Improving Signalized Intersection Operations through Signal Timing Optimization: A New Jersey Case Study

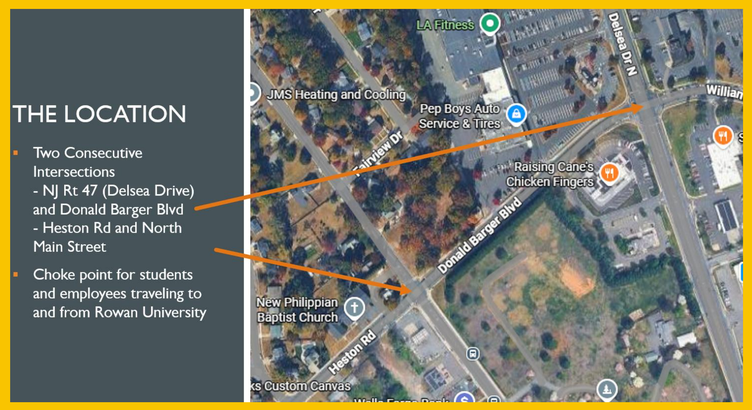
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PROJECT NEED AND OBJECTIVE

Poor signal timing can create excessive delay, uneven lane use, and recurring queues. This project tested whether revised cycle lengths and phase splits could improve two consecutive intersections near Rowan University without widening the roadway.

OBJECTIVE: Reduce delay and improve intersection LOS during the AM peak period.

STUDY CORRIDOR



Two intersections in Glassboro, NJ
NJ 47 (Delsea Drive) at Donald Barger Boulevard
North Main Street at Heston Road

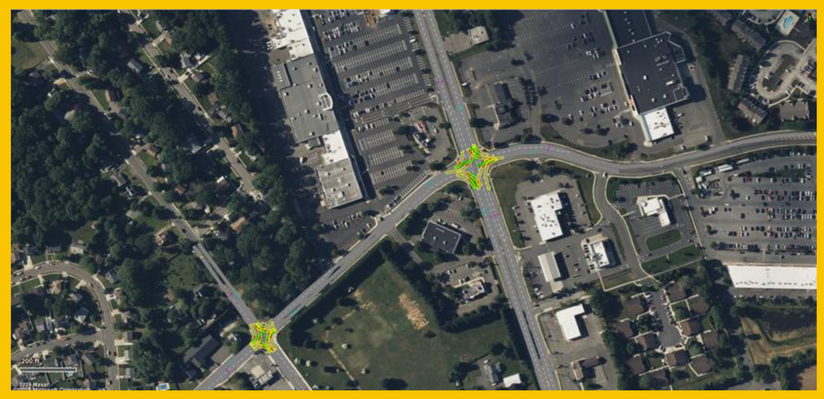
FIELD DATA

- Traffic flow data collected for the AM peak at 15-minute intervals. The dataset included all the turning movements at both intersections.
- Existing phase sequence and signal timing observed in the field
- Fleet composition: 92% passenger cars and 8% trucks

ANALYSIS FRAMEWORK

1. **Collect** — Traffic and Timing Data
2. **Model** — VISSIM Network
3. **Calibration** — GEH Check
4. **Optimize** — Vistro Genetic Algorithm

VISSIM MODEL AND CALIBRATION



CALIBRATION

100%

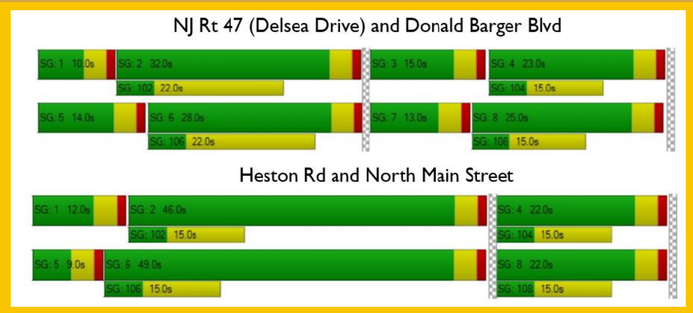
of movements had GEH < 5

GEH RESULTS

Avg. 1.26 • Max. 3.75

Model accepted for scenario testing

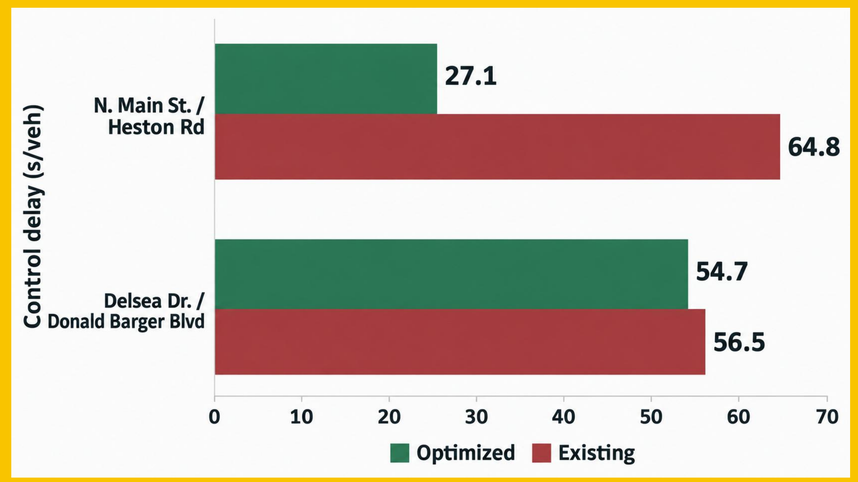
TIMING OPTIMIZATION



PTV Vistro used a genetic algorithm to minimize total network delay by adjusting cycle length and phase splits. The optimized plans shifted green time toward the most congested approaches.

OPERATIONAL RESULTS

Average Intersection Control Delay



DELSEA DRIVE

LOS E to D

3.2% lower delay

NORTH MAIN STREET

LOS E to C

58.2% lower delay

KEY FINDINGS

- The optimized signal timing plan improved overall LOS at both intersections.
- North Main Street showed the largest benefit, cutting average delay by more than half.
- Delsea Drive improved only slightly, indicating that signal timing alone cannot resolve every bottleneck.
- Several movements improved from LOS E or F to LOS C or D.

CONCLUSION AND NEXT STEPS

Signal optimization provided a low-cost operational improvement, especially at North Main Street. Future work should test PM peak demand, evaluate actuated control, and examine geometric or demand-management options for the remaining Delsea Drive bottleneck.