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Jurnal Jalan Jembatan adalah wadah informasi bidang Jalan dan Jembatan berupa hasil penelitian, studi kepustakaan maupun tulisan ilmiah terkait yang meliputi **bidang bahan dan perkerasan jalan, geoteknik jalan, transportasi dan teknik lalu-lintas serta lingkungan jalan, jembatan dan bangunan pelengkap jalan**. Terbit pertama kali tahun 1984, dengan frekuensi terbit tiga kali setahun pada bulan April, Agustus, dan Desember. Mulai tahun 2016 terbit dengan frekuensi dua kali setahun, edisi Januari - Juni dan edisi Juli - Desember, dalam versi cetak dan versi elektronik.

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Prakata

Puji dan syukur kami panjatkan ke hadirat Tuhan Yang Maha Esa atas terbitnya Jurnal Jalan dan Jembatan Volume 42 Nomor 2, Juli–Desember 2025. Edisi ini memuat enam artikel ilmiah yang merepresentasikan kontribusi dalam kinerja layanan, penerapan teknologi, dan penguatan aspek keberlanjutan infrastruktur. Artikel yang dimuat dalam edisi ini mencerminkan kecenderungan pendekatan berbasis data, teknologi mutakhir, serta efisiensi teknis dan lingkungan. Beragam kajian diharapkan dapat memperkaya referensi ilmiah sekaligus masukan berbasis evidensi bagi praktik penyelenggaraan infrastruktur jalan dan jembatan.

Pada artikel pertama, Saksena and Adikusuma (2025) menyajikan evaluasi komparatif pengukuran International Roughness Index (IRI) menggunakan Mobile Laser Scanner (MLS) dan Dipstick. Hasil penelitian menunjukkan tingkat akurasi yang tinggi untuk kedua metode. MMLS menawarkan keunggulan dari sisi efisiensi operasional, cakupan survei, dan kecepatan pemrosesan data. Kajian ini memberikan dasar bagi pemanfaatan teknologi pemindaian dalam kegiatan survei kondisi jalan dan pengelolaan aset infrastruktur.

Prastiyo et al. (2025) membahas pembaruan model Toll Road Service Quality (TRSQ) melalui integrasi inovasi teknologi berbasis kecerdasan buatan. Dengan menempatkan teknologi sebagai variabel mediasi, penelitian ini menunjukkan bahwa penerapan Intelligent Transportation Systems (ITS) berkontribusi terhadap peningkatan keandalan, keselamatan, kenyamanan, dan kualitas layanan jalan tol. Temuan ini memperluas kerangka evaluasi kualitas layanan jalan tol, yang selaras dengan perkembangan teknologi.

Artikel ketiga mengkaji efektivitas sistem pembayaran tol berbasis Single Lane Free Flow (SLFF) dan sistem E-Toll melalui analisis kinerja gerbang tol dan persepsi pengguna. Akbar dkk. (2025) menunjukkan bahwa meskipun tingkat adopsi SLFF masih relatif terbatas, sistem ini

memiliki potensi dalam meningkatkan kapasitas pelayanan, mengurangi waktu tundaan, serta mendukung transaksi tol nirsentuh. Kajian ini menegaskan pentingnya kesiapan infrastruktur, dukungan kebijakan, dan strategi implementasi.

Aspek keberlanjutan infrastruktur jalan dibahas oleh Yuliyanto dkk. (2025) dalam artikel dengan topik evaluasi emisi gas rumah kaca pada penerapan Warm Mix Asphalt (WMA). Pendekatan Life Cycle Assessment digunakan untuk menunjukkan bahwa teknologi WMA lebih mampu menurunkan konsumsi energi, emisi gas rumah kaca, serta biaya produksi, jika dibandingkan Hot Mix Asphalt. Temuan ini memberikan dasar teknis dalam penerapan teknologi perkerasan jalan yang lebih efisien dan berkelanjutan.

Artikel kelima mengkaji pengaruh pelapisan SteelGuard terhadap ketahanan deformasi permanen campuran aspal AC-WC. Hasil pengujian oleh Pradityo dkk. (2025) memperlihatkan kinerja perkerasan menunjukkan bahwa pelapisan SteelGuard meningkatkan ketahanan terhadap alur dan berkontribusi pada perpanjangan umur layan perkerasan. Kajian ini relevan sebagai rujukan teknis dalam preservasi jalan.

