

APPENDIX I

Design Memos

MEMORANDUM

State of Alaska
Department of Transportation & Public Facilities
Central Region Design and Engineering Services

TO: Distribution

DATE: November 19, 2015

FILE NO:

PHONE NO: 269-0588

FROM: Ken Morton, P.E.
Preconstruction Engineer
Central Region

SUBJECT: Highway Lighting
Guidance

Safety of the roadway users continues to be a top priority of the Department; however, it is necessary to allocate limited resources wisely between various maintenance activities. Highway lighting is expensive to install and maintain. As such, Central Region will seek to minimize new installations of highway lighting and to reduce operating costs on the existing system.

The following guidance applies to all projects unless precluded by funding:

1. DELINEATION. Consider delineation prior to choosing lighting. Note the MUTCD Section 3F.03, Paragraph 02 requires delineators on the right-hand side of freeways and expressways in the absence of continuous lighting or raised pavement markers.
2. LED LIGHTING, PHOTOCELLS. Consider LED lighting where AASHTO performance criteria can be met. Compute the life cycle cost analysis comparing existing and predicted crash costs as well as costs to the Department for both new installations and re-lamping efforts.
 - a. Use all luminaire heads with twist-lock photocell receptacles compatible with photocell-timers and 7 pin controls for future adaptive lighting communication and controls. Place the primary photocell for lighting operations on the load center in an open area accessible from a ground truck, approximately 7 feet above ground or less.
3. LEAST POLES. Minimize electrical use by maximizing pole spacing.
4. LOCATION. Consider lighting at the following junctions:
 - a. All marked pedestrian/bicycle crosswalks
 - b. Nonmotorized underpasses
 - c. Underpasses (for motorized users) where continuous lighting is provided up/downstream
 - d. Partial interchange lighting at intersection and ramp gores.
 - e. Loop ramps
 - f. Roundabouts, traffic signals, and arterial/collector level or higher all-way stops
 - g. High crash intersections where the night-to-day crash ratio is 2:1 at the site itself or 2:1 greater than the statewide average¹ OR there are 2 or more major injury crashes where darkness may be more of an apparent contributing factor than other conditions and driver actions. Both are measured over a 5 year period.

- h. Rail-highway crossings where trains block tracks for staging; humped crossings on nonlevel roadways; and crossings with a recurring nighttime crash history with trains.
5. LOCATION. Continuous lighting is not required. However, it may be approved for installation by the Preconstruction Engineer on a project-by-project basis. If recommended for installation, include a discussion in the DSR that considers the following roadway characteristics relative to surrounding roadways:
 - a. ADT
 - b. Crash history/severity (nighttime vs daytime)
 - c. Driveway density
 - d. Pedestrian and bicycle use
 - e. Cross section (rural vs urban) and clear zone – use 6:1 or flatter slopes to pole base, or mitigate cross section for vehicle trajectory, or locate pole base outside clear zone.
6. LOAD CENTERS, CIRCUITS.
 - a. Where existing continuous lighting and signal lighting share a load center, each type of lighting should be on its own circuit to provide flexibility for lighting curfews. Otherwise design power for all new lighting in Central Region with separately metered load centers from traffic signals. Lighting on top of signal poles (up to four corners) is powered as part of the signal traffic control system.
 - b. Use a separate contactor or separate load centers as needed for interchange and ramp circuits vs segment circuits between interchanges. All ramps can be on one circuit. This allows partial versus continuous lighting flexibility in the future.
 - c. Call District DOT/PF electricians at least once during the design of each lighting system. Ask what they need. Minimize final operating costs.
7. REDUCTION/REMOVAL. The Traffic and Safety Engineer in coordination with the M&O Chief may recommend locations for removal of existing continuous highway lighting or installation of equipment to implement lighting curfews (reduced hours for highway lighting) to the Regional Director. These changes may need to be incorporated into project designs.
8. OTHER LOCATIONS.
 - a. Check the need for FAA Review for any lighting close to airports.
 - b. Do not routinely add school bus stop and transit bus stop lighting.
 - c. Retain existing utility pole lighting provided by others. Do not remove or relocate utility pole lighting unless necessary or replaced by new construction.
 - d. Obtain ROW permits and/or maintenance agreements for new lighting by others.

ACCEPTANCE

All lighting additions, including retrofitting of existing HPS lighting with LED lighting, require review and acceptance by either the Regional Traffic and Safety Engineer, Chief of Maintenance and Operations, Chief of Highway Design, or the Regional Preconstruction Engineer.

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¹ NCHRP 152 Warrants for Highway Lighting, p. 33. Night to day crash rates vary greatly in Alaska due to wide swings in summer versus winter daylight, while hourly volumes remain more similar year around. Crash number ratios are recommended here as a rapid guide without the complexity of variable hourly rates.

At this time no significant design changes were made after the approval of this document. The final as-built planset for this project will be available at Central Files within the Highway Design section (4111 Aviation Ave. Anchorage, AK 99502).