program for location and construction of future public buildings.**

The Department of Administration is hereby authorized, empowered, and directed to formulate a long range building policy program and shall cooperate with the governing board of the City of Raleigh in zoning property adjacent to or in the vicinity of the Capitol Square when and if the City of Raleigh desires to zone said property. If the Department of Administration is of opinion that property adjacent to or in the vicinity of the Capitol Square will, in the future, be needed for State building purposes, it shall so advise the governing body of the City of Raleigh. At such times as the governing body of the City of Raleigh shall rezone property adjacent to or within four blocks of the State Capitol, it shall request an opinion from the Department of Administration as to whether the Department finds a future need for such property for State building purposes. In the event that the governing board of the City of Raleigh is informed by the Department of Administration that any property herein covered be needed for building purposes by the State in the future, the governing body of the City of Raleigh shall give full consideration to such opinion of the Department before making any rezoning order. Notwithstanding any other provision of law, no local zoning ordinance shall apply to any State-owned building built or to be built on any State-owned land within six blocks of the State Capitol without the consent of the Council of State. (1951, c. 1132; 1957, c. 215, s. 2; 1971, c. 1097, s. 4; 2007-482, s. 1.)

# City of Raleigh Street Lighting Technology with NCDOT Roadways Shown as LED



White Areas - Primarily LED with some Metal Halide

Yellow Areas - Primarily High Pressure Sodium

### HISTORIC DISTRICTS

#### Overlay Name

- Blount Street
- Boylan Heights
- Capitol Square
- Glenwood-Brooklyn
- Moore Square
- Oakwood
- Prince Hall

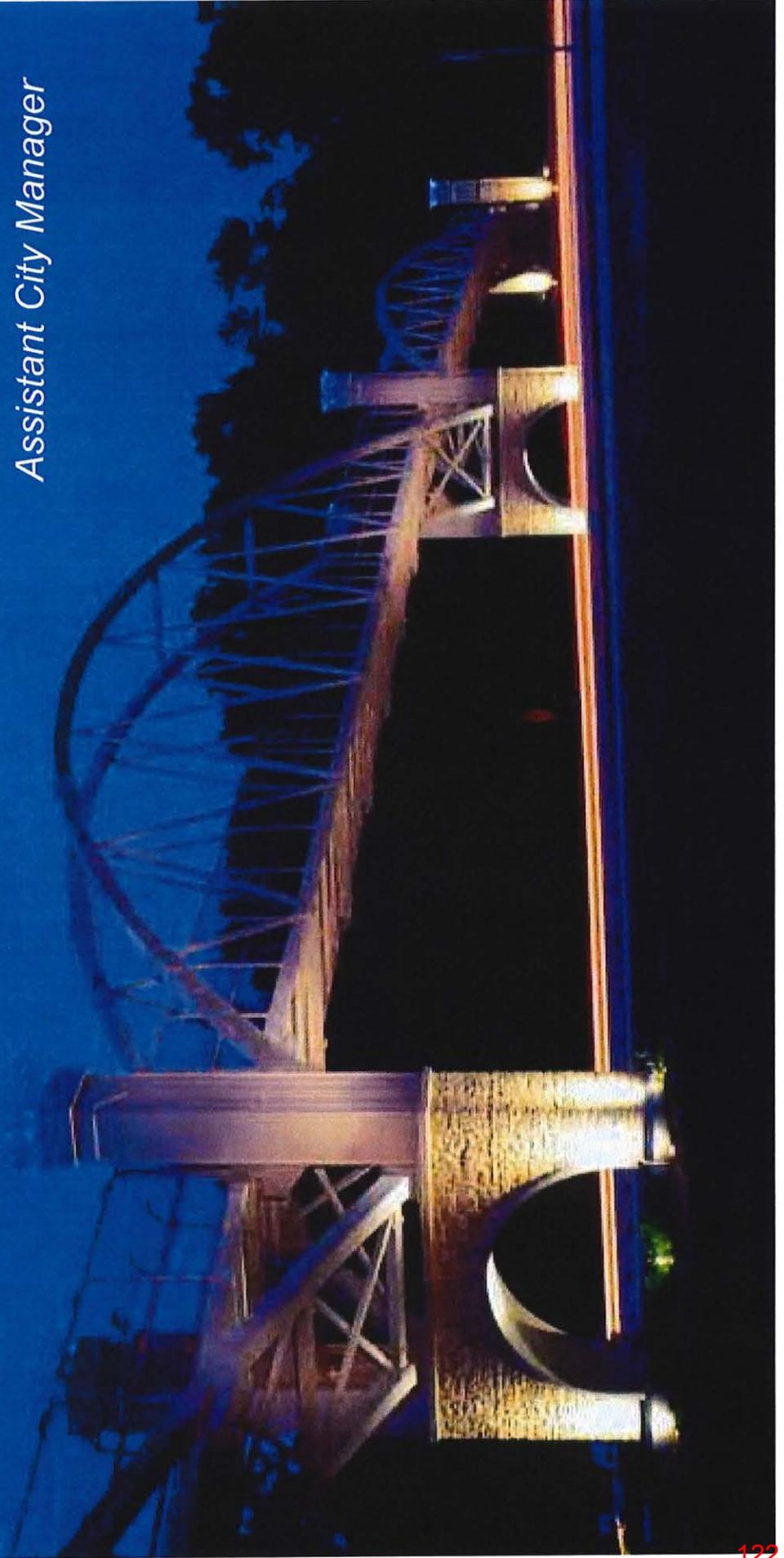




# Learning About LED

## Our Experience in Raleigh, NC

*Daniel A. Howe*  
Assistant City Manager



*Users perceive  
light as higher  
QUALITY –  
brighter and safer  
despite casting  
fewer lumens*

