摘要

本桥梁设计基于荣乌柳泉中桥的地质勘察数据，涵盖了方案比选、上部结构设计分析以及后期养护与维修策略的专项研究。设计工作的主要内容包括：

1. 设计参数：本桥按照一级公路荷载标准设计，桥面布置为双车道。抗震设防等级为 B 类，地基土层为粉质黏土。
2. 方案比选：对几种桥梁结构方案进行了评估，包括开放式拱桥，预应力空心板桥以及钢筋混凝土简支梁桥。通过全面的比较分析，最终确定钢筋混凝土简支梁桥为最佳方案。
3. 结构设计与分析：上部结构采用 T 型梁截面形式。设计内容包括纵向高程布置，通过横向荷载分布系数与荷载组合效应确定关键参数，以及钢筋的合理布置。对主梁进行内力分析，并验证其抗弯性能，抗剪能力以及挠度是否满足规范要求。此外，设计还包括横隔板布置,钢筋结构细节及桥面铺装连续性的详细计算。
4. 专题研究：基于深度学习算法的检测工具已被开发，用于识别桥面板上的裂缝。该技术通过自动化裂缝识别过程，显著提升了养护工作的准确性和效率。

关键词：公路桥梁简支 T 形梁，上部结构，内力计算，AutoCAD.

ABSTRACT

The bridge design is informed by geological data from the Liuquan Medium Bridge on Rongwu Highway and encompasses scheme selection, structural analysis for both the superstructure, as well as a focused study on maintenance and repair strategies. Major components of the design include :

1. Design Criteria : The bridge is designed to accommodate Class I Highway Loads and features two lanes. The seismic design falls under category B, with a foundation layer composed of silty clay.
2. Scheme Evaluation : Several bridge structure alternatives were evaluated, such as the open spandrel arch type, the prestressed hollow slab design, and the simply supported beam bridge utilizing reinforced concrete. Following a thorough comparison, the reinforced concrete beam bridge was determined to be most effective and suitable choice.
3. Structural Design and Analysis : The T-beam cross-sectional form is adopted for the superstructure configuration. The design process encompasses vertical alignment planning, the calculation of critical design parameters through lateral load distribution coefficients and laod combination effect, as well as a systematic arrangement of reinforcement bars. Structural analysis was conducted to assess internal forces acting on the main beams, followed by validation of flexural strength, shear resistance, and deflection compliance. Furthermore, the design integrates thorough calculations related to diaphragm placement, reinforcement detailing, and surface layer continuity.
4. Special Research : A software application utilizing deep learning algorithms has been developed to facilitate the detection of surface cracks on bridge decks. By automating the crack detection process, this technology significantly improves the precision and effectiveness of maintenance activities.

Keywords : Highway bridges Simply Supported T-beam, Superstructure, internal force calculation, AutoCAD.