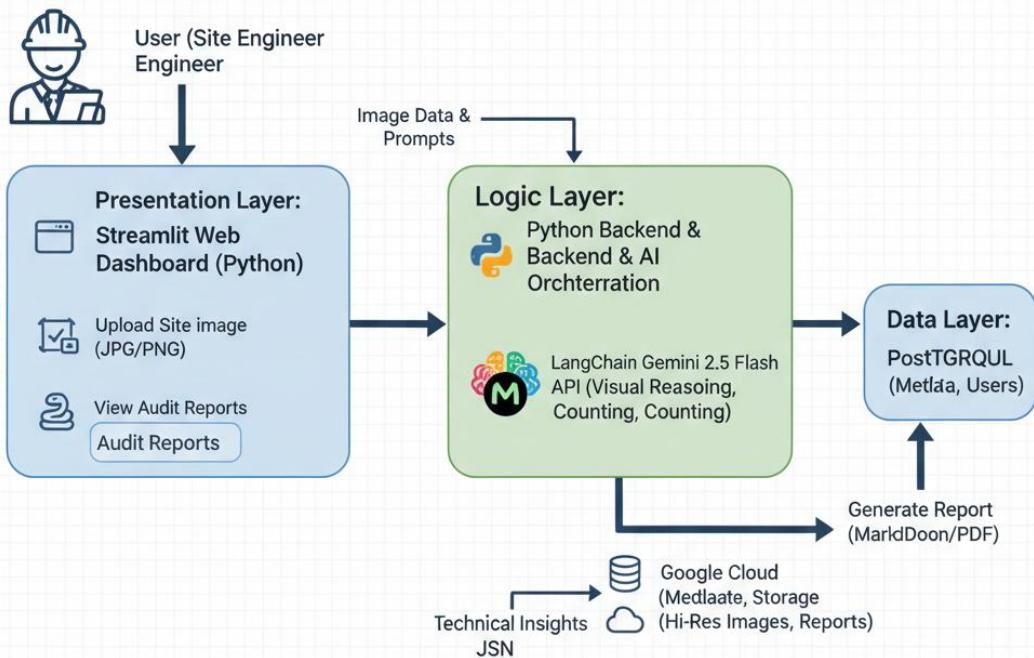


Requirement Analysis Phase-II

Technology Stack (Architecture & Stack)

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

Civil Engineering Insight Studio: Technical Architecture



Technology Stack



Streaim (UI)



Gemini 25 Flash (AI
(Orchiration))



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	Open-Source Frameworks	Utilizes robust libraries for data manipulation and UI.	Streamlit, Pandas, NumPy
2	Security Implementations	Secure handling of API keys and encrypted user data.	OAuth 2.0, SSL/TLS, Python-dotenv
3	Scalable Architecture	Decoupled architecture separating the UI from the heavy AI reasoning.	3-Tier / Serverless Architecture
4	Availability	Ensures engineers can perform site walkthroughs 24/7.	Google Cloud Run (Auto-scaling)
5	Performance	Rapid AI inference and low-latency image validation.	Gemini Flash (Low-latency) / Redis Cache