



# **Colorado Chautauqua National Historic Landmark Master Exterior Lighting Plan**

Clanton and Associates  
For the Colorado Chautauqua Association  
Approved by Colorado Chautauqua Board of Directors  
January 23, 2012

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## **Introduction**

On the Chautauqua campus, the exterior lighting helps to organize and define the nighttime visual environment. The placement, style, and performance of the lighting equipment determine much of the visual character of the environment after dark as well as the overall visibility for visitors. Changes in light levels should signify changes in public (more light) versus private (less light) zones of the park. During the day, the decorative elements of the lighting equipment will support the historic nature of the architecture and site and provide a unifying aesthetic element on the property. In addition to identifying where to provide light, the masterplan also designates areas that should remain dark. Every effort should be made to minimize light trespass and light pollution for the residences and adjacent open space.

The site lighting system should provide for driver and pedestrian visibility and way finding. Traveled pathways are lighted to provide guidance and good visibility while parking lots are lighted to provide security for both pedestrians and motorists. All of these design issues should be addressed with minimal energy use and effective maintenance in mind.

## **Design Philosophy**

The exterior lighting masterplan for Chautauqua will provide light for safety and comfort while preserving the natural resources and atmosphere that make the park so unique.

The lighting program throughout will help retain a low level of natural ambient light suitable for the City of Boulder open space and mountain parks, save energy, and reduce waste to support Chautauqua green building goals. Low glare, well-placed lighting will provide a safe and comfortable nighttime environment. This masterplan recommends lighting strategies for areas where Chautauqua deems that safety and security is a concern, but does not propose lighting throughout the entire park. Specific control measures will ensure that lighting is not used when it is not needed.

The following design principles address the philosophy of site lighting throughout the Chautauqua National Historic Landmark:

- Image & Identity
- Environmentally Sensitive Lighting
- Historic Preservation
- Nighttime Visibility
- Safety and Security
- Nighttime Aesthetics

### ***Image and Identity***

The most important issue related to Chautauqua image and identity is not so much the selection of luminaire style, but rather the consistent application of styles, mounting heights, and light levels throughout the entire historic site. This masterplan establishes a clear hierarchy of lighting equipment and strategies to support the architecture and infrastructure of the park.

The luminaire styles should be influenced by the architectural styles of the park structures. However, many traditional lighting fixtures create as much glare as they do useful light and are not designed to minimize light trespass and light pollution. With some modifications, many traditional styles can be made to better control the light and still stay true to the traditional forms.

Light enhances architectural form and will support massing, hierarchy, and details of the architecture. Surfaces will be revealed with light, but views of the light fixtures will be minimized. Light fixtures should be integrated into the architecture where possible by mounting in eaves, under canopies, recesses, or within low walls. Light fixtures shall be inconspicuous unless there is an intentional decorative purpose. In general, the pedestrian level of the architectural form shall be the emphasis for appropriate exterior lighting. Only a few select facades should have light above the pedestrian level as a way to identify Chautauqua's very prominent and public features.

### ***Environmental Issues and Goals***

Environmentally sensitive lighting minimizes light pollution and light trespass, and applies only the right amount of light where and when it is needed. To limit light trespass and light pollution, the Lighting Masterplan complies with the City of Boulder Outdoor Lighting Standards, Section 9-9-16. All exterior area lighting will be shielded or fully shielded, aimed downward, and will utilize white light sources. Lighting levels will be minimized and lighting controls will ensure that lighting is turned off in some areas when it is not needed.

- *Dark Skies – Minimizing Light Pollution*

Light pollution is uncontrolled light that travels into the atmosphere. This light represents wasted energy and creates "sky glow" that reduces visibility of stars in the night sky. Unshielded luminaires and excessively high light levels cause more light pollution than properly controlled light fixtures. The lighting within Chautauqua will be well shielded and designed to limit light levels to help maintain dark skies.

- *Friendly Neighbor – Limiting Light Trespass*

Light trespass is often felt as "the light shining in my window". Usual culprits are unshielded floodlights, high wattage lamps, and other unshielded luminaires that are improperly located and poorly aimed. Light trespass will be avoided throughout Chautauqua. Light trespass can be minimized with careful equipment selection, proper location, and proper aiming and shielding.

- *Lighting only WHAT is necessary.*

The determination of what to light is just as important as how to light. Some areas may be specifically designated as dark preserves. When an area does require lighting, the design should contain the light to that area as much as possible. For instance, light from parking areas should be adequately shielded to limit stray light onto adjacent areas or buildings. This same principle applies to street and trail lighting locations to minimize stray light onto adjacent cabins. By lighting only what is necessary, the light that is used will be more effective as compared to a design that lights all areas equally.

- *Lighting only WHEN it is necessary.*

Energy use and light pollution can be reduced by turning off lights when they are not needed. Time control and motion sensors can be used to automatically turn lights off in areas that are used less at night yet still provide light when needed for late night use.

### ***Historic Preservation***

The Chautauqua Design Guidelines note that the development of the park spanned several decades. While lighting equipment such as street poles may have some historic character, the guidelines state that simplicity should be the most important consideration. This masterplan illustrates various period styles that could be used on the site. While the style may reflect a lantern-like aesthetic, the lighting technology will still address glare and uplight from the luminaire.

The lighting of building facades and structures at Chautauqua will focus on highlighting elements and features of the existing architecture. The designs should take care to hide the lighting equipment and not use any stylized fixtures that become an additional decorative element on the façade.

## ***Nighttime Visibility***

- *Lighting Quality, not Quantity.*

Often, architectural exterior lighting is used principally for floodlighting instead of lighting quality, resulting in over-lit facades that create reflected light pollution or trespass. High quality accent lighting creates a composition of light and darkness on the architecture, using less light for greater effect. Streets and parking lots are also often over-lit when light level is used as the main lighting criteria without concern for the many other factors that affect visibility.

Lighting quality involves many issues such as contrast, brightness adaptation, minimal glare and light source color. Good visibility is achieved by balancing brightness, lighting vertical surfaces, providing clear visual cues, and controlling glare. These strategies create a high quality visual environment using low light levels and minimal energy.

- *Brightness Adaptation.*

Our eyes adjust to the brightest object in our field of view. This adjustment of our eyes is referred to as brightness adaptation. If an object is very bright, such as uncontrolled light from a floodlight, everything else in the immediate surrounding area appears relatively dark, making it harder to detect object details.

- *Reducing Glare.*

Glare is usually caused by uncontrolled light emitted from unshielded luminaires. An example of this is unshielded wall pack fixtures or floodlights located on a building façade. These situations can be easily avoided with proper equipment selection, location, aiming, and shielding.

- *Better Visibility with White Light.*

Light source color is another key to low light level visibility. Reaction time and color recognition under low light levels is superior with white light sources like metal halide, fluorescent, LED, and induction lamps. Using a warm colored light source (3000 K) will give a warm residential aesthetic while taking advantage of the white light visibility benefit.

- *Lighting Vertical Surfaces.*

Illuminated surfaces improve the sense of brightness, safety, and security in an exterior environment. These surfaces allow pedestrians to see other people and objects in silhouette as well as accenting the character of the architecture and features.

- *Wayfinding.*

Sign lighting provides an obvious complement to wayfinding features. However, lighting may also augment wayfinding in the form of indicators. For example bollards may alert motorists to the presence of pedestrians. Additionally, changes in brightness provide visual cues and orientation for pedestrians. Continuously lighted streets may identify a primary vehicle route while lower lighting levels suggest private or residential areas.

## **Safety and Security**

Lighting to improve safety involves lighting hazards so that they can be seen with sufficient reaction time. Hazards may include vehicle intersections, crosswalks, stairs and ramps, and other site features that may be perceived as unsafe if not well identified at normal night time lighted conditions. The lighting system, along with other site design elements, must provide visual information to assist users in avoiding such things as a collision or loss of bearings.

