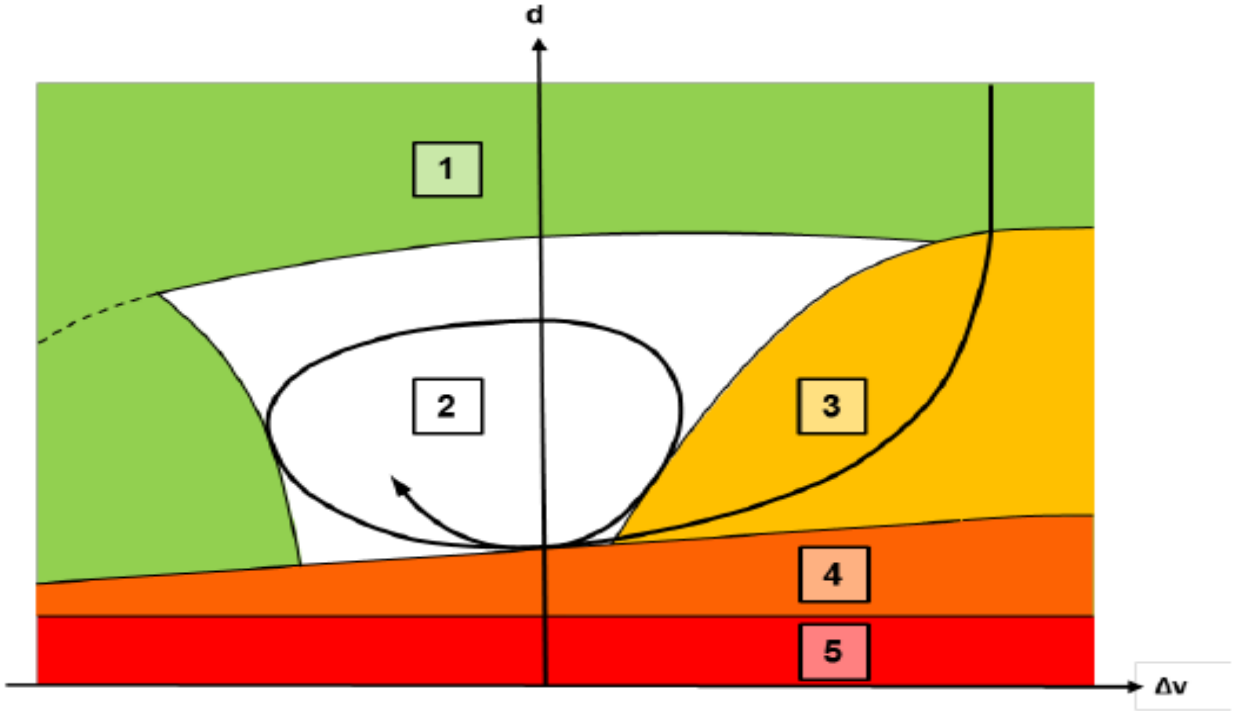
Best Practices for Traffic Modeling Software

By Sean Murphy

Introduction

- Background of VISSIM software
- Difficult Modeling Situations
- Conclusion

VISSIM Model Structure



Car following model (according to: Wiedemann 1974)

Legend

Axes: **d**: Distance, **Δv**: Change in speed	**3**: Approaching state
1: "Free flow" state	**4**: Braking state
2: Following state	**5**: Collision state

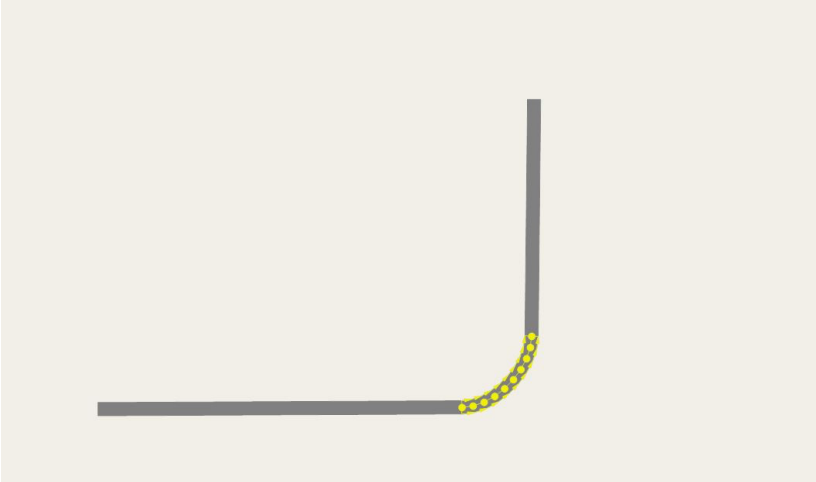
Model developed by Wiedemann (1974)

