Appendix F: Lighting

LIGHTING

Existing Conditions

Retail-oriented corridors such as Manchester Road require effective lighting in order to enhance safety for pedestrians, bicyclists, and motorists. Communities around the country have also used lighting design and placement in order to help to create a specific image or look for particular corridors. The existing lighting infrastructure along Manchester Road does not serve these goals and has resulted from uncoordinated planning for lighting over many years. The following highlights some of the key lighting issues along Manchester Road.

Visibility

- Motorists and pedestrians along Manchester Road experience excessive glare because most of the luminaries do not include shields.
- The use of lower color temperate lights (yellow lights) derived from high pressure sodium sources decreases visibility for drivers.

Aesthetics

- In general, the communities along the corridor and MoDOT have applied inconsistent design practices over the years, creating confusion and decreasing aesthetic quality along Manchester Road.
- The presence of overhead utility power lines, and associated requirements for utility clearances, limits the ability of the cities to place street lights using ideal spacings for a corridor of this type. Therefore, street light placement along Manchester Road is currently irregular and contributes to a lower quality aesthetic appearance.

Impacts to Adjacent Properties

- A few luminaries for pedestrians are in place along select sections of Manchester Road, but these facilities have not provided sufficient lighting for pedestrians and shoppers along the corridor.
- The existing overhead lighting at most car dealerships along Manchester Road uses too much light. In addition, many of the lights from car dealerships are directed toward motorists along the street, thus creating potential safety hazards for motorists.

Design

- In general, lighting design along Manchester Road does not meet best practices used around the country.
- Many sections of Manchester Road are only lit from one side, and many areas along the road do not have any lights. In general, the corridor features many areas that are either lit too brightly (from car dealerships) or are too dark (and do not feature any lights).

Manchester Road Street and Pedestrian Lighting Master Plan

The Street and Pedestrian Lighting Master Plan for Manchester Road and surrounding neighborhoods establishes lighting design themes and discusses equipment for use in current and future street lighting projects. The specific goals of the plan include improving the lighting quality, continuity, aesthetics of luminaries and light sources, and reinforcing the character and identity of each area along the corridor. In addition, minimizing maintenance and energy use will support community goals.

Design Concepts

The Streetlighting Master Plan defines quality, cost effective exterior pedestrian, street and intersection lighting that is sensitive to the character of Manchester Road. Street lighting should provide a quality of timelessness and the lighting equipment installed along Manchester Road should use current and future technologies that support the separate community goals and visions along the corridor. The following concepts guided the master planning process:

- Create a sense of timelessness using appropriate lighting equipment and layouts
- Use good quality, current and future technologies when selecting lighting equipment
- Provide a safe, secure, nighttime environment and establish visual identity
- Minimizing glare and light pollution
- Aid vehicular and pedestrian circulation with a quality lighted environment
- Complement the character of the particular portion of the corridor
- Avoid visual clutter
- Provide a comfortable, well defined environment by night and day
- Provide only the minimum amount of street lighting in less intensely developed areas. Street lights can be added when these areas are developed.
- Provide continuous lighting in the town centers
- Provide pedestrian lighting along pedestrian corridors

Successful Lighting Designs

Layers of Light

A successful lighting design employs layers of light. Lighting should provide uniform lighting on the street and strong vertical light at crosswalks and intersections for pedestrian detection. In areas along the corridor emphasizing pedestrian activity, the street lighting can be supplemented with additional pedestrian lighting assemblies. Signage, monuments and markers, and other streetscape features should also be lighted to highlight objects in a glare-free manner.

Lighting differentiation gives both the motorist and pedestrian the necessary visual information for detection and identification of hazards, thereby satisfying the issues related to safety.



Images of existing lighting along Manchester Road.

Example of existing street lighting along Main Street in the Wildwood Town Center

Example of existing pedestrian lighting along the south side of Manchester Road in Manchester, just west of Route 141

Environmentally Sensitive Lighting:

This lighting system must be thoroughly designed to minimize its impact on adjacent or nearby properties, wildlife, and the night sky. By using shielded lamps and luminaries, the lighting design will have minimal impact on the surrounding environment, especially residential properties. Minimal light pollution and light trespass will result from a well-designed lighting system.

Equipment Selection

Luminaire aesthetics should complement the character of different transects along the corridor. For instance, the luminaires located along Manchester Road may have a neutral shape such as a curvilinear, shallow round or thin elliptical. These will easily blend with particular aesthetics, but carry a continuous theme along the corridor. Luminaires within particular communities can reflect the style of each town. Luminaire style selection should also be appropriate for the lamp source technology such as larger rounds for induction lamps or thinner elongated equipment for LED sources.

There are five basic types of luminaires recommended for the street and pedestrian lighting:

- Manchester Road: fully shielded (0% uplight) luminaires located on medians and mounted on 30 to 35 foot high poles
- Side Streets: Fully shielded (0% uplight) luminaires mounted on 25 foot high poles.
- Residential Backstreets: Fully shielded (0% uplight) luminaires mounted on 20-foot high poles
- Pedestrian Walkways: Fully shielded (0% uplight), decorative units, mounted on 12 foot high poles
- Entry bollards: Partially shielded (5% uplight) decorative units, approximately 3 feet high

Recommended light sources produce warm light (CCT <= 4,000K). These light sources may be either LED, induction, or metal halide with excellent color rendering properties (CRI >= 80).

Poles should be able to accommodate the number of luminaire heads required for the application. In addition, banner arms and signs need to be identified and incorporated into the pole design.