Security can be described as the perception of safety. Lighting to improve security involves lighting potentially hazardous locations and situations. For example, an increase in reaction time can improve the ability to find refuge, or call for help. Lighting can also act as a deterrent by increasing the visibility in an area of concern. However, it should be noted that an increase in the number of people in an area will be a more effective deterrent against crime than an increase in light level.

## **Nighttime Aesthetics**

The lighting system at night should reveal a hierarchy of brightness levels and provide subtle surface brightness throughout the public spaces. The style of lighting equipment will be less noticeable at night but an organized sequence of lighted areas and surfaces will provide wayfinding and a sense of security. For example, a street that provides access to cottages may have a relatively low light level when the surrounding cottage porches have lights. Similarly, the lighted façade of the Auditorium at the end of Morning Glory Drive provides a visible destination at the end of a public street.

## **City of Boulder Lighting Ordinance**

The City of Boulder adopted a lighting ordinance in 2003. Its objective is to ensure safety and security, establish the use of white light sources (compact fluorescent, LED, and induction), prevent overlighting, and minimize light pollution. The ordinance sets limits on the following lighting characteristics:

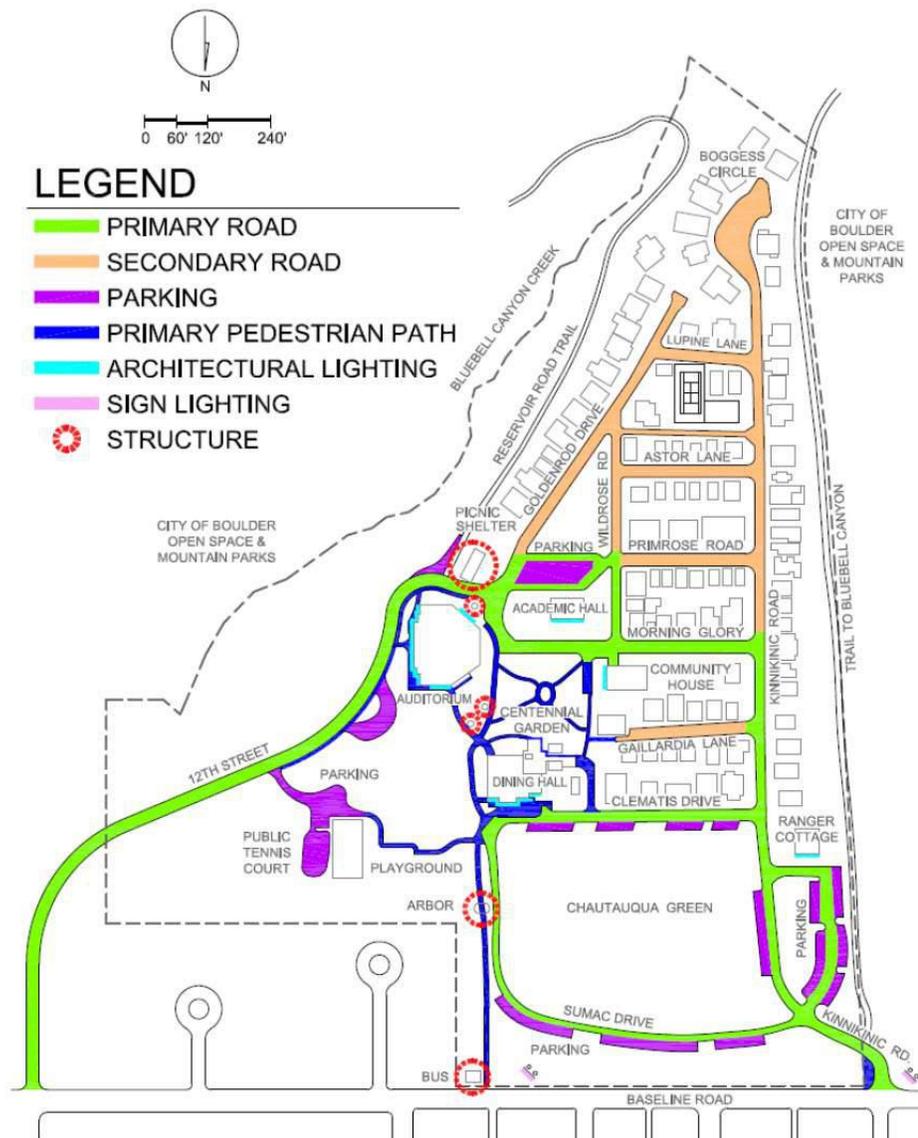
Maximum allowable light levels (illuminance in footcandles)	Building Entries: 5 Parking Lots: 5 Pedestrian Walkways: 3
Maximum uniformity ratio	15:1
Maximum lumen rating for full cutoff luminaires	14,000
Maximum lumen rating for cutoff and semi cutoff luminaires	1,250
Maximum lumen rating for unshielded luminaires	900
Lighting controls	Recommended after close of business
Maximum pole height	20' adjacent to residential 25' otherwise
Flagpole lighting	(1) Uplight not to exceed 3,500 lumens

Additional and special use requirements can be found in the City of Boulder Land Use Code, Chapter 9-9, under Section 9-9-16, Lighting, Outdoor.

## Prescriptive Designs and Strategies

The previously described concepts are applied to the typical components found throughout the Chautauqua park: roads, pedestrian spaces, structures, and residences. Roadways are made up of primary (public) routes that are frequently used by park visitors who are not necessarily staying there (open space parking, auditorium drop-off). Secondary (residential) routes serve all of the cottages but most likely are not frequented by the visiting public. Pedestrian spaces include both paths and open areas. Structures may be small focal points such as the arbor and signage or large, public facades such as the auditorium. Finally, the residential component includes all of the rented and privately owned cottages.

The map below color codes these components.



The following sections illustrate prescriptive designs and strategies for each of the components described on the map. Each section documents typical existing conditions, lighting equipment specifications, rules of thumb for location, spacing, and mounting heights, and appropriate sketches for mounting details.

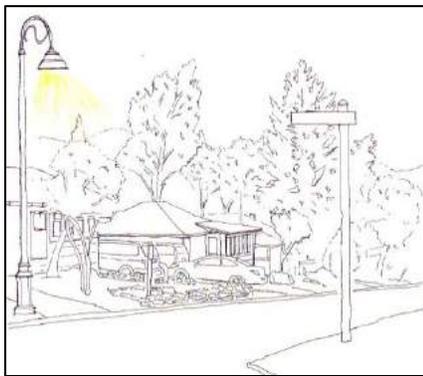
## Primary Roadways (Public)

### EXISTING CONDITIONS:



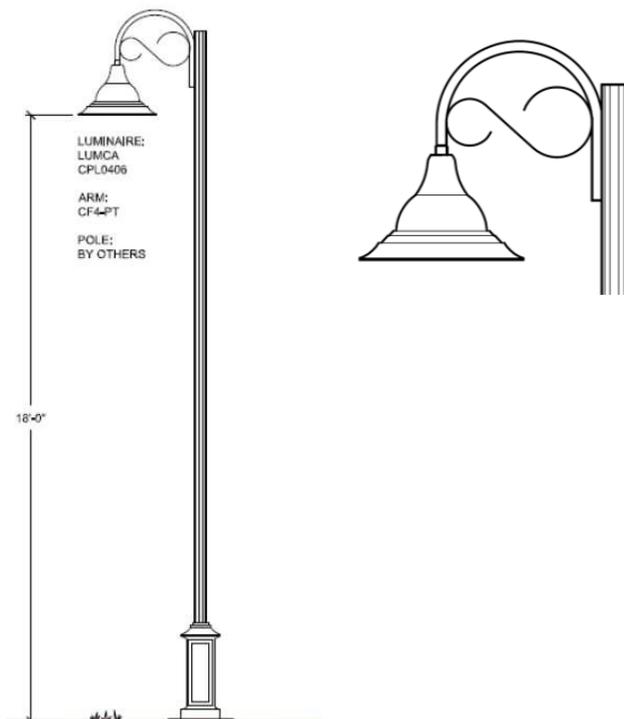
Currently, cobrahead luminaires with high pressure sodium lamps are mounted on wood poles for the majority of the street lighting. The poles are not consistently located at intersections or on the same side of the road.

