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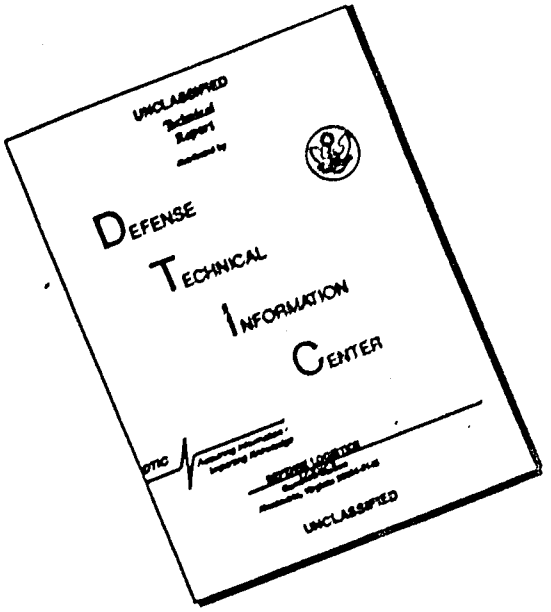

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NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER
Bethesda, Md. 20034

THE TEMPLATE METHOD OF ILLUMINATION DESIGN

By
G. W. Turner and J. P. Sinay

PROPULSION AND AUXILIARY SYSTEMS DEPARTMENT
Annapolis

RESEARCH AND DEVELOPMENT REPORT

May 1972

Report 3562

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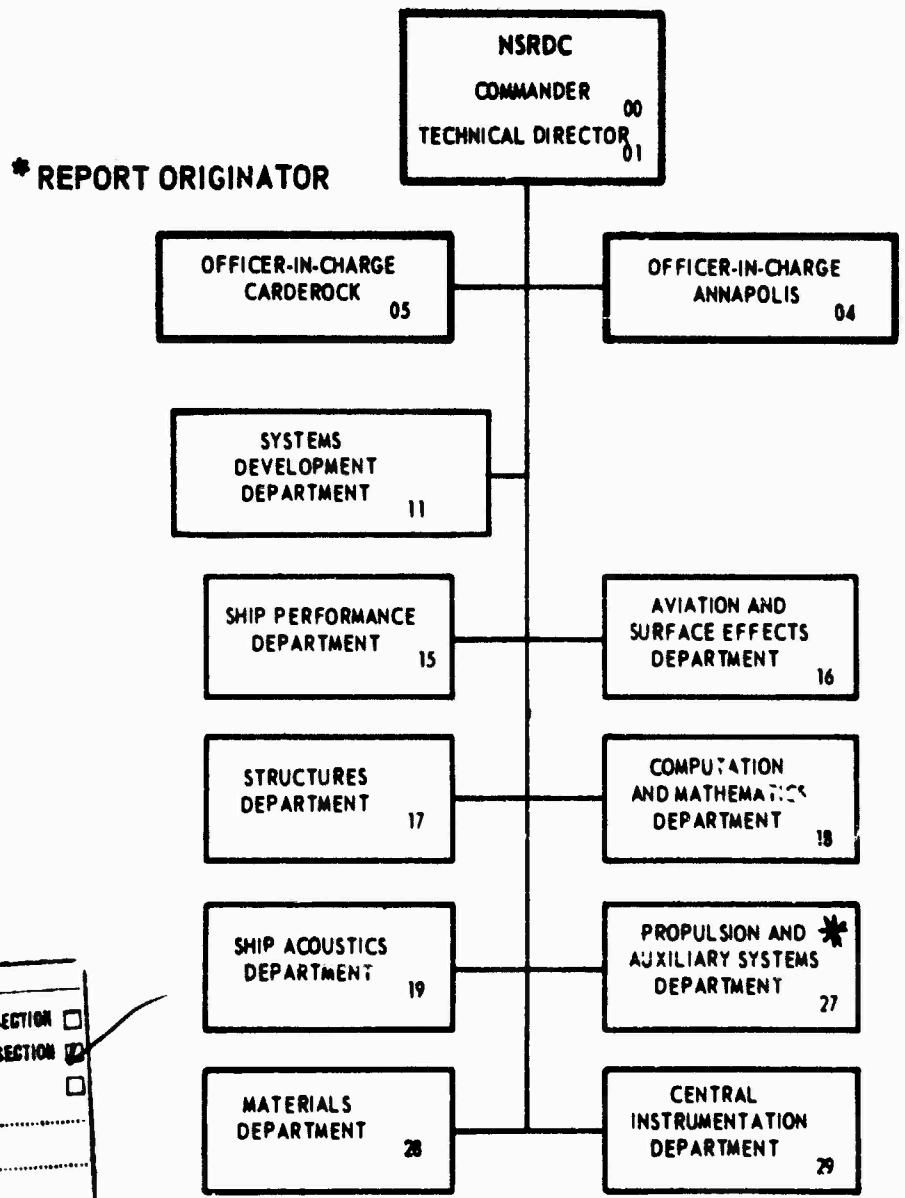

THE TEMPLATE METHOD OF ILLUMINATION DESIGN

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May 1972 6-93 Report 3562

ABSTRACT

This report describes a simple procedure for designing red lighting systems for use during night shipboard underway replenishment. Use of this method, which employs a federal stock lighting fixture, produces a lighting system layout plan that can be used to verify and check the adequacy of the lighting system. The method is sufficiently general that it can be utilized to design various lighting systems using other types of lighting fixtures.

ADMINISTRATIVE INFORMATION

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THE TEMPLATE METHOD OF ILLUMINATION DESIGN

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INTRODUCTION

BACKGROUND

Investigations of night lighting systems for underway replenishment (UNREP) operations have demonstrated a need for improved and efficient methods for designing shipboard illumination systems. Current methods of calculating shipboard illumination levels for UNREP operations vary from the "educated guess" to detailed laborious mathematical computations. The method proposed here is intended to supplant those methods; it employs specially prepared templates (scaled patterns of illumination levels), it is simple and efficient, and it is based on the mathematics of illumination engineering yet does not require the user to employ this mathematics.

Although this improved method, which will hereafter be designated as the template method, is applicable to the design of any lighting system, it is detailed here only for red lighting systems intended for use in UNREP operations. This method can also be used to evaluate existing lighting systems that employ the variables addressed in this method, i.e., light fixtures, filters, and lamps. For example, a ship's inspector, using the templates and ship's plans, can determine the light levels and light distribution patterns after he has confirmed the mounting heights and aiming angles of the installed light fixtures.

APPROACH

This report describes a method of designing a lighting system for any outdoor application where there is little or no reflection of light from the surroundings and where the minimum distance from the light source to the illuminated surface is at least five times the maximum dimension of the light source. In such a situation the light is assumed to be emitted from a point source, and the light source is referred to as a point source luminaire. The standard point source formula for computing the illumination, E, is:

$$E = \frac{I_\theta \cos^3 \theta}{H^2}$$

where

E = illumination in foot-candles

I_θ = candlepower of source in direction of the light ray (θ)

H = mounting height of the luminaire above the illuminated area

θ = angle of the light ray measured from the vertical.

The method described here makes it unnecessary for the shipyard lighting engineer to solve the above point source equation, thereby eliminating the possibility of mathematical errors.

WHAT IS THE "TEMPLATE METHOD" ?

In its broadest sense, the template method is a simplified technique of designing illumination systems. It is the application of a mathematical concept to achieve a simple, time-saving standardized technique for the lighting systems designer. It is based on point source calculations and provides only the essential information needed to describe an UNREP lighting system. It tells the designer what light level he will achieve by using lamp X in light fixture Y located at a perpendicular height Z above the deck, when the fixture is aimed at angle θ which is relative to the perpendicular to the deck.

The method employs "templates" which are scaled representations of the beam pattern that is incident on a horizontal plane. To meet the UNREP needs these patterns have been constrained by specific minimum and maximum illumination values which will be discussed later. For a given lamp, luminaire, mounting height, and aiming angle, a unique pattern is produced on the deck; ideally we would expect this and similar patterns to be elliptical in shape when the aiming angle is greater than 0°.

It is suggested that each of the templates be marked with its representative set of lighting variables (light fixture, lamp, mounting height, and aiming angle) and that the templates be grouped according to the type of lamp they represent. An example of a typical template for a 300-watt parabolic reflectorized tungsten (PAR)-type medium flood lamp, (MFL) when mounted at a height of 36 feet above the deck and aimed at 35° from the vertical appears as figure 1. Data used to construct this and other templates appear in appendix A.

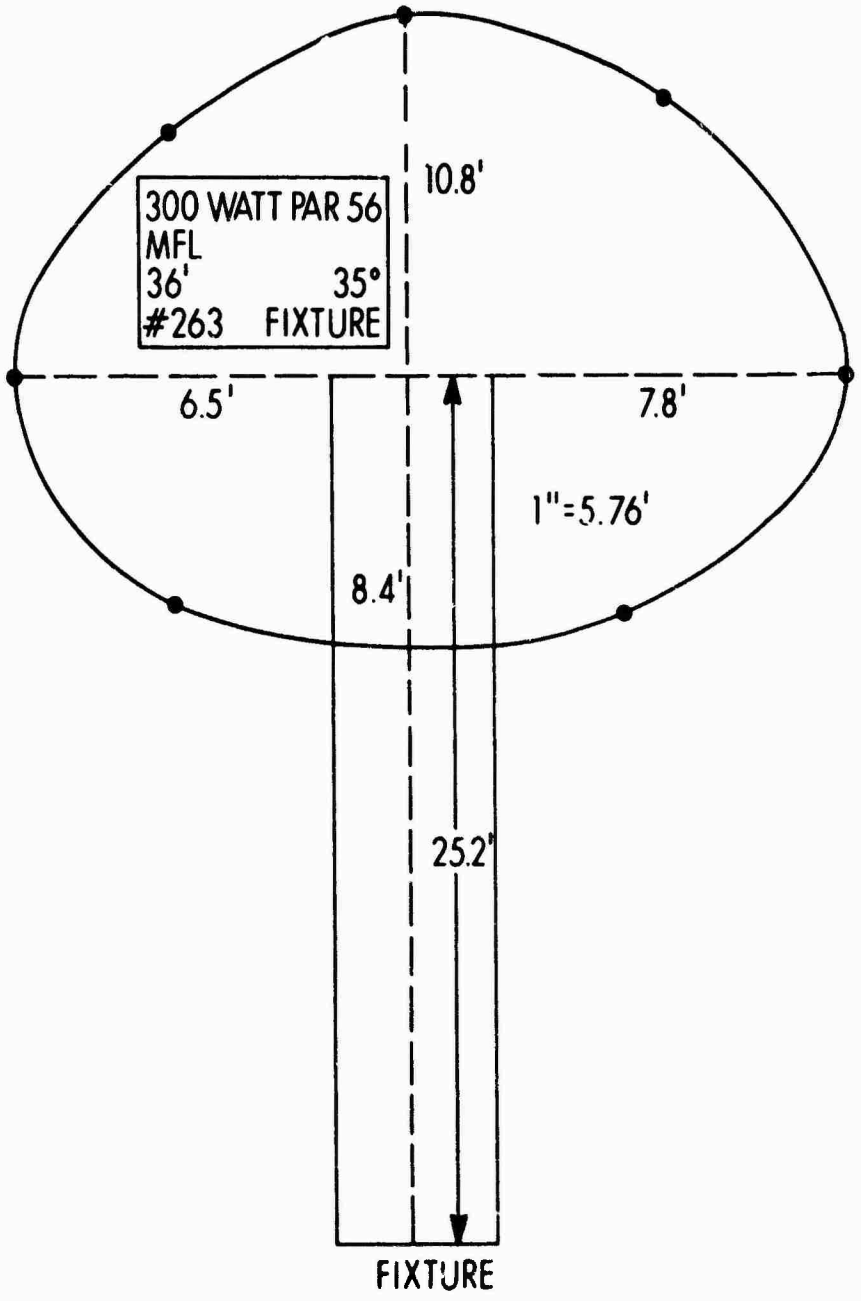


Figure 1
Template for a 300-Watt Medium Flood PAR 56 Lamp
Mounted at a Height of 36 Feet and Aimed at 35°

The "handle" of the template is the horizontal distance, measured on the deck, from the center (+) of the illumination pattern to the lamp fixture. It tells where the template should be positioned on a ship's plan drawing, relative to the light fixture. The illumination at the center spot is close to the maximum level within the pattern. The actual maximum illumination level occurs slightly closer to the mounting position along the radial line from the center spot to the "mounting pole."

The template method has two aspects. First, the generation of template parameter values, and second, the use of these illumination patterns (templates) to lay out an effective or optimal disposition of fixtures and lamps. This optimization involves several key variables;

- Intensity of light.
- Effective distribution of light.
- Dark adaption.
- Lighting fixtures (luminaires).

The last variable in the list implicitly provides cost-effectiveness analysis, as it allows the designer to perform cost tradeoffs of lights (lamps and fixtures) versus power consumption.

ASSUMPTIONS AND LIMITATIONS

The calculations embodied within the template method are based on point source illumination mathematics. That is, all of the light is considered to be emitted from a single point. In order for this assumption to be valid, the distance from the light source to the lighted surface must be at least five times the maximum dimension of the light source, according to the Illumination Engineering Society Handbook. Thus, for the 263 fixture, for example, the method would not hold true for mounting heights of less than 2.5 feet.

There are several other assumptions and limitations imposed upon the template method for UNREP lighting of supply ships. The technique is designed for large, open spaces; thus, we can assume there is negligible reflectivity.

We assume that no aiming angle will be greater than 45°, since any greater angle will result in an unwanted glare situation.

We have restricted the center spot illumination to an acceptable range of 0.9 to 2.5 foot-candles. The mounting height and aiming angle combinations selected must therefore result in an illumination pattern which conforms to these specifications. We further require that an illumination of 0.2 ft-c* of red light exists at the edge of the pattern. This is the minimum allowable illumination for noncritical areas and for critical areas the illumination patterns should be slightly overlapping to ensure a minimum of 0.4 ft-c of red light. In the fringe areas where very little activity normally occurs or in areas where only the minimum illumination is required, the 0.2 ft-c of red light is quite adequate.

We assume that the tasks are performed 3 feet off the deck; thus, the illumination pattern should be raised 3 feet. We have not built this assumption into the data in the appendixes, however, and provision for it must be made by adding 3 feet to the mounting height and adding a distance of 3 tan θ radially to the center spot distance to obtain the new aiming point. The aiming point is computed for the purpose of positioning or "aiming" the fixture. If the light pattern is to be on the deck, the aiming point will coincide with the center spot. Similarly, if task performance is required at some other height, X feet above the deck, then the mounting height should be increased X feet and the aiming point increased X tan θ radially.

The calculations required to produce the illumination pattern data were performed on an IBM 360-40 computer at NAVSHIPRANDCEN Annapolis. The computer program listing is given in appendix B, and a discussion of the program and how to use it is given in appendix C, a user's guide. The program uses candlepower distributions as measured by NAVSHIPRANDCEN Annapolis and it can also use similar data as provided by the lamp manufacturer for each lamp under study. It is assumed that the sample lamps measured are representative of their class. It should be noted, however, that an extreme-valued sample providing inputs is a possible source of error.

Facilities were not available locally for the experimental verification of the tables included in appendix A; however, all of the calculations are theoretically sound.

*Abbreviations used in this text are from the GPO Style Manual, 1967, unless otherwise noted.

WHAT DOES THE TEMPLATE METHOD MEAN TO THE SHIPYARD LIGHTING ENGINEER ?

It means no calculations, no measurements, and no guessing. He will have at his disposal sets of scaled templates with which he can devise a lighting scheme consistant with his needs.

HOW TO USE THE TEMPLATES

To begin with, procure a scaled plan-view drawing of the ship area to be illuminated.

Make certain that the scales of the ship's deck plan and the template set are consistent.

Divide the total area to be illuminated into relatively equal area sections around the kingposts or other positions that provide high possible mounting heights. Using a colored pencil, lay out the critical work areas (areas used by the transfer station crew for their various tasks that must be adequately illuminated) on the ship's deck plan - this will ensure that these areas will receive priority lighting attention. Mark the possible fixture mounting locations. Now choose an illumination pattern (template) which will cover the area farthest from the fixture mounting position (generally using a narrow spot (NSP) lamp with a high mounting height and a large aiming angle). Place the illumination template relative to the fixture mounting position and lightly trace the ellipse pattern onto the deck plan. Transfer the lamp type (NSP, MFL, wide flood (WFL), etc) and wattage, the fixture type, the mounting height and aiming angle, and the distance to the center spot all onto the lighting plan layout on the inside of the pattern just traced. Since this illumination is generally measured approximately 3 feet above the deck (where most task visibility is required), each of the given mounting heights should be increased by 3 feet. This in effect raises the pattern 3 feet above the deck.

The new lamp aiming point (⊕AP) for this raised illumination pattern will be at a distance of 3 tangent θ feet away from the old center point on a radial line from the fixture mounting position. Mark the new mounting height (MH) and aiming point on the diagram.

In a simlar manner continue to cover the remaining areas, making certain that the illumination patterns are tangent to one another or overlapping slightly, as in figure 2. This will ensure that the specified areas are adequately illuminated by the initial lighting system design plan.

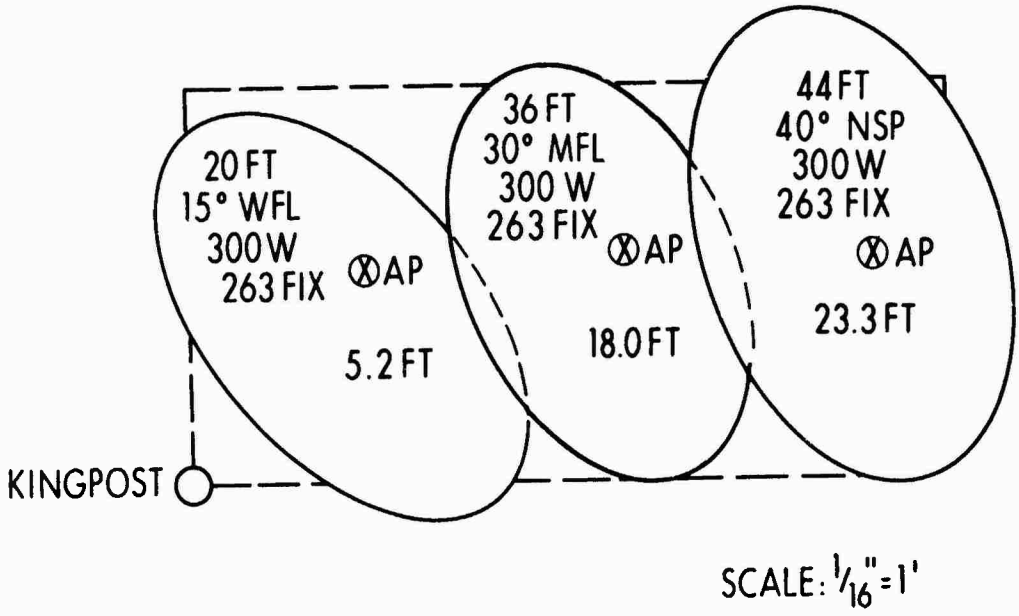


Figure 2
Lighting System Design Plan Showing Overlap
of Illumination Patterns

Once this initial plan has been laid out, it is necessary to visit the ship and check to see that the proposed mounting positions are clear of all rigging or other obstructions which might block the distribution of the light.

If there are obstructions, this initial design is not sufficient and another more suitable configuration must be found. In all likelihood a satisfactory arrangement may be found simply by replacing the blocked beam pattern by one which will result in approximately the same coverage from another mounting height or position. Note whatever changes are made on the lighting design plan. Once the area is suitably covered, the lamps can be physically positioned in place and properly aimed. A visual illumination check for shadows in critical areas should then be performed at night to confirm the adequacy of the lighting scheme. If shadows exist in any of the critical areas, than another repositioning of fixtures will be required, followed by appropiate changes in the lighting system layout plan. After the lighting system has been finally checked out for adequate lighting of critical areas and the absence of shadows, the lighting layout plan becomes the final document for verification that the red lighting system has been adequately designed and installed.

Further detailed lighting surveys could be performed to verify this red lighting system but the necessity for calibrating a low level light meter for this special red light and making the light measurements at sea (in the absence of any white light) make further testing of the lighting system extremely complex and difficult.

To expedite matters in applying the template method, it would be highly advantageous to have some standard-scale clear plastic templates all ready at hand for each lamp available. These templates would then be completely reusable and would guarantee uniformity from one installation to another.

These sets would be off-the-shelf items, available to every lighting engineer, much as a set of French curves are available to every draftsman. Unfortunately, the scale used on ship's plans varies greatly with the size and type of ship. And lighting requirements vary as well. For some application other than UNREP operations, 0.2 ft-c may not do as the minimum illumination level; 0.5 ft-c may be required, or 1.0 or 5.0 ft-c.

It becomes obvious that the number of plastic templates required to suit every scale, every lamp, every fixture, and every light level would be prohibitively large.

If you are provided with a set of templates of the same scale as your deck plans, it is a simple matter to use them.

But what if you are not provided with a set of templates? The tables in appendix A contain all the data necessary to create your own templates, appropriately scaled, as the need arises. You may choose to prepare each template as you need it, or to prepare an entire set which can be retained and reused. Paper will suffice for templates which will be used on a short-term basis only.

HOW TO PREPARE A TEMPLATE

The illumination pattern templates are basically ellipses. The tables in appendix A contain all the data necessary to make up a template. For construction of the template, reference all dimensions from the center spot (+) as the origin of a set of orthogonal axes, as in figure 3. The axis determined by the fixture position and the center spot is the radial or vertical axis. Perpendicular to the radial axis is the transverse or horizontal axis. Determine the desired scale and lightly mark the the two axes, darkening their intersection with a "+" for the

center spot. Locate the fixture position along the vertical axis according to the distance to the center spot. Now locate the minimum illumination points, E, F, K, and L, along the transverse and radial axes, respectively, as in figure 4. If you are working with the four-axis method, locate the additional minimum illumination points, M, N, R, and S, along the oblique axes as shown in figure 5.

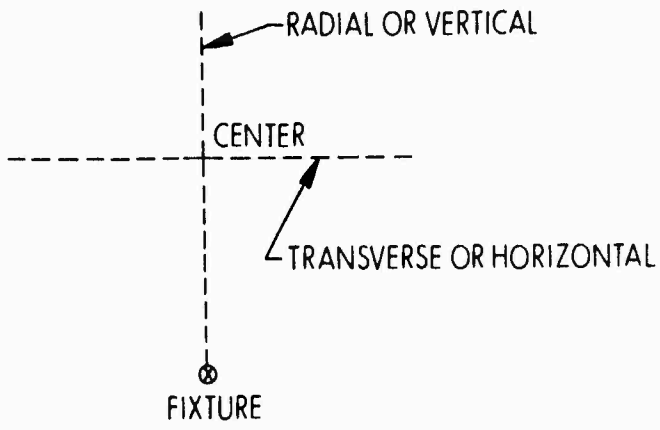


Figure 3
Horizontal and Vertical
Axes for Construction of
Template

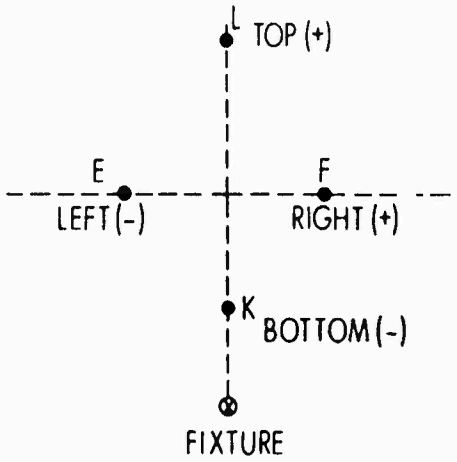


Figure 4
Horizontal and Vertical Axes
with Minimum Illumination Points

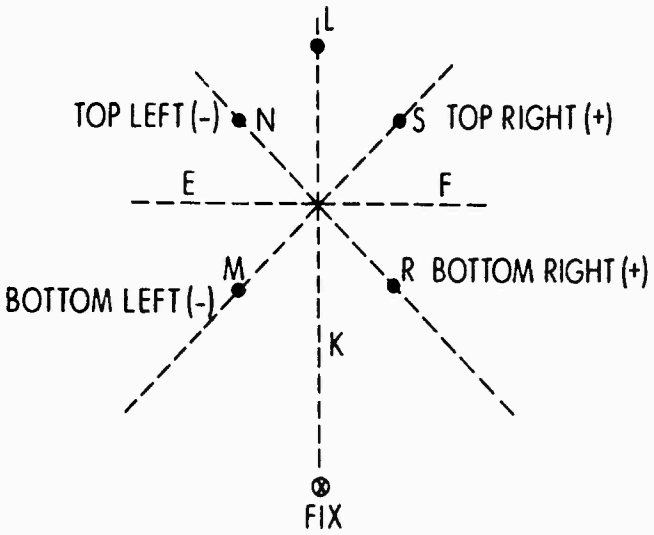


Figure 5
Horizontal, Vertical, and Oblique Axes with Minimum Illumination Points

Sketch an ellipse through points E, F, K, L (M, N, R, and S). Now cut out the ellipse, leaving a 1/2-inch strip on either side of the line to the fixture position. Print the word "FIX" on the end of this "handle" created by the 1-inch strip. To complete the template print the type of lamp (NSP, WFL, etc), the lamp wattage, the fixture, the mounting height in feet, and the vertical aiming angle on the ellipse in the upper left quadrant as shown in figure 6, and mark the scale used in preparing the template in the lower right quadrant.

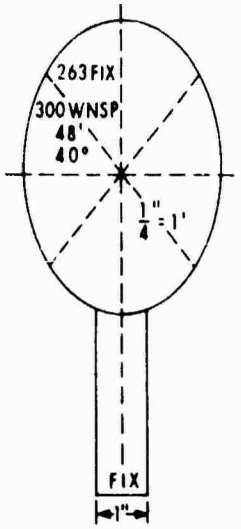


Figure 6
Completed Template Showing Lamp Type and Wattage, Fixture, Mounting Height, Aiming Angle, and Template Scale

The template is now ready to use. If a permanent set of clear plastic templates is made, they can be joined one atop the other by a pivot through the fixture as in figure 7, permitting the designer to select lamps by simply rotating the patterns about the pivot and overlaying the ship's plan. In this way, he can tell at a glance which lamp, height, and angle will best suit the space to be lighted.

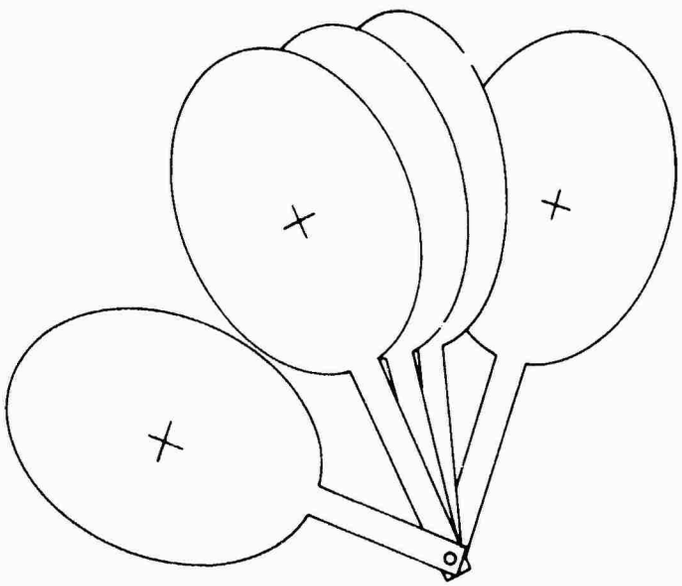


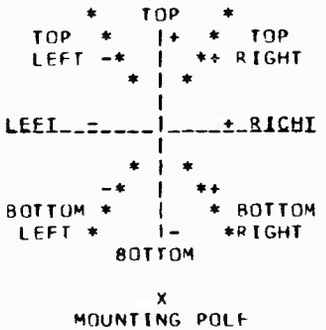
Figure 7
Pivotal "Layering" of Templates

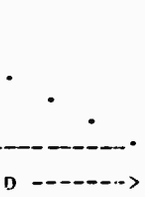
The minimum illumination points can be most easily found in the quickscan format under the desired minimum illumination value. Figure 8 shows a portion of the quickscan format for the 300-watt PAR 56 wide flood lamp in the 263 fixture with Kopp 6350 filter. The "snowflake" diagram at the top center shows the sign conventions and axis labels set in accord with the view from behind the lamp and along the center line of the beam. The first three columns contain the mounting height H, the distance D from the "mounting pole" to the center spot, and the aiming angle θ, respectively.

