Project Capsule

26-5SS

May 2026

Expanding Adaptive Traffic Control Signal Systems: A Strategic Study for Louisiana's Arterial Highways

PROBLEM

Adaptive Traffic Control Systems (ATCS) adjust signal timing parameters in response to real-time traffic conditions, as shown in Figure 1. Federal Highway Administration (FWHA) has promoted adaptive signal control as part of the Every Day Counts initiative, and multiple studies have documented that such controls can improve performance and service to road users when deployed on appropriate corridors and supported by reliable detection, communications, and maintenance.

Louisiana experiences recurring congestion and highly variable peak conditions on many arterial highways, particularly in corridors influenced by industrial shift traffic, freight activity, seasonal demand, and strong directional peaking. To improve traffic operations, the Louisiana Department of Transportation and Development (DOTD) has implemented ATCS on several corridors, including multiple corridors in District 07 and a large, interconnected deployment in District 03. Building on these deployments, DOTD is seeking a strategic framework to expand ATCS to other suitable locations statewide and to establish consistent metrics for assessing operational and infrastructure needs.

Louisiana deployments have focused on a one-system approach. With Cubic holding the statewide traffic signal controller contract, the Cubic ATCS platform, SynchroGreen, has been used in all Louisiana adaptive deployments to date. This approach provides consistency in controller integration and user interface but also places increased importance on DOTD's ability to monitor, interpret, and refine the SynchroGreen configuration and operational settings over time. In practice, many adaptive

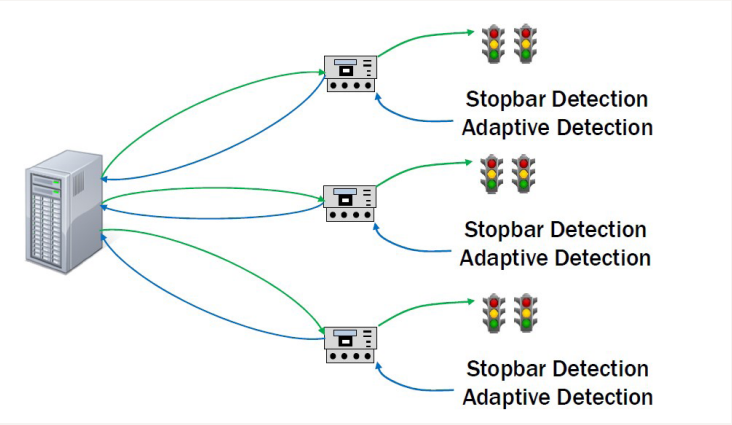

Figure 1. How ACTS works

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21 months

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corridors have been deployed successfully and have improved flow compared to pre-deployment traffic. However, operations support has often followed a "set it and forget it" model, driven by limited staffing and shrinking resources for routine signal retiming. Without evaluation and continuous performance-improvement framework, benefits can plateau, degrade, or become inconsistent across corridor types.

Louisiana's operational environment introduces several constraints that directly affect adaptive performance. Adaptive systems require reliable communication and detection. DOTD District and Headquarters responsibilities for communications and operations support are often divided, and signal components such as detection are typically maintained at the District level. Communications have historically varied in reliability between cellular, wireless Ethernet backhaul, and fiber-supported networks. Detection reliability has also varied by technology (e.g., magnetometers, video detection, and radar), with radar generally providing improved performance in recent deployments. Additionally, corridor geometry and driver behavior do not always match striping and expected lane use, requiring field observation and configuration to avoid persistent performance issues.

For these reasons, additional research is needed to evaluate Louisiana's existing adaptive deployments, identify ways to improve system performance through operational tuning and targeted infrastructure improvements, and develop a practical guide to expand adaptive systems statewide in alignment with DOTD standards, staffing realities, and maintenance agreements with local entities. Additionally, evaluation of the real application of alternative systems may shed light on the expected performance benefits across various platforms.

OBJECTIVE

The objective of this research project is to develop a guide for expanding, implementing, maintaining, and evaluating Adaptive Traffic Control Systems (ATCS) in Louisiana. The guide will be grounded in data-driven evaluation of existing Louisiana deployments and national best practices, with a focus on practical implementation under DOTD standards and resource constraints.

METHODOLOGY

The proposed research will be conducted through a structured, two-phase methodology consistent with the task framework identified below. Phase 1 focuses on planning, foundational analysis, and an interim deliverable. Phase 2 develops a statewide deployment framework and the Louisiana ATCS guide. The work plan consists of six tasks:

- **Task 1:** Review literature and document national ATCS best practices
- **Task 2:** Select and evaluate existing ATCS corridors
- **Task 3:** Evaluate the performance of existing Louisiana corridors and document infrastructure needs
- **Task 4:** Draft Interim Report No. 1 and updated Phase 2 plan
- **Task 5:** Identify high-priority corridors for ATCS expansion
- **Task 6:** Develop a Louisiana ATCS implementation, maintenance, and performance guide

IMPLEMENTATION POTENTIAL

The primary implementation product will be a Louisiana ATCS guide that can be adopted by DOTD and its partner agencies. The guide will include corridor screening criteria, infrastructure recommendations, and a practical performance monitoring and improvement framework. In accordance with LTRC implementation requirements, the final report will include an implementation plan that identifies:

- The products expected from the research
- A realistic assessment of impediments to implementation
- Activities necessary for successful implementation
- Criteria for judging the progress and consequences of implementation

The research team will present the final results to the PRC in an oral presentation held in Baton Rouge after acceptance of the final report.