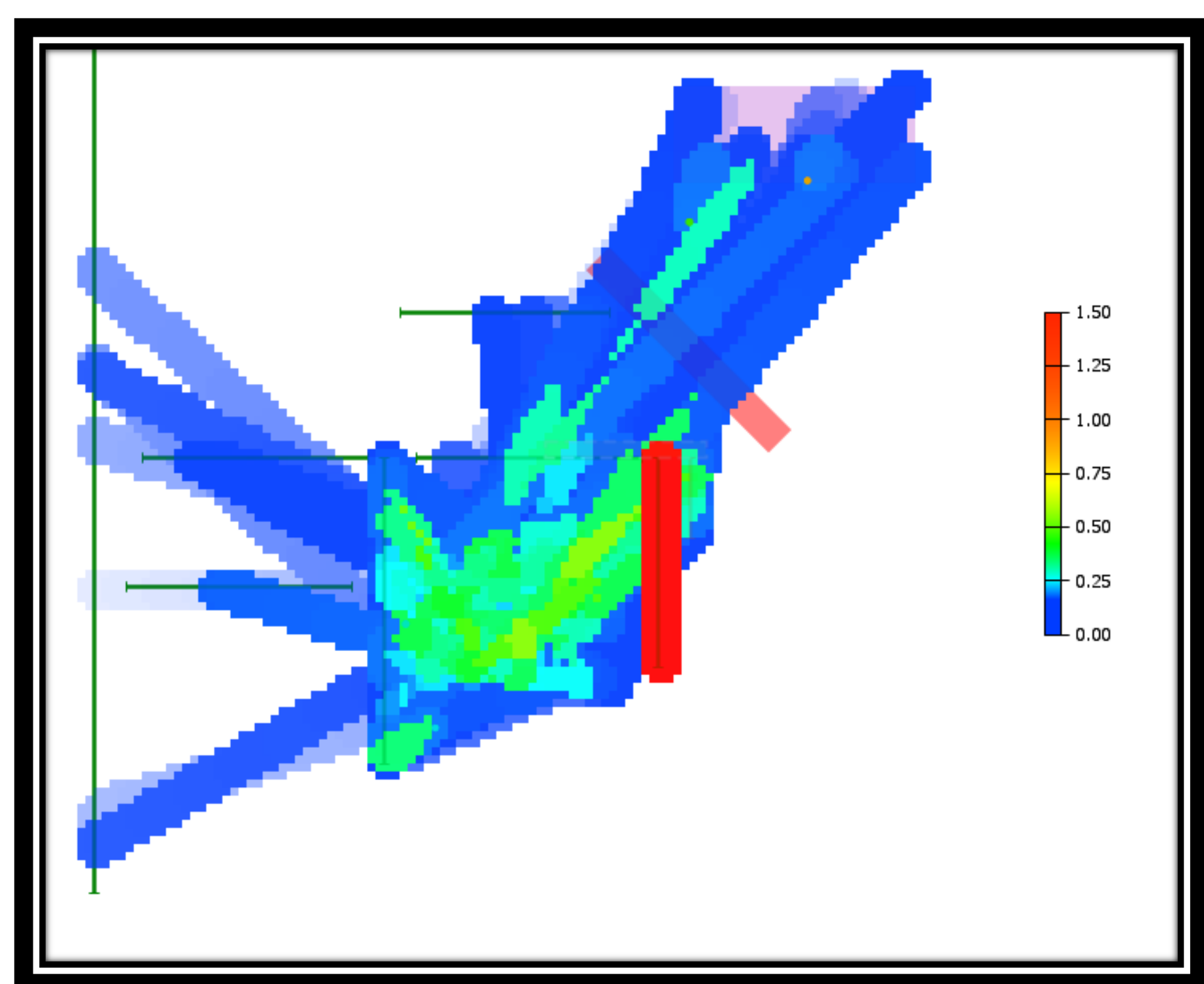


Security Perimeters for Large Events

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Large Events are categorized as those with 10,000 or more individuals gathering for a known affair. These events take considerable amounts of security personnel and resources to keep patrons safe. Large Events create higher than average amounts of population density, making these areas adapt for attacks on pedestrians and gatherers.



- The above model was made in AnyLogic PLE using multimethod modeling, crossing agent-based methodology with the pedestrian library and system dynamics.
- This model result displays an unusually high population density around a specific road, before road barricades are put in place. The map image behind the population density indicator has been removed.