### PROPOSED LIGHTING CONCEPT:



A traditional style, pole-mounted luminaire will provide lighting along the primary roads at intersections. Along stretches of primary roadway without intersections, luminaires should be spaced uniformly at curves or other decision points.

### EXAMPLES



### LUMINAIRE SPECIFICATIONS

Horizontal Distribution	Type IV or V
Lamp Type	Induction
Lumen Output	6000 lumens (85 watt)
Color Temperature	3000 K
Color Rendering Index	80+
Pole Height	18'
Pole Layout	Locate at intersections and mid-block
Controls:	Photocell ON, dim to 50% after curfew.

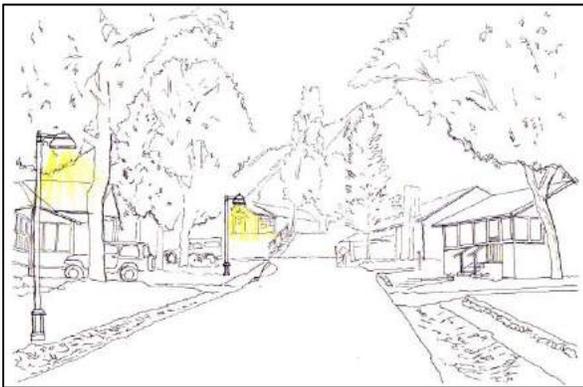
## Secondary Roadways (Residential)

### EXISTING CONDITIONS:



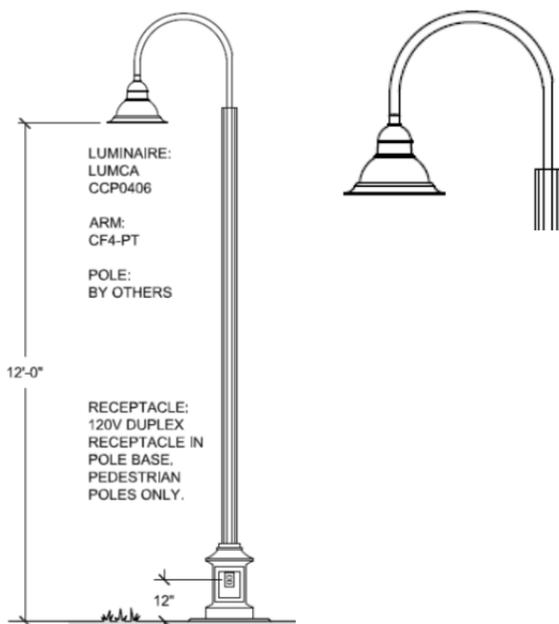
Currently, cobrahead luminaires with high pressure sodium lamps are mounted on wood poles for the majority of the secondary street lighting. Pole locations are not consistent. The remainder of the street lighting in residential streets comes from the porch lighting on the cabins.

### PROPOSED LIGHTING CONCEPT:



Smaller scale poles and luminaires should light the secondary streets. The cabin porch lanterns provide background brightness while the streetlights illuminate the roadway. Backlight from the luminaires should be controlled to prevent light trespass onto the cabin property.

### EXAMPLES



### LUMINAIRE SPECIFICATIONS

Horizontal Distribution	Type IV or V
Lamp Type	Induction
Lumen Output	3500 lumens (55 watt induction)
Color Temperature	3000 K
Color Rendering Index	80+
Pole Height	12' – 14'
Pole Layout	Locate at intersections.
Controls:	Photocell ON, dim to 50% after curfew.

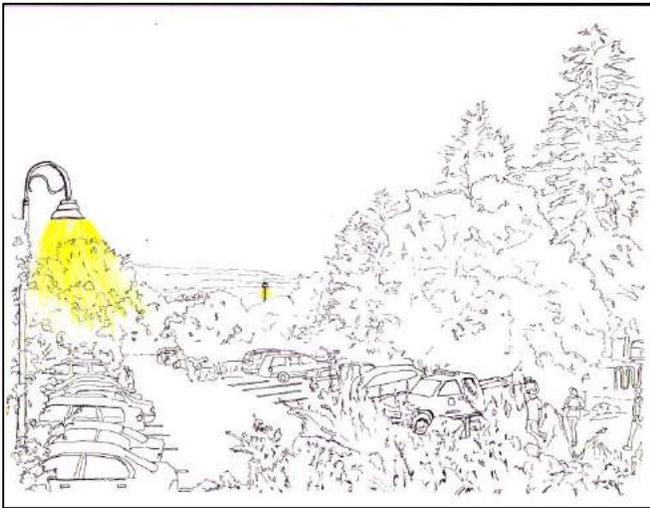
## Parking (Public)

### EXISTING CONDITIONS:



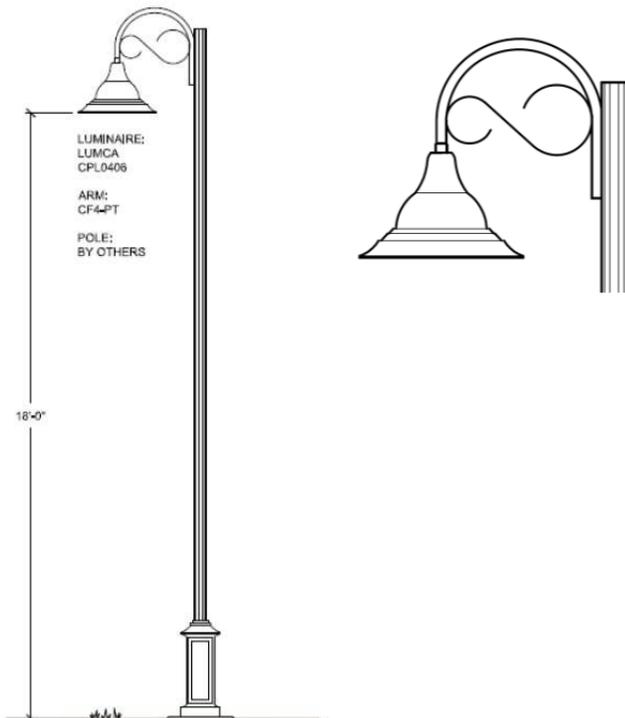
Currently, cobrahead luminaires with high pressure sodium lamps provide the lighting for parking lots. No specific lighting is provided for public parking in areas such as along the Chautauqua Green.

### PROPOSED LIGHTING CONCEPT



A traditional style, pole-mounted luminaire should provide lighting for the parking areas. The luminaire and pole configuration should match that of the adjacent roadway (primary or secondary).

### EXAMPLES



### LUMINAIRE SPECIFICATIONS

Horizontal Distribution	Type IV or V
Lamp Type	Induction or CFL
Lumen Output	3500 lumens (55 watt induction)
Color Temperature	3000 K
Color Rendering Index	80+
Pole Height	12' – 14'
Pole Layout	Space at 4-6 times pole ht.
Controls:	Photocell ON, dim to 50% after curfew.

## Pedestrian Paths

### EXISTING CONDITIONS:



Currently, pedestrian scale lighting exists along some paths and in the Centennial Garden. However, it is typically provided by adjacent street lighting (cobrahead luminaires).

### PROPOSED LIGHTING CONCEPT



For pedestrian paths that are frequently traveled at night and are not near lighted roadways, smaller scale lighting should be used. Matching existing acorn style lighting is recommended.