Artikel terakhir dibawakan Azhar dkk. (2025). Artikel membahas pemanfaatan limbah plastik Low Density Polyethylene (LDPE) sebagai bahan aditif pada campuran beraspal AC-Base. Dalam penelitian ini, penggunaan LDPE pada kadar optimum dapat meningkatkan karakteristik campuran beraspal. Kajian ini turut mendukung penerapan prinsip ekonomi sirkular dan pengurangan limbah plastik dalam konstruksi jalan.

Dewan Redaksi menyampaikan apresiasi kepada para penulis dan mitra bestari atas kontribusi ilmiah yang telah diberikan. Diharapkan artikel ilmiah dalam edisi ini dapat menjadi referensi bagi akademisi, praktisi, dan pengambil kebijakan dalam pengembangan dan penyelenggaraan jalan di Indonesia.

Ketua Dewan Redaksi,
Gede Budi Suprayoga, PhD

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Kata kunci bersumber dari artikel. Lembar abstrak ini boleh dikopi tanpa izin dan biaya	
UDC: 621.395.37 Imam Budy Prastiyo^{1*)}, Efendhi Prih Raharjo²⁾, Siti Maimunah³⁾ ⁽¹⁾ Directorate General of Land Transportation, Jakarta, Indonesia, ²⁾ Madiun Railway Polytechnic, Madiun, Indonesia, ³⁾ Indonesian Land Transportation Polytechnic, Bekasi, Indonesia) Updating the Toll Road Service Quality (TRSQ) Model Through the Integration of AI-Based Technological Innovations Jurnal Jalan Jembatan Vol. 42 No. 2 July–December 2025, pp. 65–81 ABSTRACT <i>Toll roads can play a vital role in supporting mobility, logistics, and regional economic growth. However, issues such as congestion, declining road quality, and limited real-time information systems often hinder service performance. This study aims to update the Toll Road Service Quality (TRSQ) model by integrating artificial intelligence (AI)-based technological innovations as a mediating variable to enhance excellent toll road services. Using a quantitative explanatory approach, data were collected from 480 users of the Pemalang–Batang Toll Road via a questionnaire survey. Data analysis employed SmartPLS to test causal relationships among TRSQ variables, which include information, accessibility, reliability, mobility, safety and security, rest areas, and responsiveness. Results show that all TRSQ variables significantly influence service excellence, both directly and through technology as a mediator. Priority indicators identified include toll gate queue length, availability of road markings and information boards, traffic flow, real-time traffic updates, and service comfort. The study highlights the urgency of applying AI-based intelligent transportation systems—such as innovative CCTV, remote sensors, and automated information management—to optimise toll road performance, improve user satisfaction, and strengthen sustainable transport services.</i> Keywords: <i>Brtificial intelligence, smartpls, technological innovation, toll road service, TRSQ model, user satisfaction</i>	UDC: 725.625.748 Fahmi Akbar^{1*)}, Firman Setiawan¹⁾, David¹⁾, Bahtiar¹⁾, Samuel Rorrong¹⁾ ⁽¹⁾Universitas Cenderawasih, Jayapura, Indonesia) Analisis Efektivitas Pembayaran Tol Berbasis Single Lane Free Flow (SLFF) Dibandingkan dengan E-Toll melalui Kinerja Gerbang Tol dan Persepsi Pengguna Jurnal Jalan Jembatan Vol. 42 No. 2 Juli - Desember 2025, hal. 82-95 ABSTRACT <i>Single Lane Free Flow (SLFF), known as “Let It Flo,” is a contactless toll payment system based on RFID technology developed by PT Jasamarga to reduce transaction time and queuing at toll gates. However, its implementation has not been fully effective due to low user adoption. This study aims to identify the implementation of SLFF, analyze vehicle flow, service time, service level, and delay time between the E-Toll and SLFF systems, as well as evaluate user perceptions toward the system. The analysis applies queuing theory using vehicle survey data collected at the Bekasi Timur 2 Toll Gate on January 13, 16, and 18, 2025, and questionnaires distributed to toll road users. The results show that SLFF is only used by four-wheeled light vehicles with a low adoption rate of two vehicles per hour compared to 343 vehicles per hour for E-Toll. Nevertheless, SLFF can reduce delay time by 0.6 seconds per vehicle and increase service capacity with a projected result of 6,000 vehicles per hour, significantly higher than the E-Toll system’s capacity of 957 vehicles per hour. The system eliminates queues and reduces congestion with a service intensity below one ($\rho < 1$), while users report improved safety and comfort due to non-stop and contactless transactions. The main challenges include limited infrastructure, restricted gate availability, ongoing application development, and limited technological information on the SLFF/Flo system. Therefore, infrastructure expansion, application improvement, and government support are essential to accelerate adoption and enhance the performance of the toll system in Indonesia.</i> Kata Kunci: SLFF/Flo, arus kendaraan, waktu pelayanan, persepsi pengguna, kuesioner Keywords: <i>SLFF/Flo, traffic flow, service time, user perception, questionnaire</i>

