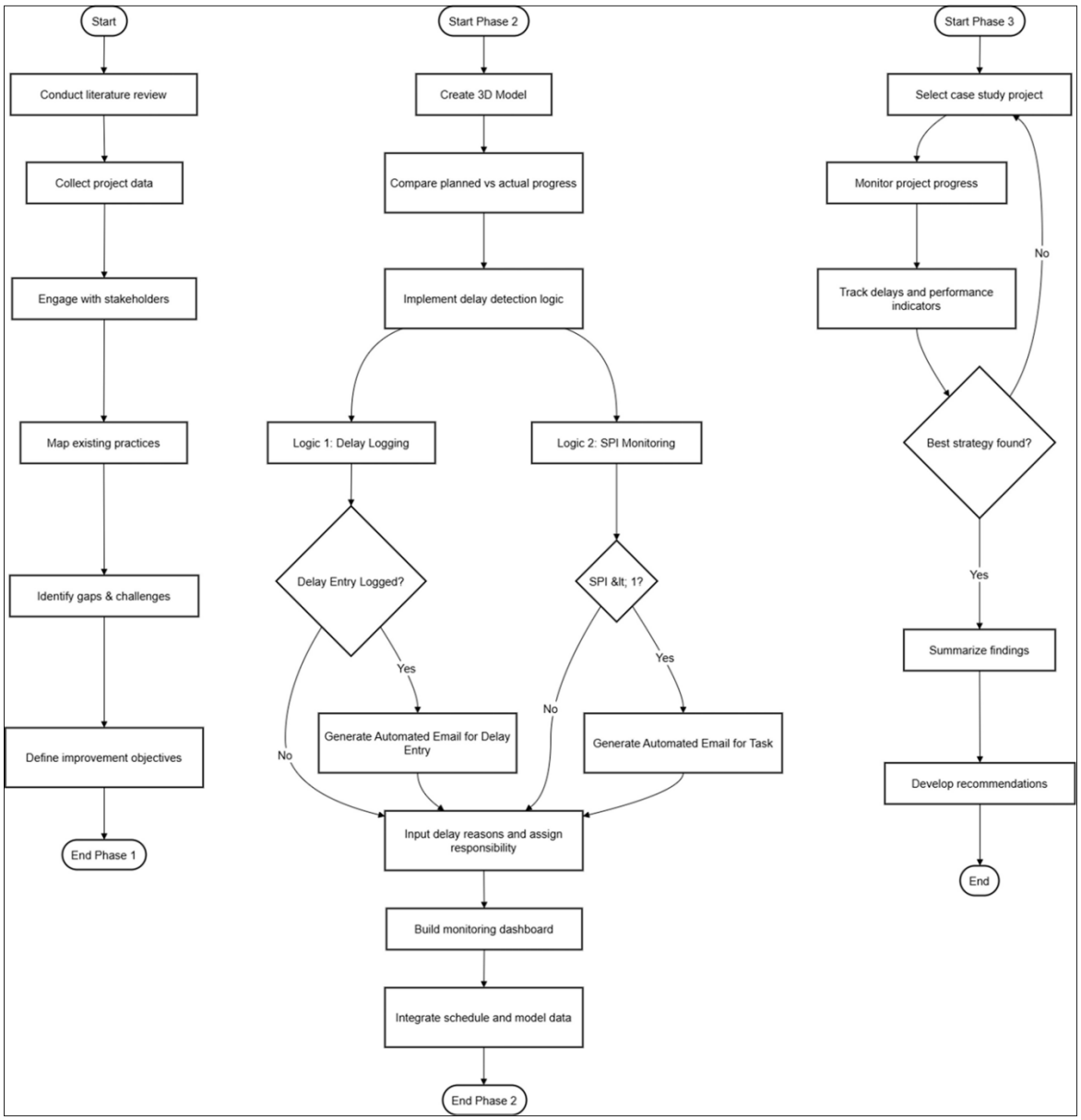
Final Year Design Project Showcase
Batch-2022
Year 2026

