ABSTRAK

Simpang *staggered* tak bersinyal pada Jalan Nasional Rajapolah–Tasikmalaya merupakan bagian dari jaringan jalan arteri primer yang memiliki peranan penting dalam mendukung mobilitas antarwilayah. Kondisi geometrik berupa dua simpang tiga lengan yang bergeser dengan jarak yang relatif dekat, tingginya volume lalu lintas pada jalan mayor, serta dominasi konflik pergerakan belok kanan berpotensi menurunkan kinerja operasional dan keselamatan lalu lintas. Penelitian ini bertujuan untuk menganalisis kinerja dan tingkat keselamatan lalu lintas eksisting, serta menentukan skenario penanganan paling efektif pada lokasi penelitian.

Metode penelitian dilakukan melalui survei lapangan untuk memperoleh data geometrik dan volume lalu lintas jam puncak, serta pengumpulan data historis kecelakaan periode 2022–2025 dari Satlantas Polres Tasikmalaya Kota. Analisis kinerja makroskopik dilakukan menggunakan Pedoman Kapasitas Jalan Indonesia (PKJI 2023). Analisis keselamatan menggunakan metode *Equivalent Accident Number* (EAN) dan *Upper Control Limit* (UCL) untuk mengidentifikasi status *Black Spot*. Selanjutnya, pemodelan dan simulasi mikroskopik dilakukan menggunakan PTV VISSIM yang telah divalidasi dengan kriteria nilai $GEH < 5$. Dua skenario penanganan diuji, yaitu Alternatif 1 (perbaikan geometrik/pelebaran badan jalan) dan Alternatif 2 (penerapan APILL, fasilitas *U-Turn*, dan kanalisasi median jalan).

Hasil analisis PKJI 2023 menunjukkan kondisi *oversaturation* pada kedua simpang, yaitu derajat kejenuhan (DJ) sebesar 1,05 pada Simpang A (Jl. Sukahening) dan 1,04 pada Simpang B (Jl. Stasiun) dengan kategori *Level of Service* (LOS) C (tundaan 21,57 det/SMP dan 20,99 det/SMP). Berdasarkan analisis EAN, kedua lokasi teridentifikasi sebagai *Black Spot* karena nilai EAN maksimum melampaui nilai UCL, yaitu Simpang A (EAN $18{,}00 > UCL\ 14{,}97$) dan Simpang B (EAN $12{,}00 > UCL\ 4{,}55$). Hasil validasi PTV VISSIM menghasilkan nilai $GEH = 2{,}82$ dengan kondisi eksisting mencatatkan tundaan 53,32 detik/kendaraan (LOS D) dan antrean maksimum 239,44 meter. Simulasi penanganan membuktikan bahwa Alternatif 2 memberikan peningkatan kinerja paling optimal dengan menekan tundaan rata-rata menjadi 14,91 detik/kendaraan (efisiensi 72,04%), meningkatkan kinerja menjadi LOS B, serta membatasi ekor antrean maksimum secara drastis hingga 25,90 meter. Selain itu, Alternatif 2 secara efektif mengeliminasi titik konflik silang di inti simpang, sehingga menjadi solusi terbaik dalam menuntaskan kemacetan sekaligus menanggulangi status *Black Spot*.

Kata Kunci: Simpang *Staggered*, PKJI 2023, *Equivalent Accident Number* (EAN), *Black Spot*, PTV VISSIM, Rekayasa Lalu Lintas.

ABSTRACT

An unsignalized staggered intersection on the Rajapolah–Tasikmalaya National Road is part of the primary arterial road network that plays a crucial role in supporting interregional mobility. Geometric conditions in the form of two three-leg intersections shifted with a relatively close distance, high traffic volume on the major road, and the dominance of right-turn movement conflicts have the potential to degrade operational performance and traffic safety. This study aims to analyze the existing traffic performance and safety levels, as well as to determine the most effective handling scenario at the study location.

The research method was conducted through field surveys to obtain geometric data and peak-hour traffic volumes, as well as collecting historical accident data for the 2022–2025 period from the Traffic Corps (Satlantas) of the Tasikmalaya City Police. Macroscopic performance analysis was carried out using the Indonesian Road Capacity Manual (PKJI 2023). Safety analysis used the Equivalent Accident Number (EAN) and Upper Control Limit (UCL) methods to identify Black Spot status. Furthermore, microscopic modeling and simulation were performed using PTV VISSIM, which was validated with the GEH criteria (GEH < 5*). Two handling scenarios were tested, namely Alternative 1 (geometric improvement/roadway widening) and Alternative 2 (implementation of traffic signals/APILL, U-Turn facilities, and median channelization).*

The PKJI 2023 analysis results indicate oversaturation conditions at both intersections, namely a degree of saturation (D_J*) of 1.05 at Intersection A (Jl. Sukahening) and 1.04 at Intersection B (Jl. Stasiun) with Level of Service (LOS) category C (delays of 21.57 sec/pcu and 20.99 sec/pcu). Based on the EAN analysis, both locations were identified as Black Spots because the maximum EAN values exceeded the UCL values, specifically Intersection A (EAN* $66 > UCL\ 35.81$*) and Intersection B (EAN* $74 > UCL\ 35.81$*). The PTV VISSIM validation results produced GEH* < 5*, with existing conditions recording an average delay of 53.32 seconds/vehicle (LOS D) and a maximum queue length of 239.44 meters. Handling simulations proved that Alternative 2 provided the most optimal performance improvement by reducing average delay to 14.91 seconds/vehicle (a 72.04% efficiency gain), improving performance to LOS B, and drastically limiting the maximum queue tail to 25.90 meters. In addition, Alternative 2 effectively eliminates crossing conflict points at the core intersection, making it the best solution to alleviate congestion while addressing the Black Spot status.*

Keywords: *Staggered Intersection, PKJI 2023, Equivalent Accident Number (EAN), Black Spot, PTV VISSIM, Traffic Engineering.*