Coding of Network Within VISSIM

- Links and Connectors
- Routing Decisions
- Priority Rules
- Conflict Areas

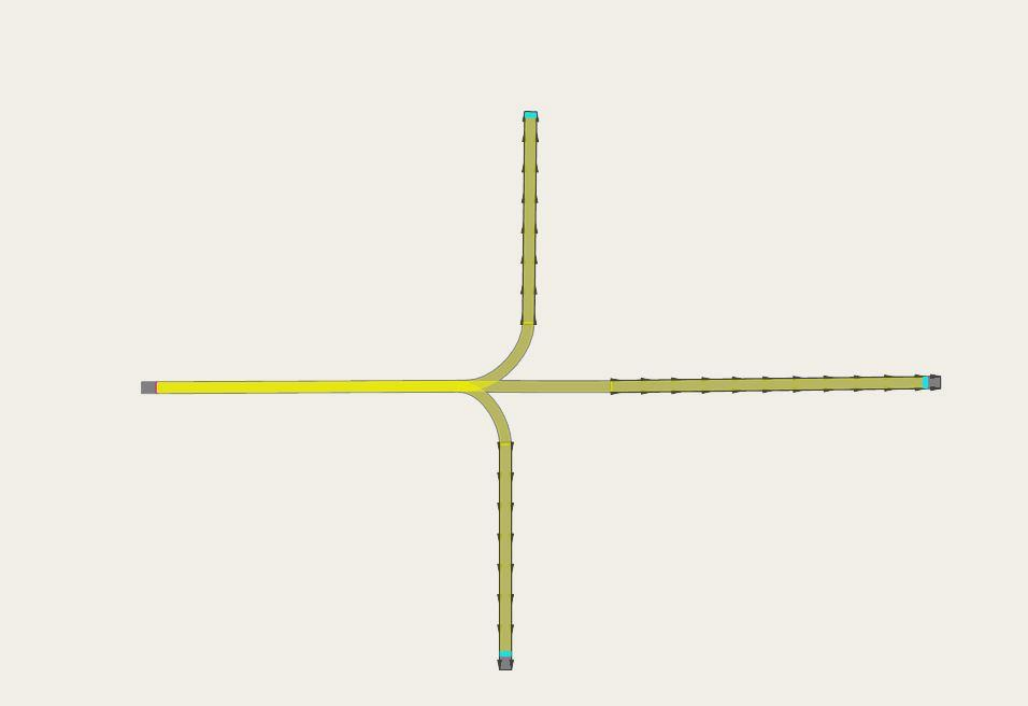
Links and Connectors

- Links – are used to build a majority of the segments in a network
- Connectors – are used to connect links.
  - Mostly used at an intersection of roadways