LAMP - 300 WATT PAR56 WFL

FIXTURE - SYMBOL #263

TRANSMISSION FACTOR - 0.150
(PER CENT REDI





			VERTICAL AXIS								HORIZONTAL AXIS							
			BOTTOM TO TOP				TOP LEFT TO BOTTOM RIGHT				LEFT TO RIGHT				BOTTOM LEFT TO TOP RIGHT			
H	D	θ	DIR 0.2	DIST TO ILLUM LEVEL OF 0.5	0.5	0.2	DIR 0.2	DIST TO ILLUM LEVEL OF 0.5	0.5	0.2	DIR 0.2	DIST TO ILLUM LEVEL OF 0.5	0.5	0.2	DIR 0.2	DIST TO ILLUM LEVEL OF 0.5	0.5	0.2
16	16.0	45	-13.9	-5.8	6.9	9.1	-8.3	-6.6	7.9	9.6	-10.6	-8.2	9.4	10.6	-8.7	-7.0	6.6	10.1
20	14.0	35	-13.1	-5.7	7.8	9.8	-8.1	-6.6	8.4	10.3	-11.4	-8.9	10.1	11.4	-9.3	-7.4	8.1	9.8
20	16.8	40	-14.1	-6.4	7.1	9.3	-9.1	-7.3	9.0	10.0	-10.8	-9.5	10.8	12.2	-9.0	-6.9	7.3	11.0
20	20.0	45	-9.6	-7.3	8.6	11.4	-10.4	-6.4	8.7	10.9	-11.7	-10.3	10.3	13.2	-9.8	-7.6	8.3	10.4
24	8.7	20	-7.7	-5.6	6.6	8.1	-9.0	-6.2	8.8	9.9	-11.9	-10.6	10.6	11.9	-8.8	-6.6	7.6	9.0
24	11.2	25	-8.0	-5.9	7.2	8.9	-8.1	-6.6	8.0	10.2	-12.3	-9.6	11.0	12.3	-9.1	-6.9	8.1	9.7
24	13.9	30	-8.5	-6.3	6.3	8.1	-8.8	-7.2	8.3	10.6	-12.9	-10.1	11.5	12.9	-9.5	-7.2	7.2	10.6
24	16.8	35	-8.1	-6.9	7.2	9.4	-9.7	-6.1	8.9	11.2	-12.1	-10.7	10.7	13.7	-10.0	-7.7	7.9	9.7
24	20.1	40	-8.9	-6.3	8.5	11.1	-8.8	-6.8	9.6	12.0	-13.0	-9.9	11.4	13.0	-9.6	-8.3	8.8	10.9
24	24.0	45	-8.7	-7.2	7.3	10.3	-10.0	-5.6	9.1	11.8	-14.1	-10.7	10.7	14.1	-10.5	-7.7	7.7	12.4
28	0.0	0	-7.5	-6.2	6.2	7.5	-8.8	-6.2	8.8	10.2	-13.1	-10.2	11.6	13.1	-8.8	-7.5	7.5	8.8
28	2.4	5	-7.4	-6.1	6.4	7.7	-9.1	-6.3	8.7	11.4	-13.1	-10.2	11.6	13.1	-10.0	-7.4	7.7	9.1
28	4.9	10	-7.4	-6.2	6.7	8.1	-7.9	-6.5	8.7	11.3	-13.3	-10.3	11.8	13.3	-10.0	-7.4	7.9	9.4
28	7.5	15	-7.5	-6.3	7.1	8.7	-8.3	-6.8	8.8	11.3	-13.5	-10.6	12.0	13.5	-10.1	-7.5	8.3	9.9
28	10.2	20	-7.7	-6.5	7.6	9.4	-8.8	-7.2	9.0	11.5	-13.3	-10.8	10.8	13.9	-10.2	-7.7	7.2	10.5
28	13.1	25	-8.1	-6.6	6.5	8.4	-9.5	-7.7	9.3	11.9	-12.8	-11.2	11.2	14.4	-9.3	-8.0	7.7	11.3

Figure 8 - Portion of the Quickscan Format for the 300-Watt, PAR 56 Wide Flood Lamp in the 263 Fixture with Kopp 6350 Filter

Under each axis heading are a group of signs - - + + , and numbers 0.2 0.5 0.5 0.2 and the heading "DIR DIST to ILLUM LEVEL of." Under each of those headings can be found the distance from the center spot along the axis to the point where the illumination is approximately equal to the figure in the heading. For instance, when the lamp is mounted at 24 feet above the deck and aimed so as to make a 30° angle with the vertical, the illumination along the radial axis (bottom to top) is closest to 0.2 ft-c at 8.5 feet from the center spot towards the mounting position, and at 8.1 feet from the center spot away from the mounting position. Similarly if we wish to know where the illumination is nearest 0.5 ft-c, we see it is at ±6.3 feet. The illumination along the other three axes can be read in a like manner. The quickscan format contains all the data needed to make a template and allows the designer to rapidly survey the available choices for a given source or between sources. If he would like to know how the light level "behaves," so to speak, inside the ellipse, the "abridged profile" lists directed distance and red illumination along each axis from the center spot to the first reading past the minimum acceptable illumination value. This may be of interest for purposes of overlapping template patterns and determining the light level within the overlap. Figure 9 shows a sample "abridged profile." Figure 10 shows a sample "complete illumination profile", which contains the input candlepower distribution, the white light level, the red light level, and the directed distances along each axis. The designer may consult the complete profile if he wishes to observe the light characteristics beyond the template boundaries. Complete illumination profiles can be made available from NAVSHIPRANDCEN Annapolis.

The quickscan format and the abridged profile are included for light sources in appendix A. The complete profile has been omitted since we are not concerned with those areas which do not satisfy the selection criteria. Figure 11 shows the additional summary format that is given for sources for which there are only two-axis inputs available, horizontal and vertical. It includes a "radial diameter" and a "transverse diameter," which are the rounded sums of the semiaxis lengths. It also explicitly calls out the illumination at the four edges.

THEORETICAL BASIS FOR THE CALCULATIONS

Figure 12 is a diagram showing a representative mounting position of the luminaire with its associated deck illumination pattern. Figure 13 is another diagram representing the same situation as figure 12, but giving some of the essential geometrical facts required for the derivation of data used in in constructing templates.

300 WATT NARROW SPOT SYMBOL #263

HEIGHT = 44 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 44.00

THETA = 45 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-15.97	0.04
-13.19	0.11
-10.24	0.47
-7.08	1.11
-3.68	1.95
0.0	2.05
4.02	0.90
8.44	0.28
13.34	0.07

RADIAL "DIAMETER" = 8.44 + 13.19 = 21.63

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
14.12	0.06
11.50	0.15
8.79	0.39
5.98	0.92
3.06	1.97
0.0	2.33
-3.22	1.17
-6.62	0.52
-10.24	0.16
-14.11	0.05

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.67	0.04
13.80	0.17
10.97	0.52
8.19	0.87
5.44	1.27
2.72	2.03
0.0	1.81
-2.72	1.35
-5.44	1.10

Figure 9 - Sample of Abridged Profile

300 WATT NARROW SPOT SYMBOL #263

MOUNTING HEIGHT = 44 FEET MOUNTING ANGLE, THETA = 45 OEGREES

-8.19	0.45
-10.97	0.12
-13.80	0.03

TRANSVERSE "OIAMETER" = 13.80 + 10.97 = 24.77

BOTTOM LEFT TO TOP RIGHT - 45 OEGREE AXIS

DISTANCE	ILLUMINATION
-11.50	0.05
-8.79	0.19
-5.98	0.58
-3.06	1.14
0.0	1.72
3.22	1.82
6.62	0.84
10.24	0.37
14.11	0.11
18.27	0.02

Figure 9 (Cont)

300 WATT NARROW SPOT SYMBOL #263

HEIGHT = 44 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 44.00

THETA = 45 DEGREES PER CENT RED = 0.150

PHI	CANDLE POWER -3 X 10	FOOT CANDLES WHITE	FOOT CANDLES RED	DISTANCE FROM CENTER
VERTICAL				
42.5	0.07	0.00	0.00	963.71
40.0	0.12	0.00	0.00	458.91
37.5	0.44	0.00	0.00	290.21
35.0	0.43	0.00	0.00	205.53
32.5	0.43	0.00	0.00	154.47
30.0	0.44	0.00	0.00	120.21
27.5	0.46	0.01	0.00	95.55
25.0	0.46	0.01	0.00	76.89
22.5	0.47	0.01	0.00	62.23
20.0	0.47	0.02	0.00	50.36
17.5	0.51	0.03	0.00	40.52
15.0	0.59	0.04	0.01	32.21
12.5	0.69	0.06	0.01	25.07
10.0	1.16	0.11	0.02	18.84
7.5	3.78	0.44	0.07	13.34
5.0	13.44	1.84	0.28	8.44
2.5	37.50	5.97	0.90	4.02
0.0	74.88	13.67	2.05	0.0
-2.5	62.75	12.99	1.95	-3.68
-5.0	32.00	7.43	1.11	-7.08
-7.5	12.19	3.14	0.47	-10.24
-10.0	2.64	0.75	0.11	-13.19
-12.5	0.84	0.26	0.04	-15.97
-15.0	0.50	0.17	0.03	-18.60
-17.5	0.14	0.05	0.01	-21.10
-20.0	0.06	0.02	0.00	-23.48
-22.5	0.04	0.02	0.00	-25.77
-25.0	0.02	0.01	0.00	-27.99
-27.5	0.01	0.01	0.00	-30.13
-30.0	0.01	0.01	0.00	-32.21
-32.5	0.01	0.00	0.00	-34.25
-35.0	0.0	0.0	0.0	-36.24
-37.5	0.0	0.0	0.0	-38.21
-40.0	0.0	0.0	0.0	-40.15
-42.5	0.0	0.0	0.0	-42.08
HORIZONTAL				
42.5	0.04	0.00	0.00	57.02
40.0	0.04	0.00	0.00	52.21
37.5	0.04	0.00	0.00	47.75
35.0	0.05	0.01	0.00	43.57

Figure 10 - Sample of Complete Illumination Profile

32.5	0.06	0.01	0.00	39.64
30.0	0.06	0.01	0.00	35.93
27.5	0.07	0.01	0.00	32.39
25.0	0.11	0.01	0.00	29.02
22.5	0.21	0.03	0.00	25.77
20.0	0.46	0.07	0.01	22.65
17.5	0.68	0.11	0.02	19.62
15.0	1.72	0.28	0.04	16.67
12.5	6.63	1.13	0.17	13.80
10.0	19.88	3.47	0.52	10.97
7.5	32.50	5.78	0.87	8.19
5.0	46.75	8.44	1.27	5.44
2.5	74.38	13.54	2.03	2.72
0.0	66.25	12.10	1.81	0.0
-2.5	49.25	8.97	1.35	-2.72
-5.0	40.50	7.31	1.10	-5.44
-7.5	16.88	3.00	0.45	-8.19
-10.0	4.50	0.78	0.12	-10.97
-12.5	1.31	0.22	0.03	-13.80
-15.0	0.63	0.10	0.02	-16.67
-17.5	0.49	0.08	0.01	-19.62
-20.0	0.35	0.05	0.01	-22.65
-22.5	0.10	0.01	0.00	-25.77
-25.0	0.08	0.01	0.00	-29.02
-27.5	0.06	0.01	0.00	-32.39
-30.0	0.06	0.01	0.00	-35.93
-32.5	0.05	0.01	0.00	-39.64
-35.0	0.05	0.01	0.00	-43.57
-37.5	0.04	0.00	0.00	-47.75
-40.0	0.04	0.00	0.00	-52.21
-42.5	0.04	0.00	0.00	-57.02

TOP RIGHT TO BOTTOM LEFT				
42.5	0.01	0.00	0.00	139.80
40.0	0.01	0.00	0.00	116.95
37.5	0.02	0.00	0.00	98.99
35.0	0.02	0.00	0.00	84.45
32.5	0.03	0.00	0.00	72.41
30.0	0.03	0.00	0.00	62.23
27.5	0.03	0.00	0.00	53.48
25.0	0.04	0.00	0.00	45.85
22.5	0.06	0.00	0.00	39.12
20.0	0.11	0.01	0.00	33.11
17.5	0.35	0.03	0.00	27.70
15.0	0.63	0.06	0.01	22.78
12.5	1.38	0.15	0.02	18.27
10.0	5.84	0.74	0.11	14.11
7.5	17.50	2.46	0.37	10.24
5.0	36.38	5.62	0.84	6.62
2.5	71.88	12.12	1.82	3.22
0.0	62.63	11.44	1.72	0.0
-2.5	38.88	7.63	1.14	-3.06
-5.0	18.38	3.85	0.58	-5.98
-7.5	5.66	1.25	0.19	-8.79
-10.0	1.50	0.45	0.05	-11.50
-12.5	0.78	0.19	0.03	-14.12
-15.0	0.59	0.15	0.02	-16.67
-17.5	0.51	0.13	0.02	-19.17
-20.0	0.46	0.12	0.02	-21.61
-22.5	0.42	0.12	0.02	-24.02
-25.0	0.41	0.11	0.02	-26.40
-27.5	0.38	0.11	0.02	-28.76

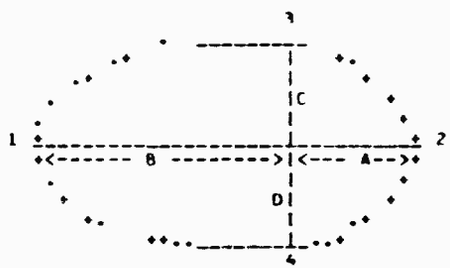
Figure 10 (Cont)

-30.0	0.30	0.08	0.01	-31.11
-32.5	0.09	0.03	0.00	-33.47
-35.0	0.07	0.02	0.00	-35.83
-37.5	0.07	0.02	0.00	-38.21
-40.0	0.06	0.02	0.00	-40.61
-42.5	0.06	0.02	0.00	-43.06

BOTTOM RIGHT TO TOP LEFT				
42.5	0.06	0.02	0.00	43.06
40.0	0.06	0.02	0.00	40.61
37.5	0.07	0.02	0.00	38.21
35.0	0.08	0.02	0.00	35.83
32.5	0.13	0.04	0.01	33.47
30.0	0.35	0.10	0.01	31.11
27.5	0.42	0.12	0.02	28.76
25.0	0.44	0.12	0.02	26.40
22.5	0.46	0.13	0.02	24.02
20.0	0.51	0.14	0.02	21.61
17.5	0.59	0.16	0.02	19.17
15.0	0.80	0.20	0.03	16.67
12.5	1.66	0.40	0.06	14.12
10.0	4.42	1.03	0.15	11.50
7.5	11.63	2.58	0.39	8.79
5.0	29.25	6.12	0.92	5.98
2.5	66.88	13.12	1.97	3.06
0.0	85.00	15.52	2.33	0.0
-2.5	46.14	7.78	1.17	-3.22
-5.0	22.50	3.48	0.52	-6.62
-7.5	7.50	1.05	0.16	-10.24
-10.0	2.50	0.32	0.05	-14.11
-12.5	0.78	0.09	0.01	-18.27
-15.0	0.41	0.04	0.01	-22.78
-17.5	0.11	0.01	0.00	-27.70
-20.0	0.06	0.00	0.00	-33.11
-22.5	0.04	0.00	0.00	-39.12
-25.0	0.04	0.00	0.00	-45.85
-27.5	0.03	0.00	0.00	-53.48
-30.0	0.03	0.00	0.00	-62.23
-32.5	0.03	0.00	0.00	-72.41
-35.0	0.03	0.00	0.00	-84.45
-37.5	0.03	0.00	0.00	-98.99
-40.0	0.02	0.00	0.00	******
-42.5	0.01	0.00	0.00	******

Figure 10 (Cont)

HORIZONTAL AND VERTICAL AXES INPUT ONLY

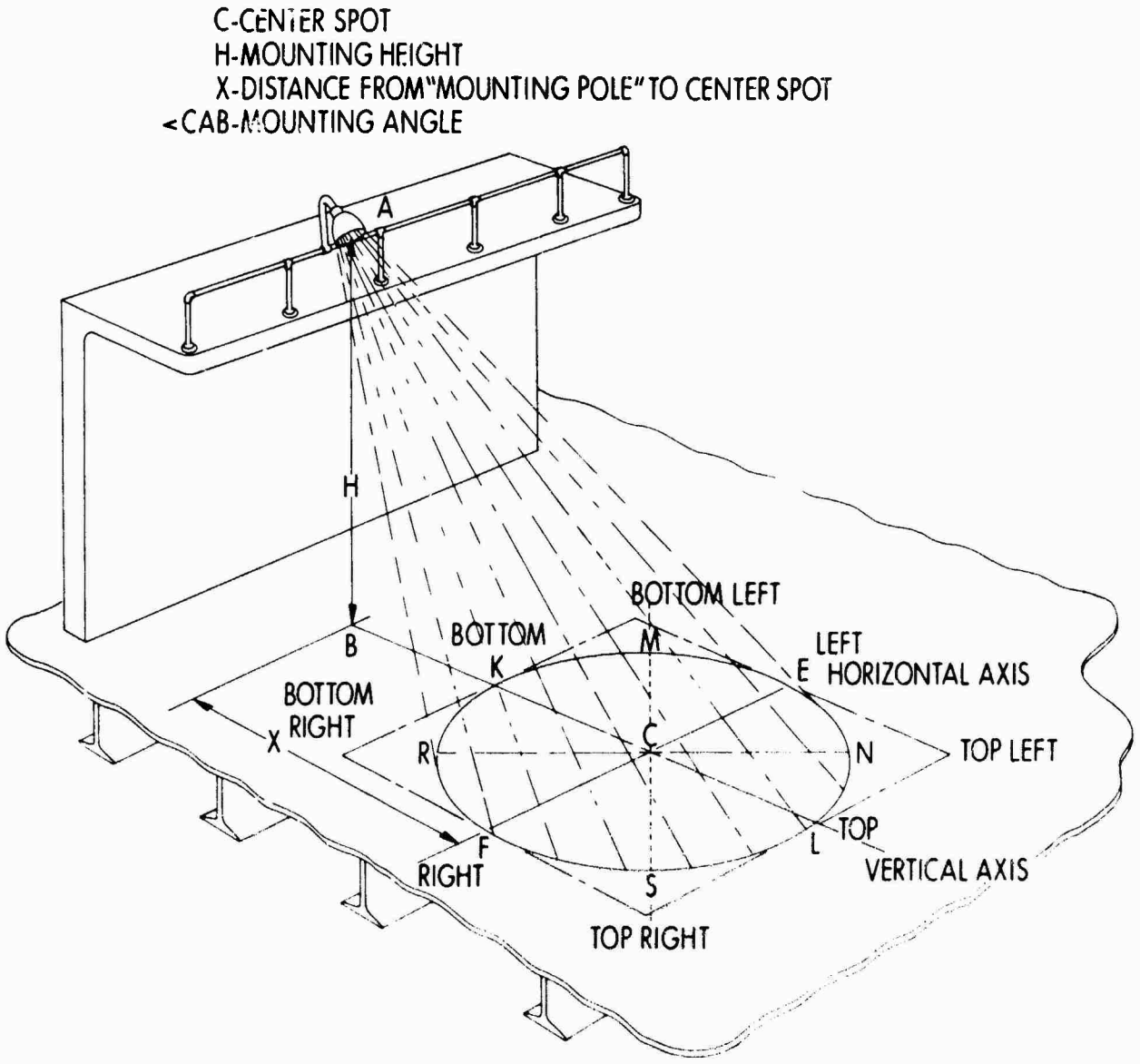


MOUNTING POLE

0 WATT PAR56 WF BARE LAMP — RED TRANSMISSION FACTOR (% RED) = 0.150

VERTICAL AIMING ANGLE DEGREES θ	RADIAL DISTANCE TO CENTER FT	R-RADIAL (VERTICAL) DIAMETER FT	T-TRANSVERSE (HORIZONTAL) DIAMETER FT	AREA (TBI) (4) FT*FT	CENTER ILLUMINATION, RED FC	EDGE ILLUMINATION, RED FC				SEMI-AXES LENGTH			
						1	2	3	4	B	A	C	D
				HEIGHT 16 FT.									
45	16.0	17	26	347	2.13	0.20	0.20	0.15	0.15	9.1	7.7	13.1	13.1
				HEIGHT 20 FT.									
35	14.0	16	28	351	2.12	0.25	0.16	0.15	0.15	7.8	7.7	14.1	14.1
40	16.8	18	27	381	1.74	0.19	0.15	0.25	0.25	9.3	8.5	13.6	13.6
45	20.0	20	29	455	1.37	0.13	0.24	0.19	0.19	11.4	8.5	14.7	14.7
				HEIGHT 24 FT.									
15	6.4	14	29	318	2.42	0.17	0.26	0.17	0.17	7.4	6.4	14.3	14.3
20	8.7	15	29	341	2.23	0.14	0.26	0.15	0.15	8.1	6.6	14.7	14.7
25	11.2	16	31	389	2.00	0.12	0.25	0.14	0.14	8.9	7.0	15.3	15.3
30	13.9	16	29	364	1.74	0.23	0.23	0.25	0.25	8.1	7.4	14.4	14.4
35	16.8	17	31	413	1.47	0.18	0.22	0.21	0.21	9.4	8.1	15.3	15.3
40	20.1	20	33	518	1.21	0.13	0.19	0.17	0.17	11.1	8.9	16.3	16.3
				HEIGHT 28 FT.									

Figure 11 - Summary Format Given for Sources Having Only Horizontal and Vertical Inputs Available



NOTE: MINIMUM ACCEPTABLE ILLUMINATION LEVEL EXISTS AT POINTS K, M, E, N, L, S, F, AND R

Figure 12
Representative Mounting Position of the Luminaire with its Associated Deck Illumination Pattern

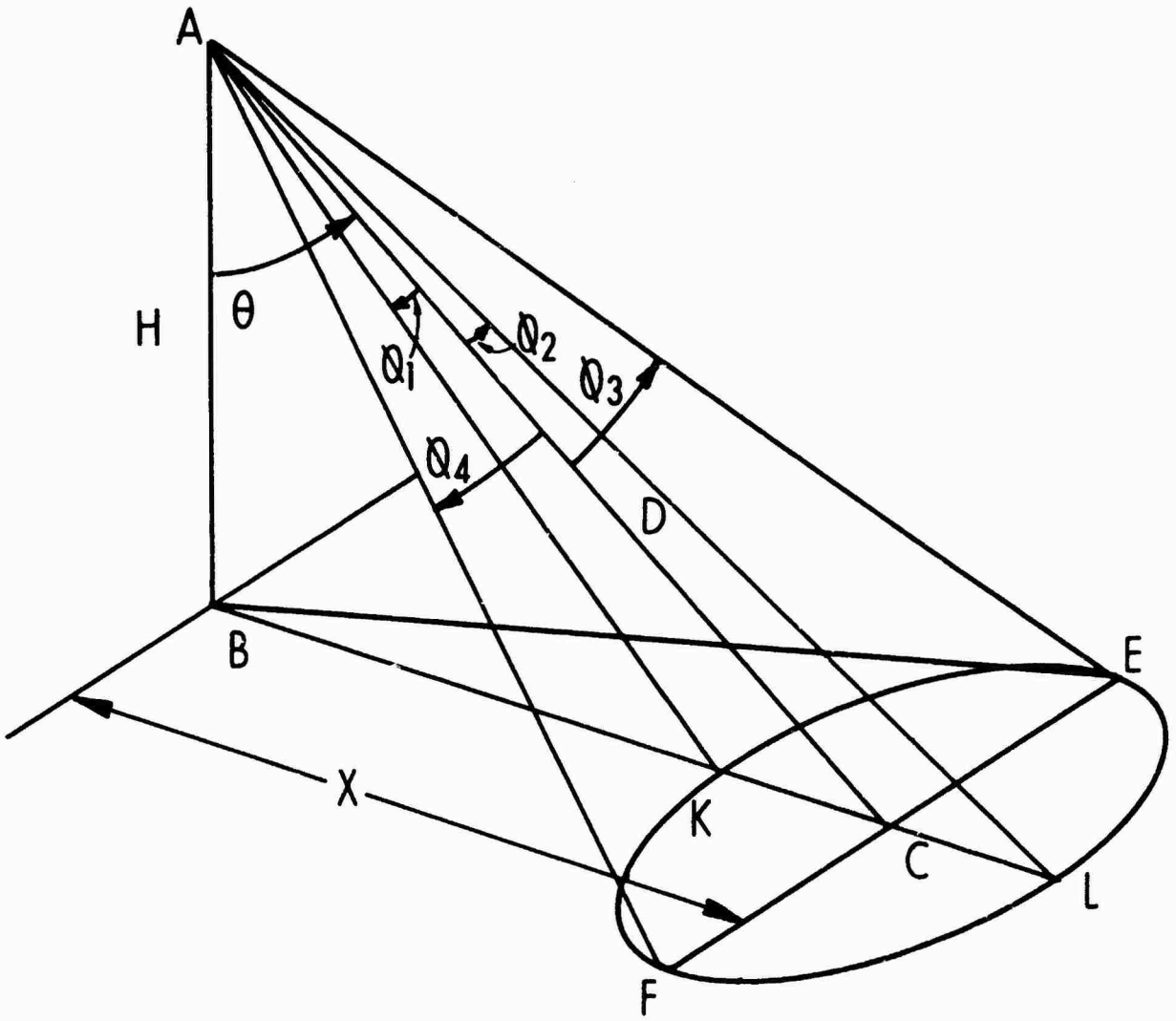


Figure 13
Two-Axis Geometry of the Template Method

Referring to figure 13, angles θ (∠BAC), ϕ_1 (∠KAC) and ϕ_2 (∠CAL) are measured in the vertical plane (plane containing the points ABKCL). Angles ϕ_4 (∠FAC) and ϕ_3 (∠CAE) are measured in the inclined plane (plane containing the points AFCE). The horizontal plane is that plane containing the points BKCLFE. The fixture is assumed to be positioned at point A, a distance of H feet above the horizontal plane. The main axis of the light beam of the lamp, line $\overline{AC}$, is directed downward, making an angle of θ degrees with line $\overline{AB}$ in the vertical plane. Angle θ is called the aiming angle.

The light pattern produced by the lamp is considered to be an ellipse in the horizontal plane having points FE and KL as points on its major and minor diameters and point C as its center.

The illumination along line $\overline{KL}$ has been calculated for values of H in increments of 4 feet, θ in increments of 5°, and θ_1 in increments of 2.5° using the candlepower distribution curves of the lamps in the vertical beam pattern and the formula:

$$E = \left[CP\big|_{\phi_1}\right]\left[\%\ RED\right]\frac{\cos^3(\theta + \phi_1)}{H^2} \quad .$$

Similarly the illumination along line $\overline{FE}$ has been calculated from the candlepower distribution curves of the lamp in the horizontal beam pattern with similar increments in the various values and the formula:

$$E = \left[CP\big|_{\phi_3,}\right]\left[\%\ RED\right]\frac{H}{GG^3_{\phi_3}} \quad ,$$

where

E = illumination on the deck in foot-candles

$\left[CP\big|_{\phi_{1\text{ or }2}}\right]$ = candlepower of the lamp at an angle ϕ_1 from the beam axis in the vertical beam pattern

$\left[CP\big|_{\phi_{3\text{ or }4}}\right]$ = candlepower of the lamp at an angle $\phi_{3\text{ or }4}$ from the beam axis in the horizontal beam pattern

$\left[\%\ RED\right]$ = percentage of the total light that the red filter transmits

θ = (lamp aiming angle) the vertical angle between the beam axis of the lamp (line AC and the vertical line from the horizontal plane to the focus of the lamp

H = (mounting height) distance from the horizontal plane to the focus of the lamp in feet

GG_{ϕ_i} = distance from the focus of the lamp to the horizontal plane along the ray which makes an angle ϕ_i with the beam axis AC.

The illumination within the ellipse is nonuniform, having its maximum value somewhere near C, on the line between K and C and decreasing in magnitude as the position is moved radially away from point C. Points KFLE are points at which the minimum allowable illumination (0.2 ft-c) exists. Line $\overline{KL}$ is designated as the radial or vertical diameter of the ellipse, and line $\overline{FE}$ is designated as the transverse or horizontal diameter of the ellipse.

To derive a more accurate plot of the deck illumination pattern, it is desirable to consider two additional axes which are 45° off the vertical axis of the lamp. In figure 12, these axes yield points M, N, R, and S.

If candlepower distributions are not available for these additonal axes, the tabular data output from the computer program will be limited to horizontal and vertical axes only which were previously addressed; the discussion which follows (plus figures 14, 15, and 16) will not apply.

Figure 14 gives the geometry for the oblique axes considered in the four-axis method. Angles ϕ_5 ($\angle$CAM) and ϕ_6 ($\angle$CAS) are measured in the oblique plane containing the points SACM, which we shall refer to as the 135° oblique plane. Angles ϕ_7 ($\angle$CAN) and ϕ_8 ($\angle$CAR) are in the plane containing the points RANC, which we shall refer to as the 45° oblique plane. The illumination along the line $\overline{RN}$ has been calculated using the candlepower distribution curves of the lamps in the 135° beam pattern and the formula:

$$E = \left[CP_{\phi_{7 \text{ or } 8}} \right] \left[\% \text{ RED} \right] \frac{H}{GG^3_{\phi_{7 \text{ or } 8}}} ,$$

where $GG_{\phi_{7 \text{ or } 8}}$ = distance from A to the <u>horizontal plane</u> along the ray at angle $\phi_{7 \text{ or } 8}$.

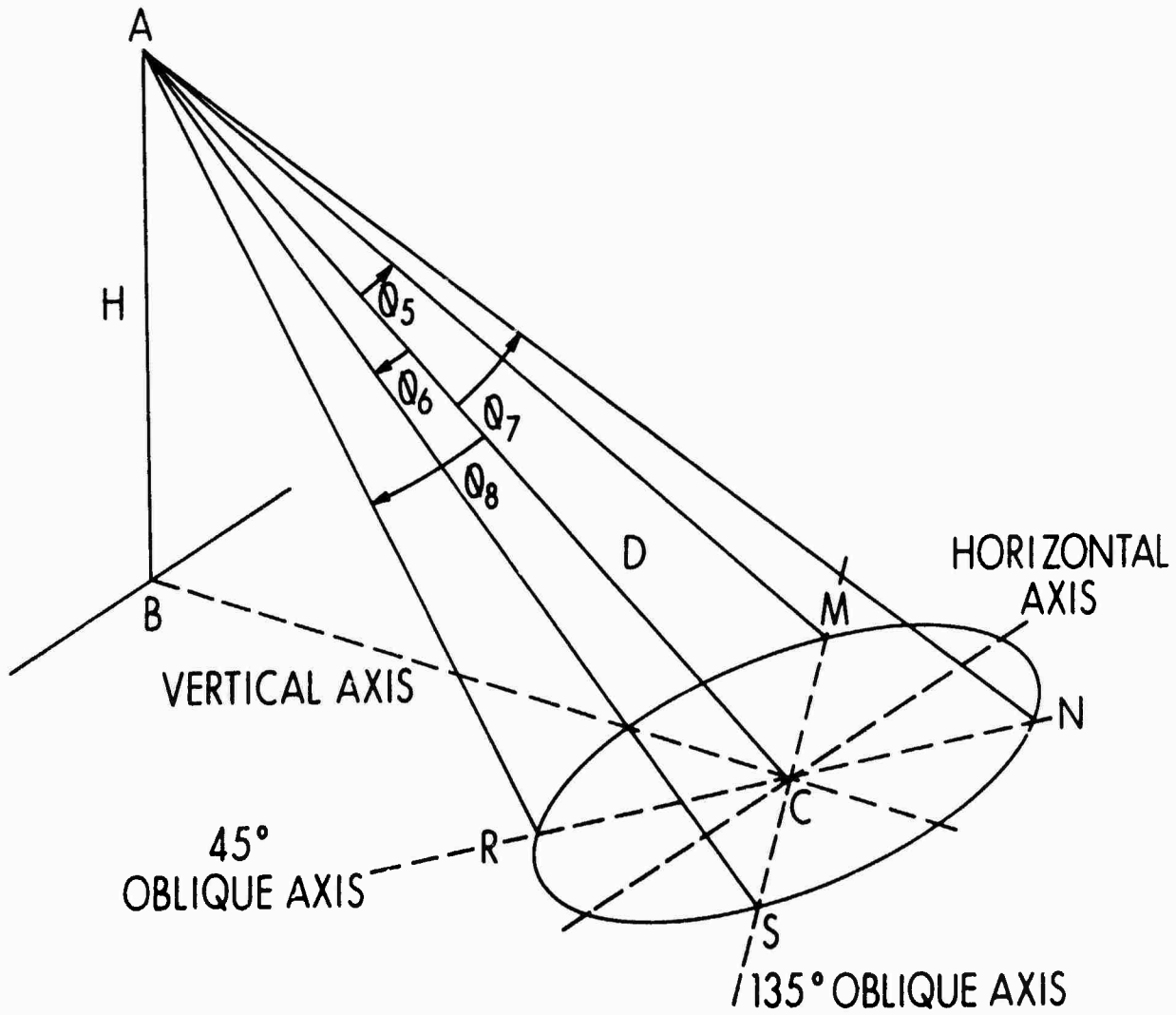


Figure 14
Oblique Axes Geometry

Figure 15 shows the geometry involved. Angle ϕ_8 is set in increments of 2.5° in accordance with the known candlepower distribution inputs.

