A Novel Signal Phasing Scheme in a Complete Street Project: A Case Study in Reno, Nevada

Rui Yue
University of Nevada, Reno
Center for Advanced Transportation Education and Research
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Background Introduction

- What is a complete street?
  - Vehicles/Motorcycles
  - Bicycles
  - Pedestrians
- What impacts will be generated to implement a complete street?
  - Road diet--Unfriendly to vehicles
  - Road extend--Friendly to other modes
- Background of California/Booth/Keystone
  - Two Three-leg intersections
  - Intersections on a slope
  - Pavement could not be extended
  - Lacking bicycle lanes
- Road diet
Existing and Proposed Conditions

• Existing Lane Configurations

• Proposed Lane Configurations
Data Collection

- Conducted on Tuesday
- Collected peak hour turning volumes
- Collected both AM and PM data
- Video cameras were used
- Peak 15-min flow rates were extracted for Synchro
- Current four-lane Configurations

Road Network
- Constructed based on actual scale
- Same background map

- Future three-lane Configurations
• Existing Two-Controller Phasing Scheme (Traditional)

Signal Timing and Phase Scheme

• An 80 sec cycle length was used
• Proper splits were divided
• Same signal timing plans were applied

• Proposed One-Controller Phasing Scheme (New)
Results Analysis

- No significant difference were found between new scheme results and old scheme results
- Future conditions performed worse than existing conditions, but not too much
- LOS dropped to C in some future conditions, but they were acceptable

### Average Delay Simulation Results

<table>
<thead>
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<th>Current Geometry</th>
<th>Future Geometry</th>
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<tr>
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<tr>
<td></td>
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<tr>
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### Average Stops Simulation Results

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### LOS Simulation Results

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<td>New Phase Scheme</td>
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</table>
Discussion of New Phasing Scheme

- **Engineers’ efficiency**
  - Do not need to follow NEMA phases locations
  - Counter-clockwise numbered
  - One ring-barrier structure
  - Free of determining coordination offsets
  - Intersections were controlled by rings
  - Same direction movements could be reflected
  - Odd numbers to label the non-opposite traffic legs

- **Cost efficiency**
  - The area were controlled by one controller
Conclusion and Future Study

• **Conclusion**
  • Both the traditional phase scheme and the proposed phase scheme can successfully accommodate the complete street project.
  • The proposed phasing scheme is more efficient than the traditional phasing scheme.
  • The two three-leg connected intersections can use this scheme.

• **Future Study**
  • How could we find more accommodated cases that can apply new scheme?
Thank you!