## **Parking Deck Pilot Project**

*Lighting Science, Inc. 2007*

# Temporary Parking Lot for Campbell Univ. Law School

Progress Solar Solutions 2009

Solar LED appears to be  
viable today for the right  
application

Performance contracting  
reduces overall cost –  
allows municipalities to  
gain benefit of tax credits

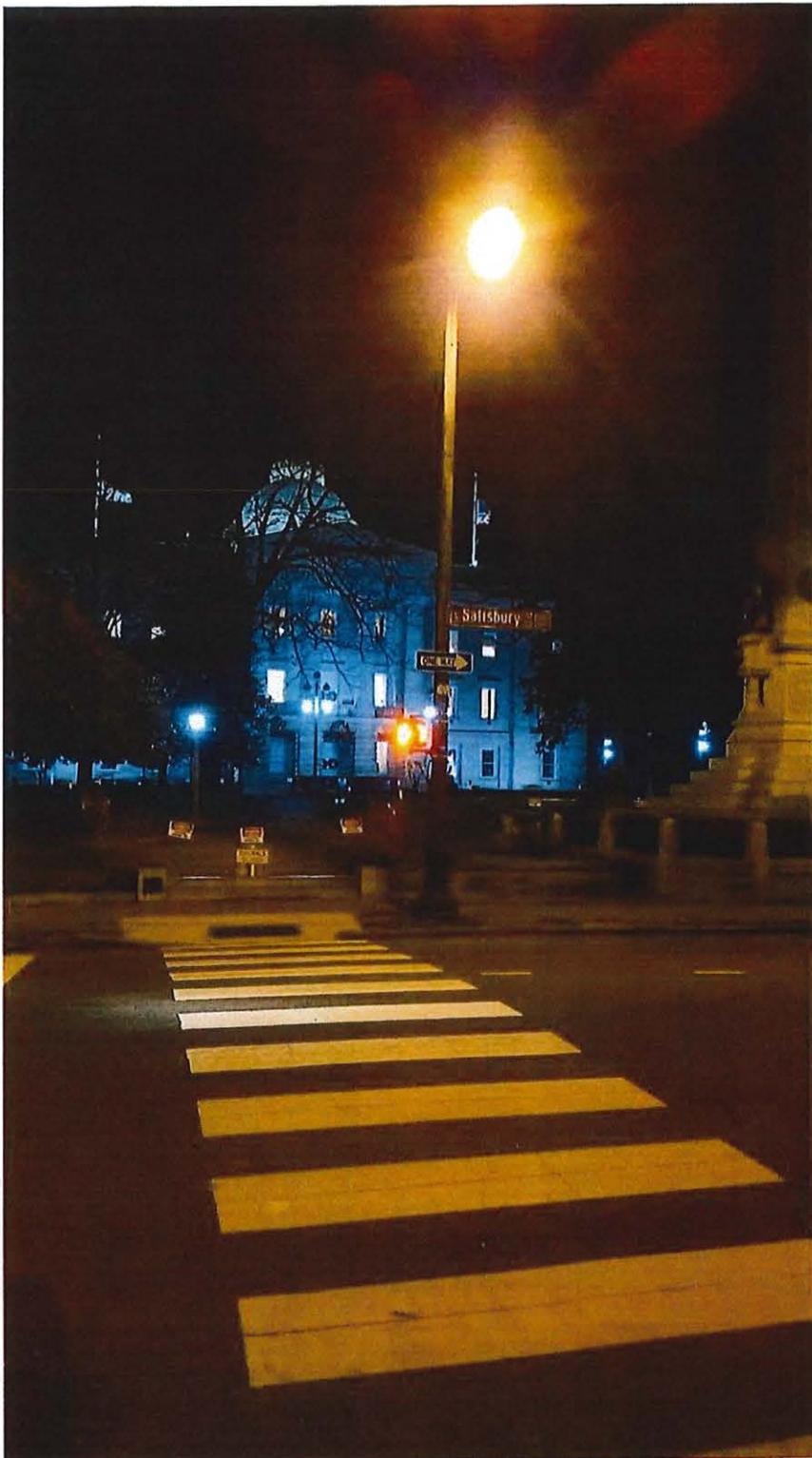


Figure 3: Night view of an existing Teardrop fixture at the intersection of Salisbury Street and Hillsborough Street with the State Capitol shown in the background

Home » Get the Facts: LED Street Lighting

## Get the Facts: LED Street Lighting

June 21, 2016 - 12:11pm



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The American Medical Association's (AMA) recently adopted [community guidance on street lighting](#) adds another influential voice to issues that have been discussed in the lighting community for some time now, regarding light at night, its potential impacts on human health and the environment, and how best to minimize those impacts. While the AMA's guidance is intended to reduce the harmful human and environmental effects of street lighting in general, it focuses on LEDs in particular. But it's important to note that these issues are neither new nor restricted to LED technology.

As explained in the DOE Fact Sheet [True Colors](#), there's nothing inherently different about the blue light emitted by LEDs; that is, at the same power and wavelength, electromagnetic energy is the same, regardless of source type. And as the potential for undesirable effects from exposure to light at night emerges from evolving research, the implications apply to *all* light sources – including, but by no means limited to, LEDs. Further, these research results are often also relevant to light we receive from televisions, phones, computer displays, and other such devices.