UDC: 504.7 Andry Yuliyanto^{1)*}, Galih Rio Prayogi¹⁾, Deny Syahputra¹⁾, Kirtinanda P.¹⁾, Ade Candra Kurniawan¹⁾ ⁽¹⁾Institut Teknologi Sumatera, Lampung, Indonesia) Evaluasi Emisi Gas Rumah Kaca Warm Mix Asphalt Metode Life Cycle Assessment Jurnal Jalan Jembatan Vol. 42 No. 2 Juli - Desember 2025, hal. 96-107 ABSTRACT <i>The Lampung Provincial Road and Construction Agency reported in 2022 that approximately 391.985 km or 23.05% of road infrastructure was damaged. The use of hot mix asphalt (HMA) for road repairs requires high production temperatures, resulting in increased energy consumption, fuel costs, and GHG emissions. Therefore, the environmental impact of road paving should not be ignored. Additives are added to the mixture to lower the mixing temperature, resulting in a mixture known as warm mix asphalt (WMA). In analyzing the potential for environmental impact savings, LCA was used. Inventory data was obtained from previous research literature studies. LCA was conducted based on a gate-to-gate approach that only covered the mixing process at the asphalt mixing plant (AMP). This study aims to determine the potential for energy reduction, fuel consumption savings, GHG reduction, and total cost savings in the alternative use of WMA in provincial road repairs in Lampung Province. Five types of WMA alternatives were considered, namely WMA with Asphamin, Advera, LEA, Sasobit, and Asphaltan additives. The results of the study show that WMA can reduce the mixing temperature and provide energy savings of between 3.15% and 13.65%. From an environmental perspective, WMA also reduces GHG emissions, with a reduction potential of up to 5.00 kgCO₂ per ton of mixture, equivalent to 13.22% compared to HMA. Economically, the use of WMA provides potential production cost savings ranging from 3.05% to 13.22%. Among the five types of additives tested (Asphamin, Advera, LEA, Sasobit, and Asphaltan), the LEA additive proved to be the most environmentally friendly alternative while also providing the greatest energy and cost savings.</i> Kata Kunci: Life Cycle Assessment, Warm Mix Asphalt, Gas Rumah Kaca, Efisiensi Energi. Keywords: Life Cycle Assessment, Warm Mix Asphalt, Greenhouse Gases, Energy Efficiency	UDC: 625.032.32 Heru Tri Saksena^{1)*}, Taufik Nur Adikusuma¹⁾ ⁽¹⁾Ministry of Public Works, Jakarta, Indonesia) A Comparative Evaluation of International Roughness Index (IRI) Techniques between Mobile Laser Scanner (MLS) and Dipstick Jurnal Jalan Jembatan Vol. 42 No. 2 July–December 2025, pp. 108-115 ABSTRACT <i>Assessing road surface quality is essential for maintaining and ensuring the safety of transportation infrastructure. This study evaluates the effectiveness of Mobile Laser Scanning (MLS) using the Leica Pegasus TRK 700 Evo in comparison to the conventional Dipstick method for measuring the International Roughness Index (IRI) on road surfaces. IRI data were collected from five sample locations, with observed differences between the two methods ranging from 0.02 m/km to 1.00 m/km and an average deviation of 0.19 m/km. The results suggest a high degree of compatibility between the IRI values generated by both methods, indicating that MLS can serve as a reliable alternative for road condition surveys. The Leica Pegasus TRK 700 Evo demonstrated operational efficiency, capable of surveying 40 to 100 kilometers of road per day under typical field constraints, such as equipment setup and GNSS base station relocation every 15 kilometers. Data processing required approximately four hours for every hour of field measurement. A field deployment scenario was developed, detailing the necessary resources, including a survey vehicle equipped with the MLS unit (staffed by a driver, operator, and section owner), a support vehicle for high IRI zones, a GNSS base station transport vehicle, and a two-person data processing team. The findings demonstrate that MLS technology is a practical and efficient tool for road condition assessment and offers a flexible, reliable alternative to traditional survey techniques in managing transportation infrastructure.</i> Keywords: International Roughness Index (IRI), Mobile Laser Scanning (MLS), point cloud, road condition, road assessment