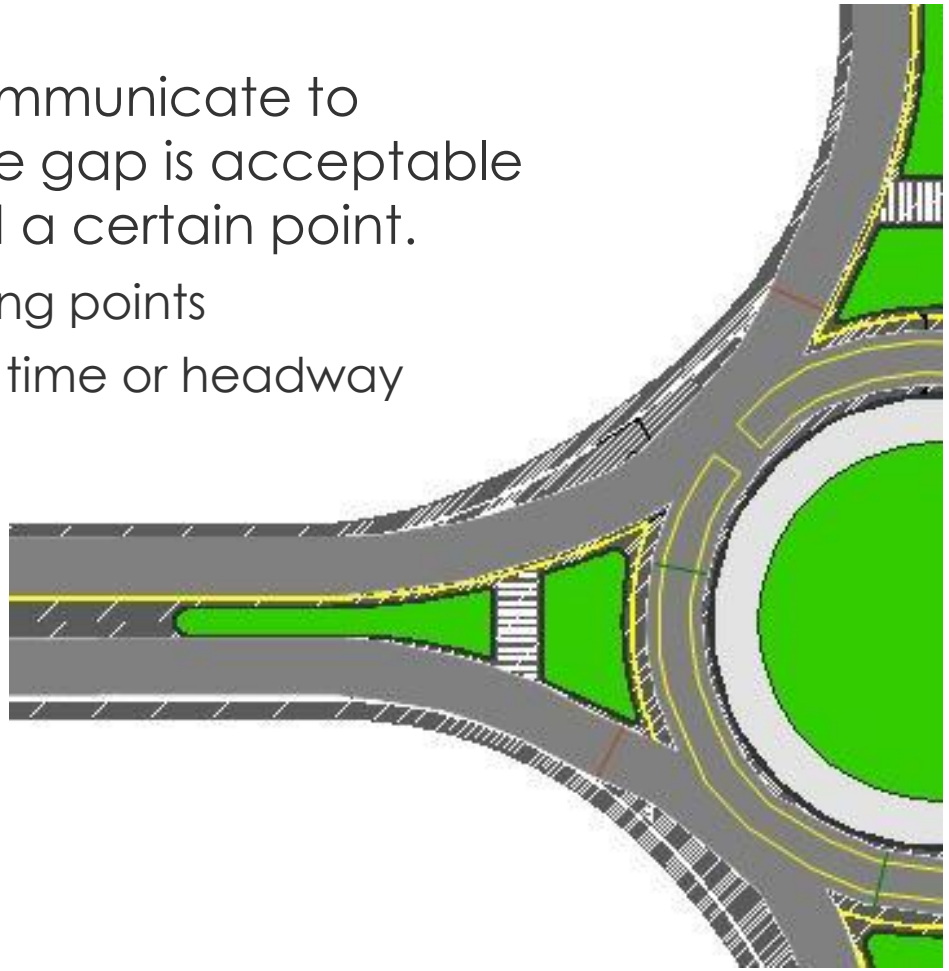
Routing Decisions

- Routing Decisions – enables the modeler to route traffic through a network by movement or lane



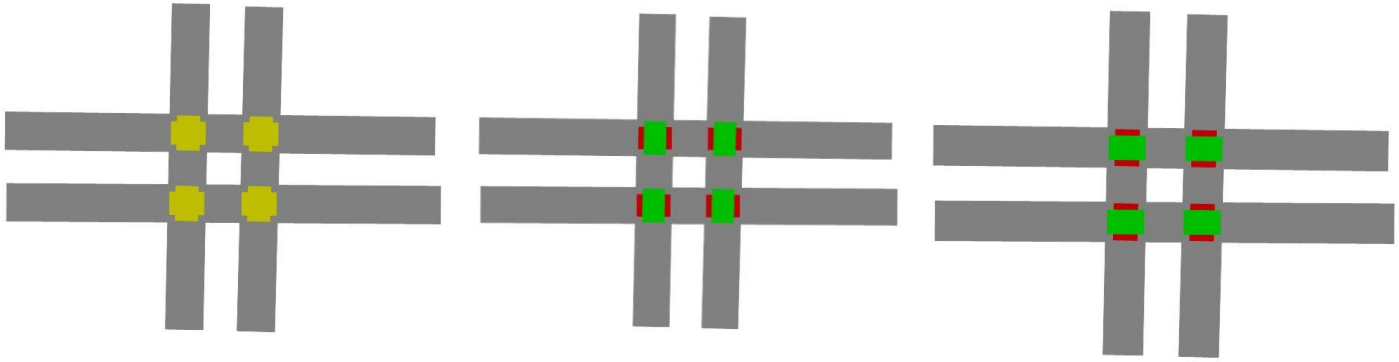
Priority Rules

- Priority Rules – are used to communicate to vehicles when an appropriate gap is acceptable for a vehicle to enter beyond a certain point.
  - Set by a stop bar and conflicting points
  - Conflicting points look for gap time or headway