While there's nothing inherently dangerous about LED lighting, it should be used with the same prudence with which we use any other technology. This means that although LED lighting is an energy-efficient way to illuminate streets, it's important to direct the light only where it's needed; to make sure the emitted spectrum supports visibility, safety, and the health of humans and other living creatures; and to limit glare for pedestrians, bicyclists, and drivers.

In that regard, LEDs have a number of distinct advantages over other lighting technologies. For one thing, their dimmability means LED street lighting systems can now provide only the level of illumination needed at any given time – which is nearly impossible for conventional street lighting products. And LEDs also offer a high degree of control over the pattern and evenness of light on the ground. By contrast, conventional lamp-based technologies produce light in all directions, so more than half of the output is typically redirected toward the desired target by means of reflectors and lenses. This results in a considerable amount of light spilling in unwanted directions and spreading unevenly across the area, which not only wastes energy but may also cause light-at-night problems, such as impacts on wildlife. When an LED replaces an incumbent product, such as a high-pressure sodium streetlight, the LED can often meet the illumination requirement with only half of the total lumens of the incumbent lamp.

What's more, unlike other lighting technologies, the spectral content of LEDs can be tailored to order – which means that, for example, the blue light emitted can be minimized. As noted above, there isn't anything special about the blue light emitted by an LED. The "blue" spectrum of visible light actually covers a range of wavelengths, from blue-violet to blue-green, although there's no specific definition of "blue light." Correlated color temperature (CCT) is a rough measure of the balance of energy in a spectrum, with lower values indicating relatively less blue content. While CCT doesn't explicitly characterize the potential for nonvisual effects, it's generally able to indicate the spectrum-specific potential for these effects, which also critically depend on quantity and duration of exposure. In point of fact, if one compares the blue content of an LED source with that of any other source, with both sources at the same CCT, the LED source emits about the same amount of blue. This applies to halogen, fluorescent, high-pressure sodium, metal halide, induction, and other source types.

LED street lighting products are available in a range of possible CCTs. Exterior LED lighting products with lower CCTs are now relatively easy to find (although, typically, they're slightly less energy-efficient than those with higher CCTs). At extremely low CCTs, such as the 2200K of high-pressure sodium, the light no longer appears white, and colors can be substantially distorted, reducing visibility. Low CCTs may be beneficial for reducing nonvisual impacts, but they may also reduce the effectiveness of the lighting, potentially even requiring designs with more lumens – which may completely negate the effects of reducing the relative amount of blue light emission.

Some media coverage of concerns about blue light, light at night, and dark-sky issues can give the impression that LEDs are the enemy, when in fact they're a critical part of the solution, which the AMA acknowledges. It's important to remember that these issues have been around for decades, long before the emergence of LED technology. The key takeaway from the AMA's guidance is the importance of properly matching lighting products with the given application, no matter what technology is used. More than any other technology, LEDs offer the capability to provide, for each application, the right amount of light, with the right spectrum, where you need it, when you need it.

--From the June 21<sup>st</sup> issue of the DOE [SSL Postings](#). For more information see the latest issue of [The Light Post](#), the DOE Municipal Solid-State Street Lighting Consortium E-Newsletter



#### RELATED ARTICLES

[DOE Publishes Fact Sheet on LED Lighting and Health](#)



[EECBG Success Story: Lighting Retrofit Improving Visibility, Saving Energy](#)

[DOE Publishes Technical Brief Clarifying Misconceptions about Safety of LED Lighting](#)

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Office of Energy Efficiency & Renewable Energy  
Forrestal Building  
1000 Independence Avenue, SW  
Washington, DC 20585

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[Inspector General](#)  
[Privacy Program](#)  
[Small Business](#)

#### FEDERAL GOVERNMENT

[The White House](#)  
[USA.gov](#)

**From:** [Brice, Dustin](#)  
**To:** [Choi, Hunt](#)  
**Cc:** [Niffenegger, Jed](#); [Duffy, Rebecca](#)  
**Subject:** FW: One additional question from Hunt  
**Date:** Wednesday, March 22, 2017 10:33:57 PM

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FYI

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**From:** Ferguson, Tony [Tony.Ferguson@duke-energy.com]  
**Sent:** Wednesday, March 22, 2017 9:08 PM  
**To:** Brice, Dustin  
**Cc:** Niffenegger, Jed; Duffy, Rebecca  
**Subject:** RE: One additional question from Hunt

**From:** Brice, Dustin [mailto:Dustin.Brice@raleighnc.gov]  
**Sent:** Wednesday, March 22, 2017 12:52 PM  
**To:** Ferguson, Tony  
**Cc:** Niffenegger, Jed; Duffy, Rebecca  
**Subject:** One additional question from Hunt

Is there flexibility in the street lighting options available to the City of Raleigh? In other words, if the City becomes aware of a fixture or other product that is available on the market, can Duke Energy make it available for installation in the City of Raleigh? Does this apply to all municipal and institutional customers, or only to the City?

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Duke Energy has a dedicated product line which, as a regulated utility, we are required to offer to everyone in the Duke Energy Progress territory. Being a regulated utility, one of the factors which we base decision of our product offerings on would be market demand across the service territorial region. We do not have the flexibility to accommodate special request from individual customers.

Thanks, and please encourage Mr. Ferguson to contact me directly if he needs clarification on any of these questions. My mobile number is (919) 455-8207.

???E-mail correspondence to and from this address may be subject to the North Carolina Public Records Law and may be disclosed to third parties by an authorized City or Law Enforcement official.???