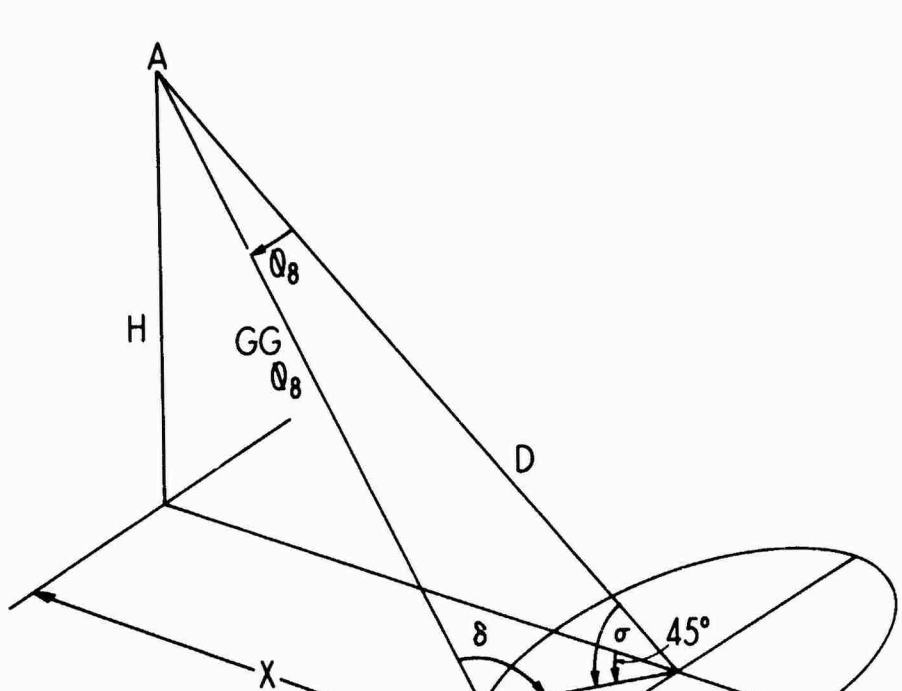


Figure 15
Bottom Right on 135° Oblique Axis

The distance D is known, as is H. To find $GG_{\phi 8}$ we must construct two vectors as shown in figure 16. The first vector A = -xi + 0j + Hk lies in the vertical plane and goes from the center spot C to the lamp position. The second vector B = -bi + bj + 0K lies in the horizontal plane along the 135° oblique axis from the center to the end point of the ray at angle ϕ_8 in figure 15.

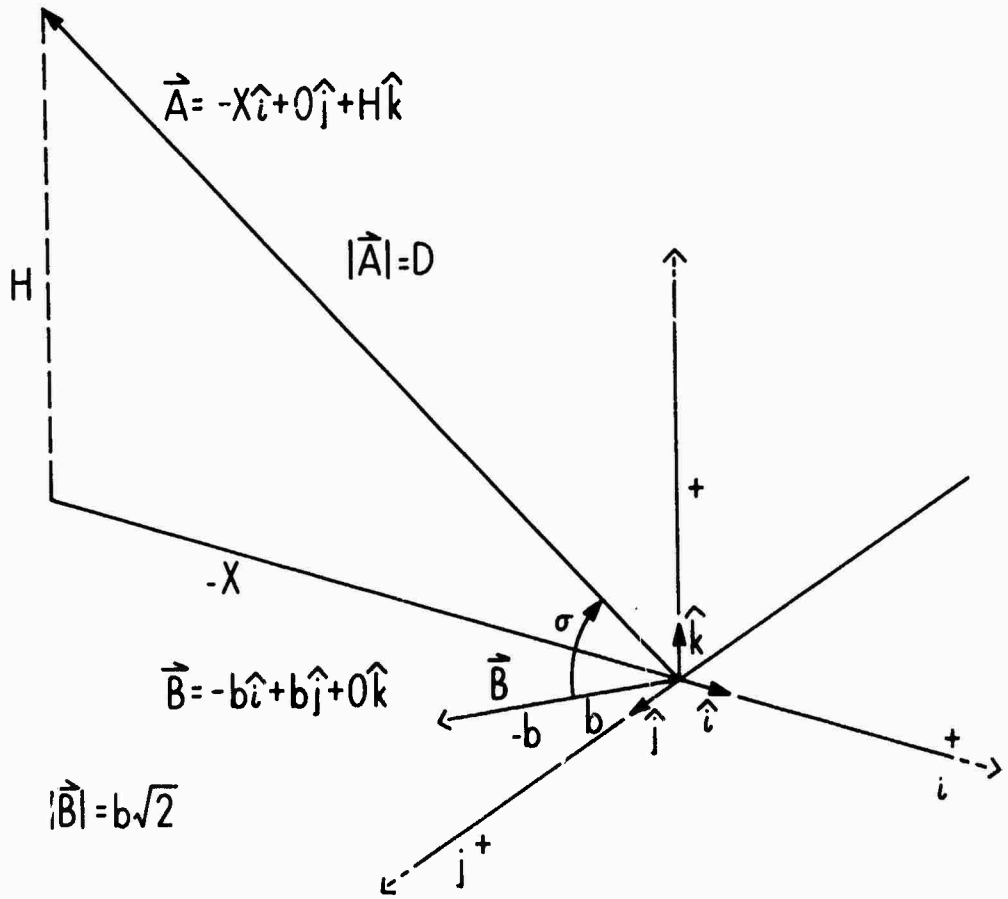


Figure 16
Vector Construct to Determine Distances and Illumination Along Oblique Axes

It follows that

$$\vec{A}\cdot\vec{B} = |\vec{A}||\vec{B}|\cos\sigma$$

$$bx = \sqrt{x^2 + H^2}\sqrt{b^2 + b^2}\cos\sigma$$

$$bx = D\, b\sqrt{2}\cos\sigma$$

$$\cos\sigma = \frac{x}{\sqrt{2}\ D}$$

$$\sigma = \cos^{-1}\left(\frac{x}{\sqrt{2}\ D}\right).$$

In figure 15, δ must then equal $(180 - (|\phi_8| + |\sigma|))$. Once all the angles are known, we can solve for GG_{ϕ_8} using the law of sines.

$$\frac{GG_{\phi_8}}{\sin \sigma} = \frac{D}{\sin \delta} = \frac{b\sqrt{2}}{\sin \phi_8}$$

$$GG_{\phi_8} = \frac{D \sin \sigma}{\sin \delta}$$

The distance from the center spot along the oblique axis can also now be solved for:

$$b\sqrt{2} = \frac{D \sin \phi_8}{\sin \delta}$$

A similar analysis follows for each of the three quadrants along the oblique axes. In this manner, the illumination is calculated along the four axes, and an illumination profile may be obtained showing the light levels throughout the interior of the template area.

LAMPS, FIXTURES AND FILTERS FOR UNREP

The Navy stock fixture symbol 263, FSN 6210-878-1131-D336, as shown in figure 17 was chosen for underway replenishment night lighting of supply ships because it had the following outstanding features:

- Relatively small size.
- Waterproof.
- Steel construction (relatively noncorrosive).
- Ease of relamping.
- Large glare shield.
- Standard filter holder.
- Rigid mounting.
- Rigid, all position aiming.

Figure 17
Navy Stock Fixture Symbol 263

The red filter to be used in conjunction with this luminaire is designated as No. 6350 as manufactured by the Kopp Glass Company. It was chosen because it has a sharp cutoff point around 600 nanometers (nm) and will transmit no light of wavelength shorter than this. This quality of red light provides excellent dark adaptation. A spectral transmittance curve of the filter is given in figure 18.

The lamps under consideration for UNREP lighting are PAR lamps. For the large spaces and great mounting heights available on supply ships, high intensity 300-watt PAR 56 lamps are available in WFL, MFL, and NSP beam configurations. This range of lamp choice allows a complete lighting system to be designed from a single type of luminaire with various types of lamps. Template method calculations for each of these types are included in appendix A.

On supply ships, available mounting heights range as high as 50 feet. On destroyers and other ships which must be replenished at sea, however, such heights are not available. Consequently, for the needs of these ships, 300-watt lamps must be bypassed; consideration should be given to smaller lamps such as 75, 100, and 150 watt.

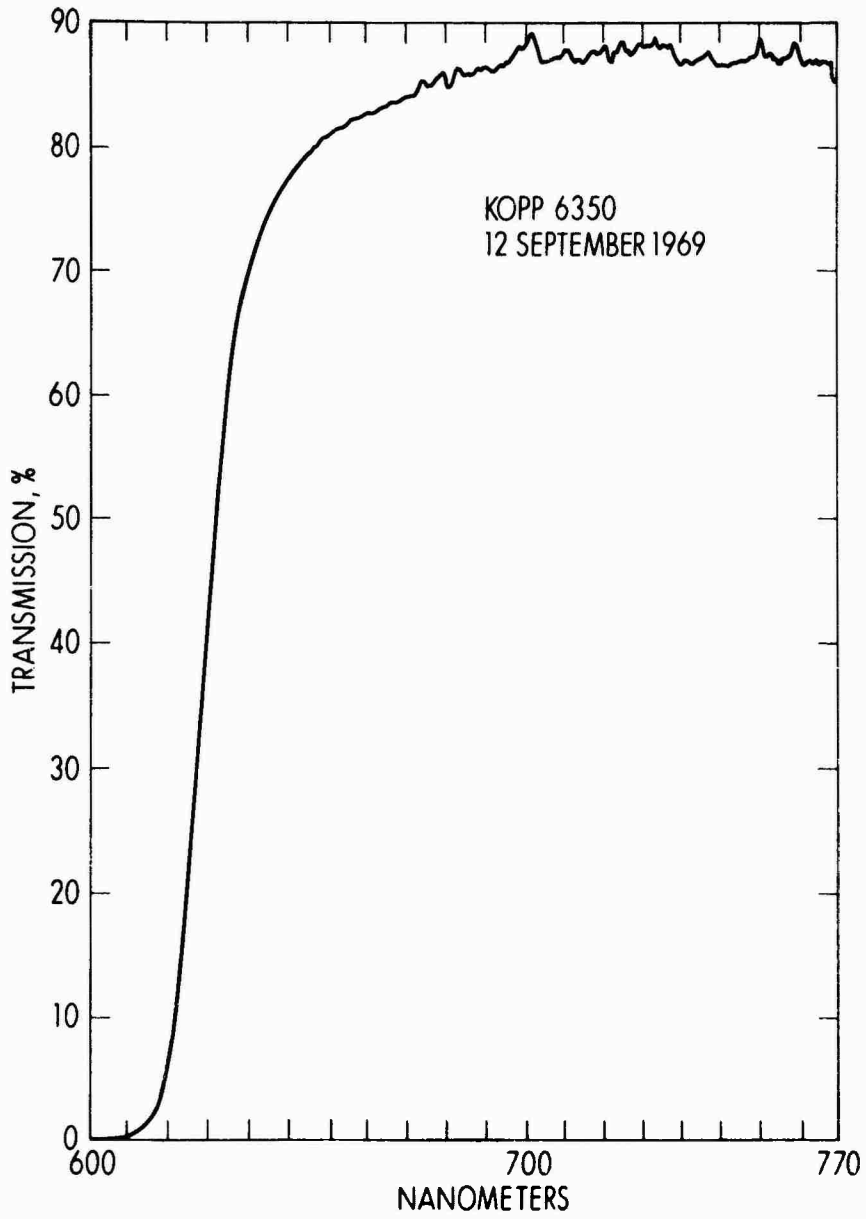


Figure 18
Spectral Transmittance

CONCLUSIONS AND RECOMMENDATIONS

This report has described a method of designing red illumination systems for night UNREP operations. This method is also applicable to the design of any illumination system which will use overhead mounted point source types of luminaires.

The method and data addressed in this report were detailed for use with a single militarized lighting fixture (Symbol 263) which was determined under this task to be adequate for use on Fleet supply ships. It is suggested that information regarding this method be introduced to naval ship designers and inspectors for use in the design of lighting systems and also in the shipboard verification of those designs.

It has also been suggested that the template method be used as an analytical tool when investigating lighting system designs which may indicate the use of special lamps and the development of new lighting fixtures. When phantom designs for the new fixtures are prepared and the corresponding illumination levels are adequately described then the following comparison tradeoffs can be made between these phantom fixture/lamp combinations and the reported symbol 263 fixture/lamps: number of fixtures/lamps required, uniformity of illumination in the work area, available mounting heights for fixtures, and power requirements. Examination of these tradeoffs can determine in advance whether the development of a new fixture is really warranted. If the new fixtures are needed, then detailed patterns or templates can be prepared as outlined herein for the Symbol 263 fixture.

In completing this task it became apparent that the Symbol 263 light fixtures were not adequate for use in the design of lighting systems for combatant-type ships. A preprototype fixture, based upon a miniaturized Symbol 263 fixture, was constructed to illustrate the illumination patterns which can be expected when employing Symbol 263 features in combination with 75-, 100-, and 150-watt PAR type tungsten lamps. Template method data for these preprototype fixture/lamp combinations are available at the NAVSHIPRANDCEN Annapolis along with candlepower distribution data for all available types (flood and spot) of the following PAR lamps (bare lamp not mounted) in any fixture; 75, 100, 150, 300, and 500 watt. This data would be useful in examining the tradeoffs of the preprotype fixture or any fixture employing available PAR-type tungsten lamps and can be made available if desired.

Appendix A

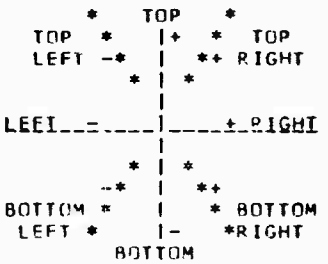
UNREP Lighting Data

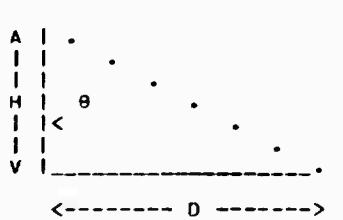
(A Set of Data Tables for UNREP Lighting,
i.e., 300-Watt PAR 56 Wide Flood, Medium Flood,
and Narrow Spot, in the Symbol 263 Fixture)

LAMP - 300 WATT NARROW SPOT

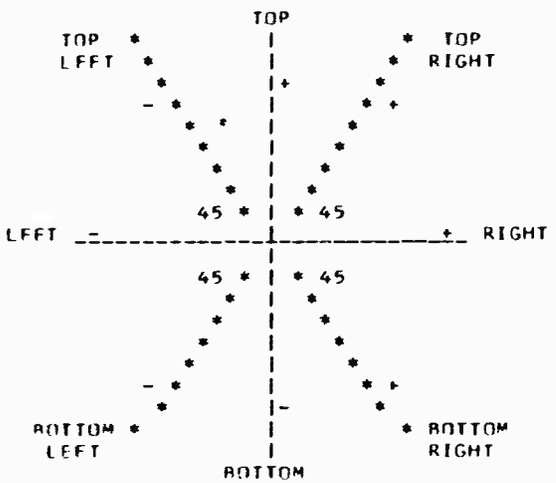
FIXTURE - SYMBOL #263

TRANSMISSION FACTOR - 0.150
(PER CENT REF.)





			VERTICAL AXIS: BOTTOM TO TOP				VERTICAL AXIS: TOP LEFT TO BOTTOM RIGHT				HORIZONTAL AXIS: LEFT TO RIGHT				HORIZONTAL AXIS: BOTTOM LEFT TO TOP RIGHT			
			DIR	DIST TO ILLUM LEVEL OF			DIR	DIST TO ILLUM LEVEL OF			DIR	DIST TO ILLUM LEVEL OF			DIR	DIST TO ILLUM LEVEL OF		
H	D	θ	0.2	0.5	0.5	0.2	0.2	0.5	0.5	0.2	0.2	0.5	0.5	0.2	0.2	0.5	0.5	0.2
40	42.0	45	-12.0	-9.3	7.7	12.1	-9.3	-6.0	8.3	10.5	-10.0	-7.4	10.0	12.5	-8.0	-5.4	9.3	12.8
44	44.0	45	-13.2	-10.2	8.4	8.4	-10.2	-6.6	8.8	11.5	-11.0	-8.2	11.0	13.8	-8.8	-6.0	10.2	14.1
48	48.3	60	-12.5	-9.7	7.7	7.7	-9.9	-6.4	8.7	11.4	-11.0	-8.2	11.0	13.9	-8.7	-5.9	9.9	13.6
48	48.0	45	-14.4	-11.2	4.4	9.2	-11.2	-7.2	9.4	12.5	-12.0	-8.9	12.0	15.0	-9.6	-6.5	11.2	15.4



MOUNTING POLE

300 WATT NARROW SPOT SYMBOL #263

ABRIDGED ILLUMINATION PROFILE

300 WATT NARROW SPOT SYMBOL #263

HEIGHT = 40 FEET

THETA = 45 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 40.00

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-14.52	0.05
-11.99	0.14
-9.31	0.57
-6.44	1.35
-3.35	2.36
0.0	2.48
3.65	1.08
7.67	0.33
12.13	0.08
17.13	0.02

RADIAL "DIAMETER" = 12.13 + 11.99 = 24.12

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.84	0.07
10.45	0.19
7.99	0.47
5.44	1.11
2.78	2.38
0.0	2.82
-2.93	1.41
-6.02	0.63
-9.31	0.19
-12.82	0.06

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
15.16	0.05
12.54	0.20
9.97	0.63
7.45	1.05
4.95	1.53
2.47	2.46
0.0	2.20
-2.47	1.63

300 WATT NARROW SPOT SYMBOL #263

MOUNTING HEIGHT = 40 EEET

MOUNTING ANGLE, THETA = 45 DEGREES

-4.95	1.33
-7.45	0.55
-9.97	0.14
-12.54	0.04

TRANSVERSE "DIAMETER" = 12.54 + 9.97 = 22.52

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.45	0.06
-7.99	0.23
-5.44	0.70
-2.78	1.38
0.0	2.08
2.93	2.20
6.02	1.02
9.31	0.45
12.82	0.13
16.61	0.03

300 WATT NARROW SPOT SYMBOL #263

HEIGHT = 44 FEET — DISTANCE FROM BASE OF POLE TO CENTER SPOT = 44.00

THETA = 45 DEGREES — PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-15.97	0.04
-13.19	0.11
-10.24	0.47
-7.08	1.11
-3.68	1.95
0.0	2.05
4.02	0.90
8.44	0.28
13.34	0.07

RADIAL "DIAMETER" = 8.44 + 13.19 = 21.63

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
14.12	0.06
11.50	0.15
8.79	0.39
5.98	0.92
3.06	1.97
0.0	2.33
-3.22	1.17
-6.62	0.52
-10.24	0.16
-14.11	0.05

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.67	0.04
13.80	0.17
10.97	0.52
8.19	0.87
5.44	1.27
2.72	2.03
0.0	1.81
-2.72	1.35
-5.44	1.10

300 WATT NARROW SPOT SYMBOL #263 MOUNTING HEIGHT = 44 FEET MOUNTING ANGLE, THETA = 45 DEGREES

-8.19	0.45
-10.97	0.12
-13.80	0.03

TRANSVERSE "DIAMETER" = 13.80 + 10.97 = 24.77

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.50	0.05
-8.79	0.19
-5.98	0.58
-3.06	1.14
0.0	1.72
3.22	1.82
6.62	0.84
10.24	0.37
14.11	0.11
18.27	0.02

300 WATT NARROW SPOT SYMBOL #263

HEIGHT = 48 FEET

THETA = 40 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 40.28

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-15.29	0.04
-12.56	0.11
-9.70	0.48
-6.67	1.15
-3.45	2.04
0.0	2.19
3.71	0.98
7.72	0.31
12.11	0.08

RADIAL "DIAMETER" = 7.72 + 12.56 = 20.29

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
14.01	0.06
11.38	0.16
8.68	0.40
5.89	0.96
3.00	2.08
0.0	2.49
-3.14	1.26
-6.44	0.57
-9.93	0.17
-13.63	0.05

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.79	0.05
13.89	0.18
11.05	0.56
8.25	0.93
5.48	1.35
2.74	2.17
0.0	1.94
-2.74	1.44
-5.48	1.17

300 WATT NARROW SPOT SYMBOL #263 MOUNTING HEIGHT = 48 FEET MOUNTING ANGLE, THETA = 40 DEGREES

-8.25	0.48
-11.05	0.13
-13.89	0.04

TRANSVERSE "DIAMETER" = 13.8[illegible] + 11.05 = 24.94

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.38	0.05
-8.68	0.20
-5.89	0.61
-3.00	1.21
0.0	1.83
3.14	1.96
6.44	0.92
9.93	0.41
13.63	0.12
17.58	0.03

300 WATT NARROW SPOT SYMBOL #263

HEIGHT = 48 FEET

THETA = 45 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 48.00

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-17.42	0.03
-14.39	0.09
-11.17	0.40
-7.72	0.94
-4.02	1.64
0.0	1.72
4.38	0.75
9.20	0.23
14.55	0.06

RADIAL "DIAMETER" = 9.20 + 14.39 = 23.59

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
15.41	0.05
12.54	0.13
9.59	0.32
6.53	0.77
3.34	1.65
0.0	1.96
-3.51	0.98
-7.22	0.44
-11.17	0.13
-15.39	0.04

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
18.19	0.04
15.05	0.14
11.97	0.44
8.94	0.73
5.94	1.06
2.96	1.71
0.0	1.52
-2.96	1.13
-5.94	0.92

300 WATT NARROW SPOT SYMBOL #263

MOUNTING HEIGHT = 48 FEET

MOUNTING ANGLE, THETA = 45 DEGREES

-8.94	0.38
-11.97	0.10
-15.05	0.03

TRANSVERSE "DIAMETER" = 15.05 + 11.97 = 27.02

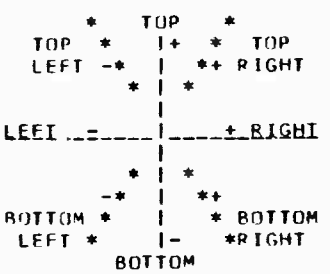
BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-12.54	0.04
-9.59	0.16
-6.53	0.48
-3.34	0.96
0.0	1.44
3.51	1.53
7.22	0.71
11.17	0.31
15.39	0.09
19.93	0.02

LAMP - 300 WATT PAR56 MFL

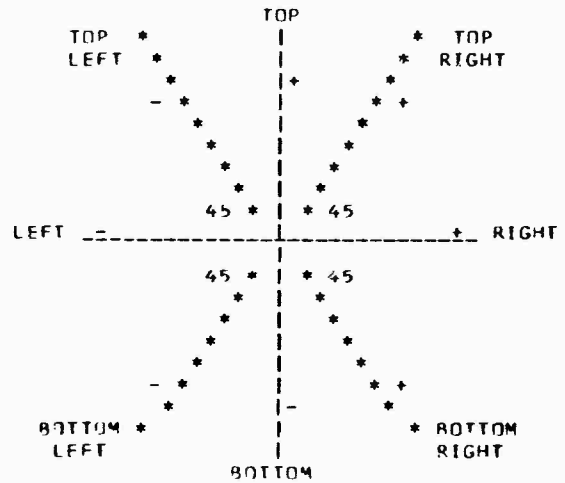
FIXTURE - SYMBOL #263

TRANSMISSION FACTOR - 0.150
(PER CENT RED)



			VERTICAL AXIS: BOTTOM TO TOP				VERTICAL AXIS: TOP LEFT TO BOTTOM RIGHT				HORIZONTAL AXIS: LEFT TO RIGHT				HORIZONTAL AXIS: BOTTOM LEFT TO TOP RIGHT			
			-	-	+	+	-	-	+	+	-	-	+	+	-	-	+	+
H	D	θ	DIR DIST TO ILLUM LEVEL OF 0.2		0.5	0.2	DIR DIST TO ILLUM LEVEL OF 0.2		0.5	0.2	DIR DIST TO ILLUM LEVEL OF 0.2		0.5	0.2	DIR DIST TO ILLUM LEVEL OF 0.2		0.5	0.2
28	28.0	45	-8.4	-6.5	8.5	12.0	-9.0	-9.0	7.3	9.0	-10.6	-8.8	10.6	12.5	-9.0	-7.3	9.0	11.6
32	26.9	40	-8.4	-6.5	8.1	11.3	-9.1	-9.1	7.6	9.3	-11.2	-9.3	11.2	13.2	-9.3	-7.6	9.1	11.7
32	32.0	45	-9.6	-7.4	9.7	13.7	-10.3	-7.4	8.4	10.3	-12.1	-10.0	12.1	14.3	-8.4	-6.4	7.4	10.3
36	25.2	35	-8.4	-6.5	7.8	10.8	-9.2	-9.2	7.9	9.7	-11.8	-9.7	11.8	13.9	-9.7	-7.9	9.2	11.8
36	30.2	40	-9.4	-7.3	9.1	12.7	-10.2	-7.4	8.5	10.5	-12.6	-10.4	12.6	14.8	-8.5	-6.5	7.4	10.2
36	36.0	45	-8.4	-5.8	10.9	10.9	-11.5	-8.4	9.4	11.6	-13.6	-9.0	11.3	13.6	-9.4	-7.2	8.4	11.5
40	18.7	25	-7.9	-6.0	6.8	9.4	-11.0	-8.6	7.7	9.6	-11.8	-9.8	11.8	13.9	-9.6	-7.7	8.6	11.0
40	23.1	30	-8.5	-6.5	7.6	10.5	-9.3	-9.3	8.2	10.1	-12.4	-10.2	12.4	14.6	-8.2	-6.2	9.3	11.9
40	28.0	35	-7.2	-7.2	8.6	12.0	-10.2	-7.5	8.7	10.8	-13.1	-10.8	13.1	15.4	-8.7	-6.6	10.2	10.2
40	33.6	40	-8.1	-5.4	10.1	14.1	-11.4	-8.3	9.5	11.7	-14.0	-9.2	11.6	14.0	-9.5	-7.2	8.3	11.4
40	40.0	45	-9.3	-6.4	7.7	12.1	-12.8	-9.3	8.0	12.8	-15.2	-10.0	12.5	15.2	-10.5	-8.0	9.3	12.8
44	7.8	10	-7.8	-5.8	6.1	8.3	-10.3	-8.1	7.8	9.7	-12.0	-9.9	12.0	14.1	-9.7	-7.8	8.1	10.3
44	11.8	15	-7.9	-6.0	6.4	8.7	-10.7	-8.4	7.9	9.9	-12.2	-10.1	12.2	14.4	-9.9	-7.9	8.4	10.7
44	16.0	20	-8.3	-6.3	6.9	9.4	-11.3	-8.9	8.2	10.1	-12.5	-10.4	12.5	14.8	-8.2	-6.2	8.9	11.3
44	20.5	25	-6.6	-5.6	7.5	10.3	-9.5	-9.5	8.5	10.5	-13.0	-10.8	13.0	15.3	-8.5	-6.4	9.5	12.1
44	25.4	30	-7.2	-4.9	8.4	11.5	-10.3	-7.5	9.0	11.1	-13.6	-11.3	11.3	13.6	-9.0	-6.8	10.3	10.3

44	30.8	35	-7.9	-5.4	9.5	13.2	-11.2	-8.2	9.6	11.9	-14.4	-9.5	11.9	14.4	-9.6	-7.3	8.2	11.2
44	36.9	40	-8.9	-6.1	7.1	11.1	-12.5	-9.1	8.0	12.8	-15.4	-10.1	12.7	15.4	-10.4	-8.0	9.1	12.5
48	0.0	0	-6.3	-6.3	6.3	8.5	-10.6	-8.5	8.5	10.6	-12.9	-10.6	12.9	15.1	-8.5	-6.3	8.5	10.6
48	4.2	5	-6.3	-6.3	6.4	8.7	-10.9	-8.6	8.4	10.6	-12.9	-10.7	12.9	15.2	-8.4	-6.3	8.6	10.9
48	8.5	10	-6.4	-6.4	6.7	9.0	-11.2	-8.9	8.5	10.6	-13.1	-10.8	13.1	15.4	-8.5	-6.4	8.9	11.2
48	12.9	15	-6.5	-6.5	7.0	9.5	-11.7	-9.2	8.6	10.8	-13.3	-11.0	13.3	15.7	-8.6	-6.5	9.2	11.7
48	17.5	20	-6.8	-4.6	7.5	10.2	-9.7	-7.2	8.9	11.1	-13.7	-11.3	13.7	16.1	-8.9	-6.7	9.7	12.4
48	22.4	25	-7.2	-4.9	8.2	11.2	-10.4	-7.6	9.3	11.5	-14.2	-11.7	11.7	14.2	-9.3	-7.0	10.4	10.4
48	27.7	30	-7.8	-5.3	9.1	12.6	-11.2	-8.2	9.8	12.1	-14.9	-9.8	12.3	14.9	-9.8	-7.4	8.2	11.2
48	33.6	35	-8.6	-5.9	10.4	10.4	-12.3	-9.0	8.0	12.9	-15.7	-10.3	13.0	15.7	-10.5	-8.0	9.0	12.3
48	40.3	40	-9.7	-6.7	7.7	12.1	-13.6	-6.4	8.7	11.4	-13.9	-11.0	11.0	16.8	-11.4	-5.9	9.9	13.6



MOUNTING POLE

300 WATT PAR56 MFL SYMBOL #263

ABRIDGED ILLUMINATION PROFILE

300 WATT PAR56 MFL SYMBOL #263

HEIGHT - 28 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 28.00

THETA - 45 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-10.16	0.09
-8.39	0.15
-6.51	0.41
-4.51	1.02
-2.34	1.81
0.0	2.27
2.56	2.00
5.37	1.24
8.49	0.50
11.99	0.12
15.95	0.03

RADIAL "DIAMETER" = 11.99 + 8.39 = 20.38

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
10.61	0.10
8.99	0.25
7.32	0.62
5.59	1.20
3.81	1.89
1.95	2.32
0.0	2.35
-2.05	1.96
-4.21	1.37
-6.51	0.76
-8.98	0.29
-11.62	0.08

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
14.41	0.04
12.49	0.11
10.61	0.42
8.78	0.90
6.98	1.37

300 WATT PARSS MFL SYMBOL #263 MOUNTING HEIGHT = 28 FEET MOUNTING ANGLE, THETA = 45 DEGREES

5.21	1.78
3.46	2.17
1.73	2.35
0.0	2.37
-1.73	2.24
-3.46	2.01
-5.21	1.57
-6.98	0.93
-8.78	0.65
-10.61	0.22
-12.49	0.06

TRANSVERSE "DIAMETER" = 12.49 + 10.61 = 23.10

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.61	0.07
-9.99	0.13
-7.32	0.36
-5.59	0.83
-3.81	1.50
-1.95	2.03
0.0	2.35
2.05	2.17
4.21	1.57
6.51	0.89
8.98	0.36
11.62	0.11
14.49	0.04

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 32 FEET

THETA = 40 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 26.85

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-10.19	0.08
-8.38	0.14
-6.46	0.37
-4.44	0.96
-2.30	1.73
0.0	2.21
2.47	1.99
5.15	1.27
8.07	0.52
11.28	0.13
14.85	0.03

RADIAL "DIAMETER" = 11.28 + 8.38 = 19.66

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
11.05	0.10
9.34	0.23
7.59	0.59
5.79	1.14
3.93	1.91
2.00	2.24
0.0	2.29
-2.09	1.93
-4.29	1.36
-6.62	0.76
-9.09	0.29
-11.72	0.09

