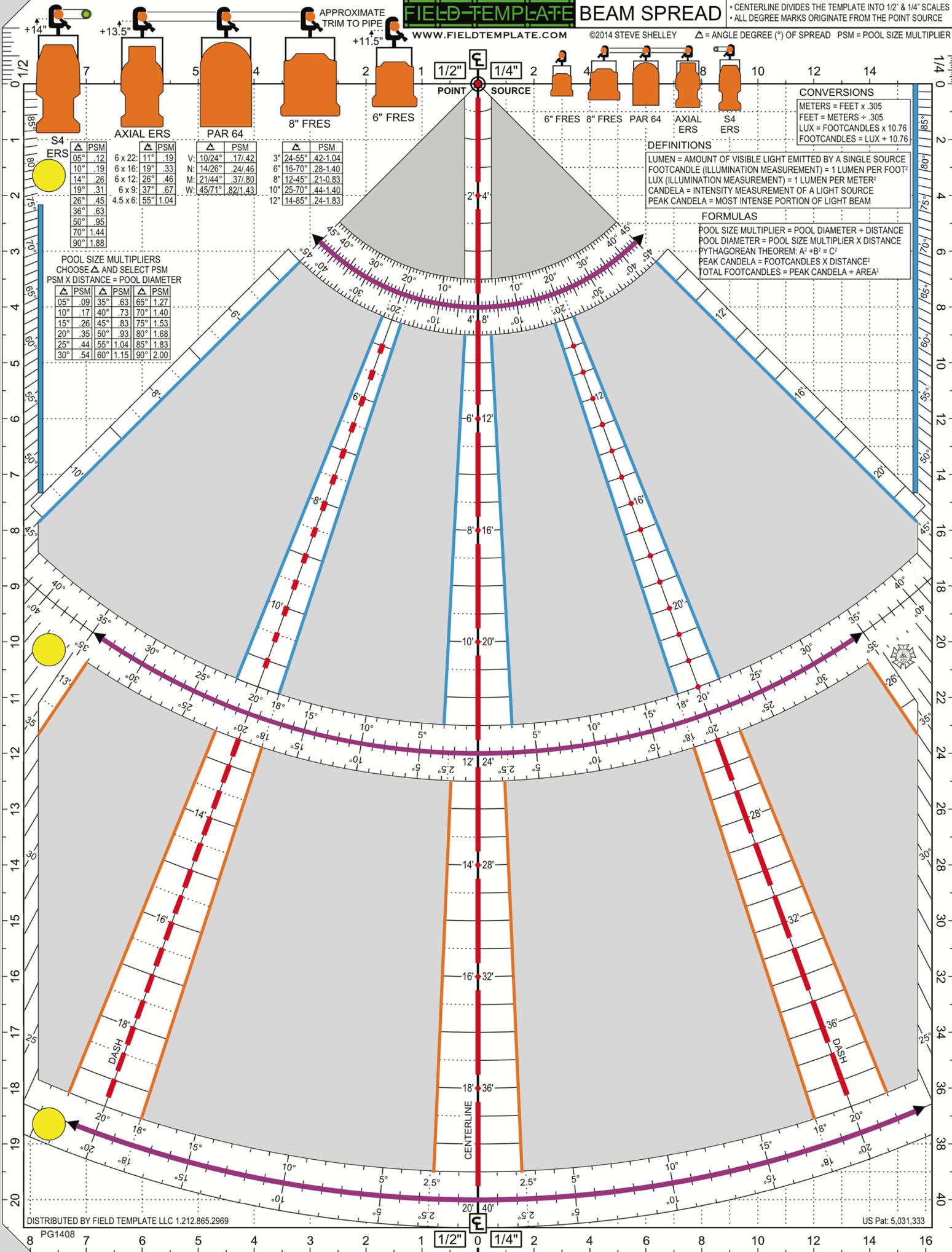


# FIELD-TEMPLATE BEAM SPREAD

• CENTERLINE DIVIDES THE TEMPLATE INTO 1/2" & 1/4" SCALES  
 • ALL DEGREE MARKS ORIGINATE FROM THE POINT SOURCE

WWW.FIELDTEMPLATE.COM ©2014 STEVE SHELLEY Δ = ANGLE DEGREE (°) OF SPREAD PSM = POOL SIZE MULTIPLIER



**CONVERSIONS**

METERS = FEET x .305  
 FEET = METERS x .305  
 LUX = FOOTCANDLES x 10.76  
 FOOTCANDLES = LUX ÷ 10.76

**DEFINITIONS**

LUMEN = AMOUNT OF VISIBLE LIGHT EMITTED BY A SINGLE SOURCE  
 FOOTCANDLE (ILLUMINATION MEASUREMENT) = 1 LUMEN PER FOOT²  
 LUX (ILLUMINATION MEASUREMENT) = 1 LUMEN PER METER²  
 CANDELA = INTENSITY MEASUREMENT OF A LIGHT SOURCE  
 PEAK CANDELA = MOST INTENSE PORTION OF LIGHT BEAM

