

### **III-11.01 Warrants for Highway Lighting**

Warrants for highway lighting should follow the NDDOT Lighting Warrant Policy found on the Manuals and Publications webpage at:

<https://www.dot.nd.gov/manuals/manuals-publications.htm>.

### **III-11.02 Plans and Specifications**

The plans and specifications for all lighting facilities to be installed on or adjacent to state highways, including service roads, constructed under an agreement between the state and a local government agency, are subject to approval by NDDOT.

#### **III-11.02.01 Design Requirements**

All new lighting installations shall utilize LED lighting.

Due to the use of dark aggregates in hot bituminous pavement and staining of concrete roadways, the value for road surface classification as shown in AASHTO's Roadway Lighting Design Guide, 2005, should be R3 for both types of roadway surfaces.

The total Light Loss Factor (LLF) is based on luminaire dirt depreciation, lamp lumen depreciation and equipment factor. For conventional or decorative lighting where location is close to the roadway, the LLF value should be 0.69. For high mast lighting, the LLF value should be 0.81.

The specific lighting and traffic signal foundation size shall be shown in the plans for each foundation installed with the project. Refer to the table on the following page for the specific foundation diameter and depth requirements for various lighting and traffic signals.

<b>LIGHTING &amp; TRAFFIC SIGNAL FOUNDATION TABLE</b>			
<b>(USE FOR SINGLE MAST ARMS ONLY)</b>			
<b>Description</b>		<b>Footing Depth, "D" 24" &amp; 30" Ø (ft)</b>	<b>Footing Depth, "D" 36" &amp; 42" Ø (ft)</b>
<b>Light Standard</b>			
30'-35'	Mounting Height	6	5
36'-44'	Mounting Height	6	5
45'-50'	Mounting Height	8	7
<b>Type I, II, V, VI, VII Signal Standard</b>			
		4	3
<b>Type IV Signal Standard</b>			
0'-25'	Signal Mast Arm	11,11	11,11
26'-30'	Signal Mast Arm	12,12	12,12
31'-35'	Signal Mast Arm	12,12	12,12
36'-39'	Signal Mast Arm	13,13	13,13
40'-45'	Signal Mast Arm	16,15	15,15
46'-50'	Signal Mast Arm	16,16	15,15
51'-55'	Signal Mast Arm	17,16	16,16
56'-60'	Signal Mast Arm	18,17	17,17
<b>Combination 30' Mounting Height</b>			
0'-25'	Signal Mast Arm	11,11	11,11
26'-30'	Signal Mast Arm	12,12	12,12
31'-35'	Signal Mast Arm	13,13	13,13
36'-39'	Signal Mast Arm	14,14	14,14
40'-45'	Signal Mast Arm	16,16	15,15
46'-50'	Signal Mast Arm	17,16	16,16
51'-55'	Signal Mast Arm	17,17	16,16
56'-60'	Signal Mast Arm	18,18	17,17

<b>LIGHTING &amp; TRAFFIC SIGNAL FOUNDATION TABLE</b>			
<b>(USE FOR SINGLE MAST ARMS ONLY)</b>			
<b>Description</b>		<b>Footing Depth, "D" 24" &amp; 30" Ø (ft)</b>	<b>Footing Depth, "D" 36" &amp; 42" Ø (ft)</b>
<b>Combination 40' Mounting Height</b>			
0'-25'	Signal Mast Arm	12,12	12,12
26'-30'	Signal Mast Arm	13,13	13,13
31'-35'	Signal Mast Arm	13,13	13,13
36'-39'	Signal Mast Arm	14,14	14,14
40'-45'	Signal Mast Arm	16,16	15,15
46'-50'	Signal Mast Arm	17,16	16,16
51'-55'	Signal Mast Arm	18,17	16,16
56'-60'	Signal Mast Arm	19,18	17,17
<b>Combination 50' Mounting Height</b>			
0'-25'	Signal Mast Arm	12,12	12,12
26'-30'	Signal Mast Arm	13,13	13,13
31'-35'	Signal Mast Arm	14,13	13,13
36'-39'	Signal Mast Arm	15,14	14,14
40'-45'	Signal Mast Arm	17,16	16,16
46'-50'	Signal Mast Arm	17,16	16,16
51'-55'	Signal Mast Arm	18,17	17,17
56'-60'	Signal Mast Arm	19,18	18,17

### III-11.02.01 Breakaway Light Standards

Breakaway light standards do not apply to High Mast Lighting.

Breakaway light standards, designed to minimize damage or injury when struck by an errant vehicle, should be specified under the following conditions:

- All lighting facilities to be used on interstate highways, including crossroad lighting, unless the light standards will be located behind adequate guardrail or bridge rail.
- All light standards to be installed within the clear zone, as shown in Tables 1 and 2 of Appendix 3-14B where the speed limit exceeds 25 mph except:
  - When the light standard is located near a pedestrian facility where light standards may fall on the pedestrian facility when impacted. However, an engineering study of the roadside conditions may warrant the installation of breakaway standards.

### III-11.03 Reference Material and Computer Programs

- AASHTO's Roadway Lighting Design Guide, 2005
- National Electric Code
- American Electric Handbook
- Illuminating Engineers Society (IES) publication RP-8-00, Roadway Lighting
- Visual Professional Edition Version 2.05.0000 Program for Conventional Lighting
- Visual Professional Edition Version 2.05.0000 Program for High Mast Lighting and Sign Lighting

### III-11.04 Standard Drawings

There are design features that are used frequently and these have been embodied in the 770 Standard Drawings, which are available on the web at:

<http://www.dot.nd.gov/dotnet2/view/std Drawings.aspx>