

# Style Points by Class, Elevation, Intensity

LIDAR point clouds in the standard LAS file format that are displayed in TNTmips Pro are provided with a specialized Lidar Layer Controls window that allows you to select and style the points based on their LIDAR characteristics. The Technical Guide entitled *LIDAR: LAS Point Cloud Display Options* provides an overview, while *LIDAR: Select Points by Class, Return Type, Intensity* describes point characteristics and associated selection procedures.

The Style menu on the Lidar Layer Control window's Style tabbed panel has a *ClassificationStyle* option that provides access to the standard Assign Style by Attribute window for setting colors, symbols, and sizes for the points based on their LIDAR point class (see the Tutorial entitled *Creating and using Styles*). However, a more flexible set of choices are provided when you choose the *Special* option from Style menu. When you choose this option, controls are provided for quickly setting point colors using a variety of LIDAR point characteristics (class, elevation, return intensity, and return type), while points can be set to be all the same size or assigned a range of sizes based on intensity.

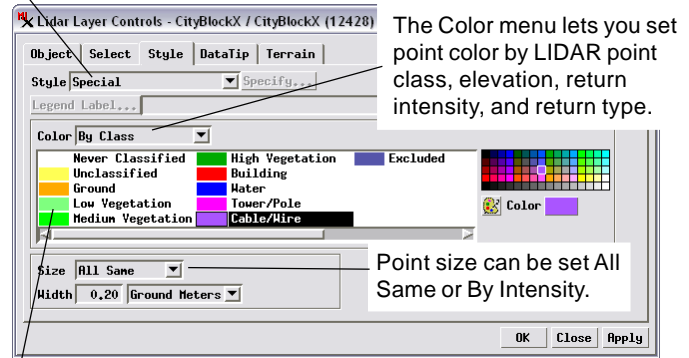
## Point Colors by Class

Choosing By Class from the Color menu provides a streamlined interface for viewing and modifying point colors assigned to the LIDAR classes, as shown in the illustration at top right of this page. Each available point class is listed along with a color sample showing its assigned color. You can easily reassign any class color by selecting the class name in the listing and choosing a new color from the color palette on the right side of the panel. A view with all LIDAR points selected for display and styled by class is illustrated to the right.

## Point Colors by Elevation

The By Elevation color option applies a color spread to the range of LIDAR point elevations in the LAS file, as illustrated in the view shown below right. Style controls provided with this option include a Spread menu from which you can choose a predefined color spread or the Manual option. For the Manual option you use the color buttons to the right of the Spread menu to choose starting and ending colors and the Path menu to choose a color path (such as RGB, HIS Clockwise, and others). When you choose the By Elevation color option, a continuous color-scale legend is automatically provided in the View. The Legend Length setting on the Style panel sets the length (in screen pixels) of this legend. (over)

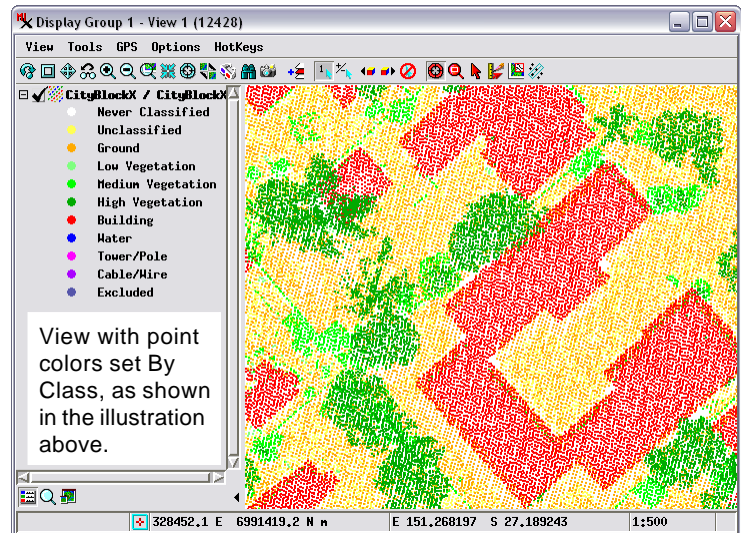
The Style tabbed panel on the Lidar Layer Controls window provides a *Special* option on the Style menu that allows you to easily vary the color and size of points on the basis of specific LIDAR attributes.