**FORMULAS**

POOL SIZE MULTIPLIER = POOL DIAMETER ÷ DISTANCE  
 POOL DIAMETER = POOL SIZE MULTIPLIER X DISTANCE  
 PYTHAGOREAN THEOREM: A² + B² = C²  
 PEAK CANDELA = FOOTCANDLES X DISTANCE²  
 TOTAL FOOTCANDLES = PEAK CANDELA ÷ AREA²

**APPROXIMATE TRIM TO PIPE**

Beam Type	Angle (Δ)	PSM
S4 ERS	05°	.12
AXIAL ERS	6 x 22°	11° .19
AXIAL ERS	6 x 16°	19° .33
AXIAL ERS	6 x 12°	26° .46
AXIAL ERS	6 x 9°	37° .67
AXIAL ERS	4.5 x 6°	55° 1.04
PAR 64	10/24°	17.42
PAR 64	14/26°	24.46
PAR 64	21/44°	37.80
PAR 64	45/71°	82/1.43
6" FRES	3°	24-56° 42-1.04
6" FRES	6°	16-70° 28-1.40
6" FRES	8°	12-45° 21-0.83
6" FRES	10°	25-70° 44-1.40
6" FRES	12°	14-85° 24-1.83

**POOL SIZE MULTIPLIERS**  
 CHOOSE Δ AND SELECT PSM  
 PSM X DISTANCE = POOL DIAMETER

Δ	PSM	Δ	PSM	Δ	PSM
05°	.09	35°	.63	65°	1.27
10°	.17	40°	.73	70°	1.40
15°	.26	45°	.83	75°	1.53
20°	.35	50°	.93	80°	1.68
25°	.44	55°	1.04	85°	1.83
30°	.54	60°	1.15	90°	2.00



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## Directions for the Field Template™ BEAM SPREAD STENCIL for Legacy Users (Folks who grok beam spreads)

The Field Template™ **BEAM SPREAD STENCIL** allows for accurate light beams to be calculated, measured, and drawn. The template also simplifies construction of overlapping light beams to create even washes of light in groundplan view, front elevation, and sectional drawings. The printed information on the template provides conversions, definitions, formulas, and a host of multiplier information to calculate beam pool size for any light beam up to 90 degrees.

The Field Template™ **BEAM SPREAD STENCIL** is a grid laid out on vinyl plastic that is slightly larger than a piece of letter-sized paper. The stencil consists of three rows of [SHADED] polygon "Pie Pieces" distributed between three sets of plastic "Support Struts." Below each row of Pie Pieces is a [LAVENDER] protractor with the "Zero Degree" centered in the middle of the Center Support Strut, the Centerline. The cut-out [RED] "dot-and-dash" Centerline runs vertically through the middle of the template, dividing the grid into two scales; half-inch scale on the left, and quarter-inch scale on the right.

At the top of the Centerline is the [RED] Point Source cut-out hole, which is the "Zero Point" for the entire template. It's vertically aligned with the [ORANGE] cut-out lighting symbols on either side, as well as the printed scales that run vertically along each side edge of the template. Distances in both scales are also printed on either side of Centerline, as well as the Side Support Struts. In this way it's possible to measure scaled distances from the middle of any light beam, as well as either edge of the light beam.

The edges of the Support Struts are designed to trace basic beam angles. The outside of the bottom Center Support Strut [ORANGE] traces a 5-degree light beam. The inside of the Side Support Struts [BLUE and ORANGE] traces a 36-degree light beam. The outside of the Side Support Struts traces a 44-degree light beam [*in anticipation for that new 44-degree lighting instrument-NOT!*].

The Point Source is also the "Zero Point" for all of the degree marks as well. The degree marks radiate from the Point Source on either side of Centerline. In addition to being printed above and below each of the three [LAVENDER] cut-out protractors, the degree marks can also be seen inside the rectangular "frame" printed inside the scales touching the edges of the template. Degree notations greater than 45-degrees [on either side] can be marked using one of the vertical [BLUE] "gutters" starting above the outside middle-row of Pie Pieces.

