Increased urbanization, population growth, and economic development within the United States have led to an increased demand for freight travel to meet the needs of individuals and businesses. Consequently, freight transportation has grown significantly over time and has worsened the capacity constraints on the infrastructure. The challenges associated with capacity are exacerbated in the event of non-recurrent incidents. Traffic diversion is an effective strategy to reduce the impact of incident-induced congestion by redirecting traffic to an alternative route to avoid congested facilities. Alternative routes for truck traffic should be carefully selected based on a route's restrictions on the size and weight of commercial vehicles, its operational characteristics, and other safety concerns.

This study presents a diversion decision methodology that integrates the ArcGIS platform with regression analysis to determine the optimal routes for trucks under non-recurrent delay conditions. When an incident occurs on a limited access facility, the diversion algorithm can be initiated. The algorithm is embedded with an incident clearance prediction model that estimates travel time on the current route based on the incident, traffic, and temporal characteristics. If travel time is expected to be greater due to the event, a route selection module is activated which evaluates available routes for diversion based on pre-defined criteria including roadway characteristics (number of lanes, lane width), heavy vehicle restrictions (vertical clearance, bridge design load, span limitations), traffic conditions (level of service, speed limit), and neighborhood impact (proximity to schools and hospitals, the intensity of commercial and residential development). If any available alternative route improves travel time, the trucks are provided with a diversion strategy. The proposed decision-making tool can assist transportation agencies in making truck diversion decisions. The results of the feasibility analysis and the simulation indicate that the tool can improve the safety and efficiency of the overall traffic network.

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Approved for distribution by Amr Oloufa, Professor, Committee Chair, on March 18, 2020.

The public is welcome to attend.