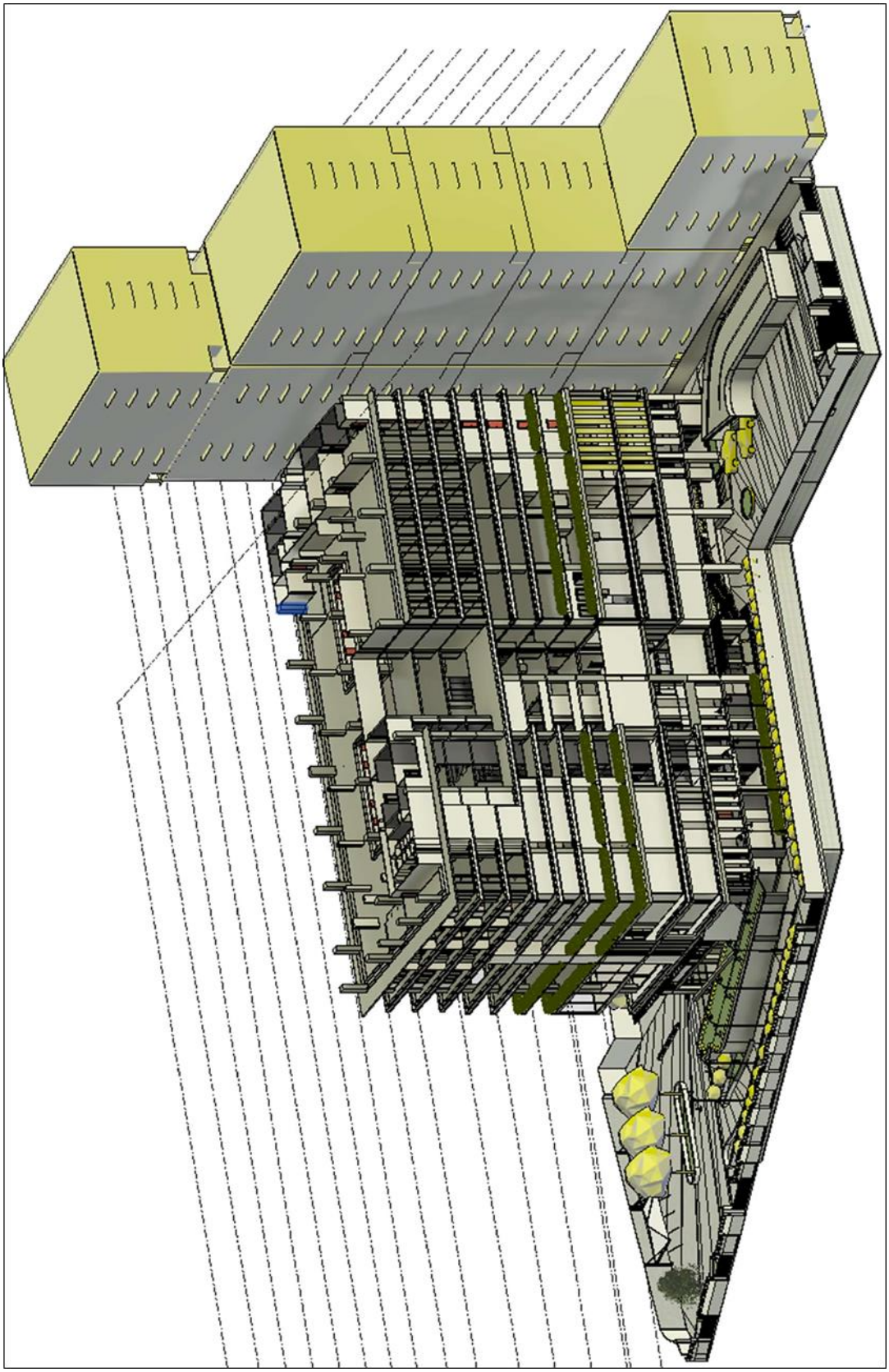
	Department: Civil Engineering Programme: Construction Engineering
1	**Project Title** BIM-based Proactive Delay Detection and Mitigation in Construction Projects
2	**Project Idea** There are numerous construction projects around the world that are typically delayed, resulting in very expensive and costly mistakes. Traditionally, project management approaches have been reactive, involving human labor and using fragmented information such as 3D modeling and different schedules, among others. The root of this persistent problem is the industry's reliance on manual, disconnected, and reactive management practices. Project information is currently handled in isolated data sources such as the 3D Building Information Model (BIM) the complex project schedule and simple paper-based delay logs. This fragmentation means managers waste valuable time manually cross-referencing information, making it impossible to establish an automatic real-time link between a physical element experiencing a problem on site and its exact impact on the project timeline. This critical data disconnect prevents teams from being able to quickly identify who is responsible for a delay and what action should be taken. Consequently, delays are only recognized and addressed after they have become severe and costly a reactive approach that maximizes the expense of recovery. There is thus an urgent industry need for a smart, automated digital platform capable of synthesizing this various project information to proactively detect potential delays early, provide immediate performance alerts, and deliver data-driven decision support for timely mitigation.
3	**Process** The process outlines the main steps for managing project delays. It starts with a Literature Review to understand the topic and then Identifies Key Factors causing delays. Next a Survey form is created, followed by Data Collection to gather information. This data then supports the Development of a Delay Management Dashboard, a tool to help track and control delays. The dashboard is then tested through Real Life Implementation. Finally, the process concludes with Result Analysis to check the method's effectiveness and Report Findings to share the conclusions. Essentially, the approach moves from background research to creating, testing, and reporting on a practical delay management tool.
4	**Outcome** A proprietary Revit Add-in that enables site engineers to record any delays right at the 3D element level was developed. The collected information is then imported into an SQL database, which is combined with the project schedule (Microsoft Project) and the "Delay Baseline Table." In case there is any recorded delay, the system sends out dynamic email alerts. This project is a great success because it transforms construction management from a reactive approach to proactive management through the use of technology. Dasboard Automation eliminates human errors, avoids conflicts, and sets up a foundation for further implementation of predictive scheduling using artificial intelligence.
5	**Evidence (Theoretical Basis)** The primary objective of this research was to address the systemic inefficiencies in traditional construction delay management by developing a BIM-integrated proactive detection system. Through the synthesis of Building Information Modeling (BIM), relational databases, and

