From economic and humanitarian perspectives, reducing the number of traffic accidents are of great importance for the well-being of the society. It is believed that concentrated traffic enforcement efforts have a positive impact in reducing the number of crashes and discouraging dangerous behavior due to their visibility. Relying on this belief, this research effort addresses the problem of covering (blanketing) critical crash zones while determining the location, number, and patrol routes of police officers. This problem will be undertaken by developing specific optimization models for maximum covering and patrol routing. Using the data available in CARE, we will first identify critical crash zones. We will also identify the effective cost of covering and patrolling as well as limitations on budget, equipment, and personnel. Next, we will formulate the maximum covering and patrol routing problems mathematically. We will develop specialized algorithms that rely on the properties of the mathematical formulations. Via extensive computational experiments using representative data, we will test the validity and usability of these models. Finally, we will provide recommendations based on sensitivity and what-if analysis.

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Notes: This proposed research is directly related to the central theme "Management and Safety of Transportation Systems" of the UTCA since it provides an analytical model to optimize state and federal resources to reduce the number of traffic crashes and increase the overall safety of Alabama highways. This project is expected to identify practices to reduce idle patrolling, reduce response time to a crash, and increase the number of citations for traffic offenses. With these outcomes, this research also supports strategic research goals of FTA in relation to (i) improving capital and operating efficiencies and (ii) improving safety and emergency preparedness.

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