

OPERATIONAL EFFECTS TO DIFFERENT TRANSPORTATION MODES AT SIGNALIZED INTERSECTIONS FROM DIFFERING GEOMETRIES, SIGNAL SYSTEMS, AND VOLUME LEVELS

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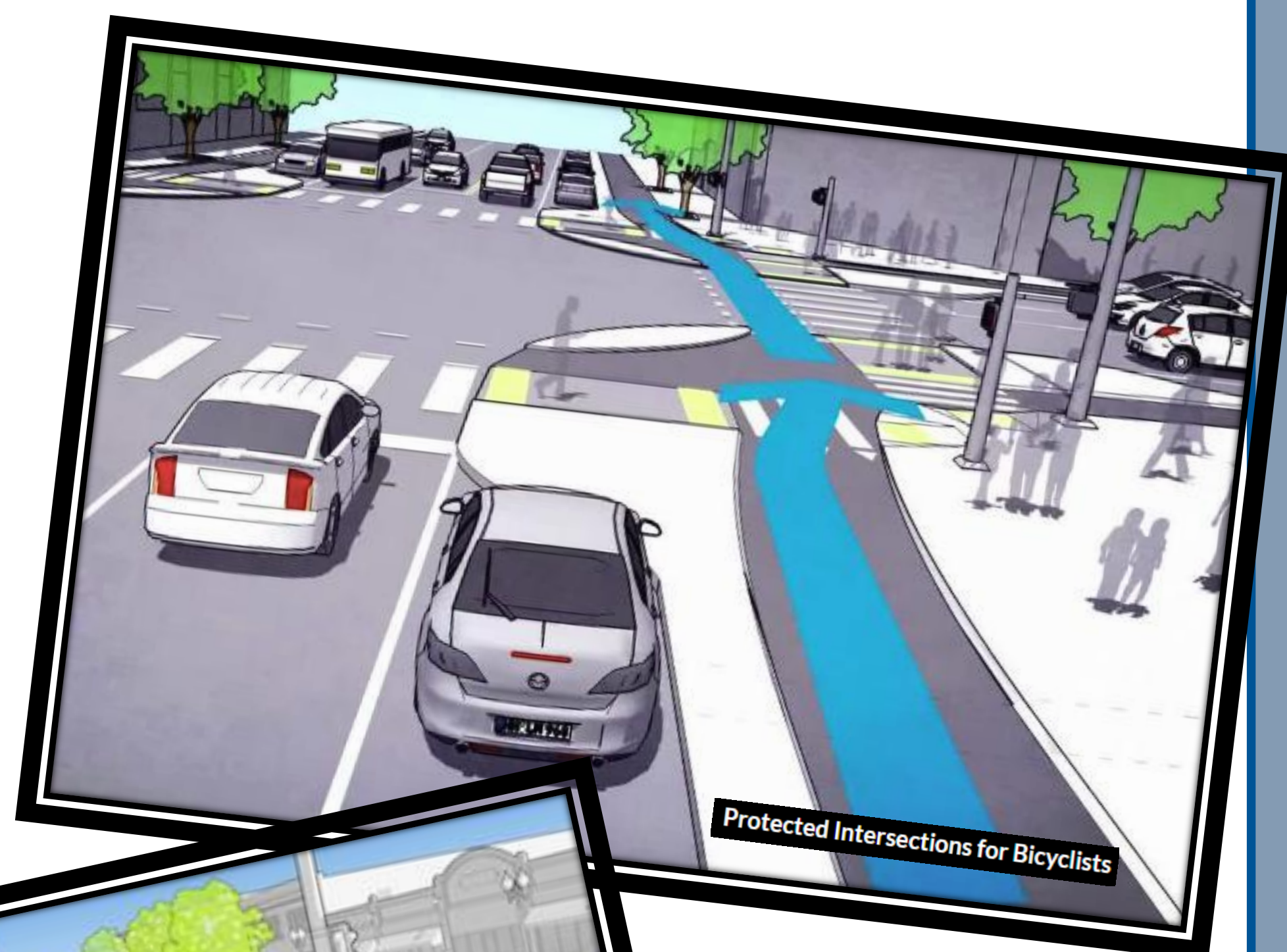
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Abstract