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UDC: 539.373 Ardianto Tri Pradityo^{1*)}, Vita Vidyaning Viarsami²⁾, Gita Nur Aisyah¹⁾, Kevin Hutama Syahputra¹⁾ (¹⁾Politeknik Negeri Bandung, Bandung, Indonesia, ²⁾Kementerian Pekerjaan Umum, Bandung, Indonesia) Pengaruh Pelapisan Steelguard terhadap Deformasi Permanen Campuran Aspal AC-WC Jurnal Jalan Jembatan Vol. 42 No. 2 Juli - Desember 2025, hal. 116-126 ABSTRACT <i>Permanent deformation is a common type of distress that occurs on pavement surfaces due to the inability of the pavement structure to withstand repeated traffic loading. This type of damage leads to irreversible changes in the pavement surface, such as rutting and surface irregularities, which can compromise both driving comfort and road safety. To address this issue, innovative surface treatment solutions are needed to enhance pavement performance and service life. One such solution is SteelGuard, a polymer-modified asphalt surface coating specifically designed to repair minor surface damage. SteelGuard can be applied using spray techniques or brushed directly onto existing pavement surfaces. The research method involved two combinations of test specimens, namely asphalt concrete wearing course (AC-WC) with and without SteelGuard coating. To analyze the effect of the SteelGuard layer on permanent deformation resistance, tests were conducted using a Hamburg Wheel Tracking (HWT) under wet conditions at two temperatures, 28°C and 45°C. The analysis compared wheel passes, rut depth, Stripping Inflection Point (SIP), Number of Passes to Failure (Nf), and performance behavior during creep and stripping conditions between the two specimen combinations. The experimental results indicate that AC-WC mixtures treated with a SteelGuard coating exhibit improved resistance to permanent deformation. This improvement is evidenced by a reduction in rut depth and enhancements in other performance parameters. Based on these findings, SteelGuard is considered effective in improving the durability and functional performance of pavement surfaces, thereby contributing to longer service life and improved roadway conditions for users.</i> Kata Kunci: Steelguard, AC-WC, deformasi permanen, hamburg wheel tracking Keywords: Steelguard, AC-WC, permanent deformation, hamburg wheel tracking	UDC: 625.07 Febiansyah Azhar^{1*)}, Rinto Permana¹⁾, Linda Aisyah¹⁾, Ardianto Tri Pradityo¹⁾ (¹⁾Politeknik Negeri Bandung, Bandung, Indonesia) Penggunaan Biji Plastik Low Density Polyethylene (LDPE) pada Campuran Beraspal AC-Base Jurnal Jalan Jembatan Vol. 42 No. 2 Juli - Desember 2025, hal. 127-139 ABSTRACT <i>Roads are one of the key infrastructures supporting public mobility. However, road conditions in Indonesia still face various issues, one of which is the frequent occurrence of road damage even before reaching the planned service life. This damage is generally caused by the insufficient stability of asphalt mixtures, which prevents pavement layers from optimally withstanding traffic loads. One type of asphalt mixture that can address this issue is AC-Base, which functions as a supporting layer beneath the surface layer and transfers traffic loads to the subgrade. Therefore, additive materials are needed to improve the stability and durability of the AC-Base mixture. One of the additives used in this study is LDPE plastic pellets, as previous research has shown that LDPE can improve the properties of asphalt mixtures, particularly stability. However, further research is required regarding the use of LDPE plastic pellets to acknowledge the effect of the use of Low-Density Polyethylene (LDPE) plastic pellets on the characteristics of an AC-Base mixture, and to obtain the LDPE optimum content with various content levels, namely 2%, 4%, 6%, and 8% by weight of asphalt. Based on the experimental results, the LDPE plastic pellet content that met the specified criteria was 2%. The comparison between the control AC-Base mixture and the modified AC-Base mixture with 2% LDPE pellets and AC-Base mixture modified with LDPE plastic pellets on the optimum content of asphalt at 4,5% showed an increase in density from 2.33 gr/cm³ to 2.35 gr/cm³ and residual stability from 90.24% to 91.08%. However, several other parameters decreased slightly: VIM from 3.18% to 3.16%, VMA from 14.13% to 13.56%, VFB from 83.49% to 82.15%, and stability from 1856.33 kg to 1839.34 kg. This research contributes to the development of more sustainable pavement material by utilising polymer waste for asphalt mixture engineering.</i> Kata Kunci: AC-Base, Plastik LDPE, Stabilitas, Volumetrik Aspal, Kadar Optimum Plastik LDPE Keywords: AC – Base, LDPE Plastic, Stability, Asphalt Volumetric, Optimum LDPE Plastic Content S
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