Conflict Areas

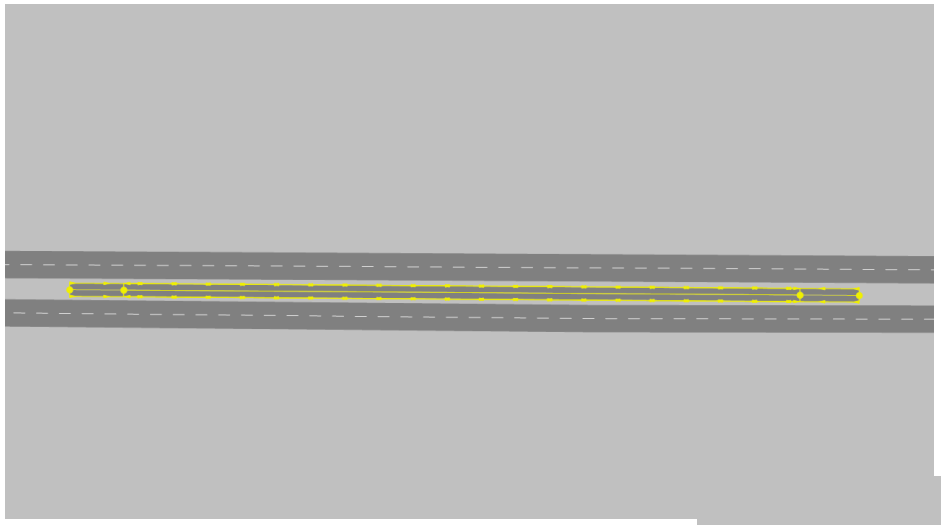
- Conflict areas – are used to model conflicts between vehicles on two links or connectors
  - Used to model right of way at conflicting areas and lead to a more intelligent driving behavior

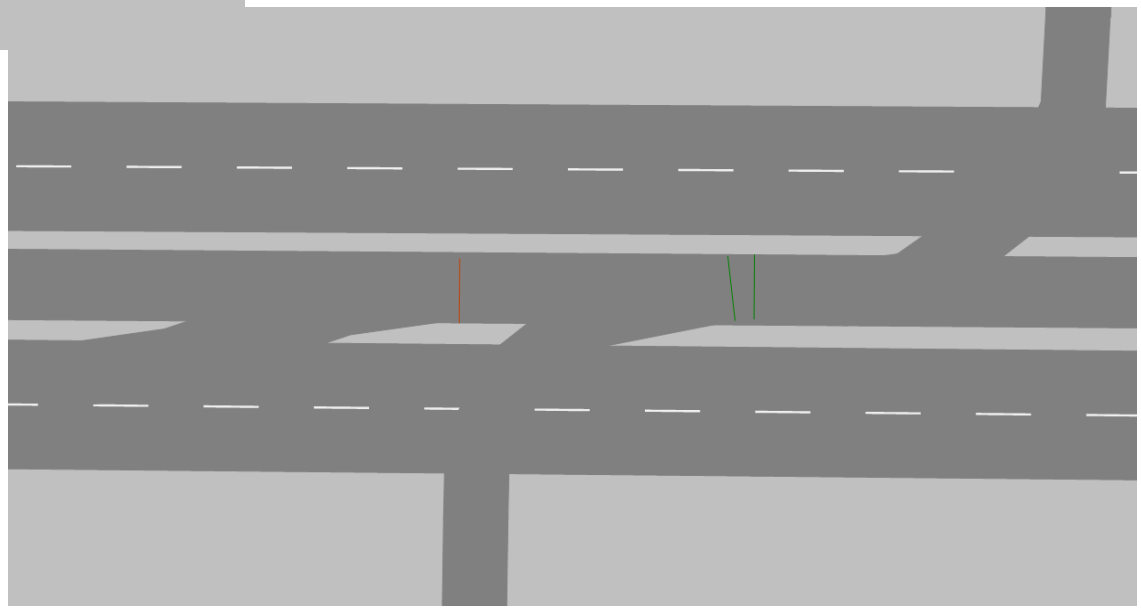


Two Way Left Turn Lanes

- Problems with Modeling TWLTLs
  - Utilizing the same same lane in both directions
  - Vehicles waiting for other vehicles in the TWLTL
- How to counteract this problem
  - Overlap two links in the opposite directions
  - Priority rules to have vehicles wait for oncoming traffic

