Section Subdivision Symbologies
Jan. 16, 2004

Reviewing and editing section subdivision instructions is very tedious and time-consuming work. A great deal of efficiency can be realized by utilizing a spatial interface for this task if the user was provided visual clues symbolizing the kind of method that was used to create each point and line. No point symbols for this purpose have been deployed in any software known to us. Following are guesses as to what would be intuitive. The experiences of software designers and feedback from the users will result in modifications in the shape and size of these symbols.

Symbols may be defined for certain scale ranges. In some cases there must be a way to inquire further into the details of a feature. A tool tip at each symbol is one example. The user will want a capability to select a point or line for editing where the system will respond by providing an editing screen to modify parameters for the computation of the selected point or line, or even to change the construction method itself.

Some section configurations from subdivision-initial.doc appear near the end of this document in order for the reader to utilize background information about the sections displayed. If there is a section number, then the section can be found in the previous document.

A measured line, from the least square adjustment, is symbolized by a continuous line. Placing midpoint, proportioned or intersection points on measured lines do not change their symbology, even though the line becomes a succession of line segments.

A constructed line, like the centerline of a section or the centerline of a quarter section, is symbolized by a dashed line. These lines are created as a byproduct of an intersection computation. This line type is the current convention when distinguishing constructed lines from measured lines.

A line created between two existing points, with no point being created, is symbolized by a dashed line, but appearing grey to the color-blind and subdued to others. This line creation has been dubbed “add-a-line” and an instruction exists solely for its creation.

A measured point, from the least square adjustment, has a solid circular symbol with a radius of 92 feet if it is a corner that controls subdivision; otherwise the radius is 50 feet. If the point is along an offset line and the one side to which it controls is known, then the symbol is half of a circle, placed on the side to which it controls and appearing grey to the color-blind and subdued to others.

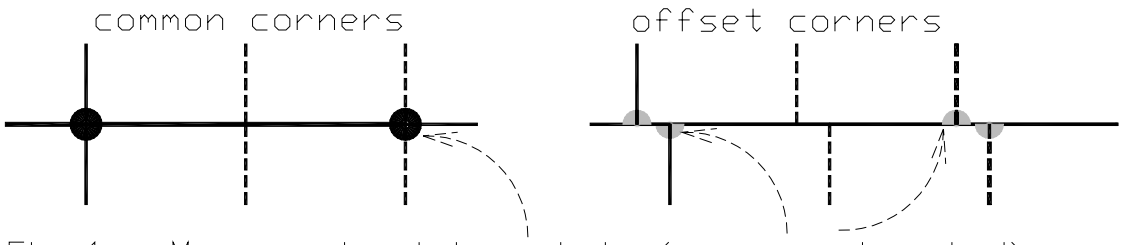


Fig. 1 - Measured point symbols (non-constructed)

A point created at intersection of two lines is a donut with an inside radius of 92 feet and an outside radius of 112 feet. The center of the donut is placed on the created point. If the point was created from an intersection computation, the color is bold (black or white to the color blind). If the point created was due to two lines crossing, then the color is subdued (grey to the color blind).

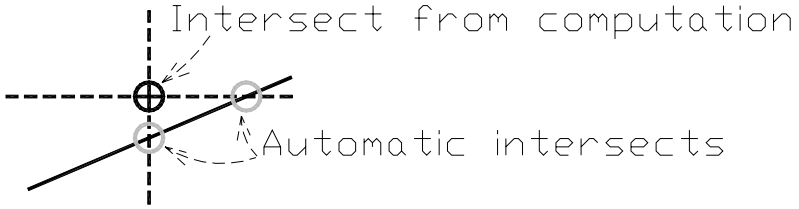


Fig. 2 - Intersection point symbols

A typical midpoint proportioned point symbol is an X consisting of 4 lines, each of 200 ft length each and 33 ft thick, diagonally radiating from the point. Exception: If the midpoint applies only to one side of the line, then only 2 lines are used, radiating diagonally from the point and in the direction of the side it controls and appearing grey to the color-blind.