Layout and Placement

The placement of equipment on any road should provide the lighting necessary for safe vehicular navigation and pedestrian circulation. In addition, the lighting equipment must provide information and visual cues as to the nature of the road and upcoming hazards. A lighting system can do this in several ways. For example:

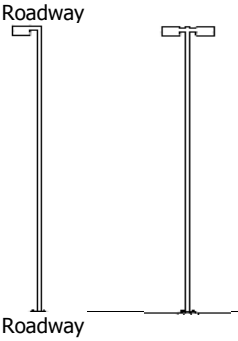
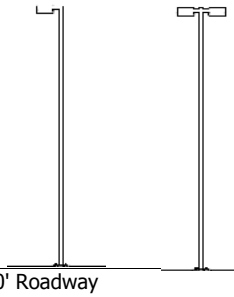
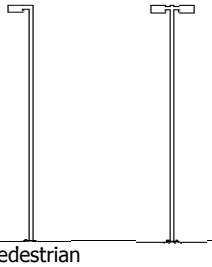
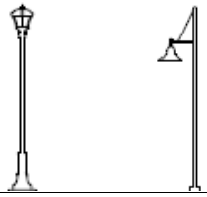
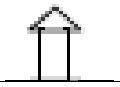
- Emphasize the intersection by increasing the quantity of luminaires and/or different pole placement near the intersection. An example of this may be to use median mounted poles along the road between intersections, and to use corner mounted poles at the intersections.
- Utilize medians for equipment placement, thus providing uncluttered views from the road to the businesses and storefronts
- Avoid staggered spacing of fixtures in order to improve visibility
- Respond to parking and turn lanes where appropriate to maintain visual cues
- Provide a visually organized, hierarchical and easily understandable lighting system
- Integrate the lighting equipment with the landscape
- Reduce clutter by combining functions such as lighting poles used for signage and banners
- Transition from one transect to another by reducing lighting layers in the transition zones.

Lighting Controls

One of the greatest street lighting opportunities involves introducing lighting controls. Recent developments in control technology now make it possible to centrally control the exterior lighting on a large scale. This will permit individual luminaires to be dimmed during low activity hours. By centralizing the controls, lighting levels can be adjusted to reduce energy use during peak demand periods, and to adapt the lighting system to adverse environmental and weather conditions such as snow.

Installing a centralized lighting control system provides many benefits, including energy savings and equipment monitoring for improved maintenance through two-way communication with each luminaire. Centralized control system types include radio frequency (RF) or power line carrier (PLC). Capabilities include:

- Control of on/off times
- Energy consumption metering (revenue grade)
- Development of adaptive lighting protocols to correspond with traffic and pedestrian flows
- Ability to control up to 100,000 points of street light control
- Logging of operating hours for each individual lamp
- Remote programing of the output of the entire street light network
- Effectively planning for lamp luminaire locations and installations
- Reduced maintenance costs and increased public safety through the development of proactive maintenance schedules – including alerts by email for lamp failures
- Rapid regeneratation of reports for installation planning, maintenance programs, and energy usage

			T3	T4	T5	SD	Specifications
		30' Roadway 		*	*		**Source:** Induction, Metal Halide or LED **Lumens**: 22,000 IND and CMH, 15,400 LED **Shielding:** Fully shielded **BUG Rating:** B2 U2 G2 **Mounting Height:** 30' to Lamp Center **Spacing:** 130' - 160' (Continuous Lighting Application) **Absolute Allowable Max (fc):** 4 **Control Strategies:** Photocell only OR photocell (On) with time switch (Dim/Off) at designated curfew
		25' Roadway 	*	*	*		**Source:** Induction, Metal Halide or LED **Lumens:** 22,000 IND and CMH, 15,400 LED **Shielding:** Fully shielded **BUG Rating:** B2 U2 G2 **Mounting Height:** 25' to Lamp Center **Spacing:** 110' - 130' (Continuous Lighting Application) **Absolute Allowable Max (fc):** 4 **Control Strategies:** Photocell only OR photocell (On) with time switch (Dim/Off) at designated curfew
		20' Roadway 	*	*			**Source:** Induction, Metal Halide or LED **Lumens:** 14,000 IND and CMH, 9800 LED **Shielding:** Fully shielded **BUG Rating:** B2 U2 G2 **Mounting Height:** 20' **Spacing:** 300' **Absolute Allowable Max (fc):** 4 **Control Strategies**: Photocell only OR photocell (On) with time switch (Dim/Off) at designated curfew
		12' Pedestrian 	*	*			**Source:** Induction, Ceramic Metal Halide or LED **Lumens:** 3800 IND and CMH, 2660 LED **Shielding:** Fully shielded **BUG Rating:** B2 U2 G2 **Mounting Height:** 12' - 14' to Lamp Center **Spacing:** XXX **Absolute Allowable Max (fc):** 3 **Control Strategies:** Photocell only OR photocell (On) with time switch (Dim/Off) at designated curfew
		3' Bollard 	*	*			**Source:** Compact Fluorescent or LED **Lumens:** 1800 CFL, 1260 LED **Shielding:** Fully shielded **BUG Rating:** B1 U2 G1 **Mounting Height:** 3' to Lamp Center **Spacing:** XXX **Absolute Allowable Max (fc):** 10 **Control Strategies:** Photocell only OR photocell (On) with time switch (Dim/Off) at designated curfew OR photocell (On), time switch (Off) with occupancy sensor at designated curfew