**Choi, Hunt**

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**From:** Brice, Dustin  
**Sent:** Thursday, March 23, 2017 11:34 AM  
**To:** Choi, Hunt  
**Subject:** FW: Street lighting questions  
**Attachments:** March 23 - The City of Raleigh QA.docx

---

**From:** Ferguson, Tony [mailto:Tony.Ferguson@duke-energy.com]  
**Sent:** Thursday, March 23, 2017 11:30 AM  
**To:** Brice, Dustin  
**Cc:** Niffenegger, Jed; Duffy, Rebecca  
**Subject:** RE: Street lighting questions

Dustin, please find the attached response to the questions below.

Thank you

**Tony Ferguson**  
**Business Development Sales Manager**  
**Duke Energy Progress**  
**4690 Simms Creek Road**  
**Raleigh, NC 27616**  
**919-219-2701**  
[www.duke-energy.com](http://www.duke-energy.com)

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**From:** Brice, Dustin [mailto:Dustin.Brice@raleighnc.gov]  
**Sent:** Wednesday, March 22, 2017 12:50 PM  
**To:** Ferguson, Tony  
**Cc:** Niffenegger, Jed; Duffy, Rebecca  
**Subject:** Street lighting questions

**\*\*\* Exercise caution. This is an EXTERNAL email. DO NOT open attachments or click links from unknown senders or unexpected email. \*\*\***

Tony,

See questions below from Hunt Choi. He asks that you please include a brief professional biography to establish your credentials as an authority on this subject matter. Reply to all three of us in case I'm unavailable. Thanks for your help on this.

Mr. Ferguson,

The City of Raleigh would like your assistance in evaluating its near-term options for street lighting. The primary purpose of the questions below is to get a sense of the market-based, regulatory, and technological trends. Based on your education, experience, knowledge, and/or observations, please answer the following questions, and feel free to elaborate upon your responses to the extent you feel you can:

1. What are the current regulatory trends concerning High-Pressure Sodium, Metal Halide, and LED street lighting? How do these regulatory trends impact the research, development, import, manufacturing, and cost of the various types of street lighting technologies? How do these regulatory trends impact what products Duke Energy is able to offer its customers? How do these regulatory trends impact what support Duke Energy is able to provide for existing installations?
2. What are the current market trends regarding the research, development, import, manufacturing, and cost of the various types of street lighting technologies? How do these market trends impact what products Duke Energy is able to offer its customers? How do these market trends impact what support Duke Energy is able to provide for existing installations?
3. With respect to street lighting, how do High-Pressure Sodium, Metal Halide, and other HID lighting technologies compare to LED technology in terms of energy efficiency and consumer cost (installation and operation)? Has the market for LED technology matured to the point of cost parity?
4. What are the forces that drive innovation in the street lighting industry? How would you describe the pace of innovation in the street lighting industry? Similarly, how would you describe the speed or suddenness with which products or technologies can become obsolete in the street lighting industry? Are there any street lighting products or technologies at use in the City of Raleigh that you believe are in danger of becoming functionally, economically, or legally obsolete?
5. Do you (or Duke Energy) have concerns regarding the long-term viability of High-Pressure Sodium and Metal Halide street lighting technology versus LED street lighting? Which technology do you believe will become the dominant or industry-standard? Do you believe that the less popular technologies will continue to be manufactured and available in marketable and significant volumes over the long term?
6. What technology preferences are your customers expressing for new and retrofitted street lighting applications? In other words, what are your new and existing customer's choosing for new and updated installations? What reasons have Duke Energy's customers given for making their choices?
7. What is the current status of Metal Halide street lighting technology in terms of manufacturing, import, availability, and long-term viability? What position has Duke Energy taken with respect to Metal Halide street lighting technology?
8. What degree of support does Duke Energy believe that it will be able to offer for Metal Halide and High-Pressure Sodium street lighting during future 20-year lease cycles? What external forces or events may impact Duke Energy's ability to provide support for these technologies in the future?
9. What experience has Duke Energy had in installing LED street lighting (or retrofitting existing non-LED fixtures) in historically significant districts or neighborhoods? What has been the response to these installations?

10. Among the street lighting options available to the City of Raleigh, what are the City's choices in terms of wattage and Kelvin ratings? Are these options common to all Duke Energy municipal and institutional customers, or are they unique to the City of Raleigh?

???E-mail correspondence to and from this address may be subject to the North Carolina Public Records Law and may be disclosed to third parties by an authorized City or Law Enforcement official.???

The City of Raleigh would like your assistance in evaluating its near-term options for street lighting. The primary purpose of the questions below is to get a sense of the market-based, regulatory, and technological trends. Based on your education, experience, knowledge, and/or observations, please answer the following questions, and feel free to elaborate upon your responses to the extent you feel you can:

1. What are the current regulatory trends concerning High-Pressure Sodium, Metal Halide, and LED street lighting? **The EISA 2007 mandated minimum efficiency levels for MH. HPS has not been impacted by regulatory mandates.** How do these regulatory trends impact the research, development, import, manufacturing, and cost of the various types of street lighting technologies? **Suppliers are moving away from MH and moving to LED while supporting HPS at this time.** How do these regulatory trends impact what products Duke Energy is able to offer its customers? **We are investigating a MH exit strategy while continuing to offer SV and LED products.** How do these regulatory trends impact what support Duke Energy is able to provide for existing installations? **We will support existing products as long as suppliers continue to meet our demand.**
2. What are the current market trends regarding the research, development, import, manufacturing, and cost of the various types of street lighting technologies? How do these market trends impact what products Duke Energy is able to offer its customers? How do these market trends impact what support Duke Energy is able to provide for existing installations? **See responses in #1.**
3. With respect to street lighting, how do High-Pressure Sodium, Metal Halide, and other HID lighting technologies compare to LED technology in terms of energy efficiency and consumer cost (installation and operation)? **LED is more efficient. Cost varies by wattage, fixture, supplier, style, lumen package and other variables.** Has the market for LED technology matured to the point of cost parity? **We continue to evaluate cost per product to provide affordable and reliable service to our customers.**
4. What are the forces that drive innovation in the street lighting industry? **Customer demand drives innovation. Lighting suppliers who perform Research and Development could provide more information.** How would you describe the pace of innovation in the street lighting industry? Similarly, how would you describe the speed or suddenness with which products or technologies can become obsolete in the street lighting industry? **Customer demand drives innovation. Lighting suppliers who perform Research and Development could provide more information.** Are there any street lighting products or technologies at use in the City of Raleigh that you believe are in danger of becoming functionally, economically, or legally obsolete? **The EISA 2007 mandated minimum efficiency levels for MH. HPS has not been impacted by regulatory mandates. Suppliers are moving away from MH and moving to LED while supporting HPS at this time.**
5. Do you (or Duke Energy) have concerns regarding the long-term viability of High-Pressure Sodium and Metal Halide street lighting technology versus LED street

- lighting? Which technology do you believe will become the dominant or industry-standard? Do you believe that the less popular technologies will continue to be manufactured and available in marketable and significant volumes over the long term? **The EISA 2007 mandated minimum efficiency levels for MH. HPS has not been impacted by regulatory mandates. Suppliers are moving away from MH and moving to LED while supporting HPS at this time. (Refer to industry leaders for more specifics.)**
6. What technology preferences are your customers expressing for new and retrofitted street lighting applications? **We continue to receive requests for new HPS and LED products.** In other words, what are your new and existing customer's choosing for new and updated installations? **We continue to receive requests for new HPS and LED products.** What reasons have Duke Energy's customers given for making their choices? **Economics, aesthetics, color, efficiency, etc.**
  7. What is the current status of Metal Halide street lighting technology in terms of manufacturing, import, availability, and long-term viability? What position has Duke Energy taken with respect to Metal Halide street lighting technology? **The EISA 2007 mandated minimum efficiency levels for MH. HPS has not been impacted by regulatory mandates. Suppliers are moving away from MH and moving to LED while supporting HPS at this time. We are investigating a MH exit strategy while continuing to offer SV and LED products.**
  8. What degree of support does Duke Energy believe that it will be able to offer for Metal Halide and High-Pressure Sodium street lighting during future 20-year lease cycles? What external forces or events may impact Duke Energy's ability to provide support for these technologies in the future? **We will support existing products as long as suppliers continue to meet our demand.**
  9. What experience has Duke Energy had in installing LED street lighting (or retrofitting existing non-LED fixtures) in historically significant districts or neighborhoods? What has been the response to these installations? **We have installed over 200,000 LED lights with positive results. Beaufort NC, Wilmington NC. Ashville NC would be example locations that may have historic significance.**
  10. Among the street lighting options available to the City of Raleigh, what are the City's choices in terms of wattage and Kelvin ratings? **50 – 280 Watts, 4000K** Are these options common to all Duke Energy municipal and institutional customers, or are they unique to the City of Raleigh? **Yes**

# Raleigh Historic Development Commission – Certificate of Appropriateness (COA) Application



**DEVELOPMENT  
SERVICES  
DEPARTMENT**

Development Services  
Customer Service Center  
One Exchange Plaza  
1 Exchange Plaza, Suite 400  
Raleigh, North Carolina 27601  
Phone 919-996-2495  
eFax 919-996-1831



<input type="checkbox"/> Minor Work (staff review) – <b>1 copy</b>  <input type="checkbox"/> Major Work (COA Committee review) – <b>10 copies</b> <input type="checkbox"/> Additions Greater than 25% of Building Square Footage <input type="checkbox"/> New Buildings <input type="checkbox"/> Demo of Contributing Historic Resource <input checked="" type="checkbox"/> All Other  <input type="checkbox"/> Post Approval Re-review of Conditions of Approval	<p style="text-align: center; margin: 0;"><b>For Office Use Only</b></p> Transaction # <u>502616</u> File # <u>022-17-CA</u> Fee <u>\$147 via CC</u> Amount Paid <u>147</u> Received Date <u>2/3/17</u> Received By <u>ACH</u>
---	---

Property Street Address Multiple streets - work to be done within public right of way

Historic District Capitol Square and Moore Square

Historic Property/Landmark name (if applicable) N/A

Owner's Name N/A

Lot size	(width in feet)	(depth in feet)
----------	-----------------	-----------------

For applications that require review by the COA Committee (Major Work), provide addressed, stamped envelopes to owners of all properties within 100 feet (i.e. both sides, in front (across the street), and behind the property) not including the width of public streets or alleys ([Label Creator](#)).

Property Address	Property Address

35 env +



### Minor Work Approval (office use only)

Upon being signed and dated below by the Planning Director or designee, this application becomes the Minor Work Certificate of Appropriateness. It is valid until \_\_\_\_\_. Please post the enclosed placard form of the certificate as indicated at the bottom of the card. Issuance of a Minor Work Certificate shall not relieve the applicant, contractor, tenant, or property owner from obtaining any other permit required by City Code or any law. Minor Works are subject to an appeals period of 30 days from the date of approval.