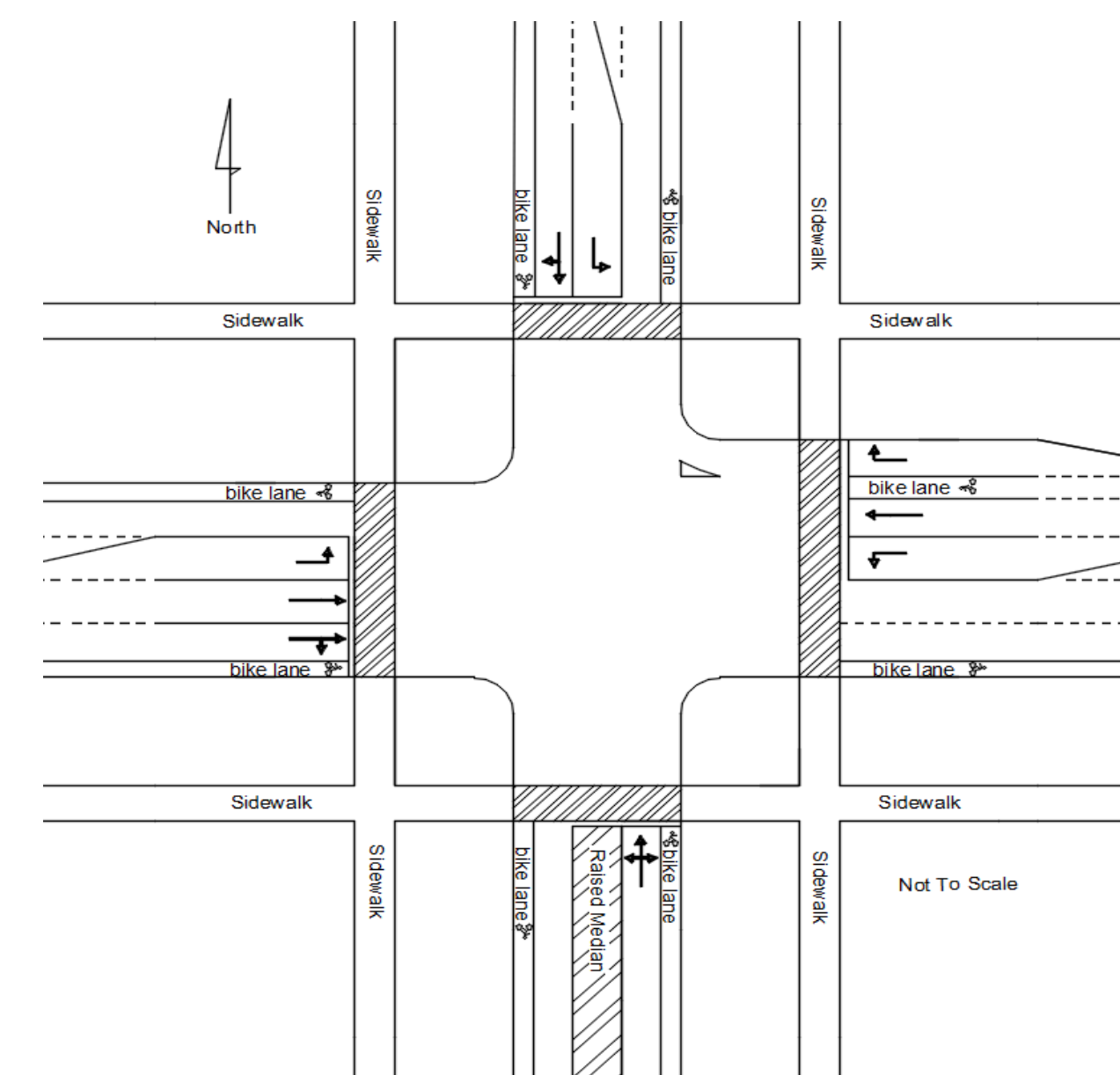
In the United States, walking and bicycling have become larger shares of transportation. Signalized intersections have not changed to a high degree geometrically or technologically to accommodate larger volumes of these modes in the presence of motor vehicles. The most advanced signal systems used today do not take pedestrians or bicyclists into account as being equal to the motor vehicle. Simple steps can be taken at the signalized intersection to improve serviceability for all users.