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
15.20	0.04
13.17	0.10
11.19	0.41
9.26	0.88
7.37	1.34

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 32 FEET MOUNTING ANGLE, THETA = 40 DEGREES

5.50	1.73
3.65	2.12
1.82	2.29
0.0	2.30
-1.82	2.18
-3.65	1.95
-5.50	1.53
-7.37	0.91
-9.26	0.63
-11.19	0.21
-13.17	0.06

TRANSVERSE "DIAMETER" = 13.17 + 11.19 = 24.36

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.05	0.07
-9.34	0.12
-7.59	0.34
-5.79	0.78
-3.93	1.44
-2.00	1.96
0.0	2.28
2.09	2.13
4.29	1.56
6.62	0.90
9.09	0.36
11.72	0.11
14.56	0.04

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 32 FEET — DISTANCE FROM BASE OF POLE TO CENTER SPOT = 32.00

THETA = 45 DEGREES — PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-11.61	0.07
-9.59	0.12
-7.45	0.31
-5.15	0.78
-2.68	1.39
0.0	1.74
2.92	1.53
6.14	0.95
9.70	0.38
13.70	0.09
18.23	0.02

RADIAL "DIAMETER" = 13.70 + 9.59 = 23.29

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.13	0.08
10.27	0.19
8.36	0.48
6.39	0.92
4.35	1.45
2.23	1.77
0.0	1.80
-2.34	1.50
-4.81	1.05
-7.45	0.59
-10.26	0.22
-13.29	0.06

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.47	0.03
14.27	0.08
12.13	0.32
10.03	0.69
7.98	1.05

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 32 FEET MOUNTING ANGLE, THETA = 45 DEGREES

5.96	1.36
3.96	1.66
1.98	1.80
0.0	1.81
-1.98	1.72
-3.96	1.54
-5.96	1.21
-7.98	0.71
-10.03	0.49
-12.13	0.17
-14.27	0.05

TRANSVERSE "DIAMETER" = 14.27 + 12.13 = 26.39

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.27	0.10
-8.36	0.27
-6.39	0.63
-4.35	1.15
-2.23	1.55
0.0	1.80
2.34	1.66
4.81	1.21
7.45	0.68
10.26	0.27
13.29	0.08

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 36 FEET

THETA = 35 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 25.21

PERCENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-10.30	0.08
-8.42	0.12
-6.47	0.34
-4.42	0.89
-2.27	1.64
0.0	2.14
2.42	1.96
5.00	1.27
7.78	0.54
10.79	0.13
14.08	0.04

RADIAL "DIAMETER" = 10.79 + 8.42 = 19.21

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
11.51	0.09
9.70	0.22
7.86	0.55
5.98	1.08
4.05	1.72
2.06	2.14
0.0	2.21
-2.14	1.88
-4.38	1.33
-6.72	0.76
-9.20	0.29
-11.82	0.09

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.00	0.04
13.86	0.10
11.78	0.40
9.74	0.85
7.75	1.29

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 36 FEET MOUNTING ANGLE, THETA = 35 DEGREES

5.79	1.67
3.84	2.04
1.92	2.21
0.0	2.23
-1.92	2.11
-3.84	1.89
-5.79	1.48
-7.75	0.88
-9.74	0.61
-11.78	0.20
-13.86	0.06

TRANSVERSE "DIAMETER" = 13.86 + 11.78 = 25.63

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.51	0.06
-9.70	0.11
-7.86	0.32
-5.98	0.74
-4.05	1.37
-2.06	1.87
0.0	2.21
2.14	2.07
4.38	1.54
6.72	0.89
9.20	0.36
11.82	0.11
14.62	0.04

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 36 FEET

THETA = 40 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 30.21

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-11.47	0.07
-9.42	0.11
-7.27	0.30
-5.00	0.76
-2.58	1.37
0.0	1.75
2.78	1.57
5.79	1.00
9.08	0.41
12.70	0.10
16.71	0.03

RADIAL "DIAMETER" = 12.70 + 9.42 = 22.12

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.44	0.08
10.51	0.18
8.53	0.46
6.51	0.90
4.42	1.43
2.25	1.77
0.0	1.80
-2.36	1.52
-4.83	1.07
-7.45	0.60
-10.22	0.23
-13.19	0.07

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
17.10	0.03
14.82	0.08
12.59	0.33
10.42	0.69
8.29	1.06

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 36 FEET MOUNTING ANGLE, THETA = 40 DEGREES

6.19	1.37
4.11	1.67
2.05	1.81
0.0	1.82
-2.05	1.73
-4.11	1.54
-6.19	1.21
-8.29	0.72
-10.42	0.50
-12.59	0.17
-14.82	0.05

TRANSVERSE "DIAMETER" = 14.82 + 12.59 = 27.41

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.51	0.09
-8.53	0.27
-6.51	0.62
-4.42	1.14
-2.25	1.55
0.0	1.80
2.36	1.68
4.83	1.23
7.45	0.71
10.22	0.29
13.19	0.09

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 36 FEET — DISTANCE FROM BASE OF POLE TO CENTER SPOT = 36.00

THETA = 45 DEGREES — PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-10.79	0.09
-8.38	0.25
-5.79	0.62
-3.01	1.10
0.0	1.38
3.29	1.21
6.90	0.75
10.92	0.30
15.41	0.07

RADIAL "DIAMETER" = 10.92 + 8.38 = 19.29

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
13.64	0.06
11.55	0.15
9.41	0.38
7.19	0.73
4.90	1.14
2.50	1.40
0.0	1.42
-2.63	1.19
-5.42	0.83
-8.38	0.46
-11.54	0.18
-14.95	0.05

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.05	0.06
13.64	0.26
11.29	0.54
8.98	0.83
6.70	1.08
4.45	1.31
2.22	1.42

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 36 FEET MOUNTING ANGLE, THETA = 45 DEGREES

0.0	1.43
-2.22	1.36
-4.45	1.21
-6.70	0.95
-8.98	0.56
-11.29	0.39
-13.64	0.13
-16.05	0.04

TRANSVERSE "DIAMETER" = 13.64 + 13.64 = 27.28

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.55	0.08
-9.41	0.22
-7.19	0.50
-4.90	0.91
-2.50	1.23
0.0	1.42
2.63	1.31
5.42	0.95
8.38	0.54
11.54	0.22
14.95	0.06

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 40 FEET

THETA = 25 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 18.65

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.78	0.07
-7.93	0.12
-6.04	0.35
-4.09	0.92
-2.08	1.75
0.0	2.35
2.17	2.22
4.44	1.49
6.83	0.65
9.36	0.17
12.04	0.05

RADIAL "DIAMETER" = 9.36 + 7.93 = 17.29

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
11.43	0.09
9.59	0.22
7.73	0.56
5.85	1.12
3.94	1.82
1.99	2.31
0.0	2.42
-2.05	2.10
-4.16	1.52
-6.35	0.88
-8.63	0.35
-11.02	0.11
-13.53	0.03

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.06	0.05
13.92	0.11
11.83	0.44
9.78	0.93

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 40 FEET MOUNTING ANGLE, THETA = 25 DEGREES

7.78	1.42
5.81	1.84
3.86	2.24
1.93	2.43
0.0	2.44
-1.93	2.31
-3.86	2.07
-5.81	1.62
-7.78	0.96
-9.78	0.67
-11.83	0.22
-13.92	0.06

TRANSVERSE "DIAMETER" = 13.92 + 11.83 = 25.74

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.43	0.06
-9.59	0.11
-7.73	0.33
-5.85	0.77
-3.94	1.45
-1.99	2.07
0.0	2.42
2.05	2.32
4.16	1.75
6.35	1.03
8.63	0.43
11.02	0.13
13.53	0.05

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 40 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 23.09

THETA = 30 DEGREES PER CENT REG = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-10.48	0.07
-8.54	0.11
-6.53	0.32
-4.44	0.83
-2.27	1.55
0.0	2.05
2.39	1.91
4.91	1.26
7.60	0.54
10.47	0.14
13.56	0.04

RADIAL "DIAMETER" = 10.47 + 8.54 = 19.01

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.01	0.08
10.10	0.20
8.16	0.51
6.19	1.00
4.18	1.62
2.12	2.03
0.0	2.11
-2.19	1.81
-4.47	1.30
-6.84	0.74
-9.33	0.29
-11.95	0.09

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.81	0.04
14.56	0.10
12.38	0.38
10.24	0.81
8.14	1.24

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 40 FEET MOUNTING ANGLE, THETA = 30 DEGREES

6.08	1.60
4.04	1.96
2.02	2.12
0.0	2.13
-2.02	2.02
-4.04	1.81
-6.08	1.42
-8.14	0.94
-10.24	0.58
-12.38	0.20
-14.56	0.06

TRANSVERSE "DIAMETER" = 14.56 + 12.38 = 26.94

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.10	0.10
-8.16	0.29
-6.19	0.69
-4.18	1.29
-2.12	1.78
0.0	2.11
2.19	2.00
4.47	1.50
6.84	0.88
9.33	0.36
11.95	0.11
14.72	0.04

300 WATT PAR56 MFL SYMPOL #263

HEIGHT = 40 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 28.01

THETA = 35 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.36	0.10
-7.19	0.28
-4.91	0.72
-2.53	1.33
0.0	1.73
2.68	1.59
5.56	1.03
8.64	0.43
11.99	0.11
15.64	0.03

RADIAL "DIAMETER" = 11.99 + 7.19 = 19.18

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.79	0.07
10.78	0.17
8.74	0.44
6.64	0.87
4.50	1.39
2.29	1.73
0.0	1.79
-2.38	1.52
-4.86	1.08
-7.47	0.61
-10.22	0.24
-13.14	0.07

RIGHT TO LE T - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
17.77	0.03
15.40	0.08
13.09	0.32
10.83	0.69
8.61	1.05
6.43	1.36

300 WATT PAR56 MFL SYMROL #263 MOUNTING HEIGHT = 40 FEET MOUNTING ANGLE, THETA = 35 DEGREES

4.27	1.66
2.13	1.79
0.0	1.80
-2.13	1.71
-4.27	1.53
-6.43	1.20
-8.61	0.71
-10.3	0.49
-13.08	0.17
-15.40	0.05

TRANSVERSE "DIAMETER" = 15.40 + 13.08 = 28.48

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.78	0.09
-8.74	0.26
-6.64	0.60
-4.50	1.11
-2.29	1.52
0.0	1.79
2.38	1.68
4.86	1.24
7.47	0.72
10.22	0.29
13.14	0.09

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 40 FEET

THETA = 40 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 33.56

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-10.47	0.09
-8.08	0.24
-5.56	0.61
-2.87	1.11
0.0	1.42
3.09	1.27
6.44	0.81
10.09	0.33
14.11	0.08
18.56	0.02

RADIAL "DIAMETER" = 14.11 + 8.08 = 22.19

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
13.82	0.06
11.68	0.15
9.48	0.37
7.23	0.73
4.91	1.16
2.50	1.43
0.0	1.46
-2.62	1.23
-5.37	0.87
-8.27	0.49
-11.36	0.19
-14.65	0.06

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.46	0.07
13.99	0.26
11.58	0.56
9.21	0.86
6.87	1.11
4.57	1.35

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 40 FEET MOUNTING ANGLE, THETA = 40 DEGREES

2.28	1.47
0.0	1.48
-2.28	1.40
-4.57	1.25
-6.87	0.98
-9.21	0.58
-11.58	0.40
-13.99	0.14
-16.46	0.04

TRANSVERSE "DIAMETER" = 13.99 + 13.99 = 27.98

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.68	0.08
-9.48	0.22
-7.23	0.50
-4.91	0.92
-2.50	1.25
0.0	1.46
2.62	1.36
5.37	1.00
8.27	0.57
11.36	0.23
14.65	0.07

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 40 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 40.00

THETA = 45 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-11.39	0.07
-9.01	0.20
-6.44	0.50
-3.35	0.89
0.0	1.11
3.65	0.98
7.67	0.61
12.13	0.24
17.13	0.06

RADIAL "DIAMETER" = 12.13 + 9.31 = 21.44

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
15.16	0.05
12.84	0.12
10.45	0.30
7.99	0.59
5.44	0.93
2.78	1.14
0.0	1.15
-2.93	0.96
-6.02	0.67
-9.31	0.37
-12.82	0.14
-16.61	0.04

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
17.84	0.05
15.16	0.21
12.54	0.44
9.97	0.67
7.45	0.87
4.95	1.06
2.47	1.15

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 40 FEET MOUNTING ANGLE, THETA = 45 DEGREES

0.0	1.16
-2.47	1.10
-4.95	0.98
-7.45	0.77
-9.97	0.46
-12.54	0.32
-15.16	0.11
-17.84	0.03

TRANSVERSE "DIAMETER" = 15.16 + 15.16 = 30.31

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-12.84	0.06
-10.45	0.18
-7.99	0.40
-5.44	0.74
-2.78	0.99
0.0	1.15
2.93	1.06
6.02	0.77
9.31	0.44
12.82	0.17
16.61	0.05

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 44 FEET

THETA = 10 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 7.76

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.68	0.06
-7.76	0.11
-5.84	0.33
-3.91	0.91
-1.97	1.78
0.0	2.49
2.00	2.44
4.03	1.71
6.11	0.78
8.26	0.21
10.47	0.06

RADIAL "DIAMETER" = 8.26 + 7.76 = 16.01

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
11.68	0.08
9.71	0.21
7.77	0.54
5.83	1.11
3.90	1.84
1.96	2.39
0.0	2.57
-1.98	2.28
-3.98	1.69
-6.03	1.00
-8.12	0.41
-10.26	0.13
-12.48	0.04

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.26	0.05
14.09	0.12
11.97	0.46
9.91	0.99

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 44 FEET MOUNTING ANGLE, THETA = 10 DEGREES

7.88	1.50
5.88	1.95
3.91	2.38
1.95	2.57
0.0	2.59
-1.95	2.45
-3.91	2.19
-5.88	1.72
-7.88	1.02
-9.91	0.71
-11.97	0.24
-14.09	0.07

TRANSVERSE "DIAMETER" = 14.09 + 11.97 = 26.06

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.68	0.06
-9.71	0.10
-7.77	0.31
-5.83	0.76
-3.90	1.46
-1.96	2.09
0.0	2.57
1.98	2.52
3.98	1.95
6.03	1.18
8.12	0.50
10.26	0.16
12.48	0.06

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 44 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 11.79

THETA = 15 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.87	0.06
-7.94	0.11
-6.00	0.32
-4.03	0.88
-2.04	1.70
0.0	2.35
2.08	2.28
4.22	1.58
6.44	0.71
8.73	0.19
11.12	0.06

RADIAL "DIAMETER" = 8.73 + 7.94 = 16.67

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
11.83	0.08
9.87	0.20
7.91	0.53
5.95	1.07
3.99	1.77
2.01	2.27
0.0	2.42
-2.04	2.13
-4.12	1.57
-6.25	0.92
-8.45	0.37
-10.71	0.12
-13.07	0.04

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.58	0.05
14.36	0.11
12.21	0.44
10.10	0.93

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 44 FEET MOUNTING ANGLE, THETA = 15 DEGREES

8.03	1.42
6.00	1.84
3.99	2.24
1.99	2.43
0.0	2.44
-1.99	2.32
-3.99	2.07
-6.00	1.62
-8.03	0.96
-10.10	0.67
-12.21	0.22
-14.36	0.06

TRANSVERSE "DIAMETER" = 14.36 + 12.21 = 26.57

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.83	0.05
-9.87	0.10
-7.91	0.31
-5.95	0.74
-3.99	1.40
-2.01	1.99
0.0	2.42
2.04	2.36
4.12	1.81
6.25	1.09
8.45	0.46
10.71	0.14
13.07	0.06

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 44 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 16.01

THETA = 20 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-10.22	0.06
-8.26	0.11
-6.26	0.31
-4.22	0.83
-2.14	1.59
0.0	2.16
2.21	2.07
4.50	1.41
6.89	0.63
9.39	0.16
12.02	0.05

RADIAL "DIAMETER" = 9.39 + 8.26 = 17.64

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.12	0.08
10.14	0.19
8.15	0.50
6.15	1.01
4.13	1.65
2.08	2.11
0.0	2.23
-2.13	1.95
-4.32	1.42
-6.57	0.83
-8.90	0.33
-11.32	0.10
-13.86	0.03

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
17.04	0.04
14.76	0.10
12.55	0.40
10.38	0.86

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 44 FEET MOUNTING ANGLE, THETA = 20 DEGREES

8.26	1.30
6.16	1.69
4.10	2.07
2.04	2.24
0.0	2.25
-2.04	2.13
-4.10	1.91
-6.16	1.50
-8.26	0.89
-10.38	0.61
-12.55	0.21
-14.76	0.06

TRANSVERSE "DIAMETER" = 14.76 + 12.55 = 27.31

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.14	0.10
-8.15	0.29
-6.15	0.69
-4.13	1.31
-2.08	1.85
0.0	2.23
2.13	2.15
4.32	1.64
6.57	0.97
8.90	0.41
11.32	0.13
13.86	0.05

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 44 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 20.52

THETA = 25 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-8.73	0.10
-5.64	0.29
-4.50	0.76
-2.29	1.44
0.0	1.94
2.39	1.83
4.89	1.23
7.51	0.54
10.29	0.14
13.24	0.04

RADIAL "DIAMETER" = 10.29 + 6.64 = 16.94

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.58	0.07
10.55	0.18
8.50	0.47
6.43	0.93
4.33	1.51
2.19	1.91
0.0	2.00
-2.25	1.73
-4.58	1.25
-6.99	0.72
-9.49	0.29
-12.12	0.09

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
17.67	0.04
15.31	0.09
13.01	0.36
10.76	0.77
8.56	1.17
6.39	1.52

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 44 FEET MOUNTING ANGLE, THETA = 25 DEGREES

4.25	1.85
2.12	2.01
0.0	2.02
-2.12	1.91
-4.25	1.71
-6.39	1.34
-8.56	0.90
-10.76	0.55
-13.01	0.19
-15.31	0.05

TRANSVERSE "DIAMETER" = 15.31 + 13.01 = 28.32

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.55	0.09
-8.50	0.27
-6.43	0.64
-4.33	1.20
-2.19	1.67
0.0	2.00
2.25	1.91
4.58	1.44
6.99	0.85
9.49	0.35
12.12	0.11
14.88	0.04

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 44 FEET

THETA = 30 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 25.40

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.39	0.09
-7.18	0.26
-4.89	0.68
-2.50	1.28
0.0	1.69
2.63	1.57
5.41	1.04
8.36	0.45
11.52	0.11
14.92	0.03

RADIAL "DIAMETER" = 11.52 + 7.18 = 18.69

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
13.22	0.07
11.11	0.16
8.98	0.42
6.81	0.83
4.60	1.34
2.33	1.68
0.0	1.75
-2.41	1.50
-4.91	1.07
-7.53	0.62
-10.26	0.24
-13.14	0.07

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.02	0.08
13.61	0.31
11.26	0.67
8.96	1.02
6.69	1.32
4.45	1.62

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 44 FEET MOUNTING ANGLE, THETA = 30 DEGREES

2.22	1.75
0.0	1.76
-2.22	1.67
-4.45	1.49
-6.69	1.17
-8.96	0.69
-11.26	0.48
-13.61	0.16
-16.02	0.05

TRANSVERSE "DIAMETER" = 13.61 + 13.61 = 27.23

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.11	0.08
-8.98	0.24
-6.81	0.57
-4.60	1.06
-2.33	1.47
0.0	1.75
2.41	1.66
4.91	1.24
7.53	0.72
10.26	0.30
13.14	0.09

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 44 FEET

THETA = 35 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 30.81

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-10.29	0.08
-7.90	0.23
-5.41	0.60
-2.78	1.10
0.0	1.43
2.95	1.31
6.11	0.85
9.51	0.36
13.19	0.09
17.21	0.03

RADIAL "DIAMETER" = 13.19 + 7.90 = 21.10

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
14.07	0.06
11.86	0.14
9.61	0.37
7.31	0.72
4.95	1.15
2.52	1.43
0.0	1.48
-2.62	1.26
-5.35	0.89
-8.22	0.51
-11.24	0.20
-14.45	0.06

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.94	0.07
14.39	0.27
11.91	0.57
9.47	0.86
7.07	1.12
4.70	1.37

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 44 FEET MOUNTING ANGLE, THETA = 35 DEGREES

2.35	1.48
0.0	1.49
-2.35	1.41
-4.70	1.26
-7.07	0.99
-9.47	0.59
-11.91	0.41
-14.39	0.14
-16.94	0.04

TRANSVERSE "DIAMETER" = 14.39 + 14.39 = 28.79

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.86	0.07
-9.61	0.21
-7.31	0.50
-4.95	0.91
-2.52	1.25
0.0	1.48
2.62	1.39
5.35	1.03
8.22	0.60
11.24	0.24
14.45	0.07

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 44 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 36.92

THETA = 40 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-11.52	0.07
-8.89	0.20
-6.11	0.51
-3.16	0.91
0.0	1.17
3.40	1.05
7.08	0.67
11.10	0.28
15.52	0.07

RADIAL "DIAMETER" = 11.10 + 8.89 = 19.99

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
15.20	0.05
12.84	0.12
10.43	0.31
7.95	0.60
5.40	0.96
2.75	1.18
0.0	1.21
-2.88	1.02
-5.91	0.72
-9.10	0.40
-12.49	0.16
-16.12	0.05

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
18.11	0.05
15.39	0.22
12.73	0.46
10.13	0.71
7.56	0.92
5.03	1.12
2.51	1.21

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 44 FEET MOUNTING ANGLE, THETA = 40 DEGREES

0.0	1.22
-2.51	1.15
-5.03	1.03
-7.56	0.81
-10.13	0.48
-12.73	0.33
-15.39	0.11
-18.11	0.03

TRANSVERSE "DIAMETER" = 15.39 + 15.39 = 30.78

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-12.84	0.06
-10.43	0.18
-7.95	0.42
-5.40	0.76
-2.75	1.03
0.0	1.21
2.88	1.13
5.91	0.83
9.10	0.47
12.49	0.19
16.12	0.06

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 48 FEET

THETA = 0 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 0.0

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-8.46	0.09
-6.32	0.27
-4.20	0.76
-2.10	1.53
0.0	2.19
2.10	2.20
4.20	1.58
6.32	0.73
8.46	0.20
10.64	0.06

RADIAL "DIAMETER" = 8.46 + 6.32 = 14.78

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.86	0.06
10.64	0.17
8.46	0.45
6.32	0.93
4.20	1.57
2.10	2.07
0.0	2.26
-2.10	2.04
-4.20	1.54
-6.32	0.93
-8.46	0.38
-10.64	0.12
-12.86	0.04

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
17.47	0.04
15.13	0.10
12.86	0.41
10.64	0.87
8.46	1.32

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 48 FEET MOUNTING ANGLE, THETA = 0 DEGREES

6.32	1.71
4.20	2.09
2.10	2.26
0.0	2.28
-2.10	2.16
-4.20	1.93
-6.32	1.51
-8.46	0.90
-10.64	0.62
-12.86	0.21
-15.13	0.06

TRANSVERSE "DIAMETER" = 15.13 + 12.86 = 28.00

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.64	0.08
-8.46	0.26
-6.32	0.64
-4.20	1.25
-2.10	1.81
0.0	2.26
2.10	2.25
4.20	1.77
6.32	1.09
8.46	0.47
10.64	0.15
12.86	0.06

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 48 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 4.20

THETA = 5 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-8.40	0.09
-6.30	0.28
-4.20	0.77
-2.10	1.53
0.0	2.16
2.12	2.15
4.26	1.52
6.44	0.70
8.66	0.19
10.93	0.06

RADIAL "DIAMETER" = 8.66 + 6.30 = 14.96

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.72	0.07
10.56	0.17
8.42	0.46
6.30	0.94
4.20	1.58
2.10	2.06
0.0	2.23
-2.11	2.00
-4.25	1.49
-6.41	0.90
-8.61	0.37
-10.85	0.12
-13.15	0.04

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
17.54	0.04
15.19	0.10
12.91	0.40
10.68	0.86
8.50	1.31

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 48 FEET MOUNTING ANGLE, THETA = 5 DEGREES

6.34	1.69
4.22	2.07
2.10	2.24
0.0	2.25
-2.10	2.13
-4.22	1.91
-6.34	1.50
-8.50	0.89
-10.68	0.61
-12.91	0.21
-15.19	0.06

TRANSVERSE "DIAMETER" = 15.19 + 12.91 = 28.10

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.56	0.09
-8.42	0.26
-6.30	0.65
-4.20	1.25
-2.10	1.80
0.0	2.23
2.11	2.21
4.25	1.72
6.41	1.05
8.61	0.45
10.85	0.15
13.15	0.06

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 48 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 8.46

THETA = 10 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-8.46	0.09
-6.37	0.28
-4.26	0.76
-2.14	1.50
0.0	2.09
2.18	2.05
4.40	1.44
6.67	0.65
9.01	0.18
11.42	0.05

RADIAL "DIAMETER" = 9.01 + 6.37 = 15.37

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.74	0.07
10.60	0.17
8.47	0.46
6.36	0.93
4.25	1.55
2.13	2.01
0.0	2.16
-2.16	1.91
-4.34	1.42
-6.57	0.84
-8.85	0.34
-11.19	0.11
-13.61	0.04

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
17.74	0.04
15.37	0.10
13.06	0.39
10.81	0.83
8.59	1.26

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 48 FEET MOUNTING ANGLE, THETA = 10 DEGREES

6.42	1.64
4.26	2.00
2.13	2.16
0.0	2.18
-2.13	2.06
-4.26	1.84
-6.42	1.45
-8.59	0.86
-10.81	0.59
-13.06	0.20
-15.37	0.06

TRANSVERSE "DIAMETER" = 15.37 + 13.06 = 28.43

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.70	0.09
-8.47	0.26
-6.36	0.64
-4.25	1.23
-2.13	1.76
0.0	2.16
2.16	2.12
4.34	1.64
6.57	0.99
8.85	0.42
11.19	0.13
13.61	0.05

400 WATT PAR56 MFL SYMBOL #263

HEIGHT = 48 FEET

THETA = 15 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 12.86

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-8.66	0.09
-6.54	0.27
-4.40	0.74
-2.22	1.43
0.0	1.97
2.27	1.91
4.61	1.32
7.02	0.59
9.52	0.16
12.13	0.05

RADIAL "DIAMETER" = 9.52 + 6.54 = 16.06

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.90	0.07
10.76	0.17
8.63	0.44
6.50	0.90
4.35	1.48
2.19	1.91
0.0	2.04
-2.23	1.79
-4.50	1.32
-6.82	0.78
-9.22	0.31
-11.69	0.10
-14.26	0.03

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
18.09	0.04
15.67	0.09
14.32	0.37
11.02	0.78
9.76	1.19

300 WATT PAR56 MFL SYMBOL #263

MOUNTING HEIGHT = 48 FEET

MOUNTING ANGLE, THETA = 15 DEGREES

6.54	1.54
4.35	1.89
2.17	2.04
0.0	2.05
-2.17	1.95
-4.35	1.74
-6.54	1.37
-8.76	0.81
-11.02	0.56
-13.32	0.19
-15.67	0.05

TRANSVERSE "DIAMETER" = 15.67 + 13.32 = 28.98

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.76	0.09
-8.63	0.26
-6.50	0.62
-4.35	1.18
-2.19	1.67
0.0	2.04
2.23	1.98
4.50	1.52
6.82	0.91
9.22	0.39
11.69	0.12
14.26	0.05

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 48 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 17.47

THETA = 20 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.01	0.09
-6.83	0.26
-4.61	0.70
-2.34	1.33
0.0	1.82
2.41	1.74
4.91	1.19
7.52	0.53
10.24	0.14
13.11	0.04

RADIAL "DIAMETER" = 10.24 + 6.83 = 17.07

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
13.22	0.06
11.06	0.16
8.89	0.42
6.71	0.85
4.51	1.39
2.27	1.77
0.0	1.87
-2.32	1.64
-4.71	1.19
-7.17	0.70
-9.71	0.28
-12.35	0.09

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
18.59	0.04
16.11	0.08
13.69	0.34
11.32	0.72
9.01	1.10
6.72	1.42

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 48 FEET MOUNTING ANGLE, THETA = 20 DEGREES

4.47	1.74
2.23	1.88
0.0	1.89
-2.23	1.79
-4.47	1.60
-6.72	1.26
-9.01	0.74
-11.32	0.52
-13.69	0.17
-16.11	0.05

TRANSVERSE "DIAMETER" = 16.11 + 13.69 = 29.79

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.06	0.08
-8.89	0.24
-6.71	0.58
-4.51	1.10
-2.27	1.55
0.0	1.87
2.32	1.81
4.71	1.37
7.17	0.82
9.71	0.34
12.35	0.11
15.12	0.04

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 48 FEET

THETA = 25 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 22.38

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.52	0.08
-7.25	0.24
-4.91	0.64
-2.50	1.21
0.0	1.63
2.60	1.54
5.33	1.04
8.20	0.45
11.23	0.12
14.45	0.03

RADIAL "DIAMETER" = 11.23 + 7.25 = 18.48

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
13.72	0.06
11.50	0.15
9.27	0.39
7.02	0.78
4.73	1.27
2.39	1.60
0.0	1.68
-2.46	1.45
-4.99	1.05
-7.62	0.61
-10.36	0.24
-13.22	0.07

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.70	0.08
14.19	0.30
11.74	0.65
9.34	0.98
6.97	1.28
4.63	1.56

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 48 FEET MOUNTING ANGLE, THETA = 25 DEGREES

2.31	1.69
0.0	1.70
-2.31	1.61
-4.63	1.44
-6.97	1.13
-9.34	0.67
-11.74	0.46
-14.19	0.16
-16.70	0.04

TRANSVERSE "DIAMETER" = 14.19 + 14.19 = 28.38

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.50	0.08
-9.27	0.23
-7.02	0.54
-4.73	1.01
-2.39	1.40
0.0	1.68
2.46	1.61
4.99	1.21
7.62	0.72
10.36	0.30
13.22	0.09

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 48 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 27.71

THETA = 30 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-10.24	0.08
-7.83	0.22
-5.33	0.58
-2.73	1.07
0.0	1.42
2.87	1.32
5.90	0.88
9.12	0.38
12.56	0.10
16.27	0.03

RADIAL "DIAMETER" = 12.56 + 7.83 = 20.39

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
14.42	0.06
12.12	0.14
9.79	0.35
7.43	0.70
5.02	1.12
2.55	1.41
0.0	1.47
-2.63	1.26
-5.36	0.90
-8.21	0.52
-11.19	0.20
-14.34	0.06

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
17.48	0.07
14.85	0.26
12.29	0.56
9.77	0.85
7.30	1.11
4.85	1.36

300 WATT PAR56 MFL SYMROL #263 MOUNTING HEIGHT = 48 FEET MOUNTING ANGLE, THETA = 30 DEGREES

2.42	1.47
0.0	1.48
-2.42	1.40
-4.85	1.25
-7.30	0.98
-9.77	0.58
-12.29	0.40
-14.85	0.14
-17.48	0.04