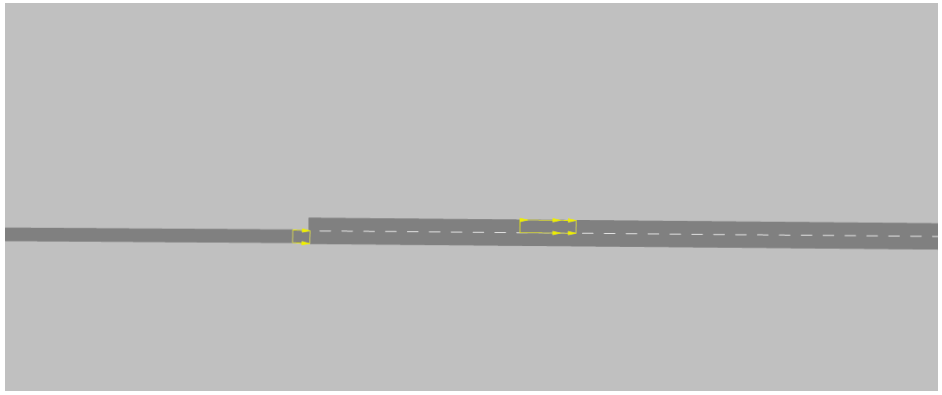
TWLTLs

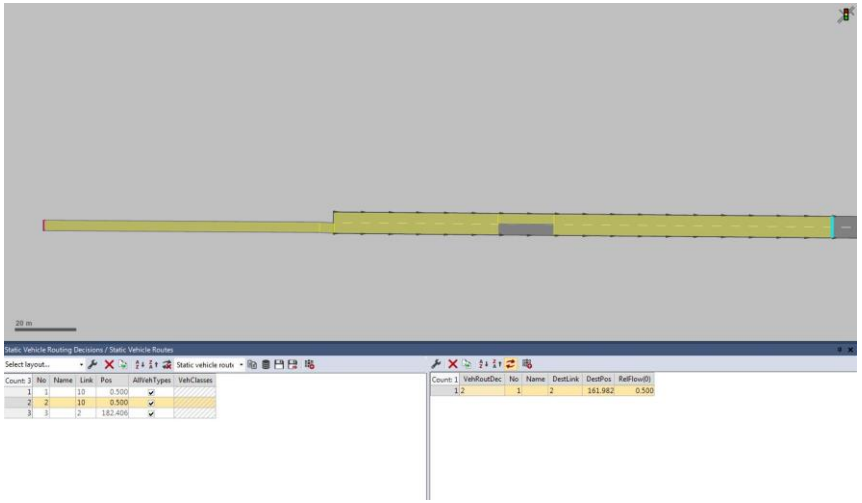




Lane Utilization

- Problems with Lane Utilization
  - Vehicles may tend to use a certain lane more than another lane
- How to counteract this problem
  - Create an overlapping link
  - Routing decision to distribute traffic in the model





Roundabout Modeling

- Problems with Roundabout Modeling
  - Vehicles entering the roundabout
- How to counteract this problem
  - Priority Rules
  - Conflict Areas