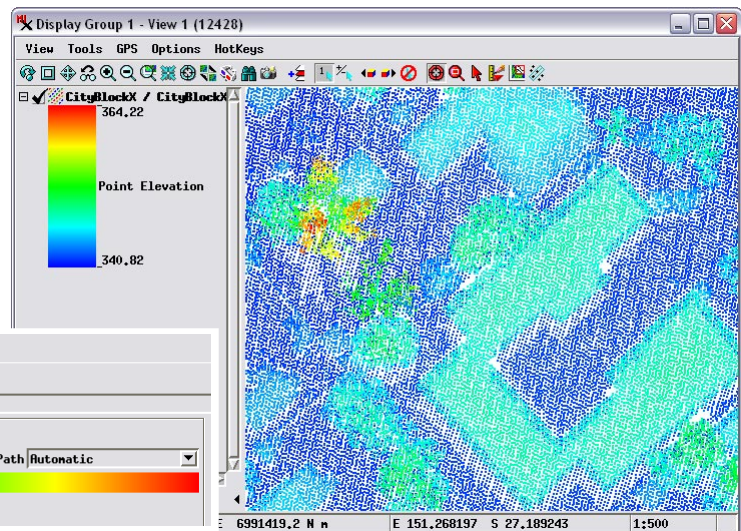
The Color menu lets you set point color by LIDAR point class, elevation, return intensity, and return type.

Point size can be set All Same or By Intensity.

Setting the Color menu to By Class provides a listing of LIDAR classes and their currently assigned colors. You can change any class color by selecting the class in the listing and picking a new color using the color palette on the right side of the panel.



View with point colors set By Class, as shown in the illustration above.

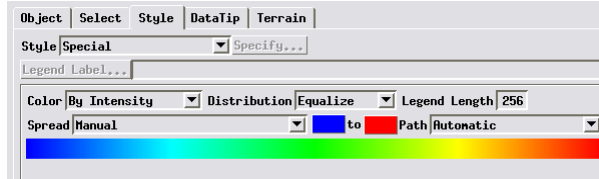


Controls for the Color By Elevation option let you choose or design an elevation color spread to color the LIDAR points.

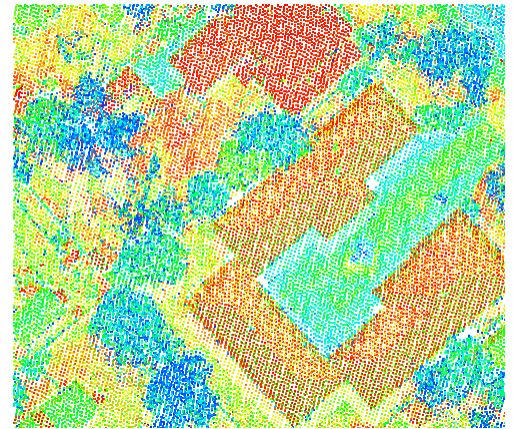
All points styled by elevation, with color scale shown in LegendView. Tree tops are the highest elevations in this urban scene.

