Construction Project Management Solution

Project Proposal

CS 476 – 2025 (Summer)

Ali Bayeh

Project Team

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1. Project Description and Scope

Infrastructure projects are large and complex to manage. This includes managing budget, schedule, and a number of delivery aspects of the project. Each dollar, and change has to be accounted for otherwise the project can fail. However, doing this is challenging due to lack of centralized data points, supporting tools, and people's aspects of the industry. The existing tools are not user friendly which discourages people from using them, or they lack the required features. As a result, spreadsheets and various other third party softwares are used to track data. This is inefficient as there is no centralization, and is more costly in the long term.

To solve the above problem, this team will develop a web-based Construction Project Management system targeted for the construction industry. The Construction Project Management Solution (CPMS) will be a tool used by project managers to manage and deliver infrastructure projects. The CPMS will include features that support the complete project lifecycle. It is designed for three key user roles: Project Managers, Collaborators, and Administrators, each with role-based access. The project manager will be able to invite collaborators for their projects, while an Administrator account has greater oversight over the whole database. The system will have the following core features:

- **Financial Tracking:** Track, and monitor all project financials, effectively reducing reliance on third party softwares.
- **Schedule Management:** Track project schedules, providing all dates within the project.
- **Project Delivery:** Dedicated project delivery information in accordance with Project Management Institute practices including Risks, Lessons Learned, etc
- **Change Log:** A log that shows changes to budget, schedule, and scope of the project.
- **Project Administration:** Permissions management, and user activity trail.

As a result of development, the following tangible outcomes can be expected:

- Improved data accuracy reducing costly errors.
- Centralized data collection which minimized data duplication.
- Centralized project oversight which allows better budget control, improved project scheduling, and better decision making.
- Faster reporting with one-click of *project export* in PDF which
- Increased accountability and audit that allows permission management, and user trail tracking.

2. Software Requirements

The backend will use a SQLite database, Node.js, JavaScript, HTML, CSS, and other tools as required.

ID	Requirement
1	The software will have three key user roles; Project Manager, Collaborator, and Administrator. a. Project Manager (PM): Normal user of the software who will have access to all functional features of the software. The PM can invite Collaborators to work on a project. b. Collaborator: A restricted user who's access is determined by the PM and Administrator. Collaborator is only able to view projects s/he is assigned to, and the tabs within the project. c. Administrator: Full control of the software. All available functions can be accessed by admins. Admins have access to administration tools within the software.
2	The software will be able to support at least 10 concurrent users in any given project.
3	The software will track all changes made to all the data points (inputs) within a project.
4	The software will allow a Project Manager to create a new project.
5	The software will have pre-defined mandatory fields such as Project Name, Project Description, and Project Manager.
6	The software will have the ability to export a complete project as a PDF file.
7	The software will generate a unique project ID for every project created.
8	The software will follow industry's best practices for UI/UX.
9	The software will have appropriate fields for adding financial data as typically done in a construction environment.
10	The software will allow web access on most common used browsers at any given location as long a stable internet connection is available.

11	Real time access to the changes in the software, if Project Manager makes any changes, collaborator and administrator views it at the same time.
12	The software will have a mechanism in-place to restore data.
13	Users will be logging in with 2-factor authentication and their passwords should be meeting the complexity requirements.
14	A tab will be locked until the access has been approved by the project manager.
15	The software will have industry standard field validation set up. For example, the end date of a project can not be before the start date of the project.

3. Project Timeline

The following timeline is an estimated schedule based on information and project progress as of 20th of May 2025.

Phase	Timeline	Description
Planning	Week 1 (15 May - 21 May)	Initial project kickoff activities including team formation, GitHub repository creation, and drafting of the project proposal. Final proposal is reviewed and submitted by May 23.
Design	Weeks 2-3 (22 May - 4 June)	Detailed planning including drafting functional requirements for all user roles. Use-case diagrams are developed for each role, and class diagram sketches with selected design patterns (Factory, Observer) are created. Project skeleton (backend, database, frontend) is designed.
Development	Weeks 4-8 (5- 9 July)	Development of system features based on the planned requirements. This includes implementing user roles, interface design, database integration, and all the functional requirements.
Testing	Week 9-10 (10 July - 24 July)	System testing including functional, usability, and performance testing is done. All features are tested to make sure they perform the

		intended function.
Presentation	Week 11 (25 July - Onwards)	Final presentation and demonstration of the software. Project documentation is submitted, along with the complete project.

4. Project Delivery

Phase	**Method**	**Description**	**Tools**
Planning, Design	Scrum	Sprint planning, defining requirements, and architecture design	Trello, Draw.io, Discord, Zoom, Figma
Development	Scrum	Sprint-based approach with planning, stand-ups, and reviews for rapid delivery.	Vs Code, GitHub, Discord, and Zoom
Testing and Maintenance	Kanban	Scrum + Kanban Hybrid	GitHub Issues, Trello
Communication (All Phase)	Agile communication	Regular check-ins, retrospectives, and task reassignments	Zoom, Discord

5. Conclusion

The Construction Project Management Solution (CPMS) aims to address critical inefficiencies faced by infrastructure project managers by offering a centralized, secure, and user-friendly platform tailored to industry needs. Through role-based access control, real-time updates, and robust financial and schedule tracking, CPMS reduces dependency on third-party tools such as Excel and enhances accountability and performance.

By adopting a hybrid Scrum-Kanban methodology, our team will ensure iterative progress with flexibility to adapt based on testing outcomes. With clearly defined user roles, well-planned sprints, and a collaborative development approach, we are confident in delivering a reliable and working system by the project deadline.