Generic trim distances, from the bottom of the batten to the yoke point, are shown above each of the [ORANGE] cut-out lighting symbols. Basic directions and a legend are printed in the top right-hand corner of the template. Four sets of reference information are printed on the template; the right-hand side [quarter-inch scale] includes rectangular boxes explaining Conversions, Definitions, and Formulas, while the left-hand side [half inch scale] includes several printed rectangles defining Field Angle Spreads and Pool Size Multipliers, both for the cut-out lighting fixtures, and for generic light beams.

Finally, the Field Template™ Beam Spread Stencil is slightly taller than a piece of paper. The three [YELLOW] holes running vertically on the left-hand side allows it to fit into the rings of a three-ring binder, so the template sticks above the rest of the pages, like a tab separator. To insure the plastic doesn't catch on the notebook's metal release tabs, the top-and-bottom left-hand corners are cut at a diagonal angle.

To allow for the greatest possible flexibility, the Field Template™ Beam Spread Stencil is designed with very large holes. For that reason, this template is a relatively delicate flower. The template must be handled and stored with care, to insure longevity. If the template is used as a door chock or a windshield snow scraper, the template will break. Field Template takes no responsibility for any broken Field Templates. It is the responsibility of the end user to treat this stencil, like all plastic templates, with respect.



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## **Directions for the Field Template™ BEAM SPREAD STENCIL for Young Users** (Folks who are just learning about beam spreads)

The Field Template™ **BEAM SPREAD STENCIL** is more than just a template that's useful to trace matching symbols. It is a tool designed to rapidly construct beam angle drawings and construct overlapping light beam systems. It can draw the edge of any light beam up to 180 degrees. Combined with a measured distance, information on the stencil makes it possible to calculate the projected size of any light beam pool up to 90 degrees.

**DISCLAIMER:** The Field Template™ **BEAM SPREAD STENCIL** is designed to allow internal lines to be drawn using the edges of the Support Struts. For that reason, this template is a relatively delicate instrument. Care must be taken in the way the template is handled and stored to insure longevity. If the template is used as a door chock or a windshield snow scraper, the template will break. Field Template takes no responsibility for any broken Field Templates. It is the responsibility of the end user to treat this device, and all plastic templates, with respect.

### **Template Arrangement**

[Viewing these directions with the the color-coded map printed out may assist comprehension. Either that, or the user may instead view the color image online at [www.fieldtemplate.com/plastic/beamsread\\_dir\\_frame.html](http://www.fieldtemplate.com/plastic/beamsread_dir_frame.html).]

The concept for the Field Template™ **BEAM SPREAD STENCIL** is based on a single light beam, which originates at the Point Source cut-out hole [located at the top of the stencil, under the [GREEN] Field Template logo.] As a light beam radiates out from a single source, so all of the degree notations fan out from the [TOP RED CIRCLE] Point Source. The stencil consists of three rows of [SHADED] "Pie Pieces" distributed between three sets of plastic "Support Struts." Below each row of Pie Pieces is a [LAVENDER] protractor with "Zero Degree" based on Centerline, emanating from the Point Source.

- The template is 8 1/2" wide x 11 1/4" tall. The three [YELLOW] holes running vertically on the left-hand side of the template allow it to fit into a three-ring binder.
- With that in mind, the left-hand top and bottom corners of the template are trimmed at an angle, to prevent the plastic from getting caught in the metal ring-release levers in the notebook.
- The three [YELLOW] holes are located in the plastic so that the top of the template sticks up above the surrounding paper, acting as a tab separator.
- The [RED] Centerline Cutouts [dash-and-dot holes], running vertically on the Center Support Strut, bisect the scales of the template. The scale on the left-hand side is 1/2", while the right-hand side is 1/4".
- The scale rules on either side edge of the template reflect this difference, reducing the need for scale rules. Horizontal scales also run across the top and bottom edge of the Centerline.
- The Point Source is the top hole of the [RED] vertical Centerline, located in a small outlined circle. The Point Source is the origin for all of the degree marks on the template.
- All of the degree marks originate from the Point Source. The outside edges of the top two [SHADED] "Pie Pieces" are at 45 degrees *on either side* of Centerline.
- The degree marks appear on either side of the three [LAVENDER] Protractor Arcs, and inside the rectangular border "frame" box of the template. Each protractor arc is an uninterrupted cut through the plastic, allowing for both tic marks and smooth radius arcs to be drawn without an additional drafting device.
- While the overall cutout span of the template is 90 degrees, the degree marks and numeric identifiers continue up each side of the template, for a total of 180 degrees. A vertical [BLUE] cutout "gutter," towards the top of each side of the template, allows additional degree tic marks outside of the 45 degree angle cutouts to be made.