### EXAMPLES



### LUMINAIRE SPECIFICATIONS

Horizontal Distribution	Type IV or V
Lamp Type	CFL
Lumen Output	1200 lumens (18 watt)
Color Temperature	3000 K
Color Rendering Index	80+
Mounting Height	12'
Pole Layout	Locate poles at path intersections and traffic / pedestrian conflict areas.
Controls:	Photocell ON, dim to 50% after curfew.

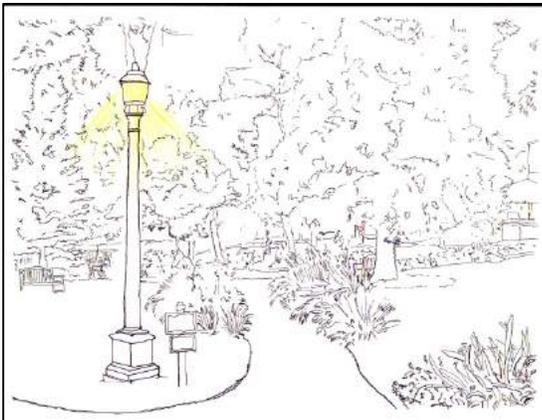
## Parks and Public Spaces

### EXISTING CONDITIONS:



Centennial Garden, currently lit by acorn style lights, is an example of an illuminated public space. The park serves as a pedestrian corridor at night as well.

### PROPOSED LIGHTING CONCEPT



These areas will use the pedestrian luminaire to match the existing acorn style lighting.

### EXAMPLE PRODUCTS



### LUMINAIRE SPECIFICATIONS

Horizontal Distribution	Type IV or V
Lamp Type	Induction or CFL
Lumen Output	1200 lumens (18 watt CFL)
Color Temperature	3000 K
Color Rendering Index	80+
Pole Height	12'
Pole Layout	Locate at path intersections.
Controls:	Photocell ON, dim to 50% after curfew.

## Building Facades

### EXISTING CONDITIONS:



The existing Auditorium façade has no exterior lighting. While it would not be lit every night, its prominence to drivers coming to Boulder on Highway 36 makes it a good landmark and public icon during events.

### PROPOSED LIGHTING CONCEPT:



Like many buildings in the park, small architectural details (niches, cupolas, etc.) could be lit with minimal lighting equipment and energy use.

Lighting in niches should be mounted at the top, lighting downward. Uplighting of the cupolas must be contained within the roof overhangs to reduce light escaping into the night sky.

### EXAMPLES



### LUMINAIRE SPECIFICATIONS

Distribution	20°-40° beam spread
Lamp Type	Linear LED
Lumen Output	400 – 900 lumens max
Color Temperature	3000 K
Color Rendering Index	80+
Controls:	Provide for the changing of overall light levels by switching different luminaire types separately. Controls should provide for a minimum of two “scenes” such as open/closed, event/no event, etc.



**Auditorium – Non-Event Evenings**



**Auditorium – Event Schedule**



**Auditorium –Event Evenings**



**Auditorium –Event Evenings**



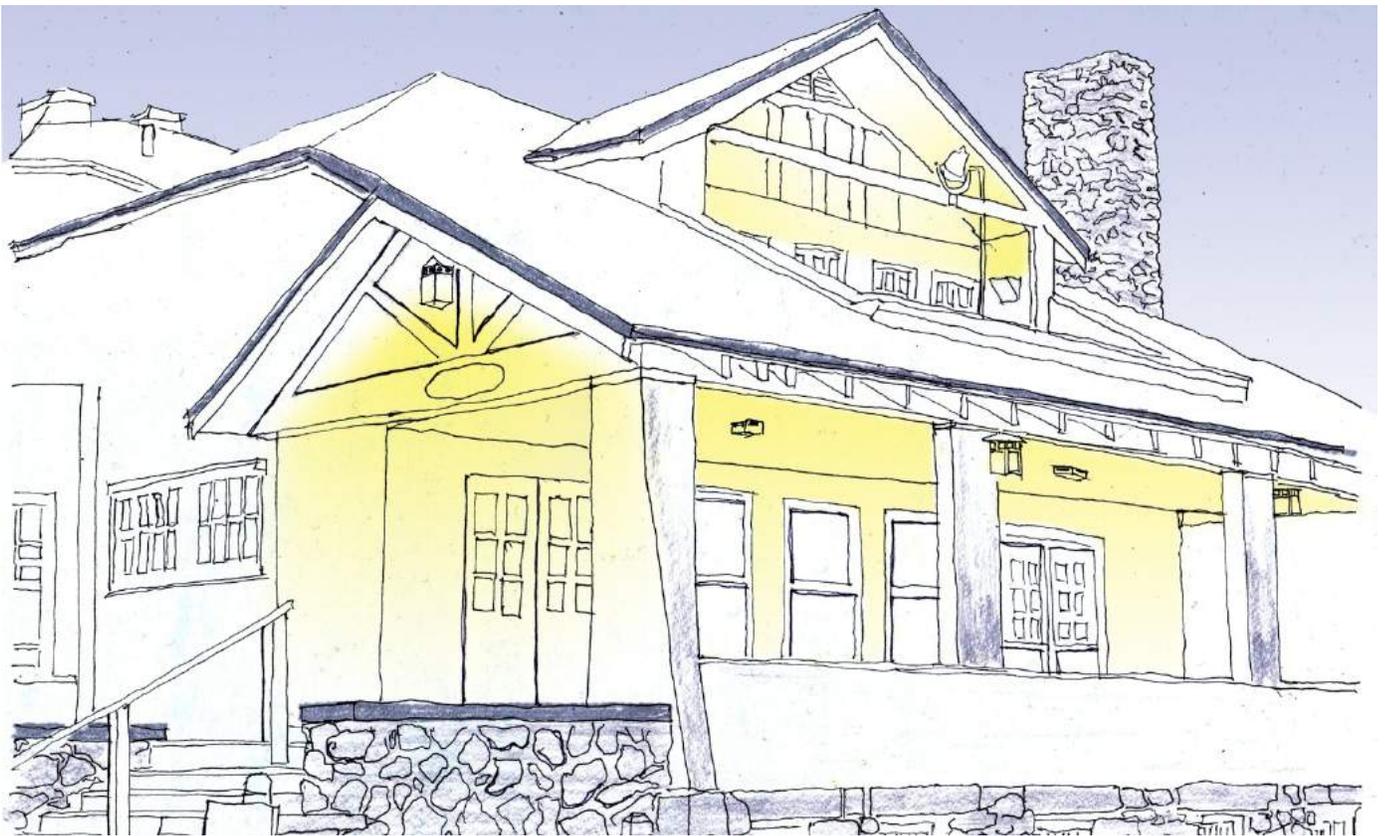
**Dining Hall – Open**



**Dining Hall – Closed**



**Academic Hall**



**Community House**

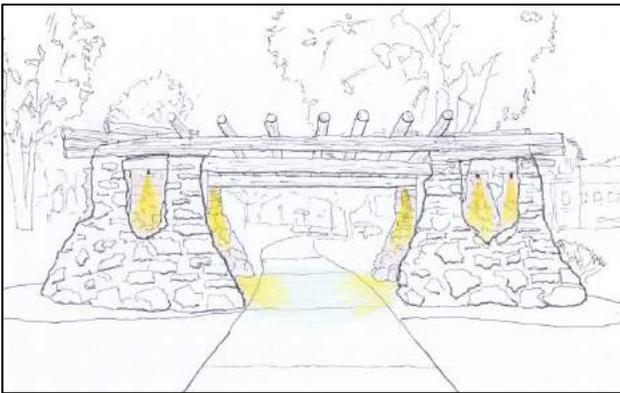
## Monuments/Structures

### EXISTING CONDITIONS:



Currently, very few structures are lit in the Park. However, structures such as the Arbor receive a significant amount of pedestrian traffic at night and warrant additional illumination.