TRANSVERSE "DIAMETER" = 14.85 + 14.85 = 29.70

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-12.12	0.07
-9.79	0.20
-7.43	0.48
-5.02	0.89
-2.55	1.23
0.0	1.47
2.63	1.39
5.36	1.04
8.21	0.61
11.19	0.25
14.34	0.08

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 48 FEET — DISTANCE FROM BASE OF POLE TO CENTER SPOT = 33.61

THETA = 35 DEGREES — PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-11.23	0.07
-8.62	0.19
-5.90	0.50
-3.03	0.92
0.0	1.20
3.22	1.10
6.67	0.72
10.37	0.30
14.39	0.07

RADIAL "DIAMETER" = 10.37 + 8.62 = 19.00

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
15.35	0.05
12.94	0.12
10.48	0.31
7.97	0.60
5.40	0.97
2.75	1.20
0.0	1.24
-2.85	1.06
-5.84	0.75
-8.96	0.43
-12.26	0.17
-15.76	0.05

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
18.48	0.06
15.70	0.22
12.99	0.48
10.33	0.73
7.71	0.94
5.13	1.15
2.56	1.24

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 48 FEET MOUNTING ANGLE, THETA = 35 DEGREES

0.0	1.25
-2.56	1.19
-5.13	1.06
-7.71	0.83
-10.33	0.49
-12.99	0.34
-15.70	0.11
-18.48	0.03

TRANSVERSE "DIAMETER" = 15.70 + 15.70 = 31.40

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-12.94	0.06
-10.48	0.18
-7.97	0.42
-5.40	0.77
-2.75	1.05
0.0	1.24
2.85	1.17
5.84	0.86
8.96	0.50
12.26	0.20
15.76	0.06

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 48 FEET

THETA = 40 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 40.28

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-12.56	0.06
-9.70	0.17
-6.67	0.42
-3.45	0.77
0.0	0.98
3.71	0.88
7.72	0.56
12.11	0.23
16.93	0.06

RADIAL "DIAMETER" = 12.11 + 9.70 = 21.80

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
14.01	0.10
11.38	0.26
8.68	0.51
5.89	0.80
3.00	0.99
0.0	1.02
-3.14	0.86
-6.44	0.60
-9.93	0.34
-13.63	0.13
-17.58	0.04

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
19.76	0.05
16.79	0.18
13.89	0.39
11.05	0.59
8.25	0.77
5.48	0.94
2.74	1.02
0.0	1.02

300 WATT PAR56 MFL SYMBOL #263 MOUNTING HEIGHT = 48 FEET MOUNTING ANGLE, THETA = 40 DEGREES

-2.74	0.97
-5.48	0.87
-8.25	0.68
-11.05	0.40
-13.89	0.28
-16.79	0.09

TRANSVERSE "DIAMETER" = 16.79 + 13.89 = 30.68

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

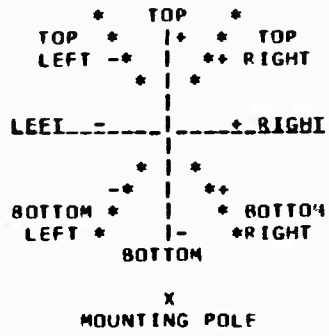
DISTANCE	ILLUMINATION
-14.91	0.05
-11.38	0.15
-4.68	0.35
-5.89	0.64
-3.00	0.87
0.0	1.02
3.14	0.95
6.44	0.69
9.93	0.40
13.63	0.14
17.54	0.05

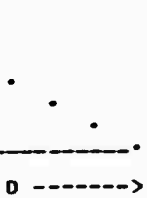
Figure 6-93

LAMP - 300 WATT PAR56 WFL

FIXTURE - SYMBOL #263

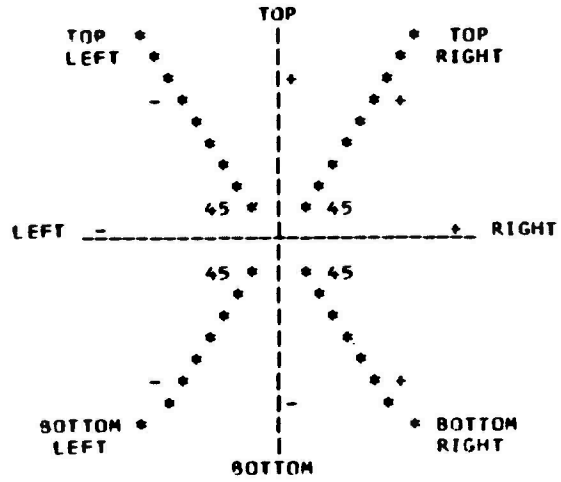
TRANSMISSION FACTOR - 0.150
(PER CENT REO)





			VERTICAL AXIS								HORIZONTAL AXIS							
			BOTTOM TO TOP				TOP LEFT TO BOTTOM RIGHT				LEFT TO RIGHT				BOTTOM LEFT TO TOP RIGHT			
			-	-	+	+	-	-	+	+	-	-	+	+	-	-	+	+
H	D	θ	DIR DIST TO ILLUM LEVEL OF															
			0.2	0.5	0.5	0.2	0.2	0.5	0.5	0.2	0.2	0.5	0.5	0.2	0.2	0.5	0.5	0.2
16	16.0	45	-13.9	-5.8	6.9	9.1	-8.3	-6.6	7.9	9.6	-10.6	-8.2	9.4	10.6	-8.7	-7.0	6.6	10.1
20	14.0	35	-13.1	-5.7	7.8	9.8	-8.1	-6.6	8.4	10.3	-11.4	-8.9	10.1	11.4	-9.3	-7.4	8.1	9.8
20	16.8	40	-14.1	-6.4	7.1	9.3	-9.1	-7.3	9.0	10.0	-10.8	-9.5	10.8	12.2	-9.0	-6.9	7.3	11.0
20	20.0	45	-9.6	-7.3	9.6	11.4	-10.4	-6.4	8.7	10.9	-11.7	-10.3	10.3	13.2	-9.8	-7.6	8.3	10.4
24	8.7	20	-7.7	-5.6	6.6	8.1	-9.0	-6.2	8.8	9.9	-11.9	-10.6	10.6	11.9	-8.8	-6.6	7.6	9.0
24	11.2	25	-8.0	-5.9	7.2	8.9	-8.1	-6.6	8.0	10.2	-12.3	-9.6	11.0	12.3	-9.1	-6.9	8.1	9.7
24	13.9	30	-8.5	-6.3	6.3	8.1	-8.8	-7.2	8.3	10.6	-12.9	-10.1	11.5	12.9	-9.5	-7.2	7.2	10.6
24	16.8	35	-8.1	-6.9	7.2	9.4	-9.7	-6.1	8.9	11.2	-12.1	-10.7	10.7	13.7	-10.0	-7.7	7.9	9.7
24	20.1	40	-8.9	-6.3	8.5	11.1	-8.8	-6.8	9.6	12.0	-13.0	-9.9	11.4	13.0	-9.6	-8.3	8.8	10.9
24	24.0	45	-8.7	-7.2	7.3	10.3	-10.0	-5.6	9.1	11.8	-14.1	-10.7	10.7	14.1	-10.5	-7.7	7.7	12.4
28	0.0	0	-7.5	-6.2	6.2	7.5	-8.8	-6.2	8.8	10.2	-13.1	-10.2	11.6	13.1	-8.8	-7.5	7.5	8.8
28	2.4	5	-7.4	-6.1	6.4	7.7	-9.1	-6.3	8.7	11.4	-13.1	-10.2	11.6	13.1	-10.0	-7.4	7.7	9.1
28	4.9	10	-7.4	-6.2	6.7	8.1	-7.9	-6.5	8.7	11.3	-13.3	-10.3	11.8	13.3	-10.0	-7.4	7.9	9.4
28	7.5	15	-7.5	-6.3	7.1	8.7	-8.3	-6.8	8.8	11.3	-13.5	-10.6	12.0	13.5	-10.1	-7.5	8.3	9.9
28	10.2	20	-7.7	-6.5	7.6	9.4	-8.8	-7.2	9.0	11.5	-12.3	-10.8	10.8	13.9	-10.2	-7.7	7.2	10.5
28	13.1	25	-8.1	-5.6	6.5	8.4	-9.5	-7.7	9.3	11.9	-12.8	-11.2	11.2	14.4	-9.3	-8.0	7.7	11.3

28	16.2	30		-8.7	-6.0	7.3	9.5		-10.3	-6.5	9.7	11.1		-13.4	-10.2	11.8	15.1		-9.7	-8.4	8.4	10.3
28	19.6	35		-8.0	-6.5	8.4	11.0		-9.2	-7.2	10.3	11.7		-14.2	-10.8	10.8	14.2		-10.3	-7.5	7.2	11.4
32	0.0	0		-7.1	-5.6	7.1	8.6		-8.6	-7.1	8.6	11.6		-13.3	-11.6	11.6	14.9		-10.1	-7.1	8.6	10.1
32	2.8	5		-7.0	-5.6	7.3	8.8		-8.8	-7.2	10.0	11.5		-13.3	-11.7	11.7	15.0		-10.0	-8.5	8.8	10.3
32	5.6	10		-7.0	-5.6	6.0	9.3		-9.1	-7.5	9.9	11.4		-13.5	-11.8	11.8	15.2		-9.9	-8.5	7.5	10.7
32	8.6	15		-7.2	-5.8	6.3	8.1		-9.5	-7.8	10.0	11.5		-13.7	-12.1	12.1	15.4		-10.0	-8.6	7.8	11.3
32	11.6	20		-7.4	-6.0	6.8	8.7		-10.1	-6.5	10.3	11.7		-14.1	-10.7	12.4	15.9		-10.3	-7.4	8.2	10.1
32	14.9	25		-7.8	-6.3	7.5	9.6		-10.8	-6.9	9.1	12.1		-14.6	-11.1	12.9	14.6		-10.6	-7.7	8.8	10.8
32	18.5	30		-8.4	-6.8	6.1	10.8		-9.6	-7.5	9.6	12.6		-15.3	-11.7	11.7	15.3		-11.1	-8.1	7.5	11.8
36	0.0	0		-8.0	-6.3	6.3	9.6		-9.6	-8.0	9.6	13.1		-14.9	-11.4	13.1	14.9		-11.4	-8.0	8.0	11.4
36	3.1	5		-7.9	-6.3	6.5	8.2		-9.9	-6.5	9.5	12.9		-15.0	-11.4	13.2	15.0		-11.2	-7.9	8.1	11.6
36	6.3	10		-7.9	-6.3	6.8	8.6		-10.2	-6.6	9.6	12.8		-15.1	-11.5	13.3	15.1		-11.2	-7.9	8.4	10.2
36	9.6	15		-8.1	-6.5	7.1	9.1		-10.7	-6.9	9.7	12.9		-15.4	-11.8	11.8	15.4		-11.3	-8.1	8.8	10.7
36	13.1	20		-8.4	-6.8	7.7	9.8		-9.3	-7.3	9.9	13.2		-15.9	-12.1	12.1	15.9		-11.5	-8.3	9.3	11.3
40	0.0	0		-8.9	-7.1	7.1	8.9		-10.7	-7.1	10.7	12.6		-16.6	-12.6	12.6	16.6		-10.7	-7.1	8.9	10.7
40	3.5	5		-8.8	-7.0	7.2	9.1		-11.0	-7.2	10.6	12.4		-16.6	-12.7	12.7	16.6		-10.6	-7.0	9.0	11.0
40	7.1	10		-8.8	-7.1	7.5	9.5		-11.3	-7.4	10.6	12.4		-16.8	-12.8	12.8	16.8		-10.6	-7.1	9.3	11.3



MOUNTING POLE

300 WATT PAR56 WFL SYMBOL #263

ABRIDGED ILLUMINATION PROFILE

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 16 FFET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 16.00

THETA = 45 DEGREES PER CENT REO = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-14.60	0.10
-13.89	0.16
-13.18	0.25
-12.45	0.30
-11.71	0.29
-10.96	0.25
-10.18	0.24
-9.37	0.25
-8.54	0.29
-7.67	0.29
-6.76	0.38
-5.81	0.51
-4.80	1.33
-3.72	2.18
-2.57	2.57
-1.34	2.47
0.0	2.24
1.46	1.87
3.07	1.51
4.85	1.14
6.85	0.61
9.11	0.25
11.71	0.08

RADIAL "DIAMETER" = 9.11 + 13.89 = 23.01

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
10.46	0.17
9.60	0.20
8.73	0.29
7.86	0.48
6.97	0.82
6.06	1.40
5.14	1.99
4.18	2.38
3.20	2.48
2.18	2.46
1.11	2.35
0.0	2.15

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 16 FEET MOUNTING ANGLE, THETA = 45 DEGREES

-1.17	1.91
-2.41	1.64
-3.72	1.31
-5.13	0.85
-6.64	0.46
-8.28	0.20
-10.07	0.08

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
11.78	0.11
10.55	0.24
9.37	0.47
8.24	0.80
7.13	1.11
6.06	1.46
5.02	1.66
3.99	1.84
2.98	1.97
1.98	2.07
0.99	2.17
0.0	2.21
-0.99	2.18
-1.98	2.12
-2.98	2.01
-3.99	1.83
-5.02	1.63
-6.06	1.35
-7.13	0.97
-8.24	0.63
-9.37	0.34
-10.55	0.15
-11.78	0.07

TRANSVERSE "DIAMETER" = 10.55 + 10.55 = 21.10

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-9.60	0.19
-8.73	0.20
-7.86	0.26
-6.97	0.44
-6.06	0.77
-5.14	1.28
-4.18	1.67
-3.20	2.29
-2.18	2.40
-1.11	2.38
0.0	2.25

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 16 FEET MOUNTING ANGLE, THETA = 45 DEGREES

1.17	1.98
2.41	1.82
3.72	1.45
5.13	1.12
6.64	0.66
8.28	0.33
10.07	0.13
12.04	0.05

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 20 FEET

THETA = 35 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 14.00

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-14.00	0.17
-13.13	0.21
-12.25	0.20
-11.37	0.18
-10.48	0.17
-9.57	0.19
-8.65	0.22
-7.70	0.23
-6.72	0.31
-5.72	0.43
-4.68	1.16
-3.59	1.95
-2.46	2.37
-1.26	2.36
0.0	2.23
1.34	1.94
2.78	1.63
4.32	1.30
6.00	0.74
7.82	0.31
9.83	0.11
12.06	0.02

RADIAL "DIAMETER" = 9.83 + 13.13 = 22.96

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
11.30	0.14
10.32	0.18
9.35	0.25
8.37	0.43
7.39	0.73
6.40	1.27
5.39	1.83
4.37	2.22
3.32	2.35
2.25	2.37
1.14	2.30
0.0	2.14
-1.19	1.94

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 20 FEET MOUNTING ANGLE, THETA = 35 DEGREES

-2.43	1.70
-3.73	1.38
-5.11	0.92
-6.57	0.50
-8.12	0.23
-9.79	0.09

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
12.71	0.11
11.39	0.24
10.11	0.46
8.89	0.79
7.70	1.11
6.54	1.45
5.41	1.65
4.31	1.83
3.21	1.96
2.14	2.06
1.07	2.16
0.0	2.20
-1.07	2.17
-2.14	2.11
-3.21	2.00
-4.31	1.82
-5.41	1.62
-6.54	1.35
-7.70	0.96
-8.89	0.63
-10.11	0.34
-11.39	0.15
-12.71	0.07

TRANSVERSE "DIAMETER" = 11.39 + 11.39 = 22.77

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.32	0.16
-9.35	0.17
-8.37	0.23
-7.39	0.39
-6.40	0.70
-5.39	1.17
-4.37	1.56
-3.32	2.17
-2.25	2.31
-1.14	2.33
0.0	2.24
1.19	2.01

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 20 FEET MOUNTING ANGLE, THETA = 35 DEGREES

2.43	1.88
3.73	1.53
5.11	1.20
6.57	0.73
8.12	0.37
9.79	0.16
11.59	0.06

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 20 FEET

THETA = 40 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 16.78

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-15.03	0.16
-14.15	0.20
-13.26	0.20
-12.35	0.17
-11.42	0.16
-10.48	0.18
-9.50	0.20
-8.50	0.21
-7.46	0.28
-6.37	0.38
-5.23	1.01
-4.04	1.67
-2.78	2.01
-1.44	1.97
0.0	1.82
1.54	1.56
3.22	1.28
5.04	1.00
7.05	0.55
9.28	0.23
11.78	0.08

RADIAL "DIAMETER" = 9.28 + 14.15 = 23.43

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
11.04	0.15
10.02	0.22
9.00	0.37
7.96	0.63
6.91	1.09
5.84	1.56
4.74	1.88
3.62	1.97
2.45	1.97
1.25	1.90
0.0	1.75
-1.31	1.57
-2.68	1.36
-4.14	1.10

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 20 FEET MOUNTING ANGLE, THETA = 40 DEGREES

-5.68	0.72
-7.33	0.39
-9.10	0.18
-11.01	0.07

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
13.59	0.09
12.17	0.20
10.81	0.38
9.50	0.65
8.23	0.91
7.00	1.19
5.79	1.35
4.60	1.50
3.44	1.60
2.28	1.69
1.14	1.76
0.0	1.80
-1.14	1.78
-2.28	1.73
-3.44	1.63
-4.60	1.49
-5.79	1.32
-7.00	1.10
-8.23	0.79
-9.50	0.57
-10.81	0.28
-12.17	0.12

TRANSVERSE "DIAMETER" = 12.17 + 10.81 = 22.99

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.02	0.15
-9.00	0.20
-7.96	0.34
-6.91	0.60
-5.84	1.00
-4.74	1.32
-3.62	1.82
-2.45	1.92
-1.25	1.92
0.0	1.83
1.31	1.63
2.68	1.51
4.14	1.22
5.68	0.95
7.33	0.57

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 20 FEET MOUNTING ANGLE, THETA = 40 DEGREES

9.10	0.28
11.01	0.12
13.10	0.04

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 20 FEET

THETA = 45 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 20.00

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-10.67	0.18
-9.59	0.19
-8.45	0.24
-7.26	0.32
-6.00	0.85
-4.65	1.39
-3.22	1.64
-1.67	1.58
0.0	1.43
1.83	1.20
3.84	0.97
6.06	0.73
8.56	0.39
11.39	0.16
14.64	0.05

RADIAL "DIAMETER" = 11.39 + 9.59 = 20.98

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.00	0.13
10.92	0.19
9.82	0.31
8.71	0.52
7.58	0.90
6.42	1.27
5.23	1.52
4.00	1.59
.72	1.58
1.39	1.50
0.0	1.37
-1.46	1.22
-3.01	1.05
-4.65	0.84
-6.41	0.55
-8.30	0.29
-10.35	0.13
-12.59	0.05

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
14.72	0.07

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 20 FEET MOUNTING ANGLE, THETA = 45 DEGREES

13.19	0.15
11.72	0.30
10.29	0.51
8.92	0.71
7.58	0.93
6.27	1.06
4.99	1.18
3.72	1.26
2.47	1.33
1.23	1.39
0.0	1.42
-1.23	1.40
-2.47	1.36
-3.72	1.28
-4.99	1.17
-6.27	1.04
-7.58	0.87
-8.92	0.62
-10.29	0.41
-11.72	0.22
-13.19	0.10

TRANSVERSE "DIAMETER" = 13.19 + 11.72 = 24.90

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.92	0.13
-9.82	0.17
-8.71	0.28
-7.58	0.49
-6.42	0.82
-5.23	1.07
-4.00	1.47
-2.72	1.54
-1.39	1.52
0.0	1.44
1.46	1.27
3.01	1.16
4.65	0.93
6.41	0.72
8.30	0.42
10.35	0.21
12.59	0.09

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 24 FEET — DISTANCE FROM BASE OF POLE TO CENTER SPOT = 8.74

THETA = 20 DEGREES — PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-8.74	0.17
-7.69	0.19
-6.64	0.26
-5.58	0.37
-4.50	1.03
-3.41	1.80
-2.30	2.29
-1.17	2.37
0.0	2.34
1.21	2.13
2.46	1.88
3.76	1.57
5.12	0.94
6.55	0.42
8.07	0.15
9.68	0.04

RADIAL "DIAMETER" = 8.07 + 7.69 = 15.76

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
11.00	0.15
9.88	0.21
8.78	0.37
7.69	0.65
6.61	1.15
5.53	1.70
4.45	2.11
3.36	2.29
2.25	2.36
1.14	2.35
0.0	2.24
-1.16	2.09
-2.35	1.87
-3.58	1.57
-4.85	1.07
-6.18	0.60
-7.56	0.29
-9.01	0.11
-10.54	0.04

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 24 FEET MOUNTING ANGLE, THETA = 20 DEGREES

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
13.30	0.11
11.91	0.25
10.58	0.49
9.30	0.83
8.05	1.16
6.84	1.52
5.66	1.73
4.50	1.92
3.36	2.05
2.23	2.16
1.12	2.26
0.0	2.31
-1.12	2.28
-2.23	2.22
-3.36	2.09
-4.50	1.91
-5.66	1.70
-6.84	1.41
-8.05	1.01
-9.30	0.66
-10.58	0.35
-11.91	0.16
-13.30	0.07

TRANSVERSE "DIAMETER" = 11.91 + 11.91 = 23.82

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-9.88	0.14
-8.78	0.20
-7.69	0.35
-6.61	0.64
-5.53	1.09
-4.45	1.48
-3.36	2.12
-2.25	2.31
-1.1[illegible]	2.38
0.0	2.35
1.16	2.16
2.35	2.07
3.58	1.74
4.85	1.41
6.18	0.88
7.56	0.46
9.01	0.20
10.54	0.08

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 24 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 11.19

THETA = 25 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.09	0.17
-8.03	0.18
-6.96	0.25
-5.87	0.35
-4.76	0.97
-3.62	1.68
-2.46	2.11
-1.25	2.16
0.0	2.10
1.30	1.88
2.67	1.64
4.10	1.35
5.61	0.80
7.22	0.35
8.95	0.12
10.80	0.03

RADIAL "DIAMETER" = 8.95 + 8.03 = 16.98

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
11.29	0.14
10.17	0.21
9.07	0.35
7.96	0.62
6.86	1.08
5.75	1.59
4.64	1.96
3.51	2.11
2.36	2.16
1.20	2.13
0.0	2.01
-1.23	1.85
-2.50	1.65
-3.81	1.37
-5.18	0.93
-6.61	0.52
-8.12	0.24
-9.71	0.10

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
13.79	0.10

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 24 FEET MOUNTING ANGLE, THETA = 25 DEGREES

12.35	0.23
10.97	0.44
9.64	0.75
8.35	1.04
7.10	1.36
5.87	1.56
4.67	1.72
3.49	1.84
2.32	1.94
1.16	2.03
0.0	2.07
-1.16	2.04
-2.32	1.99
-3.49	1.88
-4.67	1.71
-5.87	1.52
-7.10	1.27
-8.35	0.91
-9.64	0.59
-10.97	0.32
-12.35	0.14
-13.79	0.06

TRANSVERSE "DIAMETER" = 12.35 + 12.35 = 24.70

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.17	0.14
-9.07	0.19
-7.96	0.33
-6.86	0.60
-5.75	1.02
-4.64	1.37
-3.51	1.95
-2.36	2.10
-1.20	2.15
0.0	2.11
1.23	1.92
2.50	1.83
3.81	1.52
5.18	1.22
6.61	0.75
8.12	0.39
9.71	0.17
11.40	0.06

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 24 FEET

THETA = 30 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 13.86

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.62	0.16
-8.54	0.17
-7.43	0.23
-6.29	0.33
-5.12	0.89
-3.92	1.53
-2.67	1.89
-1.36	1.91
0.0	1.83
1.43	1.62
2.95	1.39
4.56	1.12
6.28	0.65
8.14	0.28
10.14	0.10

RADIAL "DIAMETER" = 8.14 + 8.54 = 16.67

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
11.74	0.13
10.61	0.19
9.48	0.33
8.35	0.57
7.21	0.99
6.06	1.44
4.90	1.76
3.72	1.88
2.51	1.91
1.27	1.87
0.0	1.75
-1.32	1.60
-2.68	1.42
-4.10	1.17
-5.60	0.78
-7.17	0.43
-8.83	0.20
-10.60	0.08

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
14.43	0.09

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 24 FEET MOUNTING ANGLE, THETA = 30 DEGREES

12.92	0.20
11.48	0.38
10.09	0.65
8.74	0.91
7.43	1.19
6.14	1.36
4.89	1.50
3.65	1.61
2.42	1.69
1.21	1.77
0.0	1.81
-1.21	1.78
-2.42	1.73
-3.65	1.64
-4.89	1.49
-6.14	1.33
-7.43	1.11
-8.74	0.79
-10.09	0.52
-11.48	0.28
-12.92	0.12
-14.43	0.05

TRANSVERSE "DIAMETER" = 12.92 + 12.92 = 25.85

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.61	0.13
-9.48	0.18
-8.35	0.31
-7.21	0.55
-6.06	0.93
-4.90	1.24
-3.72	1.74
-2.51	1.87
-1.27	1.89
0.0	1.84
1.32	1.66
2.68	1.57
4.10	1.29
5.60	1.03
7.17	0.63
8.83	0.32
10.60	0.14
12.50	0.05

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 24 FEET

THETA = 35 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 16.80

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.24	0.16
-8.07	0.22
-6.86	0.30
-5.61	0.80
-4.31	1.35
-2.95	1.65
-1.52	1.64
0.0	1.55
1.61	1.35
3.33	1.13
5.19	0.90
7.20	0.51
9.39	0.22
11.80	0.07

RADIAL "DIAMETER" = 9.39 + 8.07 = 17.46

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.38	0.12
11.22	0.18
10.04	0.30
8.87	0.51
7.68	0.88
6.47	1.27
5.24	1.54
3.99	1.63
2.70	1.65
1.37	1.60
0.0	1.48
-1.43	1.35
-2.92	1.18
-4.48	0.96
-6.13	0.64
-7.88	0.35
-9.75	0.16
-11.75	0.06

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
15.25	0.07

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 24 FEET MOUNTING ANGLE, THETA = 35 DEGREES

13.66	0.17
12.14	0.32
10.66	0.55
9.24	0.77
7.85	1.01
6.50	1.15
5.17	1.27
3.86	1.36
2.56	1.43
1.28	1.50
0.0	1.53
-1.28	1.51
-2.56	1.47
-3.86	1.39
-5.17	1.26
-6.50	1.12
-7.85	0.94
-9.24	0.67
-10.66	0.44
-12.14	0.23
-13.66	0.11

TRANSVERSE "DIAMETER" = 13.66 + 12.14 = 25.80

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.22	0.12
-10.04	0.16
-8.87	0.27
-7.68	0.49
-6.47	0.82
-5.24	1.08
-3.99	1.51
-2.70	1.61
-1.37	1.62
0.0	1.56
1.43	1.40
2.92	1.30
4.48	1.06
6.13	0.84
7.88	0.50
9.75	0.26
11.75	0.11

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 24 FEET

THETA = 40 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 20.14

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-10.20	0.15
-8.95	0.19
-7.64	0.26
-6.28	0.70
-4.85	1.16
-3.33	1.40
-1.72	1.37
0.0	1.27
1.85	1.08
3.86	0.89
6.05	0.69
8.46	0.38
11.14	0.16
14.14	0.05

RADIAL "DIAMETER" = 11.14 + 8.95 = 20.09

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
13.25	0.11
12.03	0.15
10.80	0.26
9.55	0.44
8.29	0.75
7.01	1.08
5.69	1.30
4.34	1.37
2.95	1.37
1.50	1.32
0.0	1.21
-1.57	1.09
-3.22	0.95
-4.96	0.76
-6.82	0.50
-8.79	0.27
-10.92	0.12

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
14.61	0.14

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 24 FEET MOUNTING ANGLE, THETA = 40 DEGREES

12.98	0.26
11.40	0.45
9.88	0.63
8.39	0.82
6.95	0.94
5.52	1.04
4.12	1.11
2.74	1.17
1.37	1.23
0.0	1.25
-1.37	1.23
-2.74	1.20
-4.12	1.13
-5.52	1.03
-6.95	0.92
-8.39	0.76
-9.88	0.55
-11.40	0.36
-12.98	0.19
-14.61	0.09

TRANSVERSE "DIAMETER" = 12.98 + 12.98 = 25.95

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.30	0.14
-9.55	0.24
-8.29	0.42
-7.01	0.69
-5.69	0.91
-4.34	1.26
-2.95	1.34
-1.50	1.33
0.0	1.27
1.57	1.13
3.22	1.05
4.96	0.85
6.82	0.66
8.79	0.39
10.92	0.20
13.22	0.08

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 24 FEET — DISTANCE FROM BASE OF POLE TO CENTER SPOT = 24.00

THETA = 45 DEGREES — PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-10.14	0.17
-8.71	0.22
-7.20	0.59
-5.58	0.97
-3.86	1.14
-2.01	1.10
0.0	1.00
2.19	0.83
4.60	0.67
7.2?	0.51
10.28	0.27
13.67	0.11

RADIAL "DIAMETER" = 10.28 + 8.71 = 18.99

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
13.10	0.13
11.79	0.22
10.45	0.36
9.09	0.62
7.70	0.88
6.27	1.06
4.80	1.10
3.26	1.09
1.67	1.04
0.0	0.95
-1.76	0.85
-3.61	0.73
-5.58	0.58
-7.69	0.38
-9.96	0.20
-12.42	0.09

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
15.83	0.11

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 24 FEET MOUNTING ANGLE, THETA = 45 DEGREES

14.06	0.21
12.35	0.35
10.70	0.49
9.09	0.65
7.52	0.74
5.98	0.82
4.47	0.87
2.97	0.92
1.48	0.96
0.0	0.98
-1.48	0.97
-2.97	0.94
-4.47	0.89
-5.98	0.81
-7.52	0.72
-9.09	0.60
-10.70	0.43
-12.35	0.28
-14.06	0.15
-15.83	0.07

TRANSVERSE "DIAMETER" = 14.06 + 14.06 = 28.12

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.79	0.12
-10.45	0.20
-9.09	0.34
-7.70	0.57
-6.27	0.74
-4.80	1.02
-3.26	1.07
-1.67	1.06
0.0	1.00
1.76	0.88
3.61	0.81
5.58	0.65
7.69	0.50
9.96	0.29
12.42	0.14
15.11	0.06

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 28 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 0.0

THETA = 0 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-8.83	0.12
-7.50	0.17
-6.21	0.26
-4.94	0.76
-3.69	1.39
-2.45	1.84
-1.22	2.00
0.0	2.07
1.22	1.98
2.45	1.83
3.69	1.61
4.94	1.02
6.21	0.48
7.50	0.18
8.83	0.05

RADIAL "DIAMETER" = 7.50 + 7.50 = 15.01

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
11.60	0.14
10.19	0.25
8.83	0.46
7.50	0.84
6.21	1.28
4.94	1.64
3.69	1.84
2.45	1.96
1.22	2.01
0.0	1.98
-1.22	1.91
-2.45	1.77
-3.69	1.54
-4.94	1.09
-6.21	0.63
-7.50	0.31
-8.83	0.13
-10.19	0.05