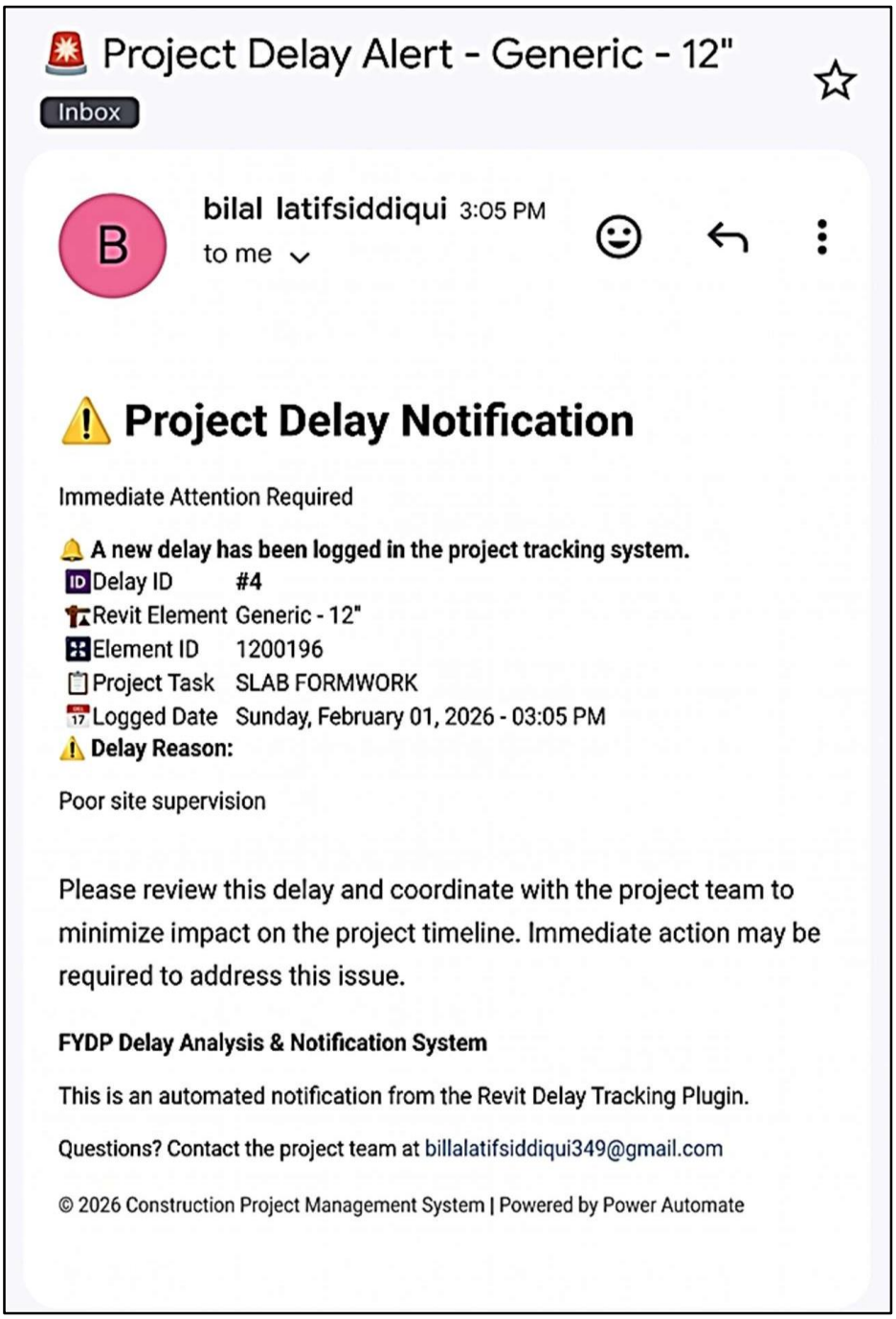
	automated scheduling logic, this project has successfully established a "Single Source of Truth" framework that bridges the gap between site-level activities and managerial oversight. The investigation into delay variables concluded that "Design Changes" and "Approval Delays" are the most critical factors impacting project timelines in the local construction landscape. To mitigate these, a proprietary Revit Add-in was developed to facilitate real-time data entry, ensuring that every disruption is digitally documented and linked to specific structural elements. This methodology was validated through the Karachi Club Extension Project, where the system successfully identified a "Major Delay" reflected by a Schedule Performance Index (SPI) of 0.88. Furthermore, the integration of a "Delay BaselineTable" based on FIDIC contract clauses and survey responses allowed for the automated allocation of liability, providing an objective basis for dispute resolution. Ultimately, the project demonstrates that transitioning from manual, paper-based reporting to an automated digital pipeline reduces communication latency by several hours and provides stakeholders with the forensic data necessary to close project cases with transparency and technical rigor.	
6	**Competitive Advantage or Unique Selling Proposition** (Cost Reduction, Process improvement, Attainment of any SDG (Sustainable Development Goal), increase of market share or capturing new market or having superior performance over a competitor. In summary, any striking aspect of the project that compels the industry to invest in FYP or purchase it. Some detailed description is required in terms of how, why when what. You can select one or more from the following dropdown and delete the rest of them). Please keep relevant options, delete the rest of them, and correct the sequence	
a	**Attainment of any SDG** (e.g. How it is achieved and why it is necessary for the region) ☒ Industry, Innovation and Infrastructure ☒ Reduced Inequalities ☒ Peace and Justice and Strong Institutions	
