**Map Types**

**There are a variety of major map types that can be used to display crime incidents. Digital maps can be extended well beyond push pins in a hanging map. In combination, map types can paint both images of individual incidents and overall trends. If not carefully constructed, digital crime maps can also be misleading.**

**\Subsection Dot Maps**

**Dot maps are a traditional mapping style where each dot represents a discrete object. Dot maps can be effective at showing where individual crime incidents occur and the distribution of many incidents across space.**

**Individual dots will be most accurately represented using a coordinate system such as latitude and longitude or state coordinates. When using data from different sources it is essential to use a single coordinate system. State coordinates cannot be accurately placed on a map developed using latitude and longitude because state map coordinates represent physical distances on the ground.**

**Dot size is also important. Dot sizes too large can oversaturate a map and lead to lots of overlap. Dot sizes too small can be hard to perceive. On the other hand, larger dots may be preferred to obfuscate the exact location of incidents. If a dot overlaps a few residencies rather than pointing to a single residence it will offer some protection of privacy to victims and/or accused. If a formal algorithm for selecting dot size is not used, it is best to compare several dot sizes to determine the most accurate and useful representation of a single incident. With leaflet, dot sizes can increase upon zoom to retain their relative size to the geographical area they represent. This is an important feature to have so that upon closer inspection the location of a single dot still appears to be in the correct coordinate space.**

**Dot maps can be used to look for trends. If dots are displayed with opacity, it is possible to see density more clearly for highly populated maps or maps with strong clustering. The patterns in a crime map are both an important investigative tool as well as possible source of misleading information. A cluster of incidents may appear to be a hot spot, but they may also represent a more highly populated area [Mapping Crime: Principle and Practice https://www.ncjrs.gov/pdffiles1/nij/178919.pdf].**

Dot maps can be used to look for trends and patterns. If dots are displayed with opacity, it is possible to see density more clearly for highly populated maps or maps with strong clustering. The patterns in a crime map are both an important investigative tool as well as possible source of misleading information. A cluster of incidents may appear to be a hot spot, but they may also represent a more highly populated area [Mapping Crime: Principle and Practice https://www.ncjrs.gov/pdffiles1/nij/178919.pdf]. Dot maps are advantaged because they can display segments of incidents or totally distinct incidents. Crime maps often include an assortment of icons to map many distinct types of incidents. The limitation of mapping many incident types at once is over saturation. The time frame for a map may need to be significantly reduced to fit many types of incidents onto a map. Furthermore, many incident types can be so busy it is difficult to interpret the map or use it as an investigative tool.

**\Cluster**

**Cluster maps are an extension of dot maps. Cluster maps represent the collection of incidents for defined surrounding areas. Cluster maps are more computationally efficient than dot maps. With Leaflet, a cluster is labeled with the number of incidents represented within each single cluster. A mouse over effect allows the user to highlight the area captured by a single cluster. When a cluster is clicked on the map zooms in toward the area captured by the cluster and pulls smaller clusters and individual markers out of the first cluster. Figure 6 shows the mouse over effect and the ‘spiderfy’ effect of clusters as the zoom increases.**

**\Heat**

**Heat maps in simple terms are fluid density projections placed on top of a basemap to indicate where incidents are most clustered. Heat maps use colors to represent a scale of numbers. Usually, as colors become darker they represent increasing numbers. A heat map is useful for a big picture view of the distribution of a single type of incident. If incidents are combined for a density analysis they should be related or grouped together and defined as a larger category.**

**Heat maps are considered distinct from hot spot maps. Heat maps do not use statistical significance to distinguish between density. Hot spot maps are projected into polygons that represent statistically different densities. When using a heat map it is important to consider this difference because there is a greater potential for misrepresenting data. If a density projection is too dark it may overemphasize crime incidents and if a projection is too faint it may be difficult to find any patterns.**