Project Design Phase-II
Solution Requirements (Functional & Non-functional)

Date	4 February 2026
Team ID	LTVIP2026TMIDS62350
Project Name	Civil Engineering Insight Studio
Maximum Marks	4 Marks

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Input Handling	User can upload construction image. User can enter structural analysis request.
FR-2	Input Validation	System validates that image is uploaded. System validates that analysis request is not empty.
FR-3	AI Structural Analysis	System constructs structured prompt for Gemini Vision API. System sends image + prompt to Google Gemini API. System receives AI-generated structural report.
FR-4	Report Display	System displays structured engineering report. Report includes structure type, materials, components, construction stage, and observations.
FR-5	Report Export	System converts generated report into downloadable format (PDF/Markdown – future scope).
FR-6	Session Management	System temporarily stores generated report in session state.
FR-7	Error Handling	System displays user-friendly error message if API call fails or invalid input is provided.

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	System shall provide a clean, intuitive Streamlit interface for engineers and supervisors.
NFR-2	**Performance**	AI analysis should complete within acceptable response time (3–10 seconds depending on API latency).
NFR-3	**Reliability**	System shall handle API failures gracefully without crashing.
NFR-4	**Availability**	Application should be accessible whenever hosting platform is active.
NFR-5	**Scalability**	System should handle multiple concurrent analysis requests within Gemini API limits.
NFR-6	**Maintainability**	Codebase should be modular, readable, and easy to update for future enhancements.
NFR-7	**Security**	API keys must be securely stored using environment variables (.env) or Streamlit secrets.