Chapter 3 - Visual Objects

There are four fundamental types of objects that may be included in a Visual lighting model. They are **Background Objects**, **Solid Objects**, **Luminaires**, and **Calculation Zones**. With these four fundamental elements, virtually any type of interior and/or exterior lighting system can be modeled to include the effects of obstructions and diffusely reflective surfaces.
### 3.1 Background Objects

Background Objects, as the name would imply, are graphical elements that may be included in the lighting *model* for visual reference only.

**Background Objects** consist solely of lines, rectangles, polygons, circles, arcs and text.

The most common kind of Background Objects are those imported from CAD files. Imported CAD files are automatically converted to Background Objects exclusively.

**Lines** identifying the location of islands or stalls in a parking lot, for instance, would classify as Background Objects. They are useful for establishing valid locations for Luminaire placement and for communicating such placement in relation to other objects or pertinent elements of the *model*.

Visual includes a variety of commands to create and manipulate Background Objects to aid in *model* construction and otherwise describe a lighting *model*.

Valid Background Objects (closed areas such as circles, rectangles, and polygons) may be converted to Solid Objects if desired. For more information on converting object types, reference Convert to Solid.

**Background Objects** do not affect lighting calculations in any way nor do they change with changes in Display Mode. See Display Modes for more information.
3.2 Solid Objects

**Solid Objects (Solids)** are planar surfaces, and/or collections of planar surfaces, that impede or alter the flow of light.

**Solids** may simply block light (Direct Only Calculation Mode) or they may reflect or transmit it according to an assigned Reflectance or Transmittance value. The specified Reflectance value, applies to both sides of a Solid Object and is related to Color.

As implied by the term "surface" that is often used to describe them, **Solid Objects** must be comprised of an enclosed area such as a circle, rectangle, or polygon. A line, for instance, cannot be a Solid Object because it has no two-dimensional area.

**Solids** are used to model physical objects such as walls, ceilings, and partitions among other architectural elements and can be created in a group using the **Room** or **Structure** commands.

A **Transmittance** can be assigned (after creation) by editing the object **Properties**.

**Solid Objects** may be calculationally inactivated, individually or in groups, from within the **Properties** tab of the **Sidebar** as well.

**Solids** are always drawn with thick, black lines and they can be converted to **Background Objects**, if desired. For more information on converting object types, reference section Convert to Background.

The appearance of **Solid Objects** in the Design Environment can be changed with the **Shaded**, **Rendered**, and **Transparent** Display Modes.

Note that **Solids** are shown in this manual as they appear in **Transparent Display Mode** and are therefore shaded/filled.
3.3 Luminaires

In Visual, the term *Luminaire* applies to the photometric, graphical, and descriptive characteristics of objects (*Luminaire Types*) created within the *Luminaire* Schedule Editor.

In the most simple case, *Luminaires* are a single entity like a *downlight*.

For more information on *Luminaire* configuration, reference the *Luminaire* chapter.

A *Luminaire* can also be a more complex assembly of multiple optical assemblies ("heads") arranged in a particular manner at the top of a *pole*.

The most complex assembly uses different photometric files for different heads.

Once placed, *Luminaires* are treated like any other graphical object within the Design Environment in that they can be manipulated with most commands on the Modify tab of the Ribbonbar.

Move, Copy, Erase, Array Polar, Array Rectangular, Mirror, and Rotate are commands that operate on *Luminaires*.

*Luminaires* may be calculationally inactivated in the Layer Manager.

*Luminaire Properties* can be modified in the Properties tab of the Sidebar.
3.4 Calculation Zones

Calculation Zones are regions where calculations are computed and reported. These zones may be lighting-based or power-based.

Calculation Zones can be lighting-based (Illuminance, Luminance, etc) or power-based (Lighting Power Density). By default, Visual shows Lighting Calculation Zones in dark red and Lighting Power Density Zones are shown with a olive border and are furthermore shaded.

Lighting Calculation Zones can be defined by rectangular areas, areas bounded by a polygon, or can be locations along a linear path. Calculation Zones can also be placed directly on surfaces (Solid Objects).

The boundary of the Calculation Zone is indicated by a dashed line and points indicated by crosses are placed in an array defined by the user.

Visual assumes the light meter orientation to be perpendicular to the defining (bounding) plane. This can be modified at creation or by editing Properties after creation.

Lighting Calculation Zones can be modified to remove points that are unwanted using the Masking commands. Points can be Masked with rectangles, polygons, by surface, or individually.

Mask boundaries are shown with a dashed purple line.

The display of the Mask boundary can be turned on or off in the Settings dialog.
Statistical Zones can be created to report information about part of a Lighting Calculation Zone. Statistical Zones are displayed in the Statistics tab of the Sidebar separately from their parent zone.

Statistical Zones can be created with rectangles, polygons, or by selecting surfaces. Statistical Zones can be grouped in the Sidebar for an additional level of reporting and analysis.

Statistical Zone boundaries are shown with a dashed dark green line. Notice how the internal points are omitted by astute boundary selection. Calculation points included in the Statistical Zone have a different symbol.

For example, only the paved area could be shown for a parking lot. Points in the Statistical Zone are indicated with green asterisk symbols by default.

Lighting Power Density (LPD) Zones can be defined by rectangular areas, areas bounded by a polygon. They have associated luminaires specifically applied to the calculation. LPD Zones can also be placed directly on surfaces (Solid Objects).

Calculation Zones may be calculationally inactivated in the Layer Manager.

The Properties of Calculation Zones can be modified in the Properties tab of the Sidebar (see Calculation Zone Properties). Global changes can be made to attributes, like default color, in the Settings dialog (see Calculation Zones Settings).