An Evaluation of Operational Efficiency Between Single Point Urban Interchange with Frontage Road and Tight Diamond Interchange

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Motivation

• **Single Point Urban Interchange (SPUI) and Tight Diamond Interchange (TDI)**
  - Have been fully evaluated
  - Operational efficiency

• **Single Point Urban Interchange with Frontage Road (SPUI-F)**
  - Existed in Reno
  - Story
  - Has not been fully investigated

• **Lack of research to compare the efficiency of TDI and SPUI-F**
Reno SPUI-F
Reno TDI

Frontage road

On ramp

ITE Western District Jun, 25th
Methodology

• Road Network Model
  • From the field
  • Easy to calibrate

• Volume Design
  • Base volume
  • Sensitivity test (5)
  • Seven Scenario Groups (7)
  • 35 cases for both interchanges

• Evaluation
  • Average Delay
  • Average Speed
  • Average Queue Length
Simulation

- SPUF-F
- TDI
Results Analysis
Results Analysis

Average Delay of All Scenarios

Average Speed of All Scenarios

Average Queue Length of All Scenarios
Discussion

• What if TTI four phase was not used?
• Other variations?
Conclusion

- **TDI outperformed SPUI-F**
  - Average delay: about 35% improved.
  - Average speed: 12% improved.
  - Average queue length: 60% improved.

- **TDI has better reliability than SPUI-F**
  - Range of average delay: TDI(8.35s) < SPUI-F(24.7s)
  - Range of average speed: TDI(1.48mph) < SPUI-F(4.03mph)
  - Range of average queue length: TDI(21.05ft) < SPUI-F(71.04ft)

- **TDI is better than SPUI-F**
Thank you!