b	**Any Environmental Aspect** (e.g. carbon reduction, energy-efficient, etc.) Due to potential savings in days lost, the daily environmental losses also gets minimized.	
c	**Cost Reduction of Existing Product** Delay minimization results in savings of days and consequently extra cost spent saved eventually.	
d	**Process Improvement which Leads to Superior Product or Cost Reduction, Efficiency Improvement of the Whole Process** (e.g. What is the issue is current process and what improvement you suggests) Project information is currently handled in isolated data sources such as the 3D Building Information Model (BIM) the complex project schedule and simple paper-based delay logs. This fragmentation means managers waste valuable time manually cross-referencing information, making it impossible to establish an automatic real-time link between a physical element experiencing a problem on site and its exact impact on the project timeline. This critical data disconnect prevents teams from being able to quickly identify who is responsible for a delay and what action should be taken.	
e	**Expanding of Market share** (e.g. how it expand and what is the problem with the current market It contributes in economic growth of industry, by completing projects on time.	
f	**Capture New Market** (e.g. Niche market or unaddressed segment) Traditionaly industry relies on conventional practices of delay management, this modern technology driven dashboard will assist users to make well informed and timely decisions.	
g	**Any Other Aspect** NA	
7	**Target Market** (Industries, Groups, Individuals, Families, Students, etc) Please provide some detail about the end-user of the product, process, or service Construction Project Managers, Contract Administrators and Clients	
8	**Team Members** (Names along with email address)	**Syeda Ifrah Ghazanfer** ghazanfer4504173@cloud.neduet.edu.pk **Mirza Ibrahim Baig**