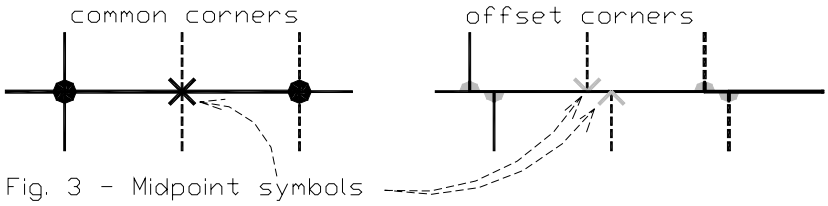


Fig. 3 - Midpoint symbols

A non-midpoint proportioned point symbol is two halves of an X, forming a double arrow, with two diagonals converging on the point and two diagonals are offset 100 feet. The length of each diagonal is 200 ft and is 33 ft thick. The symbol is to the side used in the calculation and from which the proportioned distance is applied. In Figure 3 below, an example calculation could be from the center 1/4 corner. [1320/2655]. The symbol is on the side of the 1320 foot segment in this example. If the inversed distance is 2651.38, then the applied distance [2651.38 * (1320/2655) = 1318.20] is applied to point 240540 to construct the point 220540.

1335 feet 1320 feet

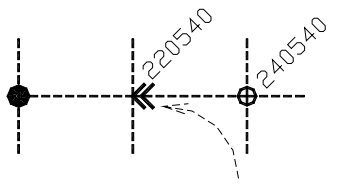


Fig. 4 - Proportionate symbol

A point calculated from a fixed distance along a line is symbolized by two lines forming half of an X, forming a single arrow, with two diagonals converging on the point created. The length of each diagonal is 200 ft and is 33 ft thick. The arrow points away from the point from which the fixed distance is applied. In addition to the arrow symbol is a rectangle 264 feet by 200 feet with its center placed 200 feet from the midpoint of the line (see Fig. 4, below) or from a weighted mean line symbol (see Fig. 7, below). The rectangle forms an area that, if picked by the user, displays the fixed distance. If the fixed distance creates a point that controls only to one side, then the symbol at the point is only one diagonal line and the rectangle is placed on the side to which the point controls and appears grey to the color-blind.

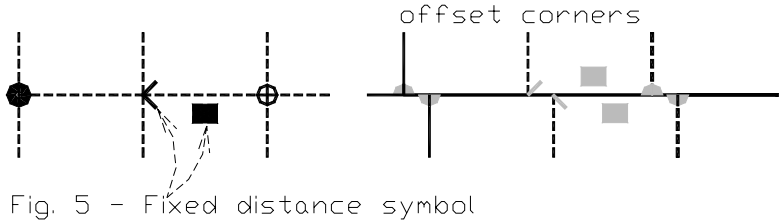


Fig. 5 - Fixed distance symbol

A line defined by weighted mean bearing is symbolized by two lines 660 feet long, 33 ft. thick, with the midpoint of which is offset 120 ft to both sides from the midpoint of the 1st quarter mile segment [this is the segment that is attached to the first point of construction, the point which the bearing is applied to.] If this first segment is shorter than 660 feet, then the length of the line symbol is one half of the segment's length.

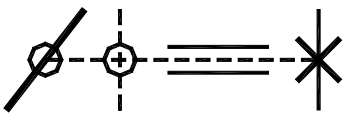
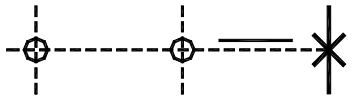


Fig. 6 - Weighted mean bearing

A line defined with a parallel line is symbolized by a single line 660 feet long, 33 ft. thick, with the midpoint of which is offset 120 ft from the midpoint of the 1st quarter mile segment [this is attached to the first point of construction, the point which the bearing is applied to.] If this first line is shorter than 660 feet, then the parallel line symbol is one half of the line's length. The offset direction is toward the line that defined the parallel value.



In this example, the line shown is parallel to a line above it.

Fig. 7 – Parallel line

A line defined by a fixed (user-specified) direction is symbolized by a rectangle 660 feet long, 132 ft. thick, with the midpoint of which is offset 132 ft from the midpoint of the 1st quarter mile segment [this is attached to the first point of construction, the point which the bearing is applied to.] If this first line is shorter than 660 feet, then the parallel line symbol is one half of the line's length and width is 1/5th the symbol length. The offset direction is toward the line that defined the parallel value. If the end user clicks on the rectangle, the system will display the fixed distance.