Signature (City of Raleigh) \_\_\_\_\_ Date \_\_\_\_\_

TO BE COMPLETED BY APPLICANT	TO BE COMPLETED BY CITY STAFF				
	YES	N/A	YES	NO	N/A
Attach 8-1/2" x 11" or 11" x 17" sheets with written descriptions and drawings, photographs, and other graphic information necessary to completely describe the project. Use the checklist below to be sure your application is complete.  <u>Minor Work</u> (staff review) – <b>1 copy</b>  <u>Major Work</u> (COA Committee review) – <b>10 copies</b>					
1. <b>Written description.</b> Describe clearly and in detail the nature of your project. Include exact dimensions for materials to be used (e.g. width of siding, window trim, etc.)	<input checked="" type="checkbox"/>				
2. <b>Description of materials</b> (Provide samples, if appropriate)	<input checked="" type="checkbox"/>				
3. <b>Photographs</b> of existing conditions are required. Minimum image size 4" x 6" as printed. Maximum 2 images per page.	<input checked="" type="checkbox"/>				
4. <b>Paint Schedule</b> (if applicable)	<input type="checkbox"/>	<input checked="" type="checkbox"/>			
5. <b>Plot plan</b> (if applicable). A plot plan showing relationship of buildings, additions, sidewalks, drives, trees, property lines, etc., must be provided if your project includes any addition, demolition, fences/walls, or other landscape work. Show accurate measurements. You may also use a copy of the survey you received when you bought your property. Revise the copy as needed to show existing conditions and your proposed work.	<input type="checkbox"/>	<input checked="" type="checkbox"/>			
6. <b>Drawings</b> showing existing and proposed work <ul style="list-style-type: none"> <li><input type="checkbox"/> Plan drawings</li> <li><input type="checkbox"/> Elevation drawings showing the façade(s)</li> <li><input type="checkbox"/> Dimensions shown on drawings and/or graphic scale (required)</li> <li><input type="checkbox"/> 11" x 17" or 8-1/2" x 11" reductions of full-size drawings. If reduced size is so small as to be illegible, make 11" x 17" or 8-1/2" x 11" snap shots of individual drawings from the big sheet.</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>			
7. Stamped envelopes addressed to all property owners within 100 feet of property not counting the width of public streets and alleys (required for Major Work). Use the <a href="#">Label Creator</a> to determine the addresses.	<input checked="" type="checkbox"/>	<input type="checkbox"/>			
8. <b>Fee</b> ( <a href="#">See Development Fee Schedule</a> )	<input type="checkbox"/>				

## **Overview of Project**

City of Raleigh Department of Transportation staff is requesting the replacement of 114 leased high pressure sodium (HPS) Teardrop style street light fixtures located in or within close proximity to the Capitol Square and Moore Square Historic Overlay Districts. This replacement will be done in conjunction with repainting many black decorative poles in downtown Raleigh which are in disrepair. The proposed LED replacement fixtures are identical to the current Teardrop fixtures aside from the light source. See the attached map of these street light locations.

## **Background**

In 2016, City of Raleigh Department of Transportation staff stressed to Duke Energy the need to repaint many black decorative signal and street light poles located in downtown Raleigh for maintenance purposes. All of the poles and signal mast arms selected to be repainted are extremely weathered, many of which are exhibiting signs of rust.

Duke Energy has agreed to have a contractor repaint the selected poles (Duke owned) and mast arms (City owned) in the coming months, with the City funding the cost of repainting the mast arms.