Roundabouts

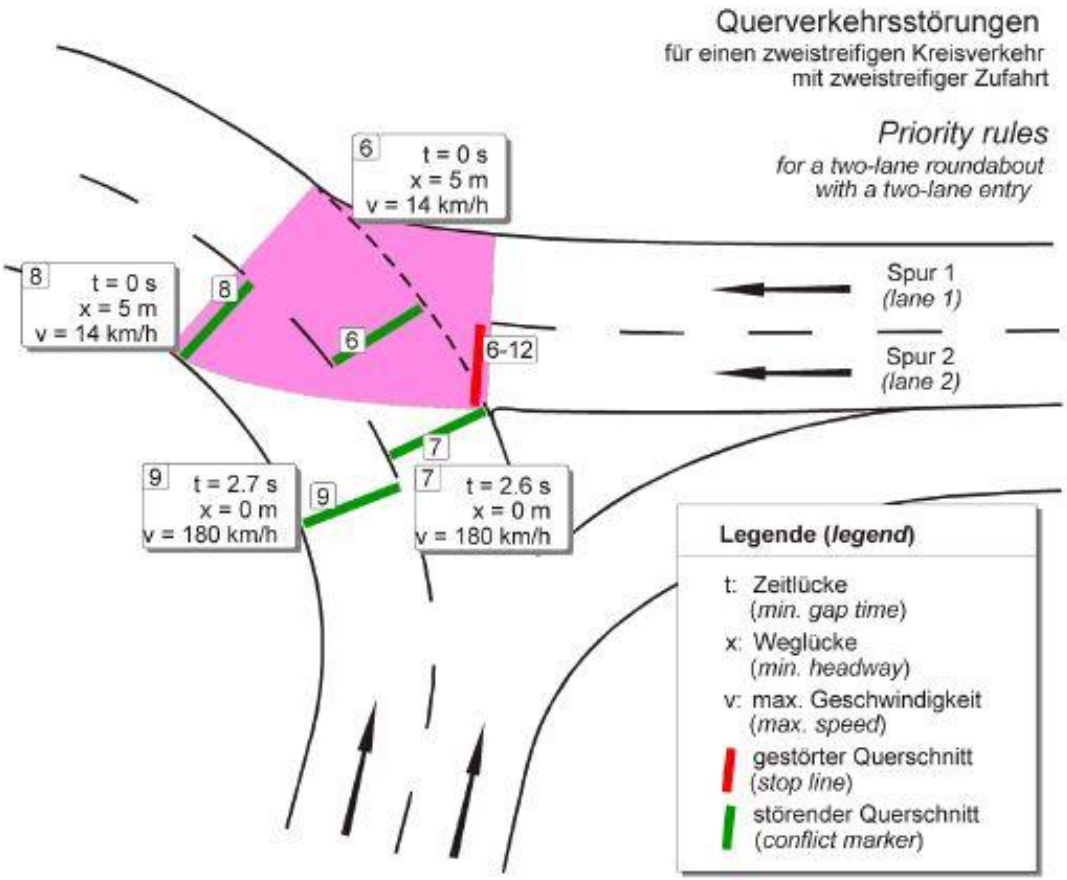
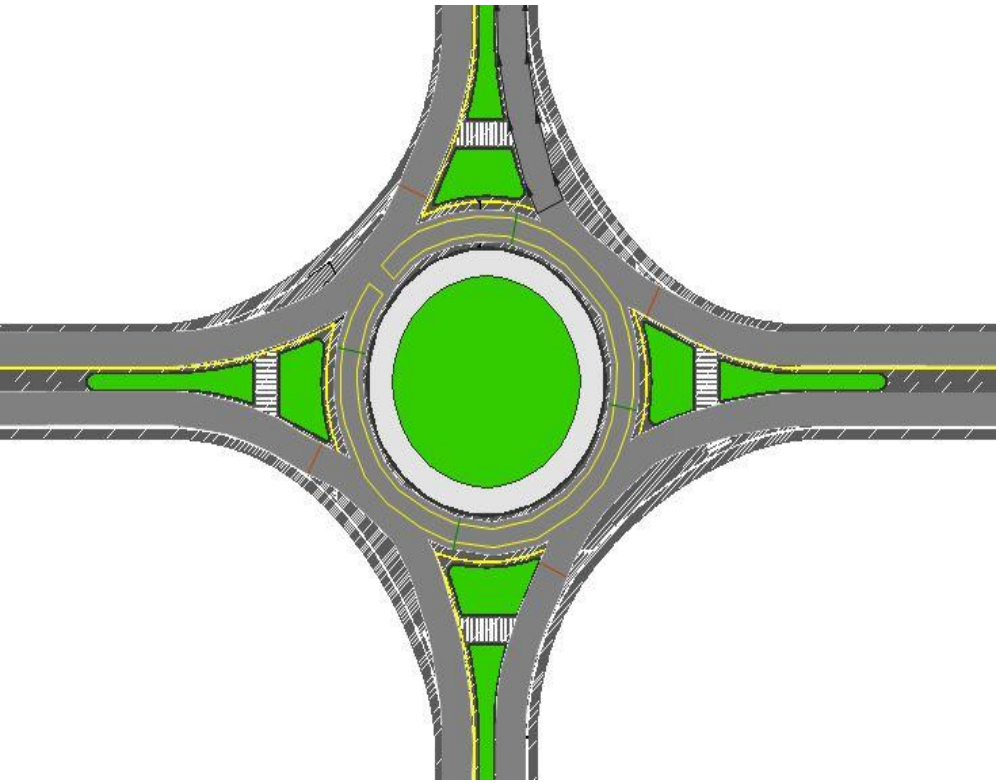
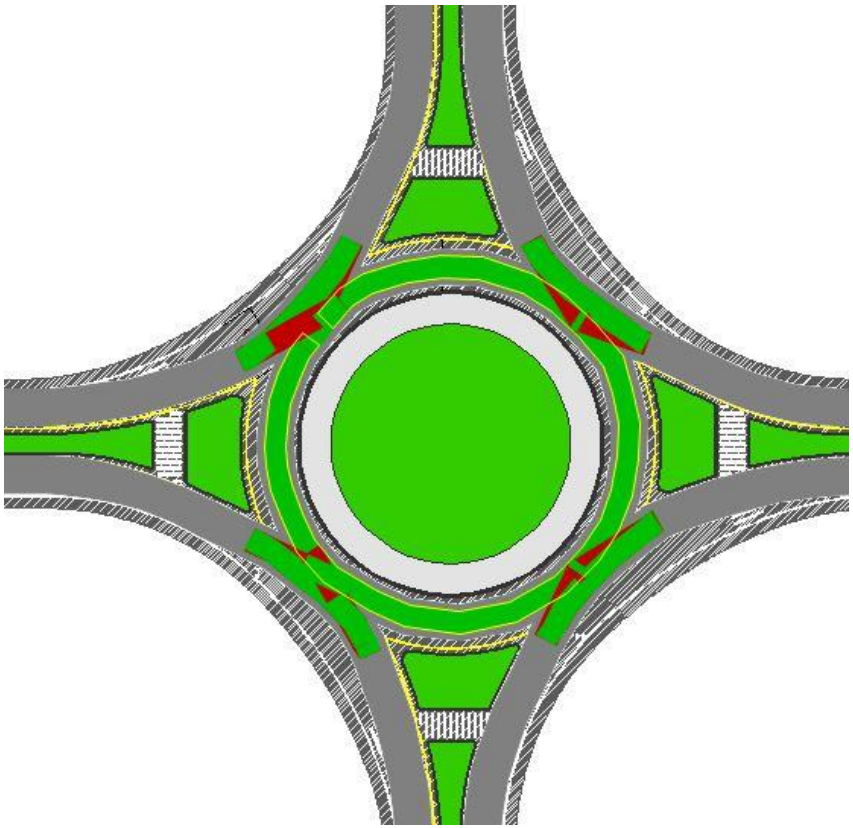