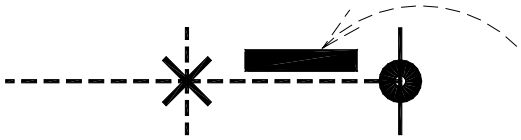


Fig. 8 – Fixed direction symbol

When distance and bearing are both fixed in value, then the symbols are placed so as not to touch each other, as in Fig. 7, below.

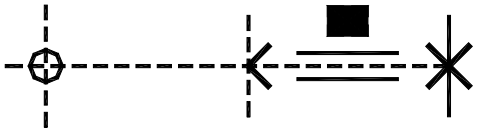


Fig. 9 – Weighted mean bearing and fixed distance symbols.

Examples of how these symbols will appear in context as the user contemplates these symbols as their part in the context of a whole section.

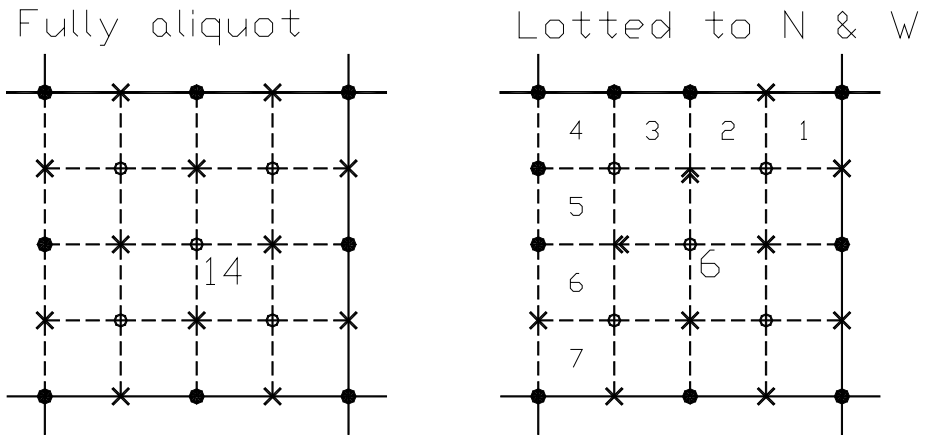


Fig. 10 -Typical sections

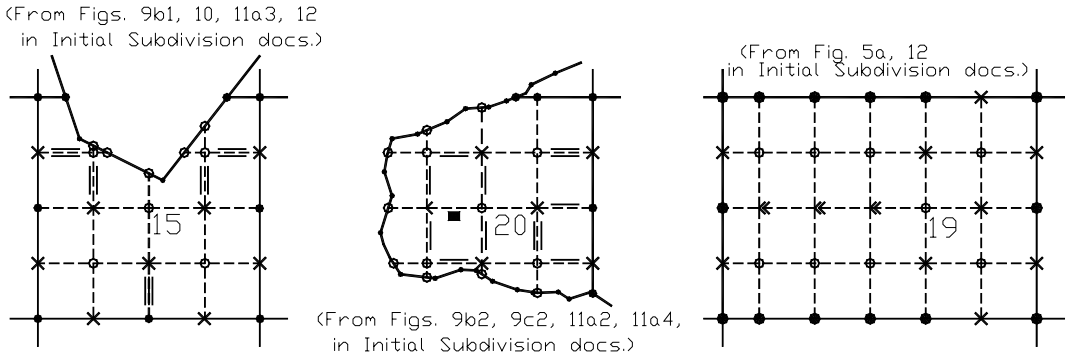


Fig. 11 - Examples of symbology for unusual sections

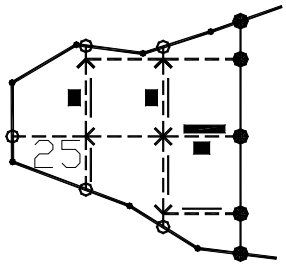


Fig. 12 - Example of 1 fixed bearing value and 3 fixed distance values

Scale ranges: When zoomed into certain scale ranges the symbols will have to take on different properties in order to see the underlying point and line connectivity. The symbol sizes would be measured in pixels (screen inches) rather than drawing units so that the whole symbol remains on the screen. The symbols will also have to assume

some transparency so that points underlying the symbol can be seen. This scale range would begin at a scale where one section would fill the screen.