## **Proposed Modifications**

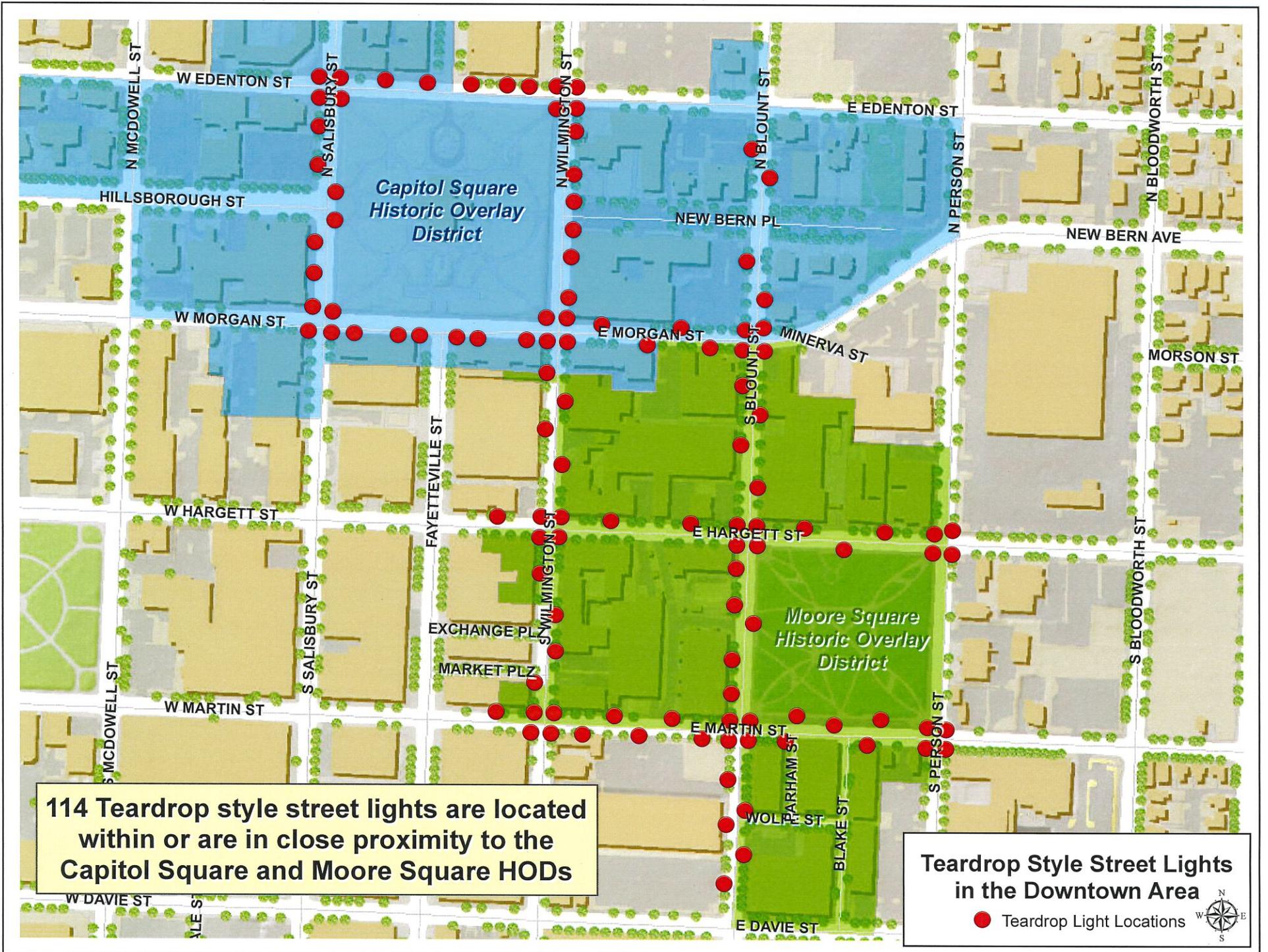
In conjunction with the proposed repainting project, City staff is recommending the replacement of all 114 decorative Teardrop style fixtures mounted to these black poles, in lieu of repainting them. Most of these existing Teardrop light fixtures were installed along with the poles over 20 years ago, thus the paint applied to the fixture housing is in a similar weathered condition as that applied to the poles.

The existing decorative Teardrop style lighting in downtown Raleigh is high pressure sodium (HPS) technology leased from Duke Energy. HPS street lighting sources are quickly being replaced by more energy efficient LED technology throughout the Duke Energy service area and beyond.

The City recommends replacing the existing HPS Teardrop fixtures with LED Teardrop fixtures that are identical in appearance. See the attached Duke Energy specification brochure detailing the LED Teardrop fixture lease option.

The Teardrop LEDs will produce a 4000 Kelvin (K) color temperature light. This is a whiter light than that produced by HPS light sources. This LED light source will match the color of the existing lighting on the State Capitol grounds, the lighting along Fayetteville Street, and the approximately 30,000 LED roadway fixtures now leased throughout most of the City. Unlike the LED roadway style fixtures installed along the majority of the City's public streets, these Teardrop fixtures have a globe (drop lens) to help diffuse the LED light source.

The roadways illuminated by Teardrop style fixtures in downtown Raleigh are primarily in commercial and governmental areas. City staff believes these areas will benefit from the improved color rendering and uniformity produced by the LED Teardrop lighting.



114 Teardrop style street lights are located within or are in close proximity to the Capitol Square and Moore Square HODs

**Teardrop Style Street Lights in the Downtown Area**  
 ● Teardrop Light Locations



Figure 1: Night view of an existing Teardrop fixture located at the intersection of Edenton Street and Salisbury Street with the State Capitol shown in the background



Figure 2: Night view of existing Teardrop street lighting looking south along Wilmington Street in comparison with the existing lighting on the State Capitol grounds