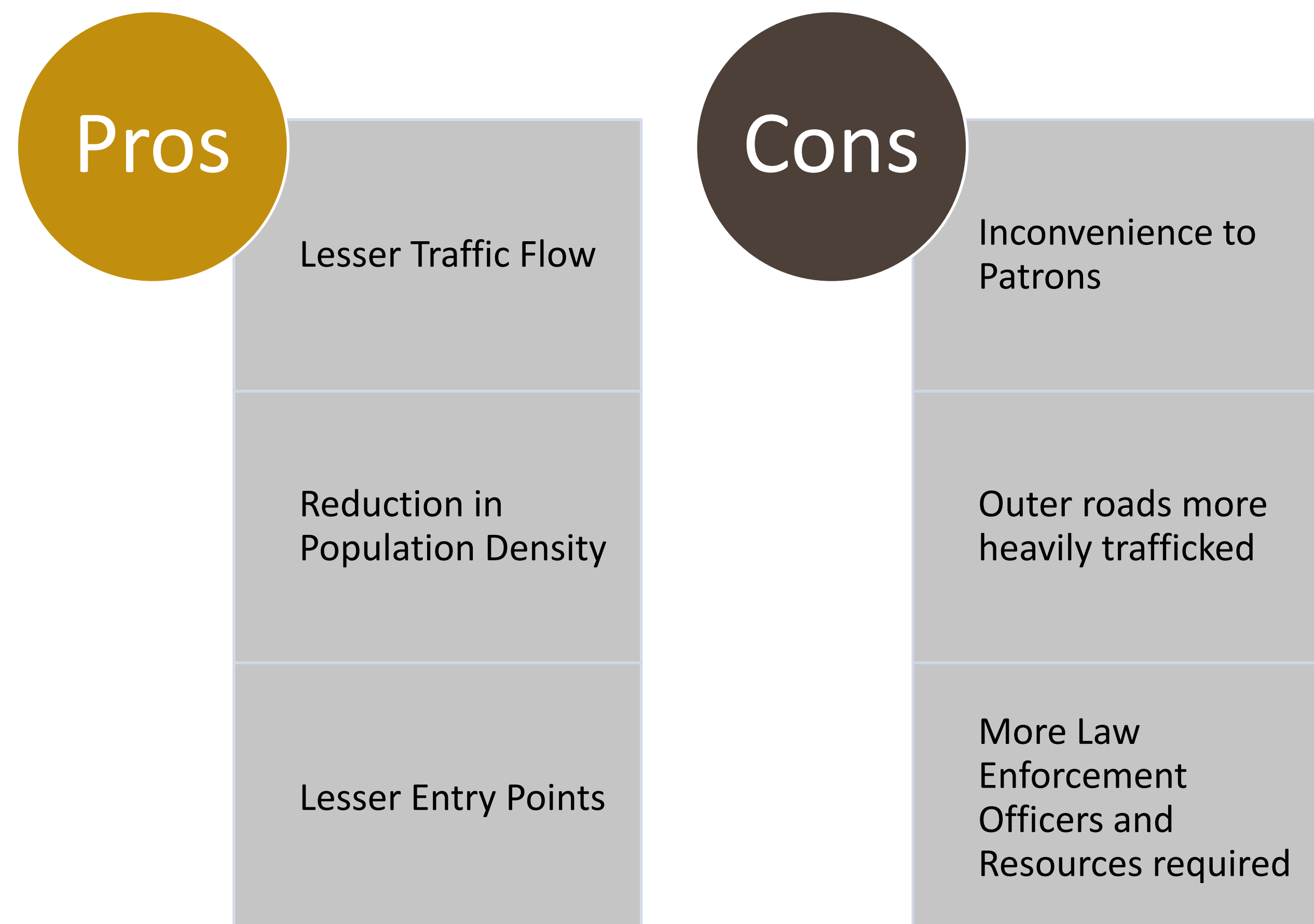
Historical Incidents in 2017:

- Jerusalem truck attack (*4 casualties*)
- Westminster attack (*5+ casualties*)
- Stockholm attack (*5 casualties*)
- London Bridge attack (*8 casualties*)
- Paris mosque attack (*failed attack*)
- Levallois-Perret attack (*failed attack*)

Methodology:

- Map local road ways, attractions, parking spaces, and other areas of interest
- Assess population density of area and find key roads for blocking traffic
- Compare traffic flow from attractions to not impede the event
- Create recommendations

The **goal** of this research to determine whether causality rates in vehicle ramming incidents can be lowered by expanding the event perimeter.



Results:

- Roads population density is unequally distributed
- Key indicators for pedestrian flow are parking spaces and convenient travel to the venue.
- Creating partial or complete road barricades assist in equally dispersing pedestrians and reducing vehicles in high population areas.

Recommendations:

- City planning may install long term equipment such as permanent bollards or other traffic control measures.
- Interim and low-cost options include using temporary bollards, barricades, garbage trucks, and other large obstacles.
- Considerations for parking and patron satisfaction should be included so that patrons yield to instructed barricades.

Notes:

1. The above model does not represent any specific venue or area of concern and is used to demonstrate the graphing of population density.
2. Historical incidents have been observed through media (citations available) and have been selected for their availability of information.