The objectives of this research is to identify safe features for an intersection, simulate the features with varying scenarios on VISSIM, and determine each features effectiveness. This research is meant to help an engineer determine effective ways to mediate operational issues between primary transportation modes at signalized intersections.

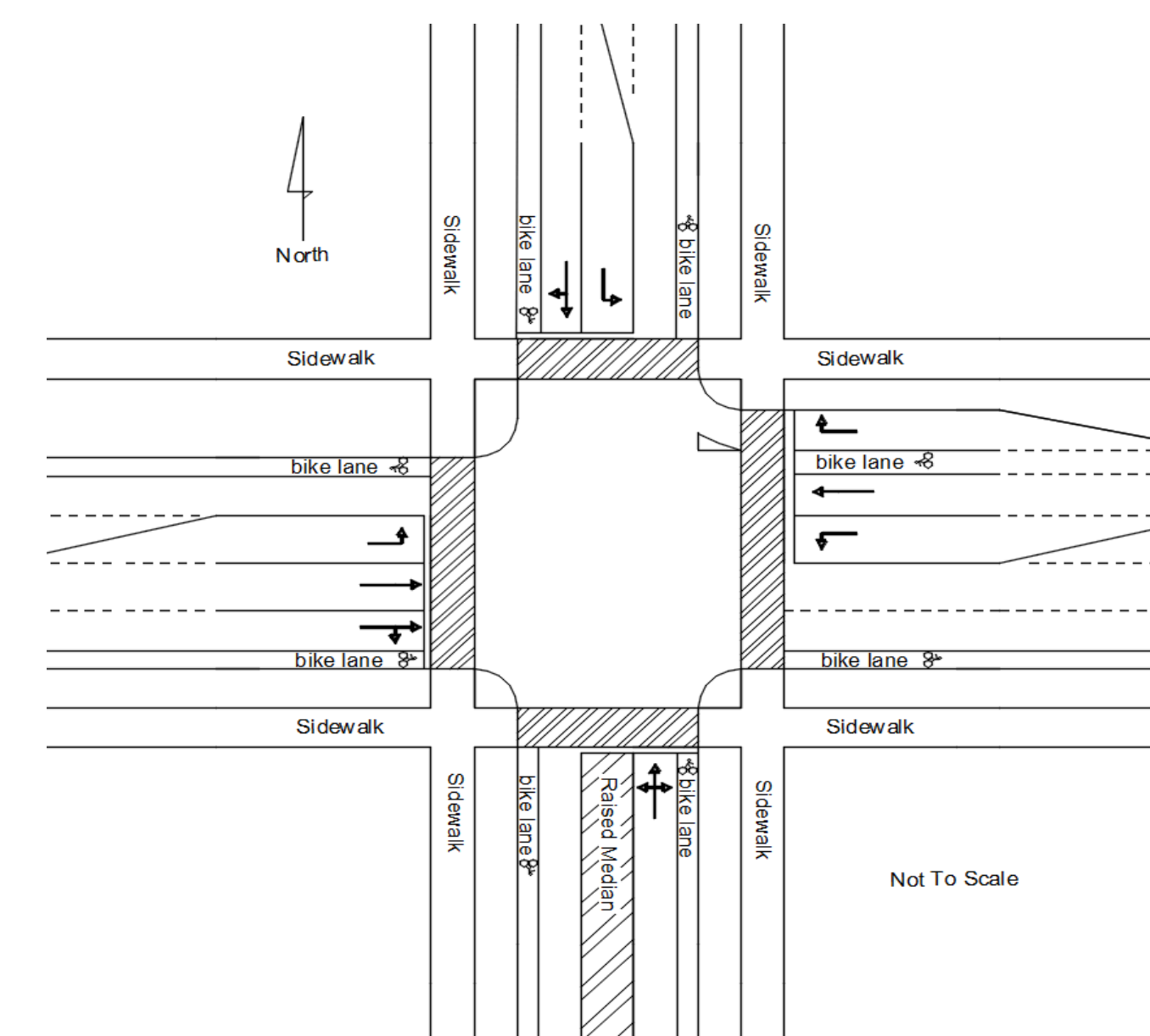


Project Description

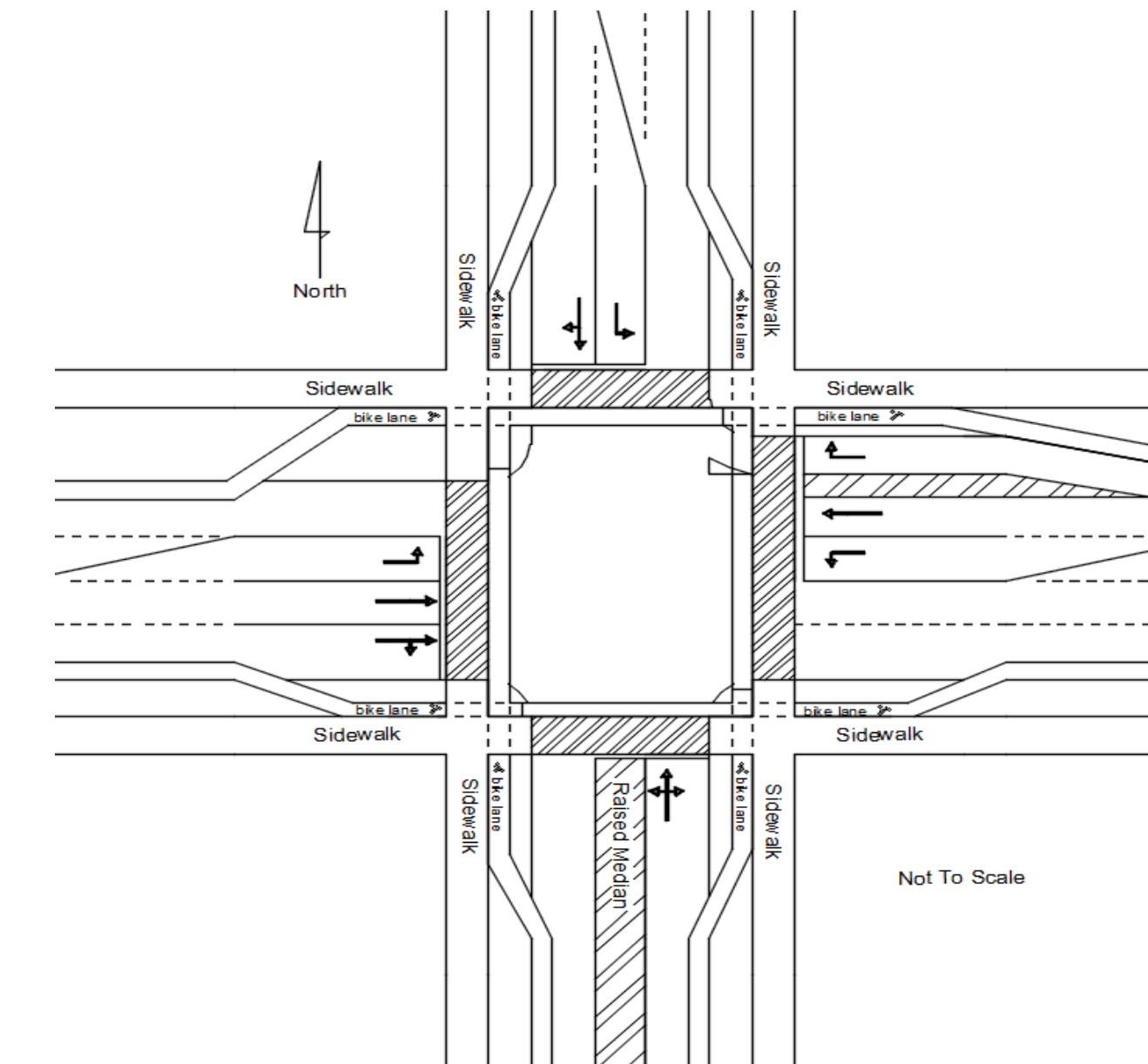
The Intersection of Vehicles, Bicyclists, and Pedestrians