		baig4502890@cloud.neduet.edu.pk **Rabee Nasir** nasir4500243@cloud.neduet.edu.pk **Muhammad Bilal Siddiqui** siddiqui4501043@cloud.neduet.edu.pk
10	**Supervisor Name** (along with email address)	Dr. Rana Rabnawaz Ahmed (enawaz@cloud.neduet.edu.pk)
11	**Video (If any)**	NA

Pictures (to be pasted below)







Project Delay Alert - Generic - 12"

Inbox

B

bilal latifsiddiqui 3:05 PM

to me

⚠️ Project Delay Notification

Immediate Attention Required

🔔 **A new delay has been logged in the project tracking system.**

Delay ID	#4
Revit Element	Generic - 12"
Element ID	1200196
Project Task	SLAB FORMWORK
Logged Date	Sunday, February 01, 2026 - 03:05 PM

⚠️ **Delay Reason:**

Poor site supervision

Please review this delay and coordinate with the project team to minimize impact on the project timeline. Immediate action may be required to address this issue.

FYDP Delay Analysis & Notification System

This is an automated notification from the Revit Delay Tracking Plugin.

Questions? Contact the project team at billalatifsiddiqui349@gmail.com

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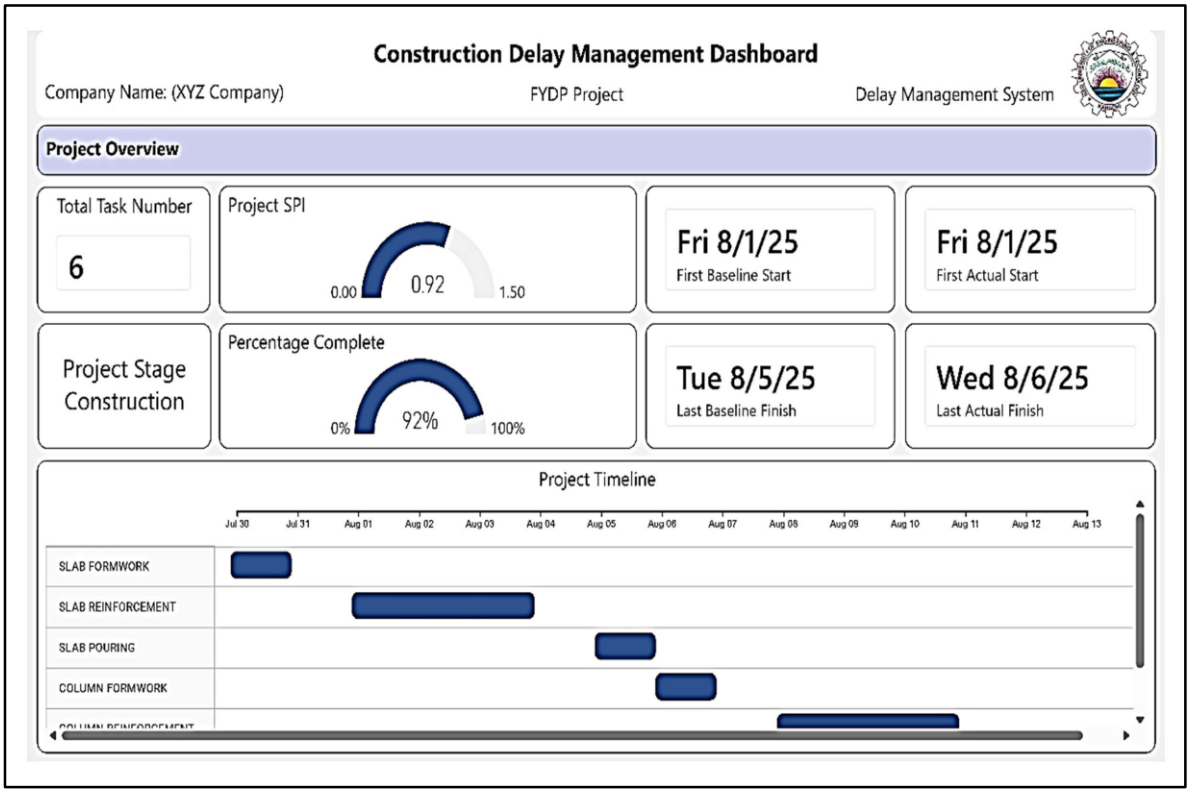
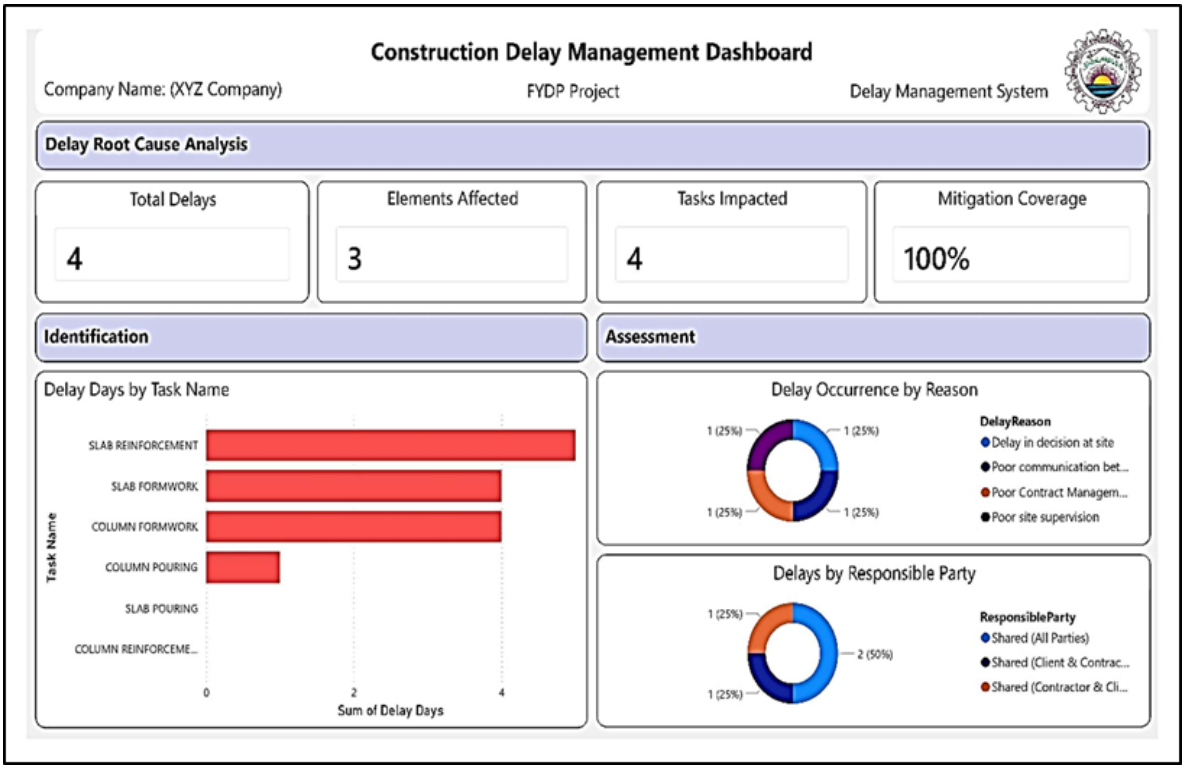