### PROPOSED LIGHTING CONCEPT:



Structure lighting should remain subtle, downward directed, and controllable so that it is only on during events or certain times of the evening.

In this lighting concept for the arbor, only the inside surfaces of the stone columns are illuminated. The reflected light will produce a glow inside the structure, inviting pedestrians to pass through on their way to the Auditorium or to Baseline Road.

### EXAMPLES:



### LUMINAIRE SPECIFICATIONS:

Distribution	Flood or Narrow Flood
Lamp Type	LED
Lumen Output	100 – 400 lumens
Color Temperature	3000 K
Color Rendering Index	80+
Controls:	Provide for the changing of overall light levels by switching different luminaire types separately. Controls should provide for a minimum of two “scenes” such as open/closed, event/no event, etc.



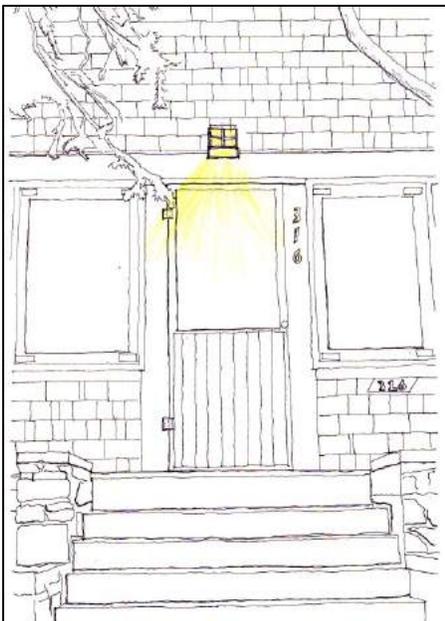
## Residential Exterior

### EXISTING CONDITIONS:



Currently, exterior lighting on and around the cabins is kept to a minimum. Most cabins have a lantern style porch light beside or above the door.

### PROPOSED LIGHTING CONCEPT



The lamps in the porch lights should be changed to compact fluorescent or LED and controlled with an automatic timer. The location of lights and building number should be paired in such a way that the number is clearly illuminated for late night arrivals and easy address identification.

For Private cottage owners:

CCA is implementing this porch lighting plan on all CCA owned cottages and CCA may offer assistance to private cottage owners in retrofitting existing switches with timers to maintain consistency throughout the park by providing a source for the timers being used and contact information for the CCA electrician. The timers being used are completely programmable and can be set to turn porch lights on from dusk until dawn.

### EXAMPLES



Lamp Type	Compact Fluorescent or LED
Lumen Output	400 – 900 lumens (max)
Color Temperature	3000 K
Color Rendering Index	80+
Mounting Height	Over door.
Controls:	Photocell ON / Timer OFF.

## Historic Globe Lighting

### EXISTING CONDITIONS:



The decorative globe fixtures located at the auditorium are dated from the early 1900's and are a character defining feature of the district.

These luminaires have been relamped with low wattage compact fluorescent lamps. This approach keeps the historic fixture while reducing glare, energy consumption, and light pollution.

### LAMP RETROFITS

Lamp Type	Compact Fluorescent
Lumen Output	900 lumens (max)
Color Temperature	3000 K
Color Rendering Index	80+
Controls:	Provide automatic time switch.

## Control Strategies

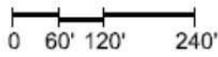
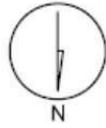
Exterior lighting control for the campus uses several different strategies:

- Automatic photocontrol: turns the light ON at sunset and OFF at dawn.
- Automatic photocontrol with time switch: turns light ON at sunset and OFF at a set time of night.
- Automatic photocontrol with time switch and manual override: turns the light ON at sunset and OFF at a set time; can be overridden to stay ON later and then reset to the regular schedule the next day.
- Partial night photocontrol: turns the light ON at sunset, dims the light to 50% at 10pm (or other selected time) and then OFF at dawn.

The control schedule for all of the lighting components is listed in the following table. The lighting varies by time of year (standard season and event nights) and by time of day (dusk to curfew and curfew to dawn).

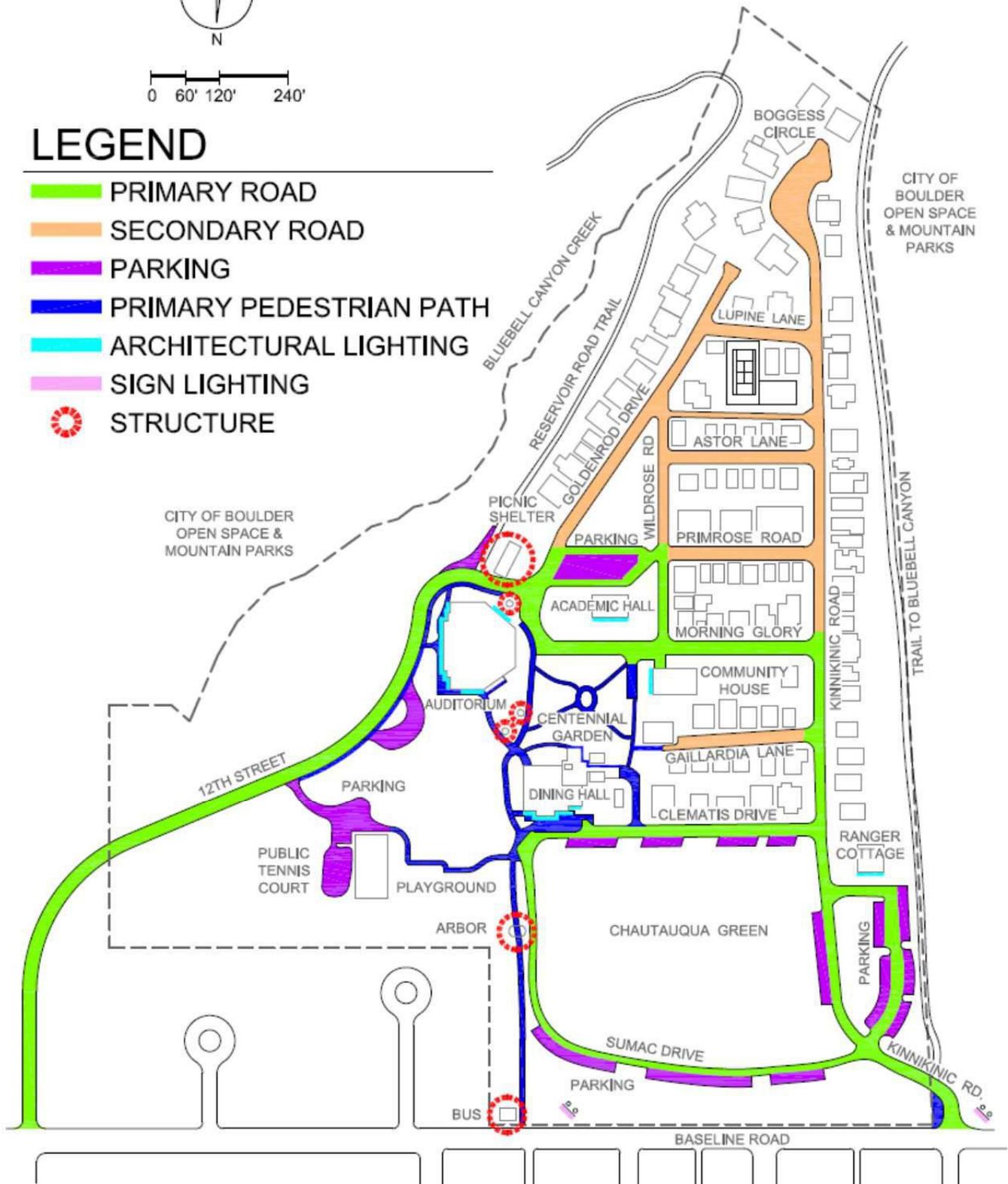
Exterior Lighting	Standard Seasonal Schedule		Event Schedule		Control Type
	Dusk to 10 PM	10 PM to Dawn	Dusk to Post Event Time	Post Event Time to Dawn	
<b>Primary Lighting</b>	ON	ON at HALF POWER	ON	ON at HALF POWER	Auto
<b>Secondary Lighting</b>	ON	ON at HALF POWER	ON	ON at HALF POWER	Auto
<b>Pedestrian Lighting</b>	ON	ON at HALF POWER	ON	ON at HALF POWER	Auto
<b>Architectural Lighting</b>					
Auditorium	Tower Lighting ON	OFF	ALL ON	OFF	Auto/Manual for Event
Community House	ALL ON	OFF	ALL ON	OFF	Auto/Manual for Event
Dining Hall	Tower Lighting ON	OFF	ALL ON	OFF	Auto/Manual for Event
Academic Hall	ALL ON	Entry Lighting ON	ALL ON	Entry Lighting ON	Auto/Manual for Event
Ranger Cottage	ALL ON	OFF	ALL ON	OFF	Auto
<b>Structure Lighting</b>					
Kiosks	OFF	OFF	ON	OFF	Auto/Manual for Event
Arbor	ON	OFF	ON	OFF	Auto/Manual for Event
Trolley Stop	ON	OFF	ON	OFF	Auto/Manual for Event
Picnic Shelter	OFF	OFF	ON	OFF	Auto/Manual for Event
<b>Sign Lighting</b>					
Baseline Entry	ON	ON	ON	ON	Auto
Trolley Stop	ON	OFF	ON	OFF	Auto/Manual for Event