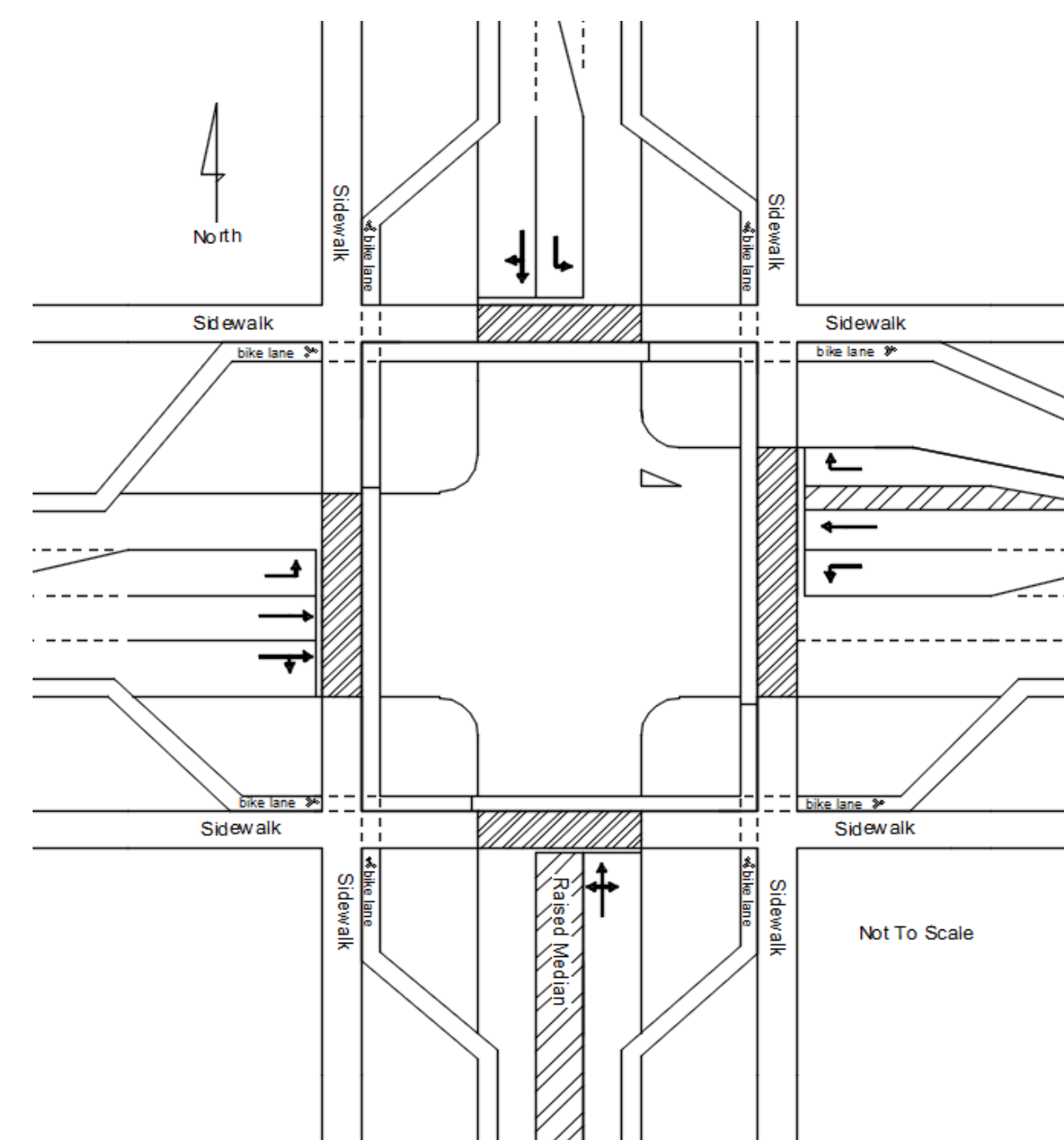
Pedestrian Configuration



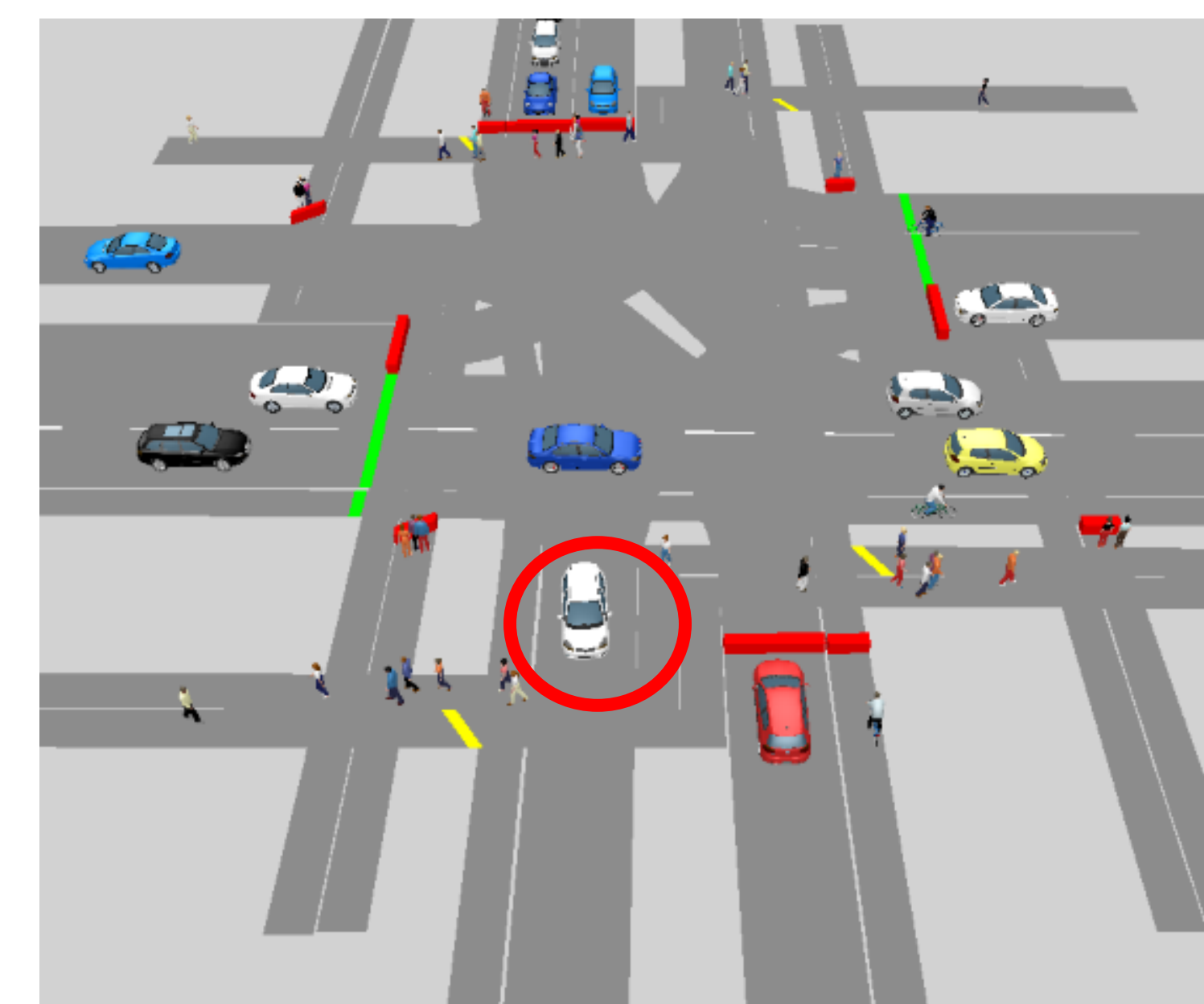
Base Configuration



Bicyclist Configuration



Combination Configuration

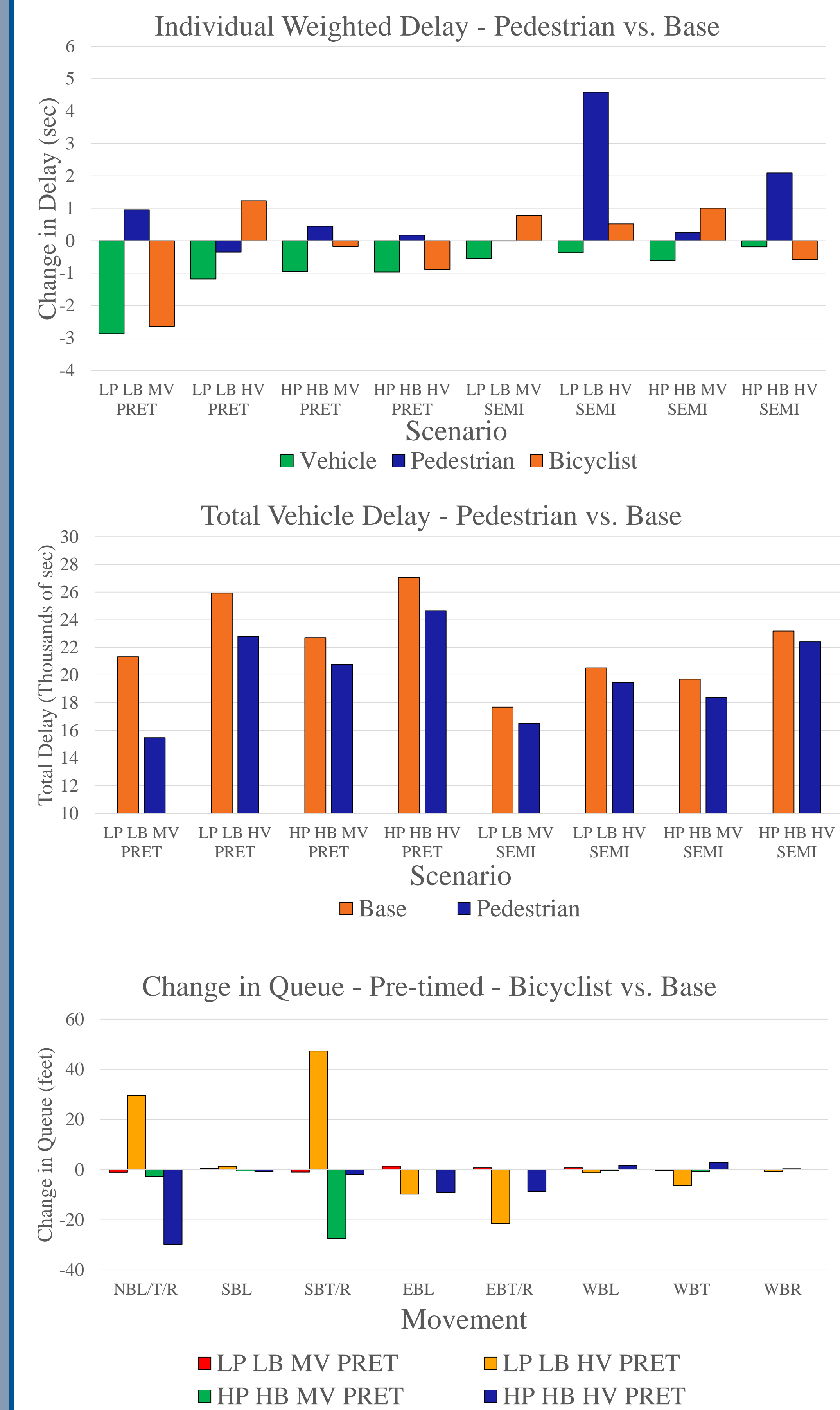


Alternative Configuration

Methodology

- Safe intersection designs have important operational effects to pedestrians, bicyclists, and vehicles
- Performance measures are delay of vehicles, bicyclists, and pedestrians plus vehicle speed and queuing
- Setback crosswalks, downstream bicyclist crossings, and staggered crosswalks are all tested in this research
- The same lane configuration is used for all tests, and signal timings are calculated separately for each scenario before being simulated in VISSIM (ten runs each)
- 40 different permutations:
 - 5 configurations
 - 2 signal systems (Pre-timed, Semi-act)
 - 2 Vehicle Volumes (Medium, High)
 - 2 Ped/Bike Volumes (Low, High)

Results



Conclusions

- The pedestrian configuration reduces vehicle delay and weighted delay but decreases sight distance
- The bicyclist configuration reduces vehicle queuing and increases vehicle average speed while reducing crossing distances
- The combination configuration reduces vehicle delay but increases bicyclist distance to travel
- The alternative configuration offers no benefit to operational effects but needs further research

