REQUIREMENT ANALYSIS Civil Engineering Insight Studio

1. Introduction
Requirement Analysis is the process of identifying, analyzing, and documenting the needs and expectations of users for a system. For the Civil Engineering Insight Studio project, this phase defines the functional and non-functional requirements necessary to develop an AI-based application capable of analyzing civil engineering structures from images.

2. Purpose of the System
The purpose of this system is to provide an automated tool that analyzes images of civil engineering structures and generates detailed engineering insights using multimodal Generative AI.

3. Scope
The system focuses on descriptive analysis of structures such as bridges, buildings, dams, and roads. It is intended for educational and preliminary analysis purposes and is accessible via a web interface.

4. Functional Requirements
• The system shall allow users to input a textual prompt.
• The system shall allow users to upload an image of a civil engineering structure.
• The system shall process text and image inputs simultaneously.
• The system shall generate a detailed description of the structure.
• The system shall display the generated output on the interface.

5. Non-Functional Requirements
• Usability: The interface must be simple and user-friendly.
• Performance: The system should generate results within a reasonable time.
• Reliability: The system should function consistently without crashes.
• Security: API keys must be stored securely using environment variables.
• Compatibility: The application should run on standard web browsers.

6. Hardware Requirements
• A computer or laptop with minimum 4 GB RAM
• Internet connectivity
• Basic input/output devices

7. Software Requirements
• Operating System: Windows / Linux / macOS
• Programming Language: Python
• Web Framework: Streamlit
• AI Service: Google Gemini API
• Supporting Libraries: Pillow, python-dotenv

8. User Requirements
Users should have basic knowledge of operating a computer and uploading files through a web interface.

9. Constraints
• Requires internet access for AI processing
• Accuracy depends on image quality
• Limited to descriptive analysis only

10. Conclusion

The Requirement Analysis phase establishes the foundation for developing the Civil Engineering Insight Studio application by clearly defining system needs, functionalities, constraints, and resources required for successful implementation.