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
14.58	0.10

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 28 FEET MOUNTING ANGLE, THETA = 0 DEGREES

13.06	0.22
11.60	0.43
10.19	0.74
8.83	1.03
7.50	1.35
6.21	1.53
4.94	1.70
3.69	1.82
2.45	1.91
1.22	2.00
0.0	2.04
-1.22	2.01
-2.45	1.96
-3.69	1.85
-4.94	1.69
-6.21	1.50
-7.50	1.25
-8.83	0.89
-10.19	0.59
-11.60	0.31
-13.06	0.14
-14.58	0.06

TRANSVERSE "DIAMETER" = 13.06 + 13.06 = 26.11

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.19	0.14
-8.83	0.25
-7.50	0.46
-6.21	0.82
-4.94	1.15
-3.69	1.70
-2.45	1.91
-1.22	2.04
0.0	2.08
1.22	1.98
2.45	1.96
3.69	1.70
4.94	1.43
6.21	0.92
7.50	0.50
8.83	0.23
10.19	0.09

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 28 FEET

THETA = 5 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 2.45

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-8.66	0.13
-7.39	0.18
-6.14	0.27
-4.90	0.78
-3.67	1.42
-2.45	1.87
-1.23	2.00
0.0	2.04
1.24	1.93
2.49	1.77
3.76	1.54
5.05	0.96
6.38	0.45
7.74	0.17
9.15	0.04

RADIAL "DIAMETER" = 7.74 + 7.39 = 15.13

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.76	0.10
11.37	0.15
10.02	0.27
8.71	0.48
7.42	0.87
6.16	1.32
4.91	1.68
3.68	1.86
2.45	1.97
1.23	2.01
0.0	1.96
-1.23	1.87
-2.48	1.72
-3.74	1.48
-5.02	1.04
-6.33	0.60
-7.67	0.29
-9.06	0.12
-10.49	0.05

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
14.63	0.10

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 28 FEET MOUNTING ANGLE, THETA = 5 DEGREES

13.11	0.22
11.64	0.43
10.23	0.73
8.86	1.02
7.53	1.33
6.23	1.52
4.96	1.68
3.70	1.80
2.46	1.89
1.23	1.98
0.0	2.02
-1.23	1.99
-2.46	1.94
-3.70	1.83
-4.96	1.67
-6.23	1.49
-7.53	1.24
-8.86	0.88
-10.23	0.58
-11.64	0.31
-13.11	0.14
-14.63	0.06

TRANSVERSE "DIAMETER" = 13.11 + 13.11 = 26.21

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.37	0.10
-10.02	0.14
-8.71	0.26
-7.42	0.48
-6.16	0.85
-4.91	1.18
-3.68	1.72
-2.45	1.92
-1.23	2.03
0.0	2.06
1.23	1.94
2.48	1.91
3.74	1.64
5.02	1.37
6.33	0.87
7.67	0.47
9.06	0.21
10.49	0.09

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 29 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 4.94

THETA = 10 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-8.62	0.13
-7.39	0.19
-6.16	0.27
-4.94	0.79
-3.71	1.42
-2.49	1.84
-1.25	1.96
0.0	1.98
1.27	1.85
2.57	1.67
3.89	1.43
5.25	0.88
6.66	0.41
8.12	0.15
9.64	0.04

RADIAL "DIAMETER" = 8.12 + 7.39 = 15.51

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.63	0.10
11.29	0.16
9.98	0.29
8.69	0.49
7.43	0.88
6.18	1.33
4.94	1.68
3.71	1.85
2.48	1.93
1.24	1.96
0.0	1.89
-1.26	1.79
-2.53	1.64
-3.83	1.40
-5.16	0.97
-6.53	0.56
-7.94	0.27
-9.40	0.11

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
14.80	0.09

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 28 FEET MOUNTING ANGLE, THETA = 10 DEGREES

13.26	0.21
11.78	0.41
10.35	0.70
8.96	0.98
7.62	1.29
6.30	1.47
5.01	1.62
3.74	1.74
2.49	1.83
1.24	1.91
0.0	1.95
-1.24	1.92
-2.49	1.87
-3.74	1.77
-5.01	1.61
-6.30	1.44
-7.62	1.19
-8.96	0.85
-10.35	0.56
-11.78	0.30
-13.26	0.13
-14.80	0.06

TRANSVERSE "DIAMETER" = 13.26 + 13.26 = 26.52

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.29	0.11
-9.98	0.15
-8.69	0.26
-7.43	0.49
-6.18	0.85
-4.94	1.17
-3.71	1.70
-2.48	1.89
-1.24	1.98
0.0	1.99
1.26	1.86
2.53	1.81
3.83	1.55
5.16	1.28
6.53	0.81
7.94	0.43
9.40	0.19
10.92	0.07

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 28 FEET

THETA = 15 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 7.50

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-8.73	0.14
-7.50	0.19
-6.28	0.27
-5.05	0.78
-3.82	1.39
-2.57	1.78
-1.30	1.87
0.0	1.86
1.33	1.72
2.69	1.54
4.10	1.30
5.55	0.79
7.07	0.36
8.66	0.13
10.34	0.03

RADIAL "DIAMETER" = 8.66 + 7.50 = 16.17

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.65	0.11
11.34	0.16
10.05	0.28
8.78	0.49
7.53	0.88
6.28	1.30
5.03	1.63
3.79	1.78
2.54	1.86
1.28	1.86
0.0	1.79
-1.30	1.68
-2.62	1.52
-3.98	1.29
-5.38	0.89
-6.82	0.50
-8.32	0.24
-9.88	0.10

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
15.09	0.09

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 28 FEET MOUNTING ANGLE, THETA = 15 DEGREES

13.52	0.20
12.01	0.39
10.55	0.66
9.14	0.93
7.77	1.21
6.43	1.38
5.11	1.53
3.82	1.64
2.54	1.73
1.27	1.81
0.0	1.84
-1.27	1.82
-2.54	1.77
-3.82	1.67
-5.11	1.52
-6.43	1.35
-7.77	1.13
-9.14	0.81
-10.55	0.53
-12.01	0.28
-13.52	0.13
-15.09	0.06

TRANSVERSE "DIAMETER" = 13.52 + 13.52 = 27.03

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.34	0.11
-10.05	0.15
-8.78	0.26
-7.53	0.48
-6.28	0.84
-5.03	1.14
-3.79	1.65
-2.54	1.81
-1.28	1.88
0.0	1.87
1.30	1.74
2.62	1.68
3.98	1.42
5.38	1.16
6.82	0.73
8.32	0.39
9.88	0.17
11.51	0.07

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 28 FEET

THETA = 20 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 10.19

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-8.97	0.14
-7.74	0.19
-6.50	0.27
-5.25	0.76
-3.98	1.32
-2.69	1.68
-1.36	1.74
0.0	1.72
1.41	1.56
2.87	1.38
4.38	1.15
5.97	0.69
7.65	0.31
9.41	0.11
11.29	0.03

RADIAL "DIAMETER" = 9.41 + 7.74 = 17.16

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.83	0.11
11.53	0.16
10.25	0.27
8.98	0.48
7.71	0.85
6.45	1.25
5.19	1.55
3.91	1.68
2.63	1.74
1.33	1.73
0.0	1.65
-1.36	1.53
-2.75	1.38
-4.18	1.15
-5.66	0.79
-7.21	0.44
-8.82	0.21
-10.51	0.08

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
15.51	0.08

300 WATT PAR56 NFL SYMBOL M263 MOUNTING HEIGHT = 28 FEET MOUNTING ANGLE, THETA = 20 DEGREES

13.89	0.18
12.34	0.36
10.85	0.61
9.39	0.85
7.98	1.12
6.61	1.27
5.25	1.41
3.92	1.51
2.61	1.59
1.30	1.66
0.0	1.70
-1.30	1.67
-2.61	1.63
-3.92	1.54
-5.25	1.40
-6.61	1.25
-7.98	1.04
-9.39	0.74
-10.85	0.49
-12.34	0.26
-13.89	0.12

TRANSVERSE "DIAMETER" = 13.89 + 12.34 = 26.24

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.53	0.11
-10.25	0.15
-8.98	0.26
-7.71	0.47
-6.45	0.80
-5.19	1.09
-3.91	1.55
-2.63	1.69
-1.33	1.75
0.0	1.73
1.36	1.59
2.75	1.52
4.18	1.28
5.66	1.03
7.21	0.64
8.82	0.34
10.51	0.15
12.29	0.06

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 28 FEET

THETA = 25 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 13.06

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.37	0.13
-8.12	0.18
-6.85	0.26
-5.55	0.71
-4.23	1.23
-2.87	1.55
-1.46	1.58
0.0	1.54
1.52	1.38
3.11	1.20
4.78	0.99
6.55	0.58
8.43	0.26
10.44	0.09

RADIAL "DIAMETER" = 8.43 + 8.12 = 16.55

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
13.17	0.10
11.87	0.15
10.58	0.26
9.29	0.45
8.00	0.80
6.71	1.17
5.41	1.44
4.09	1.55
2.76	1.58
1.39	1.56
0.0	1.48
-1.43	1.36
-2.91	1.21
-4.45	1.01
-6.04	0.68
-7.71	0.38
-9.47	0.18
-11.33	0.07

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.08	0.07

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 28 FEET MOUNTING ANGLE, THETA = 25 DEGREES

14.41	0.17
12.80	0.32
11.24	0.55
9.74	0.76
8.28	1.00
6.85	1.14
5.45	1.27
4.07	1.35
2.70	1.43
1.35	1.49
0.0	1.52
-1.35	1.50
-2.70	1.46
-4.07	1.38
-5.45	1.26
-6.85	1.12
-8.28	0.93
-9.74	0.67
-11.24	0.44
-12.80	0.23
-14.41	0.10

TRANSVERSE "DIAMETER" = 14.41 + 12.80 = 27.20

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-10.58	0.14
-9.29	0.24
-8.00	0.44
-6.71	0.75
-5.41	1.01
-4.09	1.43
-2.76	1.55
-1.39	1.58
0.0	1.55
1.43	1.41
2.91	1.34
4.45	1.12
6.04	0.90
7.71	0.55
9.47	0.29
11.33	0.12
13.30	0.05

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 28 FEET

THETA = 30 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 16.17

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.96	0.13
-8.66	0.17
-7.34	0.24
-5.97	0.66
-4.57	1.12
-3.11	1.39
-1.59	1.40
0.0	1.34
1.67	1.19
3.44	1.02
5.32	0.82
7.33	0.48
9.49	0.21
11.83	0.07

RADIAL "DIAMETER" = 9.49 + 8.66 = 18.15

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.38	0.14
11.06	0.24
9.74	0.42
8.41	0.73
7.07	1.06
5.71	1.30
4.33	1.38
2.93	1.40
1.48	1.37
0.0	1.29
-1.53	1.18
-3.13	1.04
-4.79	0.86
-6.53	0.57
-8.36	0.32
-10.31	0.15
-12.37	0.06

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.83	0.06

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 28 FEET MOUNTING ANGLE, THETA = 30 DEGREES

15.08	0.14
13.39	0.28
11.77	0.48
10.19	0.67
8.66	0.87
7.17	1.00
5.70	1.11
4.26	1.18
2.83	1.24
1.41	1.30
0.0	1.33
-1.41	1.31
-2.83	1.27
-4.26	1.20
-5.70	1.10
-7.17	0.98
-8.66	0.81
-10.19	0.58
-11.77	0.38
-13.39	0.20
-15.08	0.09

TRANSVERSE "DIAMETER" = 15.08 + 13.39 = 28.47

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.06	0.13
-9.74	0.23
-8.41	0.40
-7.07	0.68
-5.71	0.91
-4.33	1.28
-2.93	1.37
-1.48	1.39
0.0	1.35
1.53	1.22
3.13	1.15
4.79	0.95
6.53	0.75
8.36	0.46
10.31	0.23
12.37	0.10

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 28 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 19.61

THETA = 35 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.41	0.16
-8.01	0.22
-6.55	0.59
-5.03	0.99
-3.44	1.21
-1.77	1.21
0.0	1.14
1.88	0.99
3.89	0.83
6.05	0.66
8.39	0.38
10.95	0.16
13.76	0.05

RADIAL "DIAMETER" = 10.95 + 8.01 = 18.96

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
13.08	0.13
11.72	0.22
10.34	0.37
8.96	0.65
7.55	0.93
6.12	1.13
4.65	1.20
3.15	1.21
1.60	1.17
0.0	1.09
-1.66	0.99
-3.40	0.87
-5.23	0.71
-7.15	0.47
-9.19	0.26
-11.37	0.12

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
15.94	0.12

300 WATT PAR56 WFL SYMROL #263 MOUNTING HEIGHT = 28 FEET MOUNTING ANGLE, THETA = 35 DEGREES

14.16	0.24
12.44	0.40
10.78	0.56
9.16	0.74
7.58	0.84
6.03	0.94
4.50	1.00
2.99	1.05
1.49	1.10
0.0	1.12
-1.49	1.11
-2.99	1.08
-4.50	1.02
-6.03	0.93
-7.58	0.83
-9.16	0.69
-10.78	0.49
-12.44	0.32
-14.16	0.17
-15.94	0.08

TRANSVERSE "DIAMETER" = 14.16 + 14.16 = 28.32

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.72	0.12
-10.34	0.20
-8.96	0.36
-7.55	0.60
-6.12	0.79
-4.65	1.11
-3.15	1.18
-1.60	1.19
0.0	1.14
1.66	1.03
3.40	0.96
5.23	0.78
7.15	0.61
9.19	0.37
11.37	0.19
13.71	0.09

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 32 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 0.0

THETA = 0 DEGREES PER CENT REO = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-8.57	0.13
-7.09	0.20
-5.64	0.58
-4.21	1.06
-2.80	1.41
-1.40	1.53
0.0	1.58
1.40	1.51
2.80	1.40
4.21	1.23
5.64	0.78
7.09	0.37
8.57	0.14
10.09	0.04

RADIAL "DIAMETER" = 8.57 + 7.09 = 15.67

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
13.25	0.11
11.65	0.19
10.09	0.35
8.57	0.64
7.09	0.98
5.64	1.26
4.21	1.41
2.80	1.50
1.40	1.54
0.0	1.52
-1.40	1.46
-2.80	1.36
-4.21	1.18
-5.64	0.83
-7.09	0.49
-8.57	0.24
-10.09	0.10

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.66	0.08

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 32 FEET MOUNTING ANGLE, THETA = 0 DEGREES

14.92	0.17
13.25	0.33
11.65	0.56
10.09	0.79
8.57	1.03
7.09	1.18
5.64	1.30
4.21	1.39
2.80	1.47
1.40	1.53
0.0	1.56
-1.40	1.54
-2.80	1.50
-4.21	1.42
-5.64	1.29
-7.09	1.15
-8.57	0.96
-10.09	0.68
-11.65	0.45
-13.25	0.24
-14.92	0.11

TRANSVERSE "DIAMETER" = 14.92 + 13.25 = 28.18

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.65	0.10
-10.09	0.19
-8.57	0.36
-7.09	0.63
-5.64	0.88
-4.21	1.30
-2.80	1.47
-1.40	1.56
0.0	1.59
1.40	1.51
2.80	1.50
4.21	1.30
5.64	1.09
7.09	0.70
8.57	0.38
10.09	0.17
11.65	0.07

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 32 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 2.80

THETA = 5 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-8.44	0.14
-7.01	0.21
-5.60	0.60
-4.20	1.09
-2.80	1.43
-1.40	1.53
0.0	1.57
1.41	1.48
2.84	1.36
4.29	1.18
5.77	0.73
7.29	0.34
8.85	0.13
10.46	0.03

RADIAL "DIAMETER" = 8.85 + 7.01 = 15.86

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
13.60	0.12
11.46	0.20
9.95	0.37
8.48	0.67
7.04	1.01
5.61	1.29
4.20	1.43
2.80	1.51
1.40	1.54
0.0	1.50
-1.41	1.43
-2.83	1.32
-4.27	1.14
-5.74	0.80
-7.23	0.46
-8.77	0.22
-10.35	0.09

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.72	0.07

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 32 FEET MOUNTING ANGLE, THETA = 5 DEGREES

14.98	0.17
13.31	0.33
11.69	0.56
10.13	0.78
8.61	1.02
7.12	1.16
5.66	1.29
4.23	1.38
2.81	1.45
1.40	1.52
0.0	1.55
-1.40	1.52
-2.81	1.48
-4.23	1.40
-5.66	1.28
-7.12	1.14
-8.61	0.95
-10.13	0.68
-11.69	0.44
-13.31	0.24
-14.98	0.11

TRANSVERSE "DIAMETER" = 14.98 + 13.31 = 28.28

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.46	0.11
-9.95	0.20
-8.49	0.37
-7.04	0.65
-5.61	0.90
-4.20	1.32
-2.80	1.47
-1.40	1.56
0.0	1.57
1.41	1.49
2.83	1.43
4.27	1.26
5.74	1.05
7.23	0.67
8.77	0.36
10.35	0.16
11.98	0.06

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 32 FEET

THETA = 10 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 5.64

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-8.44	0.14
-7.04	0.21
-5.64	0.61
-4.25	1.09
-2.84	1.41
-1.43	1.50
0.0	1.51
1.45	1.41
2.93	1.28
4.45	1.10
6.00	0.68
7.61	0.31
9.28	0.12
11.02	0.03

RADIAL "DIAMETER" = 9.28 + 7.04 = 16.32

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.90	0.12
11.40	0.21
9.94	0.38
8.49	0.68
7.06	1.02
5.65	1.28
4.24	1.41
2.83	1.48
1.42	1.50
0.0	1.45
-1.44	1.37
-2.90	1.25
-4.38	1.07
-5.90	0.74
-7.46	0.43
-9.07	0.21
-10.74	0.08

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.92	0.07

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 32 FEET MOUNTING ANGLE, THETA = 10 DEGREES

15.15	0.16
13.46	0.32
11.83	0.54
10.25	0.75
8.71	0.98
7.20	1.12
5.73	1.24
4.28	1.33
2.84	1.40
1.42	1.46
0.0	1.49
-1.42	1.47
-2.84	1.43
-4.28	1.36
-5.73	1.24
-7.20	1.10
-8.71	0.91
-10.25	0.65
-11.83	0.43
-13.46	0.23
-15.15	0.10

TRANSVERSE "DIAMETER" = 15.15 + 13.46 = 28.61

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.40	0.11
-9.94	0.20
-8.49	0.37
-7.06	0.65
-5.65	0.90
-4.24	1.31
-2.83	1.45
-1.42	1.52
0.0	1.52
1.44	1.42
2.90	1.39
4.38	1.19
5.90	0.98
7.46	0.62
9.07	0.33
10.74	0.15
12.48	0.06

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 32 FEET

THETA = 15 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 8.57

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-8.57	0.15
-7.18	0.21
-5.77	0.60
-4.36	1.06
-2.93	1.36
-1.48	1.43
0.0	1.43
1.52	1.32
3.07	1.18
4.68	1.00
6.35	0.61
8.08	0.28
9.90	0.10

RADIAL "DIAMETER" = 8.08 + 7.18 = 15.26

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
12.96	0.12
11.49	0.21
10.04	0.38
8.60	0.67
7.17	1.00
5.75	1.25
4.33	1.37
2.90	1.42
1.46	1.42
0.0	1.37
-1.48	1.28
-3.00	1.16
-4.55	0.99
-6.14	0.68
-7.79	0.39
-9.50	0.18
-11.29	0.07

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
17.25	0.07

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 32 FEET MOUNTING ANGLE, THETA = 15 DEGREES

15.45	0.15
13.72	0.30
12.06	0.51
10.45	0.71
8.88	0.93
7.34	1.06
5.84	1.17
4.36	1.25
2.90	1.32
1.45	1.38
0.0	1.41
-1.45	1.39
-2.90	1.35
-4.36	1.28
-5.84	1.17
-7.34	1.04
-8.88	0.85
-10.45	0.62
-12.06	0.40
-13.72	0.22
-15.45	0.10

TRANSVERSE "DIAMETER" = 15.45 + 13.72 = 29.17

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.49	0.11
-10.04	0.20
-8.60	0.37
-7.17	0.64
-5.75	0.88
-4.33	1.26
-2.90	1.39
-1.46	1.44
0.0	1.44
1.48	1.33
3.00	1.29
4.55	1.09
6.14	0.89
7.79	0.56
9.50	0.29
11.29	0.13
13.16	0.05

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 32 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 11.65

THETA = 20 DEGREES PER CENT RFD = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-8.85	0.14
-7.43	0.21
-6.00	0.58
-4.55	1.01
-3.07	1.29
-1.56	1.33
0.0	1.31
1.61	1.20
3.27	1.06
5.01	0.88
6.83	0.53
8.74	0.24
10.76	0.09

RADIAL "DIAMETER" = 8.74 + 7.43 = 16.17

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
13.18	0.12
11.71	0.21
10.26	0.37
8.82	0.65
7.37	0.96
5.93	1.19
4.47	1.29
3.00	1.33
1.52	1.32
0.0	1.26
-1.55	1.17
-3.14	1.05
-4.78	0.88
-6.47	0.60
-8.24	0.34
-10.08	0.16
-12.01	0.06

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
17.73	0.06

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 32 FEET MOUNTING ANGLE, THETA = 20 DEGREES

15.88	0.14
14.11	0.27
12.39	0.47
10.74	0.65
9.12	0.86
7.55	0.97
6.00	1.08
4.48	1.15
2.98	1.22
1.49	1.27
0.0	1.30
-1.49	1.28
-2.98	1.25
-4.48	1.18
-6.00	1.07
-7.55	0.95
-9.12	0.79
-10.74	0.57
-12.39	0.37
-14.11	0.20
-15.88	0.09

TRANSVERSE "DIAMETER" = 15.88 + 14.11 = 29.98

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-11.71	0.11
-10.26	0.20
-8.82	0.36
-7.37	0.61
-5.93	0.83
-4.47	1.19
-3.00	1.30
-1.52	1.34
0.0	1.32
1.55	1.22
3.14	1.17
4.78	0.98
6.47	0.79
8.24	0.49
10.08	0.26
12.01	0.11

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 32 FEET

THETA = 25 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 14.92

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.28	0.14
-7.83	0.20
-6.35	0.55
-4.83	0.95
-3.27	1.19
-1.67	1.21
0.0	1.18
1.74	1.06
3.55	0.92
5.46	0.76
7.48	0.45
9.63	0.20
11.93	0.07

RADIAL "DIAMETER" = 9.63 + 7.83 = 17.46

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
13.57	0.12
12.09	0.20
10.62	0.35
9.15	0.61
7.67	0.89
6.18	1.10
4.68	1.18
3.15	1.21
1.59	1.20
0.0	1.13
-1.64	1.04
-3.33	0.93
-5.08	0.77
-6.91	0.52
-8.91	0.29
-10.82	0.14
-12.94	0.05

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.46	0.13

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 32 FEET MOUNTING ANGLE, THETA = 25 DEGREES

14.63	0.25
12.85	0.42
11.13	0.59
9.46	0.77
7.83	0.87
6.23	0.97
4.65	1.04
3.09	1.09
1.54	1.14
0.0	1.16
-1.54	1.15
-3.09	1.12
-4.65	1.06
-6.23	0.96
-7.83	0.86
-9.46	0.71
-11.13	0.51
-12.85	0.33
-14.63	0.18
-16.46	0.08

TRANSVERSE "DIAMETER" = 14.63 + 14.63 = 29.25

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-12.09	0.11
-10.62	0.19
-9.15	0.34
-7.67	0.57
-6.18	0.77
-4.68	1.09
-3.15	1.18
-1.59	1.21
0.0	1.19
1.64	1.08
3.33	1.03
5.08	0.86
6.91	0.69
8.81	0.42
10.82	0.22
12.94	0.09

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 32 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 18.48

THETA = 30 DEGREES PER CENT REO = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.90	0.13
-8.39	0.18
-6.83	0.50
-5.22	0.86
-3.55	1.06
-1.82	1.07
0.0	1.03
1.91	0.91
3.93	0.78
6.08	0.63
8.38	0.37
10.85	0.16
13.52	0.05

RADIAL "DIAMETER" = 10.85 + 8.39 = 19.23

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
14.15	0.11
12.64	0.18
11.13	0.32
9.61	0.56
8.08	0.81
6.53	0.99
4.95	1.06
3.35	1.08
1.70	1.05
0.0	0.99
-1.75	0.90
-3.57	0.80
-5.47	0.66
-7.46	0.44
-9.56	0.24
-11.78	0.11

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
17.23	0.11

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 32 FEET MOUNTING ANGLE, THETA = 30 DEGREES

15.31	0.21
13.45	0.37
11.65	0.51
9.90	0.67
8.19	0.76
6.52	0.85
4.86	0.90
3.23	0.95
1.61	1.00
0.0	1.02
-1.61	1.00
-3.23	0.98
-4.86	0.92
-6.52	0.84
-8.19	0.75
-9.90	0.62
-11.65	0.44
-13.45	0.29
-15.31	0.16
-17.23	0.07

TRANSVERSE "DIAMETER" = 15.31 + 15.31 = 30.61

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-12.64	0.10
-11.13	0.17
-9.61	0.31
-8.08	0.52
-6.53	0.70
-4.95	0.98
-3.35	1.05
-1.70	1.07
0.0	1.03
1.75	0.94
3.57	0.88
5.47	0.73
7.46	0.58
9.56	0.35
11.78	0.18
14.14	0.08

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 36 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 0.0

THETA = 0 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.65	0.10
-7.98	0.16
-6.35	0.46
-4.74	0.84
-3.15	1.12
-1.57	1.21
0.0	1.25
1.57	1.20
3.15	1.11
4.74	0.97
6.35	0.61
7.98	0.29
9.65	0.11
11.35	0.03

RADIAL "DIAMETER" = 9.65 + 7.98 = 17.63

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
14.91	0.09
13.10	0.15
11.35	0.28
9.65	0.51
7.98	0.77
6.35	0.99
4.74	1.11
3.15	1.19
1.57	1.22
0.0	1.20
-1.57	1.15
-3.15	1.07
-4.74	0.93
-6.35	0.66
-7.98	0.38
-9.65	0.19
-11.35	0.08

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.79	0.13

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 36 FEET MOUNTING ANGLE, THETA = 0 DEGREES

14.91	0.26
13.10	0.45
11.35	0.62
9.65	0.81
7.98	0.93
6.35	1.03
4.74	1.10
3.15	1.16
1.57	1.21
0.0	1.24
-1.57	1.22
-3.15	1.19
-4.74	1.12
-6.35	1.02
-7.98	0.91
-9.65	0.76
-11.35	0.54
-13.10	0.35
-14.91	0.19
-16.79	0.09

TRANSVERSE "DIAMETER" = 14.91 + 14.91 = 29.82

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-13.10	0.08
-11.35	0.15
-9.65	0.28
-7.98	0.50
-6.35	0.70
-4.74	1.03
-3.15	1.16
-1.57	1.23
0.0	1.26
1.57	1.20
3.15	1.19
4.74	1.03
6.35	0.86
7.98	0.56
9.65	0.30
11.35	0.14
13.10	0.05

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 34 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 3.15

THETA = 5 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.50	0.11
-7.89	0.16
-6.30	0.47
-4.72	0.86
-3.15	1.13
-1.58	1.21
0.0	1.24
1.59	1.17
3.20	1.07
4.83	0.93
6.50	0.58
8.20	0.27
9.95	0.10

RADIAL "DIAMETER" = 8.20 + 7.89 = 16.09

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
14.62	0.09
12.89	0.16
11.20	0.29
9.54	0.53
7.92	0.80
6.32	1.02
4.73	1.13
3.15	1.19
1.58	1.21
0.0	1.19
-1.59	1.13
-3.18	1.04
-4.81	0.90
-6.45	0.63
-8.14	0.36
-9.86	0.18
-11.64	0.07

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
16.85	0.13

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 36 FEET MOUNTING ANGLE, THETA = 5 DEGREES

14.97	0.26
13.15	0.44
11.39	0.61
9.68	0.81
8.01	0.92
6.37	1.02
4.76	1.09
3.16	1.14
1.58	1.20
0.0	1.22
-1.58	1.20
-3.16	1.17
-4.76	1.11
-6.37	1.01
-8.01	0.90
-9.68	0.75
-11.39	0.54
-13.15	0.35
-14.97	0.19
-16.85	0.08

TRANSVERSE "DIAMETER" = 14.97 + 14.97 = 29.94

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-12.89	0.09
-11.20	0.16
-9.54	0.29
-7.92	0.51
-6.32	0.71
-4.73	1.04
-3.15	1.16
-1.58	1.23
0.0	1.24
1.59	1.17
3.18	1.15
4.81	0.99
6.45	0.83
8.14	0.53
9.86	0.28
11.64	0.13
13.48	0.05

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 36 FEET

THETA = 10 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 6.35

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.50	0.11
-7.92	0.17
-6.35	0.48
-4.78	0.86
-3.20	1.12
-1.61	1.18
0.0	1.19
1.63	1.12
3.30	1.01
5.00	0.87
6.76	0.53
8.56	0.25
10.44	0.09

RADIAL "DIAMETER" = 8.56 + 7.92 = 16.48

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
14.51	0.09
12.83	0.17
11.18	0.30
9.55	0.54
7.95	0.80
6.36	1.01
4.77	1.12
3.19	1.17
1.60	1.18
0.0	1.15
-1.62	1.08
-3.26	0.99
-4.93	0.85
-6.64	0.59
-8.40	0.34
-10.21	0.16
-12.09	0.07

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
17.05	0.13

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 36 FEET MOUNTING ANGLE, THETA = 10 DEGREES

15.14	0.25
13.31	0.43
11.53	0.59
9.79	0.78
8.10	0.89
6.45	0.98
4.81	1.05
3.20	1.11
1.60	1.16
0.0	1.18
-1.60	1.16
-3.20	1.13
-4.81	1.07
-6.45	0.98
-8.10	0.87
-9.79	0.72
-11.53	0.52
-13.31	0.34
-15.14	0.18
-17.05	0.08

TRANSVERSE "DIAMETER" = 15.14 + 15.14 = 30.28

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-12.83	0.09
-11.18	0.16
-9.55	0.30
-7.95	0.52
-6.36	0.71
-4.77	1.03
-3.19	1.14
-1.60	1.20
0.0	1.20
1.62	1.12
3.26	1.10
4.93	0.94
6.64	0.77
8.40	0.49
10.21	0.26
12.09	0.12

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 36 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 9.65

THETA = 15 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.65	0.12
-8.07	0.17
-6.50	0.47
-4.91	0.84
-3.30	1.08
-1.67	1.13
0.0	1.13
1.70	1.04
3.46	0.93
5.27	0.79
7.14	0.48
9.09	0.22
11.14	0.08

RADIAL "DIAMETER" = 9.09 + 8.07 = 17.17

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
14.58	0.10
12.92	0.17
11.29	0.30
9.68	0.53
8.07	0.79
6.47	0.99
4.87	1.08
3.26	1.12
1.64	1.13
0.0	1.08
-1.67	1.01
-3.37	0.92
-5.12	0.78
-6.91	0.54
-8.77	0.30
-10.69	0.15
-12.70	0.06

