

## **Application of Surrogate Safety Measures for Safe Signal Timing in Urban Intersections**

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### **Abstract**

Safe Signal timing at urban intersections as bottlenecks of road facilities can be achieved through investigation of traffic conflicts. Traffic conflicts are among safety indices which have the ability to proactively predict safety conditions of a site without any crash occurrence. Attempt is made here to develop models in order to design a safe signal timing for an isolated intersection in Isfahan, Iran, using surrogate safety measures. To this end, vehicle trajectories of several simulated scenarios with two, three and four phase signals are assessed in SSAM software. VISSIM simulation software enables simulators to export trajectory files of vehicles to the SSAM environment in order to determine different types of conflicts. After defining several transportation parameters in SPSS environment, linear regression models are obtained for different types of vehicle conflicts and average delay. The results can be utilized to calculate and compare different timing and phase planning schemes in order to decrease delay and different types of conflicts. The main contribution of current research is consideration of different signal phases in proposed models which can contribute to the design and planning of safe signal timing at three lane signalized intersections.

**Key words:** surrogate safety measure, conflict, regression, delay, simulation

### **1. Introduction**

Many factors such as population growth, car ownership, and urban construction have increased daily travels in many large cities. Higher travel demands and roadway limitations have led to many intricacies. As a matter of fact, different concepts should be considered for exertion of a straightforward attitude in solving such problems. Concerns related to safety are among the most important problems that necessitates a comprehensive consideration. Primary and secondary equivalent costs of crashes, congestions, delays, and any impact on travel reliability caused by accidents mandate a careful attention to safety. Intersections as traffic bottlenecks of road facilities are among the most unsafe parts of urban transportation areas. Safe Signal timing at urban intersections can be achieved through investigation of Surrogate safety measures. Surrogate safety measures are