- The [ORANGE] lighting symbol cutouts across the top perimeter of the template visually reinforce the difference in the two scales on either side of Centerline.
- The [ORANGE] lighting symbol cutouts are pre-spaced on 1'-6" centers, in their relative scale.
- The [ORANGE] lighting symbol cutouts are vertically positioned so that the template only needs to be shifted left or right to allow the Point Source to be properly positioned inside any lighting symbol. The lighting symbol cutouts are provided to facilitate beam section drawings, while reducing dependence on additional templates.
- Above each lighting symbol is a circle cutout inside of a printed c-clamp, representing a batten pipe. The printed distance indicates the height from the Yoke Point to the bottom of the batten pipe.
- The middle and bottom rows of "Pie Pieces" are horizontally separated from one another by the Center Support Strut and two Side Support Struts.
- The four series of [RED] dashed-cutouts on each Side Support Strut provides four regulated dashed patterns that can be used while constructing dashed-beam diagrams.

### **Template Components**

- The [RED] Centerline Cutouts define the "zero degree", or the middle of a light beam [replacing the "90 degree" identification for the same line seen on other protractors.] By making Centerline "zero," it's no longer necessary to add to or subtract from 90 to calculate beam spreads.

The template's design makes it possible to determine the linear distance or the Actual Throw Distance from the Point Source through the middle of a light beam, or along the edge of a light beam:

- The Zero Points of the 1/2" and 1/4" scales [printed vertically on each side edge of the template] are aligned to the top horizontal line bisected by the Point Source.
- These same scaled distances are also displayed on the arc lines that appear on the Center Support Strut [on either side of the [RED] Centerline cutouts.]
- These same arc distances [from the Point Source] are also printed on the 20-degree Support Struts.
- Finally, these same distances are printed outside of the 45-degree angle cuts of the middle row of [SHADED] "Pie Pieces."
- In this way, it's possible to measure scaled distances from the middle of any light beam, as well as either edge of the light beam.

The degree numbers displayed on either side of each [LAVENDER] Protractor Arc are shown both right-side up and upside-down; in this way, the numbers can be read whether the template is right-side up tracing downlight in front elevations, or upside-down tracing frontlight in groundplans.

The edges of the Pie Pieces can be used to trace diagonal lines originating from the Point Source:

- The outside edges of the top pair of Pie Pieces can be used to trace 45° angle lines.
- The edges of the middle row of Pie Pieces [BLUE] can be used to trace 3°, 18°, 22°, or 45° angle lines on either side of Centerline.
- The edges of the bottom row of Pie Pieces [ORANGE] can be used to trace 2.5°, 18°, 22°, or 45° angle lines on either side of Centerline.

Generic trim distances, from the bottom of the batten to the yoke point, are shown above each of the [ORANGE] cut-out lighting symbols.

Basic directions and a legend are printed in the top right-hand corner of the template.



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## **Template Indicia**

The upper right-hand corner contains three INFORMATION RECTANGLES:

- The CONVERSIONS BOX includes the transformation formulas between meters and feet, and footcandles and lux.
- The DEFINITIONS BOX provides explanations for Lumen, Footcandle, Lux, Candela, and Peak Candela.
- The FORMULAS BOX provides the equations for Pool Size Multiplier, Pool Diameter, Pythagorean Theorem, Peak Candela, and Total Footcandles.

In the upper left-hand corner, four BEAM POOL MULTIPLIER BOXES are shown for the sampling of basic lighting instruments; ETC Source Four, Axial Ellipsoidal, PAR 64, and Fresnels.

Underneath those boxes is the GENERIC BEAM POOL MULTIPLIER BOX showing the fundamental beam spreads in 5 degree increments.

## **Usage Notes:**

In order to draw lines or arcs using the BEAM SPREAD STENCIL, it is necessary to press down the plastic onto the paper while drawing along any edge of the stencil. Tests have shown that and amount of pressure required to immobilize the stencil is no greater than any other template. Doing so will insure there is no line deflection while tracing any element of the stencil.