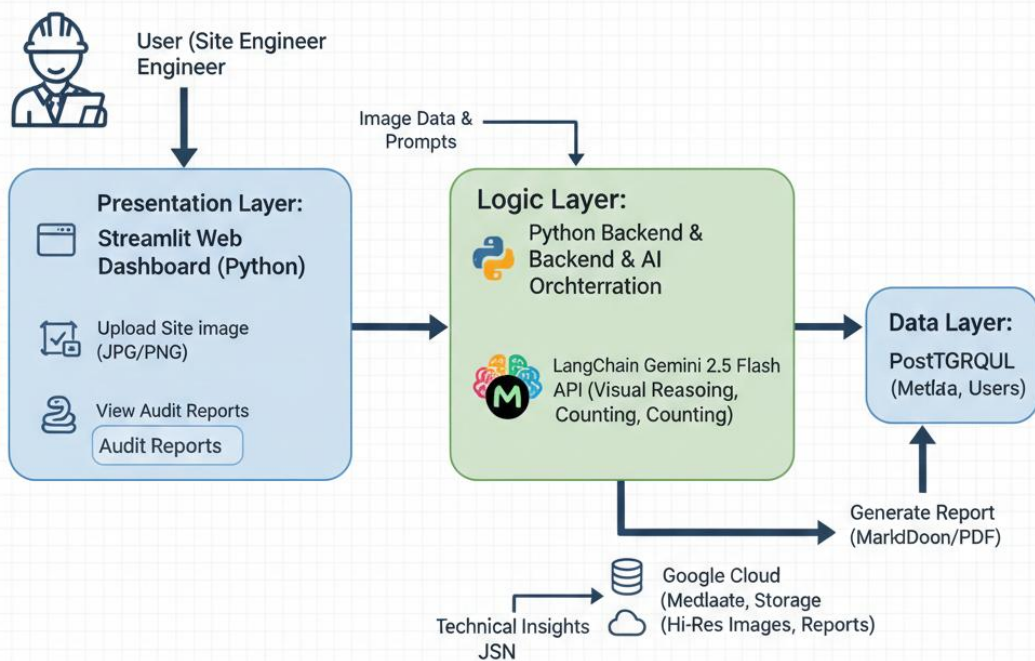


# Requirement Analysis Phase-II

## Technology Stack (Architecture & Stack)

<b>Date</b>	18 January 2026
<b>Team ID</b>	LTVIP2026TMIDS81723
<b>Project Name</b>	Civil Engineering Insight Studio
<b>Maximum Marks</b>	4 Marks

### Civil Engineering Insight Studio: Technical Architecture



#### Technology Stack



Streamlit (UI)



Gemini 2.5 Flash (AI Orchestration)



LangChain (DB GP Cloud)

Pandas

(DataFrames)

1. Technical Architecture Diagram

This diagram follows the provided guidelines by illustrating the demarcation between the local user environment (Field Engineer), the cloud-based AI processing layer (Google Gemini), and the central data storage.

Table-1: Components & Technologies

S.No	Component	Description +2	Technology +2
1	User Interface	Responsive Web Dashboard for image uploads and audit management.	Streamlit, HTML5, CSS3
2	Application Logic-1	Core backend logic for handling file uploads and report formatting.	Python 3.10
3	Application Logic-2	Multimodal data processing and prompt engineering.	LangChain / Google Generative AI SDK
4	Database	Relational storage for user profiles and project metadata.	PostgreSQL
5	Cloud Database	Fully managed database instance for global accessibility.	Google Cloud SQL / Supabase
6	File Storage	Storage for high-resolution site imagery and generated reports.	Google Cloud Storage (GCS) / AWS S3
7	Machine Learning Model	Visual reasoning model for structural member identification.	Google Gemini 2.5 Flash API
8	Infrastructure	Scalable cloud deployment for high availability.	Google Cloud Platform (GCP)

**Table-2: Application Characteristics**

S.No	Characteristics	Description +2	Technology +2
1	<b>Open-Source Frameworks</b>	Utilizes robust libraries for data manipulation and UI.	Streamlit, Pandas, NumPy
2	<b>Security Implementations</b>	Secure handling of API keys and encrypted user data.	OAuth 2.0, SSL/TLS, Python-dotenv
3	<b>Scalable Architecture</b>	Decoupled architecture separating the UI from the heavy AI reasoning.	3-Tier / Serverless Architecture
4	<b>Availability</b>	Ensures engineers can perform site walkthroughs 24/7.	Google Cloud Run (Auto-scaling)
5	<b>Performance</b>	Rapid AI inference and low-latency image validation.	Gemini Flash (Low-latency) / Redis Cache