## Point Colors by Intensity

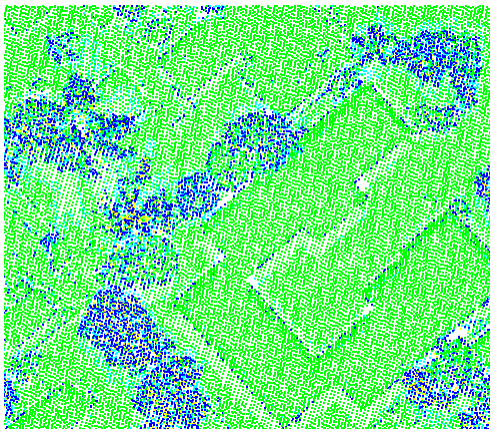
The By Intensity color option applies a color spread to the range of LIDAR return intensities in the LAS file, as illustrated in the view shown to the right. The color spread controls for intensity are similar to those for elevation, described on the reverse. The only addition for intensity is the Distribution menu, which allows you to apply a mathematical redistribution to the range of intensity values before the color spread is applied to the points. The Distribution options are Linear, Equalize, Normalize, and Logarithmic. The nonlinear redistribution options can produce a more discriminating color spread when there are extreme outliers in the intensity range. A continuous color range intensity legend is automatically provided in LegendView.



The By Intensity color option allows you to set a numerical distribution option for the intensity values and then applies a color spread to the adjusted values.



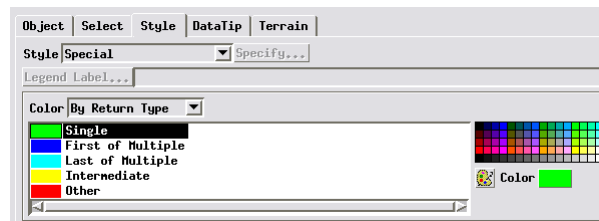
All points colored by intensity using the Equalize distribution option. Bright-colored building roofs show the highest return intensities (red colors), while trees (which generate multiple returns) show the lowest intensity values.



All points colored by return type (above left) as shown in the Lidar Layer Controls illustration above. Single return points (green) are generated by solid surfaces such as the ground and building roofs. Multiple returns (blue, cyan, and yellow) are generated by vegetation and building edges.

## Point Colors by Return Type

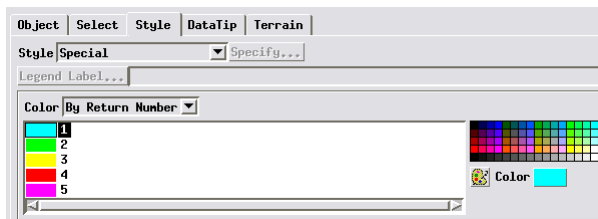
The By Return Type color option assigns point colors to the 5 return types (Single, First of Multiple, Last of Multiple, Intermediate, and Other) that are listed on the Style panel. You can easily reassign any return type color by selecting the type name in the listing and choosing a new color



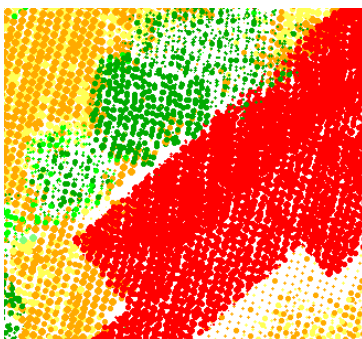
from the color palette on the right side of the panel. A view with all LIDAR points selected for display and styled by return type is illustrated to the left.

## Point Colors by Return Number

The By Return Number color option assigns point colors to return numbers 1 through 5. You can easily reassign any return number color by selecting the type name in the listing and choosing a new color from the color palette on the right side of the panel.

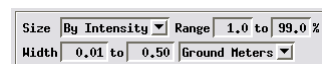


The illustration to the right shows all LIDAR points colored by return number using the colors shown in the Lidar Layer Controls illustration above. Return 1 includes both single returns and the first of multiple returns.



## Point Size All Same or by Intensity

The Style panel also provides controls that let you set point size to be all the same, or to vary the size by intensity. The latter option allows you to portray variations in intensity using the point size and another LIDAR attribute using point color.



You can set point size to vary by intensity and limit the percentage intensity range to exclude spurious high or low values, as shown in the illustration of the controls above. In the zoomed view excerpt shown to the left, points are colored by class and sizes set by intensity. Smaller, low-intensity points are primarily multiple returns from vegetation (green) and ground returns (orange) from the shadowed southeast side of the building (red).

All points can be set to the same width (as shown below) in screen pixels, in millimeters or inches on screen, or in ground meters.

