



INTISARI

Jalur kereta api Boyolali–Purwosari merupakan salah satu jalur di wilayah eks-Solo Raya yang memiliki peran historis dalam mendukung distribusi hasil pertanian dan industri pada masa kolonial. Seiring waktu, jalur ini dinonaktifkan dan sebagian besar lahannya beralih fungsi menjadi permukiman dan infrastruktur lainnya. Di tengah meningkatnya kebutuhan transportasi ramah lingkungan dan efisien, reaktivasi jalur ini menjadi salah satu alternatif strategis untuk mendukung konektivitas antarwilayah dan mengurangi ketergantungan pada jalan raya. Penelitian ini bertujuan untuk merancang ulang geometrik trase jalur kereta api Boyolali–Purwosari yang sesuai dengan standar teknis saat ini.

Metode penelitian mencakup identifikasi trase eksisting melalui kombinasi survei lapangan, pemetaan jalur berdasarkan peta historis, dan interpretasi citra satelit saat ini. Proses *geo-referencing* dilakukan untuk memetakan ulang jalur lama, yang kemudian dijadikan salah satu rancangan dari 3 alternatif trase. Ketiga alternatif trase dianalisis untuk menetapkan trase terbaik menggunakan metode *Multi Criteria Analysis* yang mempertimbangkan aspek teknis, sosial, lingkungan, ekonomi, serta tata ruang. Perancangan geometrik pada trase terpilih dilakukan dengan mengacu pada Peraturan Menteri Perhubungan Nomor 60 Tahun 2012.

Hasil studi menunjukkan bahwa trase eksisting dapat di-*tracking* dan diketahui bahwa 91% lahan sudah berubah menjadi bangunan dan daerah pemukiman. Berdasarkan analisis multikriteria, Alternatif 2 terpilih sebagai trase rancangan dengan skor tertinggi sebesar 2,22. Perancangan geometrik dilakukan untuk jalur rel kelas V dengan kecepatan rencana 80 km/jam. Trase terpilih memiliki 11 lengkung horizontal (7 lengkung transisi, $R=1050$ m dan 4 lengkung lingkaran, $R=500$ m) serta 14 lengkung vertikal (8 di antaranya berbentuk cekung dan 6 di antaranya berbentuk cembung, $R=6000$ m). Perancangan divisualisasikan menggunakan *AutoCAD Civil 3D* dan dapat diterapkan secara teknis. Volume pekerjaan tanah mencakup galian sebesar $\pm 389.426,61$ m³ dan timbunan $\pm 247.701,82$ m³.

Kata kunci: reaktivasi, jalur kereta api, Boyolali–Purwosari, analisis multikriteria, geometrik jalan rel



ABSTRACT

The Boyolali–Purwosari railway line is an inactive line within the former Solo Raya region, which historically played a vital role in supporting the distribution of agricultural and industrial products during the colonial era. Over time, the line was deactivated, and a significant portion of its land has been converted into settlements and other infrastructure. Amid the growing demand for environmentally friendly and efficient transportation, the reactivation of this line presents a strategic alternative to enhance inter-regional connectivity and reduce dependency on road-based transport. This research aims to redesign the geometric alignment of the Boyolali–Purwosari railway line to comply with current technical standards.

The research methodology includes the identification of the existing alignment through a combination of field surveys, route mapping based on historical maps, and interpretation of current satellite imagery. A georeferencing process was conducted to remap the old route, which was then established as one of three alternative alignment designs. These three alternatives were analyzed to determine the optimal alignment using the Multi-Criteria Analysis (MCA) method, considering technical, social, environmental, economic, and spatial planning aspects. The geometric design of the selected alignment was based on the Minister of Transportation Regulation No. 60 of 2012.

The study results indicate that the existing alignment was traceable, revealing that 91% of its land has been converted into buildings and residential areas. Based on the multi-criteria analysis, Alternative 2 was selected as the design alignment with the highest score of 2.22. The geometric design was developed for a Class V railway track with a design speed of 80 km/h. The selected alignment features 11 horizontal curves (7 transition curves, $R=1050$ m, and 4 circular curves, $R=500$ m) and 14 vertical curves (8 of which are sag curves, $R=6000$ m). The design was visualized using AutoCAD Civil 3D and is considered technically feasible. The estimated earthwork volume includes approximately 389.426,61 m³ of cut and 247.701,82 m³ of fill.

Keywords: reactivation, railway line, alignment, Boyolali–Purwosari, multi-criteria analysis geometric railway design,