# Maps and Drawings

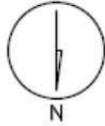


## LEGEND

- PRIMARY ROAD
- SECONDARY ROAD
- PARKING
- PRIMARY PEDESTRIAN PATH
- ARCHITECTURAL LIGHTING
- SIGN LIGHTING
- STRUCTURE



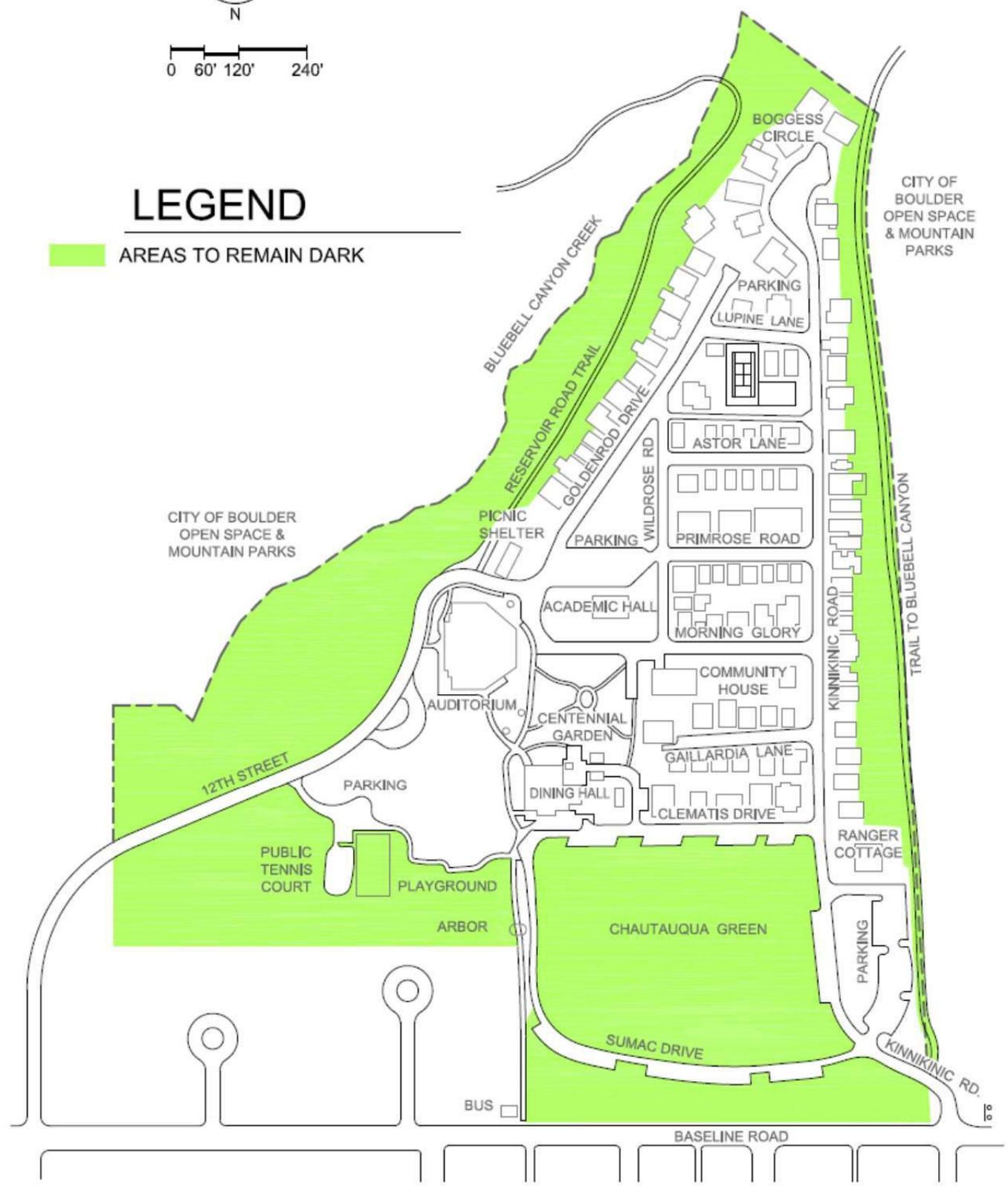
## AREA CLASSIFICATIONS

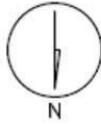


0 60' 120' 240'