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
17.38	0.12

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 36 FEET MOUNTING ANGLE, THETA = 15 DEGREES

15.44	0.24
13.57	0.40
11.75	0.56
9.99	0.73
8.26	0.84
6.57	0.93
4.91	0.99
3.26	1.04
1.63	1.09
0.0	1.11
-1.63	1.10
-3.26	1.07
-4.91	1.01
-6.57	0.92
-8.26	0.82
-9.99	0.68
-11.75	0.49
-13.57	0.32
-15.44	0.17
-17.38	0.08

TRANSVERSE "DIAMETER" = 15.44 + 15.44 = 30.88

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-12.92	0.09
-11.29	0.16
-9.68	0.29
-8.07	0.51
-6.47	0.69
-4.87	1.00
-3.26	1.10
-1.64	1.14
0.0	1.13
1.67	1.05
3.37	1.02
5.12	0.86
6.91	0.70
8.77	0.44
10.69	0.23
12.70	0.10

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 36 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 13.10

THETA = 20 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-9.95	0.11
-8.36	0.16
-6.76	0.46
-5.12	0.80
-3.46	1.02
-1.75	1.05
0.0	1.04
1.81	0.95
3.68	0.83
5.64	0.70
7.68	0.42
9.83	0.19
12.10	0.07

RADIAL "DIAMETER" = 9.83 + 8.36 = 18.19

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
14.82	0.10
13.18	0.16
11.54	0.29
9.92	0.51
8.29	0.76
6.67	0.94
5.03	1.02
3.38	1.05
1.71	1.04
0.0	1.00
-1.74	0.93
-3.53	0.83
-5.37	0.70
-7.28	0.48
-9.26	0.27
-11.34	0.13

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
17.86	0.11

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 36 FEET MOUNTING ANGLE, THETA = 20 DEGREES

15.87	0.22
13.94	0.37
12.08	0.52
10.27	0.68
8.49	0.77
6.76	0.85
5.04	0.91
3.35	0.96
1.67	1.01
0.0	1.03
-1.67	1.01
-3.35	0.98
-5.04	0.93
-6.76	0.85
-8.49	0.75
-10.27	0.63
-12.08	0.45
-13.94	0.29
-15.87	0.16
-17.86	0.07

TRANSVERSE "DIAMETER" = 15.87 + 15.87 = 31.74

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-13.18	0.09
-11.54	0.16
-9.92	0.29
-8.29	0.49
-6.67	0.66
-5.03	0.94
-3.38	1.03
-1.71	1.06
0.0	1.04
1.74	0.96
3.53	0.92
5.37	0.77
7.28	0.63
9.26	0.39
11.34	0.20
13.51	0.09

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 40 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 0.0

THETA = 0 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-10.72	0.08
-8.87	0.13
-7.05	0.37
-5.27	0.68
-3.50	0.90
-1.75	0.98
0.0	1.01
1.75	0.97
3.50	0.90
5.27	0.79
7.05	0.50
8.87	0.24
10.72	0.09

RADIAL "DIAMETER" = 8.87 + 8.87 = 17.74

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
14.56	0.12
12.61	0.22
10.72	0.41
8.87	0.63
7.05	0.81
5.27	0.90
3.50	0.96
1.75	0.99
0.0	0.97
-1.75	0.93
-3.50	0.87
-5.27	0.75
-7.05	0.53
-8.87	0.31
-10.72	0.15
-12.61	0.06

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
18.65	0.11

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 40 FEET MOUNTING ANGLE, THETA = 0 DEGREES

16.57	0.21
14.56	0.36
12.61	0.50
10.72	0.66
8.87	0.75
7.05	0.83
5.27	0.89
3.50	0.94
1.75	0.98
0.0	1.00
-1.75	0.99
-3.50	0.96
-5.27	0.91
-7.05	0.83
-8.87	0.74
-10.72	0.61
-12.61	0.44
-14.56	0.29
-16.57	0.15
-18.65	0.07

TRANSVERSE "DIAMETER" = 16.57 + 16.57 = 33.14

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-12.61	0.12
-10.72	0.23
-8.87	0.40
-7.05	0.57
-5.27	0.83
-3.50	0.94
-1.75	1.00
0.0	1.02
1.75	0.97
3.50	0.96
5.27	0.83
7.05	0.70
8.87	0.45
10.72	0.24
12.61	0.11

300 WATT PAR56 MFL SYMBOL #263

HEIGHT = 40 FEET

THETA = 5 DEGREES

DISTANCE FROM BASE OF POLE TO CENTER SPOT = 3.50

PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-10.55	0.09
-8.77	0.13
-7.00	0.38
-5.25	0.70
-3.50	0.91
-1.75	0.98
0.0	1.00
1.77	0.95
3.55	0.87
5.37	0.75
7.22	0.47
9.11	0.22
11.06	0.08

RADIAL "DIAMETER" = 9.11 + 8.77 = 17.88

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
14.32	0.13
12.44	0.24
10.60	0.43
8.80	0.65
7.02	0.82
5.25	0.91
3.50	0.97
1.75	0.98
0.0	0.96
-1.76	0.92
-3.54	0.84
-5.34	0.73
-7.17	0.51
-9.04	0.29
-10.96	0.14
-12.94	0.06

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
18.72	0.11

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 40 FEET MOUNTING ANGLE, THETA = 5 DEGREES

16.63	0.21
14.61	0.36
12.66	0.50
10.76	0.65
8.90	0.74
7.08	0.82
5.29	0.88
3.51	0.93
1.75	0.97
0.0	0.99
-1.75	0.98
-3.51	0.95
-5.29	0.90
-7.08	0.82
-8.90	0.73
-10.76	0.61
-12.66	0.43
-14.61	0.28
-16.63	0.15
-18.72	0.07

TRANSVERSE "DIAMETER" = 16.63 + 16.63 = 33.26

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-12.44	0.13
-10.60	0.24
-8.80	0.42
-7.02	0.58
-5.25	0.84
-3.50	0.94
-1.75	1.00
0.0	1.01
1.76	0.95
3.54	0.93
5.34	0.80
7.17	0.67
9.04	0.43
10.96	0.23
12.94	0.10

300 WATT PAR56 WFL SYMBOL #263

HEIGHT = 40 FEET DISTANCE FROM BASE OF POLE TO CENTER SPOT = 7.05

THETA = 10 DEGREES PER CENT RED = 0.150

BOTTOM TO TOP - VERTICAL AXIS

DISTANCE	ILLUMINATION
-10.55	0.09
-8.80	0.13
-7.05	0.39
-5.31	0.70
-3.55	0.90
-1.79	0.96
0.0	0.97
1.81	0.90
3.66	0.82
5.56	0.70
7.51	0.43
9.52	0.20
11.60	0.07

RADIAL "DIAMETER" = 9.52 + 8.80 = 18.31

BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
14.25	0.13
12.42	0.24
10.61	0.43
8.83	0.65
7.06	0.82
5.30	0.90
3.54	0.95
1.78	0.96
0.0	0.93
-1.80	0.88
-3.62	0.80
-5.48	0.69
-7.38	0.48
-9.33	0.27
-11.34	0.13
-13.43	0.05

RIGHT TO LEFT - HORIZONTAL AXIS

DISTANCE	ILLUMINATION
18.94	0.10

300 WATT PAR56 WFL SYMBOL #263 MOUNTING HEIGHT = 40 FEET MOUNTING ANGLE, THETA = 10 DEGREES

16.82	0.20
14.78	0.34
12.81	0.48
10.88	0.63
9.00	0.72
7.16	0.80
5.35	0.85
3.55	0.90
1.77	0.94
0.0	0.96
-1.77	0.94
-3.55	0.92
-5.35	0.87
-7.16	0.79
-9.00	0.70
-10.88	0.59
-12.81	0.42
-14.78	0.27
-16.82	0.15
-18.94	0.07

TRANSVERSE "DIAMETER" = 16.82 + 16.82 = 33.65

BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS

DISTANCE	ILLUMINATION
-12.42	0.13
-10.61	0.24
-8.83	0.42
-7.06	0.58
-5.30	0.84
-3.54	0.93
-1.78	0.97
0.0	0.97
1.80	0.91
3.62	0.89
5.48	0.76
7.38	0.63
9.33	0.40
11.34	0.21
13.43	0.09

Appendix B

Computer Program

(A Listing of the Template Method Computer Program)

```
C     THIS PROGRAM WILL PROCESS CANDLEPOWER DISTRIBUTIONS FOR TWO AXES OR
C     FOUR AXES.  THE FOUR AXES INPUT MUST BE STRUCTURED ACCORDING TO THE
C     FOLLOWING FORMAT--
C
C     ..........................................................................
C
C
C                                 TOP
C              TOP                 I                 TOP
C              LEFT *              I              * RIGHT
C                    *             I             *
C                     *            I+           *
C                    - *           I           * +
C                       *          I          *
C                        *         I         *
C                         *        I        *
C                          *       I       *
C                        45 *      I      * 45
C        LEFT  -  _________________I_________________  +  RIGHT
C                        45 *      I      * 45
C                          *       I       *
C                         *        I        *
C                        *         I         *
C                       *          I          *
C                    - *           I           * +
C                     *            I-           *
C           BOTTOM   *             I             *  BOTTOM
C             LEFT  *              I              *  RIGHT
C                                  I
C                               BOTTOM
C
C
C
C                                  X
C                            MOUNTING POLE
C
C
C
C     ..........................................................................
C
C
C     THE SIGN CONVENTIONS AND AXIS LABELS ARE IN ACCORD WITH THE VIEW
C     FROM BEHIND THE LAMP AND ALONG THE CENTER LINE OF THE BEAM.
C     SUCH READINGS ARE NOT GENERALLY AVAILABLE, AND HAVE CONSEQUENTLY
C     BEEN EXPRESSLY MEASURED BY NSRDL, ANNAPOLIS.
C
C     THE PROGRAM REQUIRES KNOWN COSINE AND TANGENT VALUES FROM 0 TO 90
C     DEGREES.  IT IS CURRENTLY SET UP TO READ IN THESE VALUES IN INCREMENTS
C     OF 2.5 DEGREES, THUS ACCOUNTING FOR THE INDEX OF 37 IN THE FIRST READ
C     STATEMENT.  THE MOUNTING ANGLE INCREMENT AND CANDLEPOWER DISTRIBUTION
```

```
C      INPUT ANGLES INCREMENT MAY THEREFORE
C      BE ANY MULTIPLE OF 2.5 ( E.G., 2.5, 5.0 ).
C
C  DATA CARDS
C
C      THE FIRST SET OF CARDS MUST BE THE KNOWN COS AND TAN VALUES AS
C      DESCRIBED ABOVE WITH THE ANGLE, COS, THEN TAN IN 3F10.7 FORMAT.
C      THE NEXT CARD SHOULD HAVE THE SINGLE VALUE, TABLE ANGLE INCREMENT,
C      IN DEGREES.
C
C.....
C
0001          IMPLICIT INTEGER*2 (I,N)
C
0002          DIMENSION VPHI(40), FPHI(40), CPV(40), CPH(40), HEADER(10),
             A     FCRBRT(40), FCWBRT(40), FCWTRB(40), FCRTRB(40), C2BRT(40),
             B     CPTRB(40), COSKWN(37), TANKWN(37), TOP2BT(40), FCRH(40),
             C     FCWH(40), BR2TL(40), RT2LFT(40), TR2BL(40),
             D     FCWV(40), FCRV(40), TRBPHI (40), BRTPHI (40)
C
C        TYPE SPECIFICATIONS
C
0003          INTEGER*4 VNUM, HNUM, NOBLQ1, NOBLQ2, NEXT, J, M, N, QKSCAN
0004          INTEGER*2 AREA, AXESNO, HMAX, HMIN, I, IH, II, INCHT,
             I          INDX3, INDX4, INDX1B, INDX2B, INDX1H, INDX2H,
             *          INDX1T, INDX2T, INDX1V, INDX2V, INTO, ISUM, K,
             2          NDXHI, NDXLO, RADIAM, TRDIAM
0005          INTEGER*2 IPAGE, IPAG1, LINE, LINEN
C
0006          LOGICAL*1 BYPASS, HTWRTN, NA2YA4, OPT1, OPT2, OPT3, RDSET1, RDSET2
0007          COMMON XO, SQRT2, D, PCTREQ, PI, DEGRAD, H, M, N, OPT1, NA2YA4
C
C          CONSTANTS
C
0008          L      = 6
0009          PI     = 3.14159
0010          PIOVR4 = PI / 4.0
0011          DEGRAD = PI / 180.0
0012          SQRT2  = SQRT (2.0)
C
C      COSINES AND TANGENTS ARE READ IN TO PROVIDE TABLE LOOKUP IN THE INTEREST
C          OF SPEED AND EFFICIENCY.
C
C      DEGINC  --  INCREMENT FOR ANGLE VARIATION IN COS AND TAN TABLES.
C
0013          READ (1,140) (COSKWN (I), TANKWN (I), I = 1, 37 ), DEGINC
C
0014        1 READ (1,155) AXESNO, RDLVL1, RDLVL2, INCHT, M, N, QKSCAN
0015          IPAGE  = 1
0016          IPAG1  = 1
C
C      AXESNO  --  INTEGER INDICATING NUMBER OF AXES FOR WHICH CANDLE POWER
C          DISTRIBUTIONS WILL BE INPUT.
C
```

```
                C        AXESNO = 4 INDICATES 4 AXES CP DIST. INPUT
                C        AXESNO = 2 INDICATES 2 AXES CP DIST. INPUT
                C        AXESNO = 0 INDICATES NO SOURCE, JOB TERMINATION
                C
0017                 IF (AXESNO.EQ.0)  CALL EXIT
0018                 IF (AXESNO.EQ.2)  NA2YA4 = .FALSE.
0019                 IF (AXESNO.EQ.4)  NA2YA4 = .TRUE.
                C
                C    NA2YA4  --  LOGICAL VARIABLE INDICATING 2 OR 4 AXIS METHOD,
                C        DEPENDING ON THE INPUT (AXESNO).
                C
0020                 IF (NA2YA4 )  GO TO 7
                C
                C    RDLVL1 -- MINIMUM ILLUMINATION LEVEL ACCEPTABLE (RED LIGHT), IN
                C        FOOT CANDLES.
                C
                C    RDLVL2 -- SECOND ILLUMINATION LEVEL OF INTEREST, IF ANY, IN
                C        FOOT CANDLES.  ZERO, IF NONE SPECIFIED.
                C
                C    INCHT  --  MOUNTING HEIGHT INCREMENT
                C
                C    M    --  UNIT ON WHICH TO OUTPUT COMPLETE LIST OF DISTANCES AND
                C        ILLUMINATIONS IF OPT1 AND/OR OPT2 ARE IN EFFECT.  NORMALLY,
                C        A TAPE UNIT.
                C
                C    N    --  UNIT ON WHICH TO OUTPUT DATA SETS WHICH SATISFY SELECTION
                C        CRITERIA.  WILL NORMALLY BE THE PRINTER.
                C
                C    QKSCAN  --  UNIT ON WHICH TO OUTPUT LIST OF ACCEPTABLE CONFIGURATIONS
                C        IN THE QUICKSCAN FORMAT, SUITABLE FOR RAPID SCANNING AND EASY
                C        COMPARING.
                C
0021                 READ(I,145) VNUM, HNUM, HMIN, HMAX, PCTRED, OPT1, OPT2, OPT3,
                    A    (HEADER(I), I=1,10)
0022                 GO TO 6
                C
0023               7 READ (1,150) VNUM, HNUM, NOBLQ1, NOBLQ2, HMIN, HMAX, PCTRED, OPT1,
                    A    OPT2, OPT3, (HEADER(I), I=1,10)
                C
                C    VNUM EQUALS NUMBER OF VERTICAL PHI READINGS, AND THE
                C            NUMBER OF CANDLEPOWER INPUT READINGS ON THE VERTICAL AXIS
                C
                C    HNUM EQUALS NUMBER OF HORIZONTAL PHI READINGS, AND THE
                C            NUMBER OF CANDLEPOWER INPUT READINGS ON THE HORIZONTAL AXIS
                C
                C    NOBLQ1 -- NUMBER OF CANDLEPOWER INPUT READINGS ON THE 45 DEGREE AXIS,
                C        TOP RIGHT TO BOTTOM LEFT
                C
                C    NOBLQ2 -- NUMBER OF CANDLEPOWER INPUT READINGS ON THE 45 DEGREE AXIS,
                C        BOTTOM RIGHT TO TOP LEFT
                C
                C    HMIN EQUALS MINIMUM MOUNTING HEIGHT
                C    HMAX EQUALS MAXIMUM MOUNTING HEIGHT
                C
```

```
C     PCTRED EQUALS PER CENT RED TRANSMISSION
C
C     OPT1  -- OPTION TO PRINT OUT ON UNIT M A COMPLETE LIST OF DISTANCES
C         AND ILLUMINATION FOR EACH AXIS, FOR EACH DATA SET .NOT. BYPASSED,
C         I.E., EACH DATA SET MEETING THE SELECTION CRITERIA
C
C     OPT2  -  OPTION TO PRINT OUT ON UNIT M A LIST OF THE DISTANCES AND
C         ILLUMINATION  ALONG THE VERTICAL AND/OR HORIZONTAL AXES OF
C         A DATA SET THAT HAS BEEN BYPASSED FOR NOT MEETING THE SELECTION
C         CRITERIA
C
C     OPT3  -- OPTION TO PRINT OUT CRITICAL VALUES IN A FORMAT SUITABLE
C         FOR RAPID SCANNING.
C
C     HEADER - LAMP IDENTIFICATION, UP TO 40 CHARACTERS
C
C     PHI  --  ANGLE FROM THE CENTER AXIS OF THE LAMP.
C     CP  --  CANDLE POWER
C     FCW  -- FOOT CANDLES WHITE
C     FCR  -- FOOT CANDLES RED
C
C        SUFFIXES, PREFIXES
C
C             V   - VERTICAL
C             H   - HORIZONTAL
C             TRB - TOP RIGHT TO BOTTOM LEFT
C             BRT - BOTTOM RIGHT TO TOP LEFT
C
C
C     TOP2BT  - DISTANCE FROM THE CENTER SPOT ALONG THE VERTICAL AXIS
C
C     RT2LFT  - DISTANCE FROM THE CENTER SPOT ALONG THE HORIZONTAL AXIS
C
C     TR2BL   - DISTANCE FROM THE CENTER SPOT ALONG THE 45 DEGREE AXIS,
C         TOP RIGHT TO BOTTOM LEFT
C
C     BR2TL   - DISTANCE FROM THE CENTER SPOT ALONG THE 45 DEGREE AXIS,
C         BOTTOM RIGHT TO TOP LEFT
C
0024        6  RDSET1 = .TRUE.
0025           ROSET2 = .TRUE.
C
C     RDSET1  - LOGICAL VARIABLE INDICATING FOR THE 4-AXIS METHOD WHETHER
C         THE CANDLEPOWER INPUT READINGS ON THE 45 DEGREE AXIS, TOP RIGHT
C         TO BOTTOM LEFT, REMAIN TO BE READ IN.
C
C     ROSET2  - SAME AS ROSET1, BUT FOR THE BOTTOM RIGHT TO TOP LEFT AXIS
C
0026           INTO   = (VNUM + 1) / 2
C     INTO  --  POINTER TO CENTER SPOT ALONG THE VERTICAL AXIS.
C
0027           IF ( NA2YA4 ) GO  TO 12
C
C     WRITE MESSAGE STATING 2 AXIS METHOD
```

```
DOS FORTRAN IV 360N-FO-479 3-5          MAINPGM          DATE   09/10/71     TIME    11.07.50      PAGE 0005

                C
0028                  WRITE (N,190)  IPAGE
0029                  WRITE (N,298)
0030                  WRITE (N,300)
                C
0031                  WRITE (L,190)  IPAGE
0032                  WRITE (L,298)
0033                  WRITE (L,300)
                C
0034                  GO TO 13
                C
                C          OUTPUT GUIDE GRAPH SHOWING MOUNTING POLE, DECK, AND
                C               SIGN CONVENTIONS FOR 4-AXIS METHOD
                C
0035                12  WRITE (N,335) IPAGE
0036                    WRITE (N,294)
0037                    WRITE (N,296)
                C
0038                13  WRITE (N,230) ( HEADER(I), I= 1,10)
0039                    DO 2 I = I, VNUM
0040                 2  READ (I,160) VPHI(I), CPV(I)
                C
0041                    IF (VPHI(INTOI .EQ. 0.0 ) GO TO 3
0042                    WRITE (N,170)
0043                    IF ( NA2YA4 ) GO TO 14
0044                    NOBLQ1 = 0
0045                    NOBLQ2 = 0
0046                14  NEXT   = HNUM + NOBLQ1 + NOBLQ2
0047                    CALL CLEARI NEXT, 0 )
0048                    GO TO 1
                C
                C       THE VERTICAL PHI READINGS SHOULD BE ARRANGED IN DESCENDING ORDER
                C           POSITIVE TO NEGATIVE
                C           THUS THE MIDDLE READING SHOULD BE 0 DEGREES.  IF NOT, SKIP
                C           THIS SOURCE AND READ ANOTHER.
                C
0049                 3 DO 4 I = I, HNUM
0050                 4 READ (I,160) HPHI(I), CPH(I)
                C
0051                    IF ( NA2YA4 ) GO TO 1009
0052                    WRITE (L,235)   HEADER
0053                    WRITE (L,220)   PCTRED
0054             1009 IF ( .NOT. OPT3 ) GO TO 1200
                C
                C       WRITE OUT QUICKSCAN TITLING AND HEADINGS
                C
0055                    IF ( NA2YA4 ) GO TO 2020
0056                    WRITE (QKSCAN,190) IPAGI
0057                    GO TO 2030
                C
0058             2020 WRITE (QKSCAN,335) IPAGI
0059             2030 WRITE (QKSCAN,305) (HEADER(I), I = 1,10), PCTRED
0060                    WRITE (QKSCAN,306)
0061                    WRITE (QKSCAN,307)
```

```
0062              LINE   = 23
                  C
0063              IF (RDLVL2 .EQ. 0.0) GO TO 1011
0064              WRITE (OKSCAN,325) (RDLVL1, RDLVL2, RDLVL2, RDLVL1, I = 1, 4 )
0065              GO TO 1200
                  C
0066             1011 WRITE (OKSCAN,315) (RDLVL1, I = 1, 8 )
                  C
0067             1200 DO 40 IH = HMIN, HMAX, INCHT
0068              H      = IH
                  C
                  C     H  EQUALS HEIGHT
                  C
                  C     FOR EACH MOUNTING HEIGHT , THE MOUNTING ANGLE OF THE LAMP IS VARIED
                  C         FROM 0 DEGREES TO 45 DEGREES, IN STEPS OF 5 DEGREES.  AFTER 45 DEG,
                  C         INCREMENT THE HEIGHT AND BEGIN AGAIN WITH 0 DEGREES.
                  C
0069              HTWRTN = .FALSE.
0070              DO 30 K = 5, 50, 5
0071              BYPASS = .FALSE.
0072              J      = K - 5
0073              INDX4  = FLOAT ( J ) / DEGINC + 1.
0074              D      = H / COSKWN (INDX4 )
                  C
0075              XO     = H * TANKWN (INDX4)
                  C     XO  --  DISTANCE FROM BASE OF 'MOUNTING POLE' TO CENTER SPOT.
                  C
                  C.....................................................................
                  C
                  C     VERTICAL
                  C
                  C.....................................................................
                  C
0076               5 DO 10 I = 1, VNUM
0077              PSI    = FLOAT (J) + VPHI (I)
0078              INDX3  = ABS ( PSI ) / DEGINC + 1.
0079              E      = (COSKWN(INDX3))**3 / (H*H)
0080              FCWV(I) = E * CPV(I) * 1000.
0081              FCRV(I) = FCWV(I) * PCTRED
0082              TANAID = TANKWN (INDX3)
0083              IF ( PSI( .LT. 0.0 ) TANAID = -TANAID
0084             10 TOP2BT(I) = H * TANAID - XO
                  C
                  C     REDCTR  --  RED CENTER ILLUMINATION
                  C
                  C     IF THE CENTER SPOT ILLUMINATION LEVEL IS LESS THAN 0.95 FOOT
                  C         CANDLES (FC), OR GREATER THAN 2.5 FC, BYPASS THIS CONFIGURATION.
                  C         ALSO BYPASS IF ANY ONE OF THE EXTREME OUTERMOST VERTICAL
                  C         OR HORIZONTAL EDGE ILLUMINATIONS IS GREATER THAN 0.3 FC.
                  C         INCREMENT THE MOUNTING ANGLE BY 5 DEGREES, AND PROCEED.
                  C
0085              REDCTR = FCRV(INTO)
0086              IF ((FCRV(I).GT.0.3).OR.(FCRV(VNUM).GT.0.3)) BYPASS = .TRUE.
0087              IF((REDCTR.LT.0.95) .OR. (REDCTR.GT.2.5)) BYPASS = .TRUE.
```

```
0088                IF (.NOT. BYPASS) GO TO 17
                C
0089                IF (.NOT. OPT2) GO TO 15
                C
0090                WRITE (M,201) (HEADER(I), I=1,10), IH, XO, J, PCTRED
0091                WRITE (M,200)
0092                WRITE (M,100) (VPHI(I), CPV(I), FCWV(I), FCRV(I), TOP28T(I),
                   *     I = 1, VNUM )
0093                GO TO 15
                C
0094              17 IF ( .NOT. OPT1 ) GO TO 16
0095                 WRITE (M,201) (HEADER(I), I=1,10), IH, XO, J, PCTRED
0096                 WRITE (M,200)
0097                 WRITE (M,100) (VPHI(I), CPV(I), FCWV(I), FCRV(I), TOP28T(I),
                    *     I = 1, VNUM )
0098              16 CALL NDXSET ( VNUM, FCRV, NDXLO1, NDXHI1, ROLVL1 )
                C                                                                    C
0099                 IF ( ROLVL2 .NE. 0.0 ) CALL NDXSET ( VNUM, FCRV, NDXLV, NDXHV,
                    1     ROLVL2 )
                C
0100                 BL      = TOP28T (NDXLO1)
0101                 BKT     = TOP28T INDXHI1)
0102                 BK      = ABS (BKT)
0103                 BLBK    = BL + BK
                C
0104                 IF ( NA2YA4 ) GO TO 57
                C
                C.....................................
                C
                C     TWO AXIS METHOD,  VERTICAL OUTPUT DETERMINATION
                C
                C.....................................
                C
                C     RADIAM  --  RADIAL DIAMETER IN 2-AXIS TECHNIQUE.  I.E., THE DISTANCE
                C         BETWEEN CRITICAL VALUE ILLUMINATION LEVELS I.2 FC) ALONG THE
                C         VERTICAL AXIS.
                C
                C     EIVP  --  EDGE ILLUMINATION, VERTICAL PLUS EDGE
                C
                C     EIVM  --  EDGE ILLUMINATION, VERTICAL MINUS EDGE
                C
0105                 EIVP    = FCRV(NDXLO1)
0106                 EIVM    = FCRVINDXHI1)
                C
0107                 RADIAM = IFIX ( BLBK + 0.5 )
                C
                C.....................................................................
                C
                C     HORIZONTAL
                C
                C..... .....................................................................
                C
0108              57 IF ( OPT1 ) WRITE (M,110)
                C
```

```
0109              DO 20 I = 1, HNUM
0110              HORANG = HPHI (I)
0111              INDX3  = ABS ( HORANG ) / DEGINC + 1.
0112              GG     = D / COSKWN(INDX3)
0113              FCWH(I) = H * CPH(I) * 1000. / (GG * GG * GG)
0114              FCRH (I) = FCWH (I) * PCTRED
0115              TANAID = TANKWN (INDX3)
0116              IF ( HORANG .LT. 0.0 ) TANAID = - TANAID
0117           20 RT2LFT (I) = D * TANAID
                C
                C              BYPASS IF ANY ONE OF THE EXTREME OUTERMOST VERTICAL
                C          OR HORIZONTAL EDGE ILLUMINATIONS IS GREATER THAN 0.3 FC.
                C
0118              IF ((FCRH(1).GT.0.3).OR.(FCRH(HNUM).GT.0.3)) BYPASS = .TRUE.
0119              IF (.NOT. BYPASS ) GO TO 18
0120              IF (OPT2) WRITE (M,100)(HPHI(I), CPH(I), FCWH(I), FCRH(I),
                 *     RT2LFT(I), I = 1, HNUM )
0121              GO TO 15
                C
0122           18 IF (OPT1) WRITE (M,100)(HPHI(I), CPH(I), FCWH(I), FCRH(I),
                  *     RT2LFT(I), I = 1, HNUM )
                C
0123              CALL NDXSET ( HNUM, FCRH, NDXLO2, NDXHI2, RDLVL1 )
0124              IF ( RDLVL2 .NE. 0.0 ) CALL NDXSET ( HNUM, FCRH, NDXLH, NDXHH,
                 1      RDLVL2 )
                C
0125              CF1    = RT2LFT (NDXLO2)
0126              CF2T   = RT2LFT (NDXHI2)
0127              CF2    = ABS (CF2T)
0128              CF1CF2 = CF1 + CF2
                C
0129              IF ( NA2YA4 ) GO TO 58
                C.............................
                C
                C     TWO AXIS METHOD,  HORIZONTAL OUTPUT DETERMINATION
                C
                C.............................
                C
                C     TRDIAM  --  TRANSVERSE DIAMETER IN 2-AXIS TECHNIQUE. I.E., THE DISTANCE
                C         BETWEEN  CRITICAL VALUE ILLUMINATION LEVELS I.2 FC) ALONG THE
                C         HORIZONTAL AXIS.
                C
                C     EIHP  -- EDGE ILLUMINATION, HORIZONTAL PLUS EDGE
                C     EIHM  -- EDGE ILLUMINATION, HORIZONTAL MINUS EDGE
                C
0130              TRDIAM = IFIX ( CF1CF2 + 0.5 )
0131              EIHP   = FCRH (NDXLO2)
0132              EIHM   = FCRH (NDXHI2)
0133              AREA   = PIOVR4 * RADIAM * TRDIAM
                C
0134              IF ( HTWRTN ) GO TO 19
0135              WRITE (L,240) (H
0136              HTWRTN = .TRUE.
                C
```

```
0137          19  WRITE (L,210) J, XO, RADIAM, TRDIAM, AREA, REDCTR, EIVP, EIVM,
                 1     EIHP, EIHM, BL, BK, CF1, CF2
0138              GO TO 605
             C
0139          58  IF ( OPTI ) WRITE (M,I30)
             C
             C.................................................................
             C
             C      OBLIQUE AXES
             C
             C.................................................................
             C
0140              CALL OBLIQ ( NOBLQ1, TRBPHI, CPTRB, FCWTRB, FCRTRB, TR2BL, -1.,
                 <     RDSET1 )
             C
0141              CALL NDXSET ( NOBLQ1, FCRTRB, NDXLO4, NDXHI4, ROLVL1 )
0142              IF ( RDLVL2 .NE. 0.0 ) CALL NDXSET ( NOBLQ1, FCRTRB, NOXLT, NOXHT,
                 1      RDLVL2 )
             C
0143              IF ( OPTI ) WRITE (M,135)
             C
0144              CALL OBLIQ ( NOBLQ2, BRTPHI, CPBRT, FCWBRT, FCRBRT, BR2TL, 1.,
                 ,     RDSET2 )
             C
0145              CALL NDXSET ( NOBLQ2, FCRBRT, NDXLO3, NDXHI3, RDLVL1 )
0146              IF ( RDLVL2 .NE. 0.0 ) CALL NDXSET ( NOBLQ2, FCRBRT, NOXLB, NOXHB,
                 1      RDLVL2 )
             C
             C
             C      OUTPUT SECTION FOR ABRIDGED ILLUMINATION PROFILE
             C
0147         605  IPAGE  = IPAGE + 1
0148              WRITE (N, 201) HEADER, IPAGE, IH, XO, J, PCTRED
             C
0149              WRITE (N,260)
0150              LINEN  = 15
0151              CALL RESET (INDX1V, INDX2V, NOXLO1, NDXHI1, VNUM)
0152              ISUM   = INDX1V + INDX2V
             C
0153              DO 610 I = INDX1V, INDX2V
             C
             C          PRINT MINUS TO PLUS
             C
0154              II     = ISUM - I
0155              WRITE (N,180) TOP2BT(II), FCRV(II)
0156              LINEN  = LINEN + 1
0157              IF ( LINEN .LE. 56 ) GO TO 610
0158              IPAGE  = IPAGE + 1
0159              WRITE (N,205) HEADER, IH, J, IPAGE
0160              LINEN  = 2
0161         610  CONTINUE
             C
0162              WRITE (N,120) BL, BK, BLBK
             C                                                                  C
```

```
0163                IF ( .NOT. NA2YA4 ) GO TO 625
                C
0164                WRITE (N,270)
0165                LINEN  = LINEN + 7
0166                CALL RESET ((NDX1B, INDX2B, NDXLD3, NDXHI3, NDBLQ2 )
                C
0167                DO 620 I = INOX1B, INOX2B
0168                WRITE (N,180) BR2TL (I), FCRBRT(I)
0169                LINEN  = LINEN + 1
0170                IF ( LINEN .LE. 56 ) GO TO 620
0171                IPAGE  = IPAGE + 1
0172                WRITE (N,205) HEADER, IH, J, IPAGE
0173                LINEN  = 2
0174              620 CONTINUE
                C
0175              625 WRITE (N,280)
0176                LINEN  = LINEN + 7
0177                CALL RESET ((NDX1H, INOX2H, NDXLD2, NDXHI2, HNUM)
                C
0178                DO 630 I = INOX1H, INDX2H
0179                WRITE (N,180) RT2LFT(I), FCRH(I)
0180                LINEN  = LINEN + 1
0181                IF ( LINEN .LE. 56 ) GO TO 630
0182                IPAGE  = IPAGE + 1
0183                WRITE (N,205) HEADER, IH, J, IPAGE
0184                LINEN  = 2
0185              630 CONTINUE
                C
0186                WRITE (N,125) CF1, CF2, CF1CF2
                C
0187                IF ( .NOT. NA2YA4 ) GO TO 650
                C
0188                WRITE (N,290)
0189                LINEN  = LINEN + 7
0190                CALL RESET ((NDX1T, INDX2T, NDXLO4, NDXHI4, NDBLQ1 )
0191                ISUM   = INDX1T + INDX2T
                C
0192                DO 640 I = INOX1T, INDX2T
                C
                C       PRINT MINUS TO PLUS
                C
0193                II     = ISUM - I
0194                WRITE (N,180) TR2BL(II), FCRTRB(II)
0195                LINEN  = LINEN + 1
0196                IF ( LINEN .LE. 56 ) GO TO 640
0197                IPAGE  = IPAGE + 1
0198                WRITE (N,205) HEADER, IH, J, IPAGE
0199                LINEN  = 2
0200              640 CONTINUE
                C
0201              650 IF ( .NOT. DPT3 ) GO TO 30
                C
0202                IF ( NA2YA4 ) GO TO 660
                C
```

```
0203                IF (RDLVL2 .EQ. 0.0) GO TO 1031
                C
0204                WRITE (QKSCAN,340) IH, XO, J, BKT, TOP2BT(NDXHV), TOP2BT(NDXLV),
                   A      BL, CF2T,  RT2LFT(NDXHH), RT2LFT(NDXLH), CF1
0205                LINE    = LINE + 2
0206                IF ( LINE .GT. 54 ) GO TO 1015
0207                GO TO 30
                C
0208             1031 WRITE (QKSCAN,350) IH, XO, J, BKT, BL, CF2T, CF1
0209                LINE    = LINE + 2
0210                IF ( LINE .GT. 54 ) GO TO 1015
0211                GO TO 30
                C
0212               660 IF (RDLVL2 .EQ. 0.0) GO TO 1021
0213                WRITE (QKSCAN,320) IH, XO, J,
                   A      BKT             , TOP2BT(NOXHV), TOP2BT(NDXLV), BL             ,
                   B      BR2TL (NOXH(3), BR2TL (NOXH8), BR2TL (NDXL8), BR2TL (NDXLO3),
                   C      CF2T            , RT2LFT(NDXHH), RT2LFT(NDXLH), CF1            ,
                   D      TR28L (NOXHI4), TR28L (NDXHT), TR28L (NOXLT), TR28L (NDXLO4)
0214                LINE    = LINE + 2
0215                IF ( LINE .GT. 54 ) GO TO 1015
0216                GO TO 30
                C
0217             1021 WRITE (QKSCAN,310) IH, XO, J, BKT           , BL
                   A      BR2TL(NDXHI3), BR2TL(NOXLO3), CF2T, CF1,
                   B      TR28L(NDXHI4), TR28L(NDXLO4)
0218                LINE    = LINE + 2
0219                IF ( LINE .GT. 54 ) GO TO 1015
0220                GO TO 30
                C
0221             1015 IPAG1  = IPAG1 + 1
0222                WRITE (QKSCAN,335)  IPAG1
0223                LINE    = 1
0224                GO TO 30
                C
0225               15 IF ( OPT2 ) WRITE (M,250)
0226               30  CONTINUE
0227               40  CONTINUE
                C
0228                IF (ROSET1 .AND. NA2YA4) CALL CLEAR ( NOBLQ1, NOBLQ2 )
                C
                C       ARE THERE OTHER SOURCES?
                C
0229                GO TO 1
                C
                C       FORMATS
                C
0230               100 FORMAT ( F20.1, F19.2, 3F21.2 )
0231               110 FORMAT ( '0' / '0' / 9X, 'HORIZONTAL' // )
0232               120 FORMAT ( '+', 55X,      'RADIAL "DIAMETER"  = ', F6.2, ' +', F6.2,
                      A     '  = ', F8.2 )
0233               125 FORMAT ( '+', 55X, 'TRANSVERSE "DIAMETER"  = ', F6.2, ' +', F6.2,
                      A     '  = ', F8.2 )
0234               130 FORMAT ( '0'/'0'/ 9X, 'TOP RIGHT TO ' / 10X, 'BOTTOM LEFT' )
```

```
DOS FORTRAN IV 360N-FO-479 3-5          MAINPGM           DATE   09/10/71     TIME     11.07.50

0235          135 FORMAT ( '0'/'0'/ 9X, 'BOTTOM RIGHT' / 10X, 'TO TOP LEFT' )
0236          140 FORMAT ( 10X, 2F10.1 )
0237          145 FORMAT ( 4I4, F8.3, 3L1, 10A4 )
0238          150 FORMAT ( 6I4, F8.3, 3L1, 10A4 )
0239          155 FORMAT ( I4, 2F6.1, 4I4 )
0240          160 FORMAT ( 2F10.1 )
0241          170 FORMAT ( '0 THE VERTICAL PHI READINGS ARE NOT IN PROPER ORDER.  '
                 A         'READ NEXT SOURCE, IF ANY.' )
              C
0242          180 FORMAT ( 2F20.2 )
0243          190 FORMAT ( '1HORIZONTAL AND VERTICAL AXES INPUT ONLY' T125, 'PAGE '
                 A         I4 )
0244          200 FORMAT (                  34X,'CANDLE', 15X, 'FOOT', 17X, 'FOOT',
                 D    15X,'DISTANCE'/16X,'PHI', 15X, 'POWER', 15X,
                 E    'CANDLES', 14X, 'CANDLES', 15X,'FROM'/ 38X, '-3', 15X, 'WHITE',
                 F    17X, 'RED', 16X,'CENTER'/ 34X, 'X 10' / 'D', 9X, 'VERTICAL'//)
              C
0245          201 FORMAT ('1', / '0'  10A4, T125, 'PAGE ' I4 /
                 *    'D' 2X, 'HEIGHT   =     ', I2, 4X, 'FEET',
                 A    16X, 'DISTANCE FROM BASE OF POLE TO CENTER SPOT = ', F7.2/  'D'
                 B    2X, 'THETA    =     ', I2, 4X, 'DEGREES', 13X, 'PER CENT RED',
                 C    10X, '=  ', F6.3 /'0' )
0246          205 FORMAT ( '1' 10A4, 8X  'MOUNTING HEIGHT  = ' I2, ' FEET' 8X
                 A         'MOUNTING ANGLE, THETA  = ' I2, ' DEGREES' T125, 'PAGE '
                 B         I4 / )
              C
0247          210 FORMAT ('0',  5X, I2, 9X, F5.1, 8X, I3, 11X, I3, 9X, I4, 5X, F6.2,
                 1    5X,  4F6.2, 4F7.1 )
              C
0248          220 FORMAT ( '+' 60X 'RED TRANSMISSION FACTOR (% RED)  = ' F6.3 /
                 Z    '0' 2X     'VERTICAL       RADIAL      R-RADIAL    T-TRANSVERSE
                 A AREA      CENTER' 14X 'EDGE' 19X 'SEMI-AXES LENGTH' / 4X
                 B    'AIMING       DISTANCE    (VERTICAL)    (HORIZONTAL)    (TRT)     ',
                 C    'ILLUMINA-' 10X, 'ILLUMINA-' / '+' 55X '___' /
                 D                                 5X 'ANGLE      TO CENTER     DIAMETER'
                 E    '       DIAMETER      I 4 )     TION, RED' 10X 'TION, RED' /
                 F    3X,  'DEGREES D        FT           FT            FT          ',
                 G    'FT*FT       FC' 18X,     'FC'/ '+', 10X, '-' /
                 H    80X '1' 5X '2' 5X '3' 5X '4' 6X 'B' 6X 'A' 6X 'C' 6X 'D' / '+'
                 I    79X '_' 5X '_' 5X '_' 5X '_' 6X '_' 6X '_' 6X '_' 6X '_' / )
              C
0249          230 FORMAT ( 'D' 10A4 / '0ABRIDGED ILLUMINATION PROFILE' )
0250          235 FORMAT ( '0' 10A4 )
              C
0251          240 FORMAT ( 9X, 4('_____________________________') / '+', 73X,
                 A     '|', 27X, '|' / '0', 45X, 'HEIGHT ', I2, ' FT.' / )
              C
0252          250 FORMAT ( ' THIS DATA SET HAS BEEN BYPASSED ' )
              C
0253          260 FORMAT ( '0   BOTTOM TO TOP  -  VERTICAL AXIS'/'0', I2X, 'DISTANCE
                 1         ILLUMINATION' /'0' )
              C
0254          270 FORMAT (/'0   BOTTOM RIGHT TO TOP LEFT - 45 DEGREE AXIS'/ '0',
                 1    12X, 'DISTANCE        ILLUMINATION' /'0' )
```

```
0255          280 FORMAT (/'0   RIGHT TO LEFT  -  HORIZONTAL AXIS'/'0', 12X,
                  1    'DISTANCE          ILLUMINATION' /'0' )
0256          290 FORMAT I/'0   BOTTOM LEFT TO TOP RIGHT - 45 DEGREE AXIS'/'0', 12X,
                  1    'DISTANCE          ILLUMINATION' /'0' )
              C
0257          294 FORMAT ( 32X  'TOP' /
                  A         18X 'TOP  *'  9X '|' 9X '*  TOP'   /
                  B         18X 'LEFT  *' 8X '|' 8X '*  RIGHT' /
                  C         25X      '*       |+       *'      /
                  D         24X    '- *       |       * +'     /
                  E         27X       '*      |      *'        /
                  F         28X        '*     |     *'         /
                  G         29X         '*    |    *'          /
                  H         30X          '*   |   *'           /
                  I         28X        '45 * | * 45'           /
                  J         14X 'LEFT _____________________________ RIGHT' /
                  K         '+' 19X '-'  12X '|' 12X '+' )
              C
0258          296 FORMAT (33X              '|'                 /
                  A         28X        '45 * | * 45'           /
                  B         30X          '*  |  *'             /
                  C         29X         '*   |   *'           /
                  D         28X        '*    |    *'          /
                  E         27X       '*     |     *'         /
                  F         24X     '- *     |      * +'      /
                  G         25X      '*      |-       *'      /
                  H         16X'BOTTOM *' 9X '|' 9X '* BOTTOM' /
                  I         17X 'LEFT'  12X  '|'  11X  'RIGHT' /
                  J         30X 'BOTTOM'        / '0' / '0' / 33X '0' /
                  K         '+' 32X 'X' / 27X 'MOUNTING POLE')
              C
0259          298 FORMAT ( '0', 32X, '3'/ 23X, '.  _________'/19X, '.+', 12X,
                  A     '|   +.' / 16X,'.+',15X, '|     +'/ 14X, '.', 18X, '|C      +'
                  B     ,12X, 'MOUNTING' / 13X, '.', 19X, '|', 8X, '+', 13X, 'POLE' /
                  C     11X, '1 ______________________________ 2', 11X, '0' )
              C
0260          300 FORMAT ( '+', 12X,'+',19X,'|',9X,'+',13X,'X' / 13X,
                  A     '+<------ B -------->|<--- A-->+' / 14X,'.', 18X, '|', 8X, '+'
                  B     / 15X, '+', 16X, 'D|', 7X, '+' / 17X, '+.', 14X, '|', 4X, '.+'
                  C     / 22X, '++.._________..+' / '+', 32X, '|' / 33X, '4' / '0' )
0261          305 FORMAT (     73X '*   TOP   *' / ' LAMP    - ' 5A4, 38X 'TOP  *  '
                  A     ' |+  *  TOP' 22X 'A | .' / 69X 'LEFT -*  |  *+ RIGHT' 21X
                  B     '| |    .' / ' FIXTURE - ' 5A4, 45X '* | *' 29X '| |' 7X '.' /
                  C     78X '|' 31X 'H |  0' 7X '.' / '+' 114X '-' / 67X 'LEFT  -' 4X
                  D     '|' 4X '+ RIGHT' 20X '| |<' 12X '.' / '+' 66X '__________ '
                  E     '__________' / ' TRANSMISSION FACTOR -' F6.3, 50X '|' 31X
                  F     '| |' I6X '.' )
0262          306 FORMAT ( 3X '(PER CENT REQ)' 59X '* | *' 29X 'V |_____________'
                  A     '___.' / 74X '-*  |  *+' / 67X 'BOTTOM *   |   * BOTTOM' 23X
                  B     '<-------- D ------->' / 68X 'LEFT *    |-   *RIGHT' / 75X
                  C     'BOTTOM' / '0' 77X 'X' / 72X 'MOUNTING POLE')
0263          307 FORMAT ( '0' I6X '|<',4('-----'),' VERTICAL AXIS ',4('-----'),
                  A     '>|<',3('------'),'- HORIZONTAL AXIS -',3('------'),'>' /
                  B     17X,4( '|' 28X ) / 17X '|<------BOTTOM TO TOP------->|<-'
```

```
     C    'TOP LEFT TO BOTTOM RIGHT->|<------LEFT TO RIGHT------->|<-'
     D    'BOTTOM LEFT TO TOP RIGHT->' / ' _________________',4('|',
     E    7('____') ) / 17X , 4('|', 7('____')) / '+' 13X, 4(1X,
     F    2(6X, '-'), 2(6X '+')) / '  H' 4X 'O' 5X 'O' 3X,
     G    4('| DIR DIST TO ILLUM LEVEL OF ' ) / '+' 12X '-' )
0264      310 FORMAT ( 'O' I2, F7.1,   I4, 3X, 4('|', 6X, 2F7.1, 8X))
0265      315 FORMAT ( 17X, 4( '|', 9X, F3.1, 4X, F3.1,  9X ) /
        A    '+', 12('__________'))
0266      320 FORMAT ( 'O', I2, F7.1,   I4, 3X, 4('|', 4(F6.1, 1X)))
0267      325 FORMAT ( 17X, 4 ( '|', 2X, 3(F3.1, 4X) , F3.1, 2X) /
        A    '+', 12('__________'))
0268      335 FORMAT ( '1' T125, 'PAGE ' I4 )
0269      340 FORMAT ( 'O' I2, F7.1, I4, 3X, 2('|', 4(F6.1, 1X), '|' 28X ))
0270      350 FORMAT ( 'O' I2, F7.1, I4, 3X, 2('|', 6X, 2F7.1, 8X '|' 28X ))
0271          END
```

```
0001            SUBROUTINE OBLIQ ( NOBLQI, TRBPHI, CPTRB, FCWTRB, FCRTRB, TR2BL,
              *     SIGN, RDSET )
          C
0002            INTEGER*4 NOBLQI
0003            INTEGER*2 HAFWAY, HAFAGN, II, I
0004            LOGICAL*1 POSITV, OPT1, RDSET, NA2YA4
          C
0005            DIMENSION TRBPHI(40), CPTRB(40), FCWTRB(40), FCRTRB(40), TR2BL(40)
0006            COMMON XO, SQRT2, D, PCTRED, PI, DEGRAD, H, M, N, OPT1, NA2YA4
          C
0007            HAFWAY = IFIX( FLOAT(NOBLQI) / 2. )
0008            POSITV = .TRUE.
0009            COSGAM = SIGN * XO / (SQRT2 * D )
          C
0010        200 GAMMA = ARCOS ( COSGAM )
0011            DSNGAM = D * SIN ( GAMMA )
          C
0012            DO 390 II = 1, HAFWAY
0013            IF ( POSITV ) I = II
0014            IF ( .NOT. POSITV ) I = HAFAGN + II
0015            IF (RDSET) READ (1,160) TRBPHI(I), CPTRB(I)
          C
          C     CONVERT DEGREES TO RADIANS
0016            BETA = TRBPHI(I) * DEGRAD
          C
0017            DELTA = PI - (GAMMA + ABS ( BETA ) )
0018            SNDELT = SIN ( DELTA)
0019            GG = DSNGAM / SNDELT
0020            FCWTRB (I) = H * CPTRB(I) * 1000./ (GG * GG * GG )
0021            FCRTRB (I) = FCWTRB(I) * PCTRED
0022            TR2BL(I) = D * SIN (BETA) / SNDELT
0023            IF ( OPT1 ) WRITE (M,100) TRBPHI(I), CPTRB(I), FCWTRB(I), FCRTRB
              A     (I), TR2BL(I)
0024        390 CONTINUE
          C
0025            IF ( POSITV ) GO TO 300
0026            RDSET = .FALSE.
0027            RETURN
          C
0028        300 HAFAGN = HAFWAY + 1
0029            IF (RDSET) READ(1,160) TRBPHI(HAFAGN), CPTRB(HAFAGN)
0030            FCWTRB(HAFAGN) = H * CPTRB(HAFAGN) * 1000. / (D*D*D)
0031            FCRTRB(HAFAGN) = FCWTRB(HAFAGN) * PCTRED
0032            TR2BL (HAFAGN) = 0.0
0033            I = HAFAGN
0034            IF ( OPT1 ) WRITE (M,100) TRBPHI(I), CPTRB(I), FCWTRB(I), FCRTRB
              A     (I), TR2BL(I)
0035            POSITV = .FALSE.
0036            COSGAM = - COSGAM
0037            GO TO 200
          C
0038        100 FORMAT (15X, F5.1, 13X, F6.2,             3(15X,F6.2))
0039        160 FORMAT ( 2F10.1 )
0040            END
```

```
UOS FORTRAN IV 360N-FO-479 3-5          NDXSET              DATE    08/06/71      TIME     08.02.35

 0001                SUBROUTINE NDXSET ( VNUM, FCR, INDX1, INDX2, RDLVL )
 0002                INTEGER*4 VNUM
 0003                INTEGER*2 INDX1, INDX2, IJ, JK
 0004                LOGICAL*1 NA2YA4, OPT1
 0005                COMMON X0, SQRT2, D, PCTRED, PI, DEGRAD, H, M, N, OPT1, NA2YA4
                C
                C       SUBROUTINE NDXSET FINDS THE CRITICAL ILLUMINATION VALUES (RDLVL)
                C           AND SETS POINTERS TO THEM
                C
                C           INDX1  -- POINTER TO POSITIVE VALUE (DIRECTED DISTANCE) LIMIT
                C
                C           INDX2  -- POINTER TO NEGATIVE VALUE (DIRECTED DISTANCE) LIMIT
                C
                C
 0006                DIMENSION FCR(40)
                C
 0007                TWORED = 2.0 * RDLVL
                C
 0008                DO 14 IJ=2, VNUM
 0009                IF(FCR(IJ).LT. RDLVL) GO TO 14
 0010                IF (FCR(IJ) +FCR(IJ-1) - TWORED) 16, 16, 17
 0011          16    INDX1 =IJ
 0012                GO TO 18
 0013          17    INDX1= IJ-1
 0014                GO TO 18
 0015          14    CONTINUE
                C
                C
 0016          18    DO 19 IJ=2,VNUM
 0017                JK= VNUM -IJ+1
 0018                IF (FCR(JK).LT. RDLVL) GO TO 19
 0019                IF (FCR(JK)+FCR(JK+1) - TWORED) 21, 21, 22
 0020          22    INDX2= JK+1
 0021                RETURN
 0022          21    INDX2=JK
 0023                RETURN
 0024          19    CONTINUE
                C
 0025                END
```

```
DOS FORTRAN IV 360N-FO-479 3-5          RESET                DATE    08/06/71      TIME     08.01.59

0001                SUBROUTINE RESET ( INDX1, INDX2, NDX1, NDX2, MNUM )
0002                IMPLICIT INTEGER*2 (I,N)
0003                INTEGER*4 MNUM
                C
0004                IF ( NDX1 .EQ. 1 ) GO TO 61
0005                INDX1 = NDX1 - 1
0006                GO TO 62
0007              61 INDX1 = NDX1
                C
0008              62 IF ( NDX2 .EQ. MNUM ) GO TO 63
0009                 INDX2 = NDX2 + 1
0010                 RETURN
0011              63 INDX2 = NDX2
0012                 RETURN
0013                 END
```