Point symbol behavior: To assist the user in inquiring into details, each symbol could exhibit appropriate behaviors. When a point symbol is selected during an inquiry operation, the point is highlighted as well as the controlling points that are defined in the point's computation.

Line symbol behavior: There are rectangles that represent user-entered, fixed values of either distance or direction. If one of those rectangles is selected during an inquiry operation, the distance or direction is displayed as well as highlighting the point from which the distance or direction is applied. In the case of a distance, the point created from this distance is also highlighted.

Editing behavior: A point or line can be edited in three ways:

- Edit the fixed distance and direction values that are assigned to some computations.
- Change the points which are parameters of a method
- Change the method by which to create a point.

Logic of symbology:

Solid dots represent the foundation of the subdivision. The larger dots are explicitly called in the computations of subdivision points.

The smaller dots represent points that are not influencing the subdivision, although if these adjusted points occur on a section or subdivisional line that has a constructed point on it, then the adjusted point creates a bend in the line that must be accounted for in the calculations.

The hollow circles (donuts) are a symbol of inclusiveness – intersections include the lines which come into that circle.

The X that represents the point created at midpoint between two points is two arrows that equally point from the controlling corners.

The double arrows representing a point created at proportionate distance is symbolic of the two distances that create the proportion and point from the beginning construction point toward the point created.

The two wide lines representing a line whose direction was determined by weighted mean bearing have a symbol that suggests influence from both sides.

The one wide line representing a line whose direction was determined by being parallel has a symbol that suggests influence from only the side to which it is placed.

The long rectangle that represents a line whose direction was determined by a fixed direction has a symbol that is similar in placement and length as the other directional symbols, but has extra width to suggest it is holding a known value.

The shorter and wider rectangle for fixed distances somewhat represents the text. Text for distances is shorter in length than for text for bearings. The wider width provides a proportion that is more easily distinguishable from the fixed direction symbol.

Alternate symbology:

An alternate symbology can be considered. The logic for the alternate data is cleaner, but some alternate symbols may be harder to distinguish than the symbols described above. In this new scheme, all circular points would be from the least square adjustment. The donut symbol described above for intersections would be used as the symbol for a measured point that is not controlling the subdivision.

A new symbol would be created to symbolize intersection. This would be a diamond made from the elemental shapes that create the midpoint symbol.

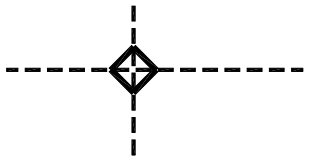


Fig. 13 - Alternate intersect symbol

A section would look similar to the ones below:

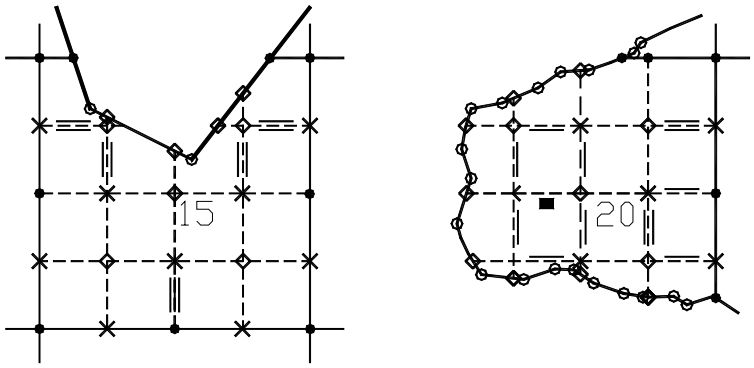


Fig. 14 - Sections with alternative symbols

The drawback in this alternate scheme is that the diamonds are easily confused with the donuts, as seen most dramatically in Section 20 of Figure 14, above.