Figure from VISSIM 8 Manual page 444

Priority Rules



Conflict Areas



Conclusions

- Link and Connectors – Accurate usage of links and connectors enable realistic depiction.
  - Can be utilized for lane utilization and TWLTLs
- Routing Decisions – Allows traffic to be routed in certain lanes
- Priority Rules – Used to accurately depict gap and headway times
- Conflict Areas – Used to give right-of-way in overlapping links and connectors

References

- Gallelli, Vincenzo, and Rosolino Vaiana. "Roundabout intersections: evaluation of geometric and behavioural features with VISSIM." *TRB National Roundabout Conference, Kansas City, Mo. 2008.*
- Ratrout, Nedal T., and Syed Masiur Rahman. "A comparative analysis of currently used microscopic and macroscopic traffic simulation software." *The Arabian Journal for Science and Engineering 34.1B (2009): 121-122*
- Trueblood, Michael, and Jim Dale. "Simulating roundabouts with VISSIM." *2nd Urban Street Symposium: Uptown, Downtown, or Small Town: Designing Urban Streets That Work. 2003.*
- VISSIM 8 User Manual, PTV AG, Karlsruhe, Germany, 2015.

Paper: Best Practices for Traffic Modeling Software

- Authors

Sean Murphy, EI
University of Nebraska-Lincoln
Department of Civil Engineering
Email: smurphy@huskers.unl.edu

John Sangster, PE, PTOE, Ph.D.
University of Nebraska-Lincoln
Department of Civil Engineering
Email: john.sangster@unl.edu