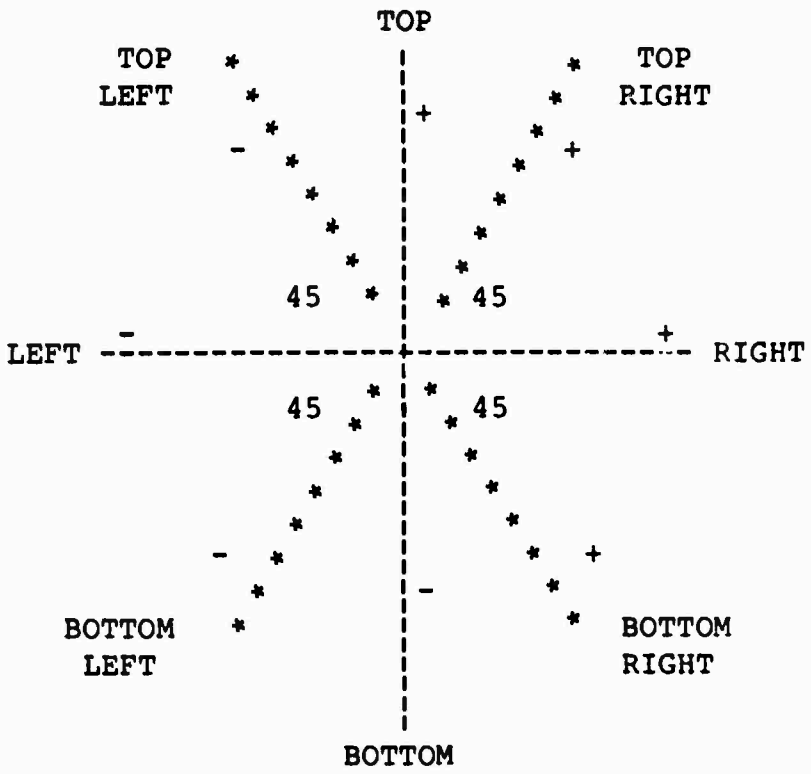
```
DOS FORTRAN IV 360N-FO-479 3-5          CLEAR                DATE    08/06/71      TIME     08.01.43      PAGE 0001

0001                SUBROUTINE CLEAR ( NOBLQ1, NOBLQ2 )
                C
0002                INTEGER*4 NOBLQ1, NOBLQ2
0003                INTEGER*2 NUMBR, I
0004                LOGICAL*1 NA2YA4, OPTI
0005                COMMON XO, SQRT2, O, PCTRED, PI, DEGRAD, H, M, N, OPTI, NA2YA4
                C
0006                NUMBR = NOBLQ1 + NOBLQ2
0007                DO 10 I = 1, NUMBR
0008              10 READ (1,160) ANGL, CANPOW
                C
0009                WRITE (N,220)
0010              220 FORMAT ( ' NO ACCEPTABLE COMBINATIONS FOUND FOR THIS SOURCE. INPUT
                     A CLEARED.' )
0011              160 FORMAT ( 2F10.1 )
0012                 RETURN
0013                 END
```

Appendix C

User's Guide

(A User's Guide for the Template Method Computer Program)

The template method computer program processes candlepower distributions for two or four axes and computes an illumination profile, a lighting pattern which is characteristic of a given lamp, mount (fixture), mounting height and angle. The axes' candlepower distributions must be structured according to the following format:



MOUNTING POLE

The axis labels are in accord with the view from behind the lamp and along the center line of the beam. Such readings are not generally available, and have consequently been expressly measured by NAVSHIPRANDCEN Annapolis.

The program requires known cosine and tangent values from 0° to 90°. It is currently set up to read in these values in increments of 2.5°, thus accounting for the index of 37 in the first read statement. This 2.5° increment is consistent with the increment in the candlepower distribution inputs; for the purposes of table lookup of cosines and tangents, it must be read in next as the quantity, DEGINC. Thus, the first data cards to be read contain:

Columns 1-10 ϕ	Columns 11-20 cos ϕ	Columns 21-30 tan ϕ
0.0	1.0000000	0.0
2.5	0.9990482	0.0436609
5.0	0.9961948	0.0874885
7.5	0.9914449	0.1316522
10.0	0.9848078	0.1763267
12.5	0.9762962	0.2216945
15.0	0.9659260	0.2679489
17.5	0.9537172	0.3152984
20.0	0.9396929	0.3633699
22.5	0.9238798	0.4142129
25.0	0.9063081	0.4663069
27.5	0.8870112	0.5205662
30.0	0.8660258	0.5773493
32.5	0.8433918	0.6370692
35.0	0.8191525	0.7002062
37.5	0.7933539	0.7673256
40.0	0.7660451	0.8390981
42.5	0.7372780	0.9163293
45.0	0.7071074	0.9999981
47.5	0.6755909	1.0913057
50.0	0.6427884	1.1917505
52.5	0.6087623	1.3032217
55.0	0.5735774	1.4281445
57.5	0.5373008	1.5696802
60.0	0.5000018	1.7320423
62.5	0.4617503	1.9209728
65.0	0.4226198	2.1444979
67.5	0.3826848	2.4142036
70.0	0.3420222	2.7474566
72.5	0.3007076	3.1715708
75.0	0.2588207	3.7320242
77.5	0.2164420	4.5106554
80.0	0.1736503	5.6712065
82.5	0.1305282	7.5956392
85.0	0.0871584	7.5956392
87.5	0.0436218	11.4296980
90.0	0.0	22.9024658
DEGINC	2.5	99999999.9 (∞)

Each source to be evaluated will be read in one axis at a time, vertical, horizontal, top-right-to-bottom-left, and bottom-right-to-top-left. For a source with only two axes' input available the last two will, of course, to be omitted. Two cards must precede these inputs, however. The first must contain the following:

Column 4	a single digit, the number of axes to be processed, 2 or 4. (AXESNO)
5-10	the minimum illumination acceptable in foot-candles (ft-c), in this case 0.2 ft-c. (RDLVL1)
11-16	a second illumination level of interest, if any. (e.g., 0.5 ft-c). (RDLVL2)
17-20	the desired increment for mounting heights, we have generally used 4 feet. This quantity must be right justified, i.e., in column 20. (INCHT)
24	the unit number indicating which computer I/O device to which you will output the complete illumination distribution, if so desired; usually a tape.
28	the unit number indicating which you will output the "abridged illumination distribution profile".
32	the unit number indicating which computer I/O device to which you will output the "quickscan summary format", if so desired; usually a tape, to be listed after the corresponding "abridged" profile.

The format of the next card depends on whether the source to follow has two- or four-axes inputs.

For the two-axis the card should contain:

Column 1-4 VNUM, the number of candlepower input readings on the vertical axis, right justified.

5-8 HNUM, the number of candlepower input readings on the horizontal axis, right justified.

9-12 HMIN, the minimum mounting height to be considered, right justified.

13-16 HMAX, the maximum mounting height to be considered, right justified.

17-24 PCTRED, percent transmission of red filter used. For the Kopp 6350 filter, PCTRED = 0.15 (15%).

25 OPT1, option (valued T or F), to permit printing of a complete list of distances and illuminations for each axis, for each data set not bypassed; i.e., each data set meeting the selection criteria.

26 OPT2, option (valued T or F), to permit printing of a complete list of distances and illuminations along the vertical and/or horizontal axes of a data set that has been bypassed for not meeting the selection criteria.

27 OPT3, option (valued T or F), to permit printing of critical values in a format suitable for rapid scanning, the "quickscan format".
Note: If OPT3 = F, RDLVL2 should be equal to 0.0.

28-47 title identifying the lamp.

48-67 title identifying the fixture or mount.

For the four-axis technique, the card should contain:

Column 1-4	VNUM, same as two-axis.
5-8	HNUM, same as two-axis.
9-12	NOBLQ1, the number of candlepower input readings on the oblique (45°) axis, top-right-to-bottom left.
13-16	NOBLQ2, the number of candlepower input readings on the oblique (45°) axis, bottom-right-to-top-left.
17-20	HMIN, same as two-axis.
21-24	HMAX, same as two-axis.
25-32	PCTRED, same as two-axis.
33	OPT1, same as two-axis.
34	OPT2, same as two-axis.
35	OPT3, same as two-axis.
36-55	lamp identification.
56-75	fixture identification.

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13. ABSTRACT
This report describes a simple procedure for designing red lighting systems for use during night shipboard underway replenishment. Use of this method, which employs a federal stock lighting fixture, produces a lighting system layout plan that can be used to verify and check the adequacy of the lighting system. The method is sufficiently general that it can be utilized to design various lighting systems using other types of lighting fixtures.

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