



YORK TOLL PLAZA
MAINE TURNPIKE AUTHORITY
HIGHWAY LIGHTING

October 3, 2016



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Jacobs has analyzed and designed a highway lighting system for the proposed York Toll Plaza at Mile 8.8 on Interstate 95 based on the Illuminating Engineering Society DG-23-14 Design Guide for Lighting for Toll Plazas. The toll plaza lighting design guide is based on input from various tolling authorities, experienced illumination engineers and organizations responsible for warranting/setting illumination guide lines. The human eye can handle a sudden increase in lighting but not a sudden decrease in lighting.

Toll Plazas consist of distinct driving areas: Approach/Departure Roads/Zones, Queuing/Areas and Toll Collection Islands. The approach and departure road is the first area where the driver experiences when entering a toll plaza facility. The approach and departure zones and the queuing area are the most critical areas for drivers due to the lighting level changes to the toll collection booth due to driver familiarity, congestion and potential pedestrians. The toll collection canopy provides the means to provide luminaires to provide the necessary illuminance for the collection areas roadway surface.

Recommended Illuminance Criteria (Provided by Table 1, IES DG-23-14)

Toll Collection Area (Manual & Electronic Booths)	10-30 fc
Toll Collection Island (Includes Electronic Booths)	2-5 fc
Approach and Departure Zones	1-5 fc

Design Illuminance Criteria used on York Toll Plaza

Toll Collection Booths/Canopy	10.4 fc
Space Frame	14-15 fc
Queueing Area/Immediate Departure	2.6-3 fc
Approach and Departure Zones	0.9-1.2 fc
Open Road Tolling Lanes	1.1 fc
Administration building parking lot/access road	.09-1.1 fc
Mile 7.3, North & South limits of Mile 8.8	0.9-1.1 fc

The illumination values were determined as an interpretation of the IES DG23-14 to provide transition lighting from no lighting beyond the work limits to lighting levels at the toll collection islands and transition back to no lighting on the departure end.

All lighting luminaires proposed shall be full cut off LED. Cobra head luminaires at the new toll plaza will be installed at a 37 foot mounting height. Due to the width of the highway and toll plaza, the 37 foot mounting height provides excellent uniformity throughout the tolling facility. All poles on the edge of the plaza will be equipped with house-side light shields to control light trespass. The combination of the shields to control the amount of light that is projected off the pavement surfaces and the height of the trees that surround the toll plaza, we expect the lighting to be in practically

undetectable to any abutter in the vicinity of the proposed toll plaza. The lighting fixtures will utilize a standard color temperature that results in a warmer yellow color rather than the cooler bluish hues associated at the higher end of the spectrum.

Lighting luminaires at mile 7.3 will be installed at a 37 foot mounting height, while lighting luminaires at the administration building parking lot and access road will be installed at a 27 foot mounting height.

The project has been analyzed using the American Electric ATB2 Luminaire. At mile 8.8 the ATB2 80BLEDE85 Type III distribution is used at 224w per luminaire while the ATB2 40BLEDE13 Type III distribution is used at 177w per luminaire at Mile 7.3 and ATB0 20BLEDE10 Type III distribution is used at 72 w per luminaire for the access road and administration building parking lot. All luminaires that are adjacent to the ROW are analyzed using “house side” shields to prevent light trespass on adjacent properties.

The Table shown below shows the lighting statistics for the various areas of the toll plaza.

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Table - Lighting Statistics

Description	Avg	Max	Min	Max/Min	Avg/Min
Access Rd Curve	0.9 fc	1.8 fc	0.1 fc	18.0:1	9.0:1
Access Road Entrance	0.9 fc	1.8 fc	0.2 fc	9.0:1	4.5:1
Admin Parking Lot	1.1 fc	2.1 fc	0.1 fc	21.0:1	11.0:1
Exit 7 NB	0.9 fc	3.1 fc	0.1 fc	31.0:1	9.0:1
Exit 7 SB	0.9 fc	3.1 fc	0.1 fc	31.0:1	9.0:1
NB Approach Close	3.2 fc	6.5 fc	0.8 fc	8.0:1	4.0:1
NB Approach Far	1.1 fc	3.3 fc	0.1 fc	33.0:1	11.0:1
NB Departure Close	3.2 fc	6.5 fc	0.8 fc	8.1:1	4.0:1
NB Departure Far	1.1 fc	3.3 fc	0.1 fc	33.0:1	11.0:1
NB Off ROW	0.0 fc	0.1 fc	0.0 fc	N/A	N/A
NB Space Frame	14.8 fc	21.4 fc	6.4 fc	3.3:1	2.3:1
NB Toll Booths	10.4 fc	24.0 fc	1.2 fc	20.0:1	8.7:1
North Limit	1.0 fc	3.2 fc	0.1 fc	32.0:1	10.0:1
ORT	1.1 fc	12.1 fc	0.1 fc	121.0:1	11.0:1
SB Approach Close	3.0 fc	4.8 fc	1.7 fc	2.8:1	1.8:1
SB approach Far	1.2 fc	3.3 fc	0.1 fc	33.0:1	12.0:1
SB Departure Close	3.2 fc	7.8 fc	0.7 fc	11.1:1	4.6:1
SB Departure Far	0.9 fc	3.2 fc	0.1 fc	32.0:1	9.0:1
SB Lane Drop South	0.9 fc	3.2 fc	0.1 fc	32.0:1	9.0:1
SB Off ROW	0.1 fc	0.5 fc	0.0 fc	N/A	N/A
SB Space Frame	14.4 fc	19.8 fc	6.6 fc	3.0:1	2.2:1
SB Toll Booths	10.4 fc	25.0 fc	0.8 fc	31.3:1	13.0:1