Construction Delay Management Dashboard
Company Name: (XYZ Company)
FYDP Project
Delay Management System
Project Overview
Total Task Number
6
Project SPI
0.00
0.92
1.50
Fri 8/1/25
First Baseline Start
Fri 8/1/25
First Actual Start
Project Stage
Construction
Percentage Complete
0%
92%
100%
Tue 8/5/25
Last Baseline Finish
Wed 8/6/25
Last Actual Finish
Project Timeline
Jul 30
Jul 31
Aug 01
Aug 02
Aug 03
Aug 04
Aug 05
Aug 06
Aug 07
Aug 08
Aug 09
Aug 10
Aug 11
Aug 12
Aug 13
SLAB FORMWORK
SLAB REINFORCEMENT
SLAB POURING
COLUMN FORMWORK


Construction Delay Management Dashboard
Company Name: (XYZ Company)
FYDP Project
Delay Management System
Delay Root Cause Analysis
Total Delays
4
Elements Affected
3
Tasks Impacted
4
Mitigation Coverage
100%
Identification
Assessment
Delay Days by Task Name
SLAB REINFORCEMENT
SLAB FORMWORK
COLUMN FORMWORK
COLUMN POURING
SLAB POURING
COLUMN REINFORCEME...
Task Name
0
2
4
Sum of Delay Days
Delay Occurrence by Reason
1 (25%)
1 (25%)
1 (25%)
1 (25%)
DelayReason
Delay in decision at site
Poor communication bet...
Poor Contract Managem...
Poor site supervision
Delays by Responsible Party
1 (25%)
2 (50%)
1 (25%)
ResponsibleParty
Shared (All Parties)
Shared (Client & Contrac...
Shared (Contractor & Cli...

Construction Delay Management Dashboard

Company Name: AAA Partnership Pvt. Ltd. | FYDP Project | Delay Management System

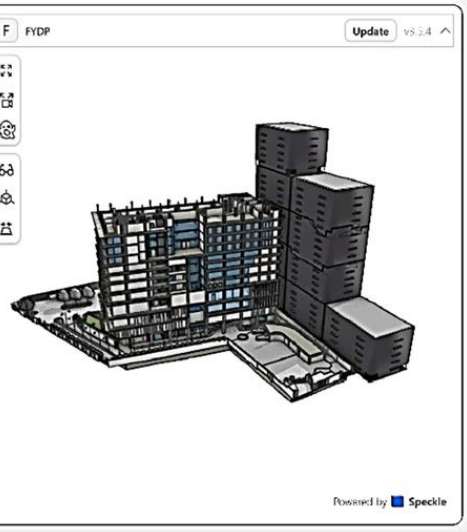
Schedule, Delay Log & BIM Model

Schedule

TaskOrder	Task Name	Baseline Duration	Baseline Start	Baseline Finish	Actua
146	Pre-Stressing Work	6	2025-04-08	2025-04-14	
147	Columns	10	2025-02-22	2025-03-05	
148	Core Walls	10	2025-02-22	2025-03-05	
149	Shear Walls	10	2025-02-22	2025-03-05	
150	Slab & Beams	16	2025-03-18	2025-04-14	
151	Electrical Conduiting & Sleeves Placement	4	2025-04-10	2025-04-14	
152	Staircase	5	2025-04-15	2025-04-19	

Delay Log

CombinedID	ProjectTask	RevitElementId	DelayReason
1	Columns	338706	Late Material Delivery
2	Slab & Beams	480059	Equipment Breakdown / Malfunction
3	Electrical Conduiting & Sleeves Placement	324201	Slow Response to RFIs



Construction Delay Management Dashboard

Company Name: AAA Partnership Pvt. Ltd. | FYDP Project | Delay Management System

Executive Conclusion

Project Status Summary:

The project currently faces **3** logged delay events affecting critical path elements. The overall Schedule Performance Index (SPI) is currently at **0.88**. The most frequent cause of delay is **Equipment Breakdown / Malfunction**.

Recommended Mitigations

CombinedID	ProjectTask	DelayReason	Mitigation
1	Columns	Late Material Delivery	Ensure proper procurement scheduling. Monitor supplier performance regularly. Track logistics and delivery t
3	Electrical Conduiting & Sleeves Placement	Slow Response to RFIs	Ensure defined RFI response timelines. Assign dedicated staff for query handling. Use digital RFI tracking syst
2	Slab & Beams	Equipment Breakdown / Malfunction	Ensure preventive maintenance schedule. Keep backup equipment available. Conduct regular inspections.