# LEGEND

 AREAS TO REMAIN DARK

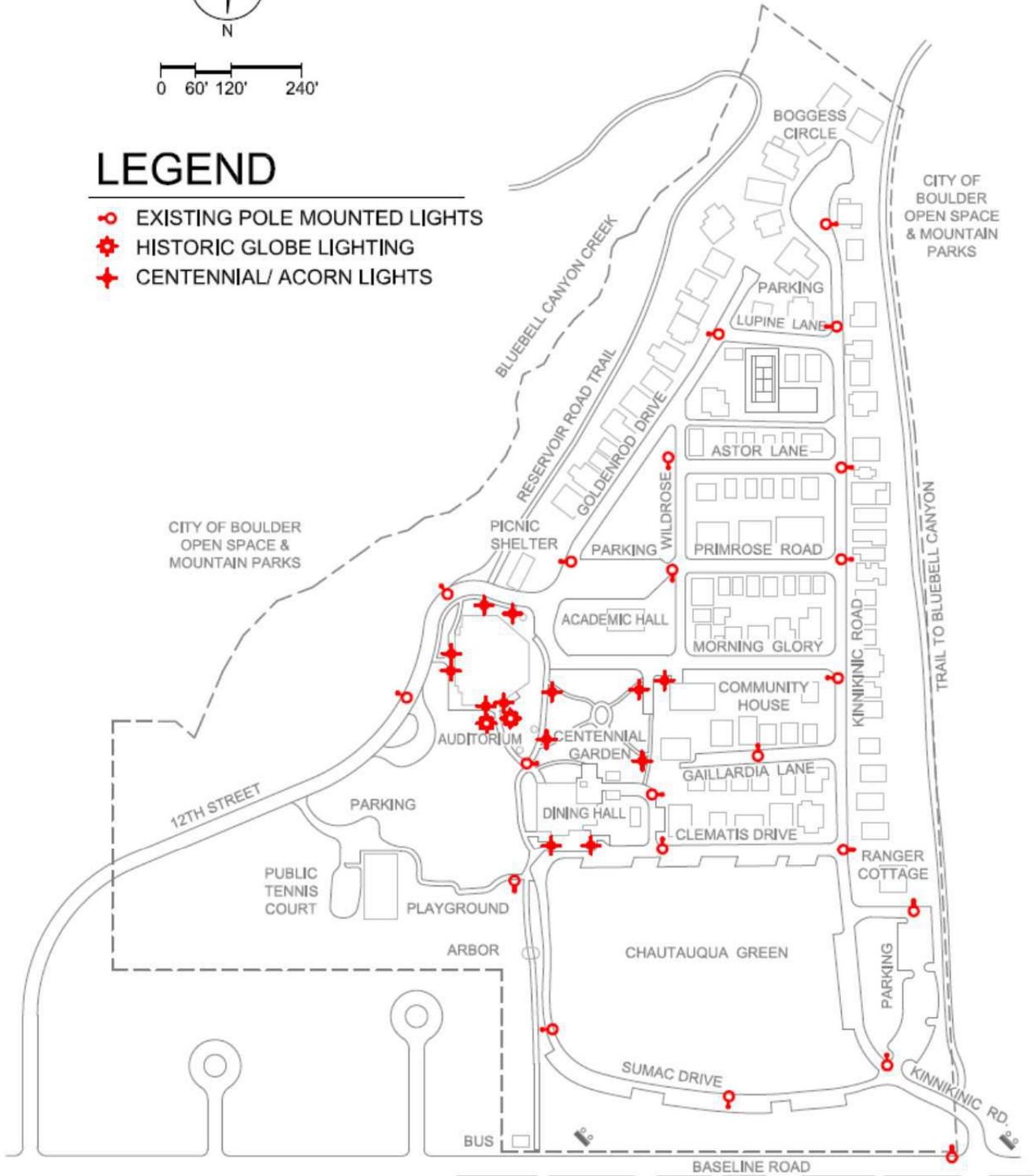




0 60' 120' 240'

## LEGEND

-  EXISTING POLE MOUNTED LIGHTS
-  HISTORIC GLOBE LIGHTING
-  CENTENNIAL/ ACORN LIGHTS



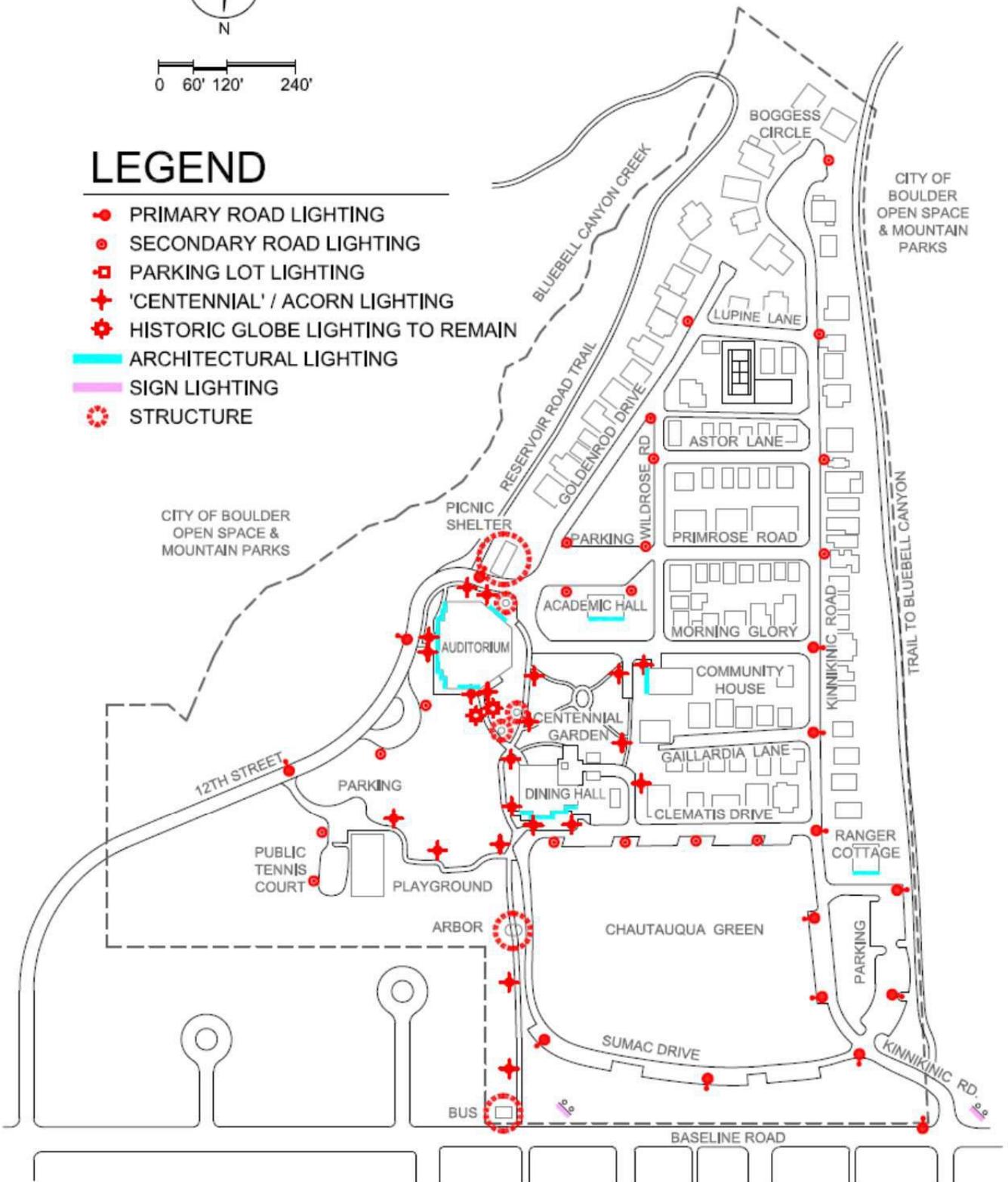
# EXISTING POLE MOUNTED LIGHTING LOCATIONS (APPROX.)



0 60' 120' 240'

# LEGEND

-  PRIMARY ROAD LIGHTING
-  SECONDARY ROAD LIGHTING
-  PARKING LOT LIGHTING
-  'CENTENNIAL' / ACORN LIGHTING
-  HISTORIC GLOBE LIGHTING TO REMAIN
-  ARCHITECTURAL LIGHTING
-  SIGN LIGHTING
-  STRUCTURE