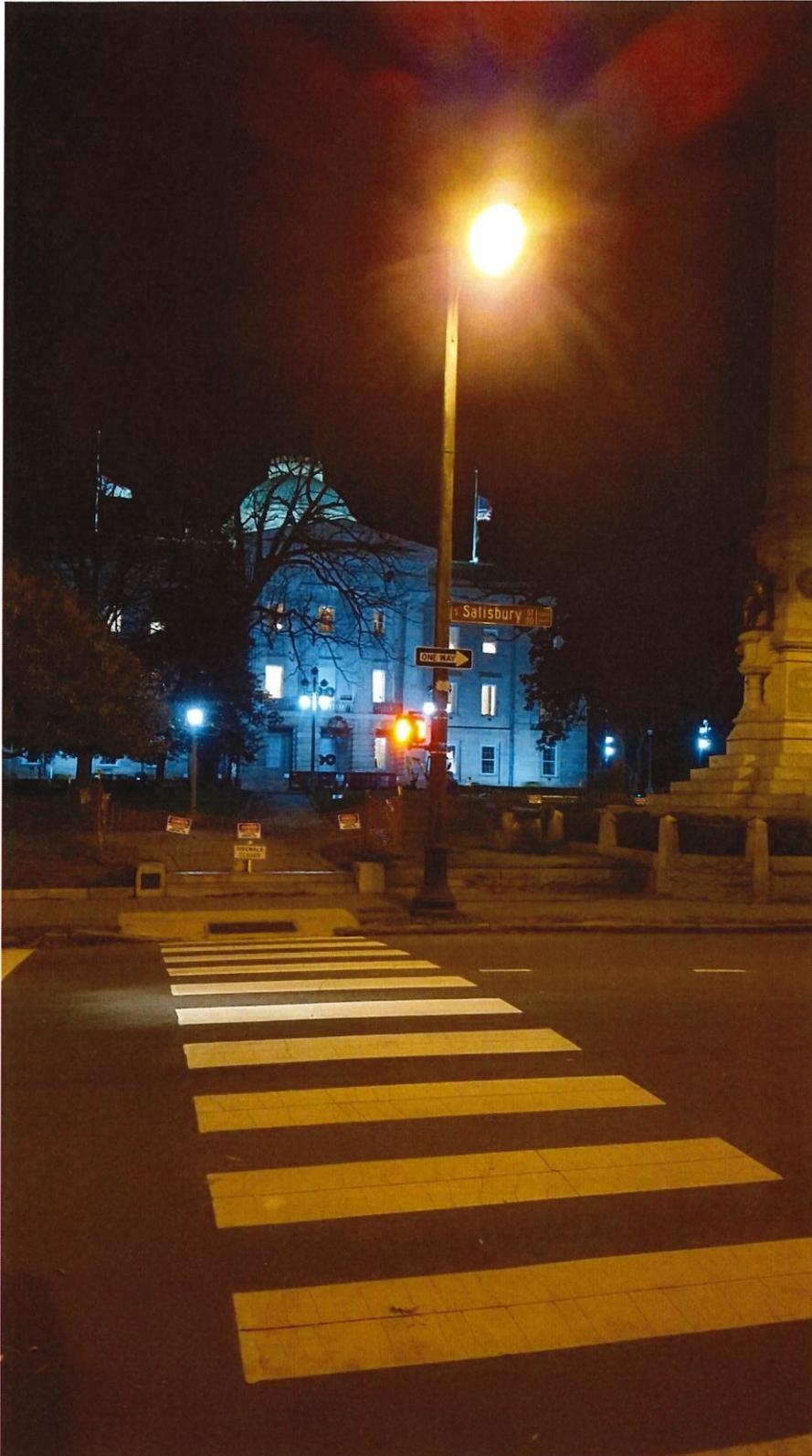


Figure 3: Night view of an existing Teardrop fixture at the intersection of Salisbury Street and Hillsborough Street with the State Capitol shown in the background



Figure 4: Day view of existing Teardrop fixture at the intersection of Salisbury Street and Hillsborough Street with the State Capitol shown in the background

Outdoor Lighting  
**Teardrop LED**



Subject to variance from manufacturer. Contact us for region specific details.

The Teardrop LED has an historic appearance with a nostalgic feel and can enhance any municipal downtown or historic district. Efficiency is combined with turn-of-the-century appeal to provide an image that is attractive and distinctive. Mount on new black concrete poles or existing approved metal poles that are painted black.

<b>LED</b> (Light Emitting Diode)	150 watts
<b>Mounting height</b>	27.5'
<b>Colors</b>	Black Green
<b>Pole</b>	Black concrete <i>(additional monthly cost)</i>

*Note: The black fixtures and poles are not stocked by Duke Energy Progress. They must be special ordered and require up to eight weeks of lead time for arrival.*

For additional information, visit us at [duke-energy.com/OutdoorLighting](http://duke-energy.com/OutdoorLighting) or call us toll free at 866.769.6417.

## Outdoor Lighting

# Teardrop LED

**Light source:** LED (*white*)

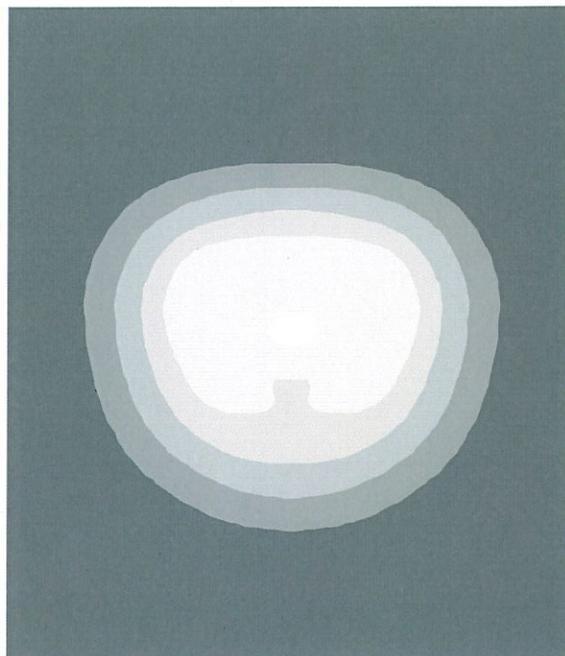
**Wattage:** 150

**Lumens:** 10,898

**Light pattern:** IESNA Type III (*oval*)

**IESNA Backlight – Uplight – Glare (BUG) Rating:** B3-U3-G3

**Color temperature:** 4,000K



*light distribution pattern*

### Pole available:

<i>Name</i>	<i>Mounting height</i>	<i>Color</i>
Concrete	27.5'	Black ( <i>additional monthly cost</i> )

### Features

Little or no installation cost

Design services by lighting professionals included

Maintenance included

Electricity included

Warranty included

One low monthly cost on your electric bill

Turnkey operation

Backed by over 40 years of experience

### Benefits

Frees up capital for other projects

Meets industry standards and lighting ordinances

Eliminates high and unexpected repair bills

Less expensive than metered service

Worry-free

Convenience and savings for you

Provides hassle-free installation and service

A name you can trust today ... and tomorrow

*Note: These black fixtures and poles are not stocked by Duke Energy Progress. They must be special ordered and require up to eight weeks of lead time for arrival.*