# LIGHTING MASTER PLAN



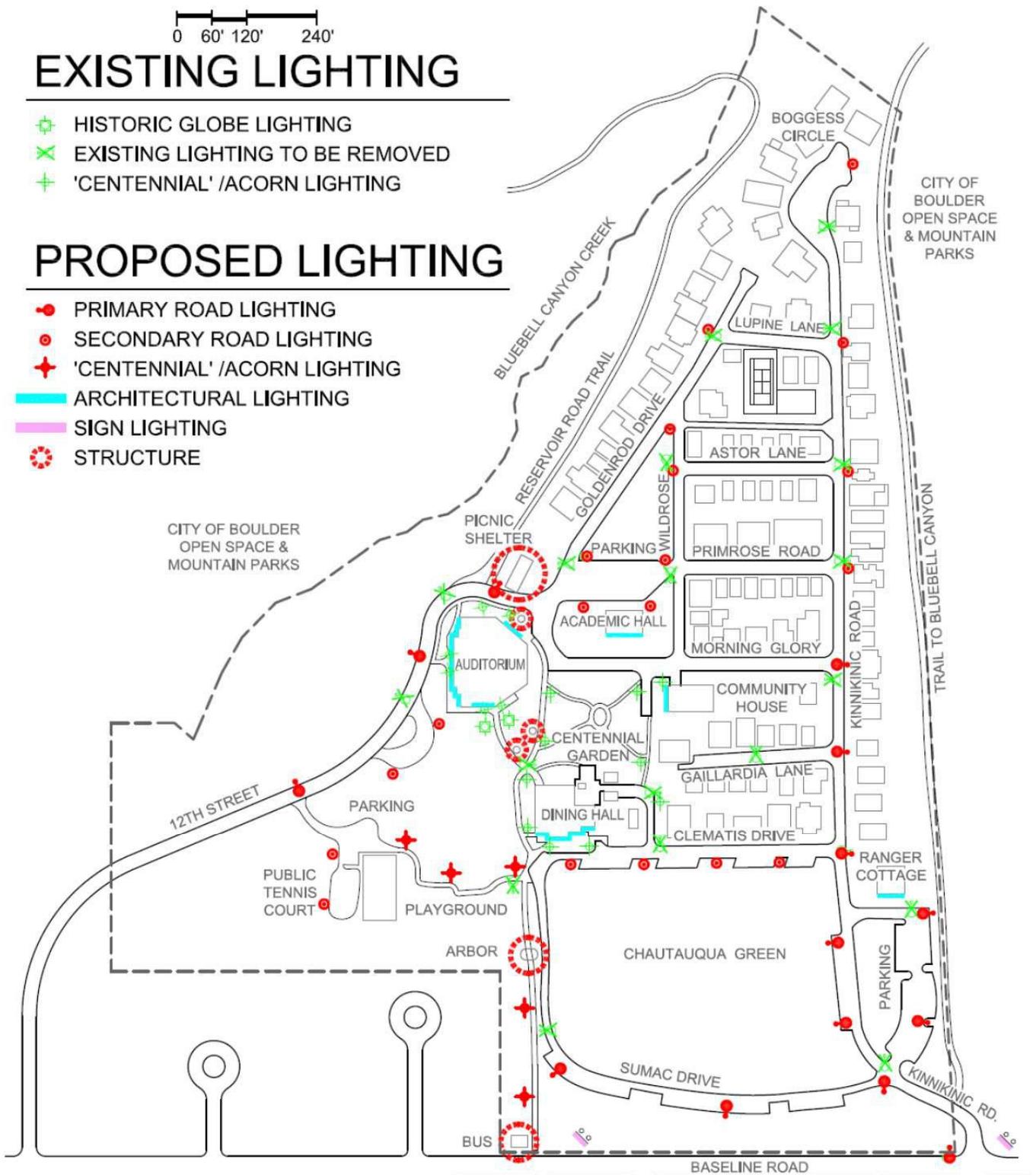
0 60' 120' 240'

## EXISTING LIGHTING

- HISTORIC GLOBE LIGHTING
- EXISTING LIGHTING TO BE REMOVED
- 'CENTENNIAL' /ACORN LIGHTING

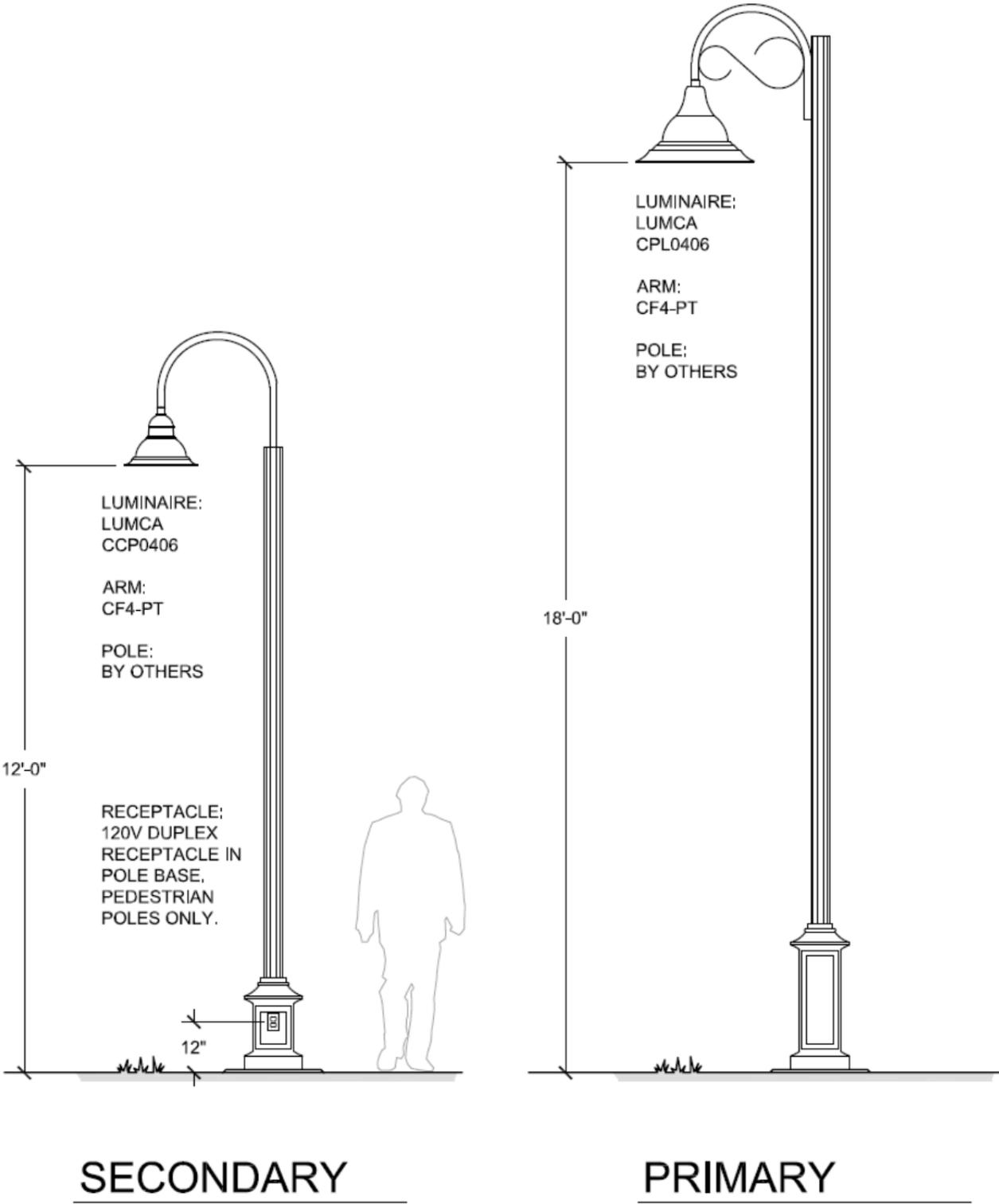
## PROPOSED LIGHTING

- PRIMARY ROAD LIGHTING
- SECONDARY ROAD LIGHTING
- 'CENTENNIAL' /ACORN LIGHTING
- ARCHITECTURAL LIGHTING
- SIGN LIGHTING
- STRUCTURE



EXISTING & NEW PROPOSED LOCATIONS  
(APPROX.)

Appendix A



CHAUTAUQUA STREET LUMINAIRES

## **Appendix B**

In 1998, Clanton & Associates completed a lighting design for the Centennial Garden. At that time, other recommendations were made for the auditorium architectural lighting and pedestrian lighting north of the arbor and near the playground. This appendix contains the documentation for those recommendations. The concepts and designs shown in the masterplan continue the recommendations made at that time.