

Integrated Building Application Submission, Review & Approval System



MSPM- Fall 2025

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January 2026

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DEDICATION

Specially dedicated to
my parents and teachers
(Muhammad Usman Gill)

my parents and teachers
(Usama Bin Shafaat)

my parents and teachers
(Muhammad Hasnain Ahsan)

ACKNOWLEDGEMENTS

We would like to thank everyone who had contributed to the successful completion of this project. We would like to express our gratitude to my research supervisor, Mr. Mohsin Rashid for his invaluable advice, guidance, and his enormous patience throughout the development of the research.

In addition, we would also like to express my gratitude to our loving parent and friends who had helped and given me encouragement.

Muhammad Hasnain Ahsan

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ABSTRACT

This project was created with the primary intention of creating and developing an Integrated Building Application Submission, Review and Approval System. This digital platform will also be an attempt to substitute manual, paper-based building permit with a mobile and web-based solution. The system links homeowners who are required to post drawings and documents to qualified authorities who would go through them and annotate and approve these submissions.

The development was undertaken using the SCRUM model and JIRA software was used to monitor, track and manage the issues of the project. The project was separated into two large Epics: Epic1 which worked on the main submission and review system and Epic2 which worked on stabilization, quality assurance and the preparation of the release.

During four Sprints, the team has managed to develop secure login system, multi-format drawing uploads, reviewer dashboard and digital annotation tools. We also resolved serious stability bugs and End-to-End (E2E) testing. This report describes the processes of Scrum, started, planned and actual, and gives some evidence of its implementation using JIRA artifacts like Burn-down charts and roadmaps.

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LIST OF SYMBOLS / ABBREVIATIONS

Abbreviation	Definition / Meaning
AAB	Android App Bundle
API	Application Programming Interface
APNS	Apple Push Notification Service
CFD	Cumulative Flow Diagram
DoD	Definition of Done
DoR	Definition of Ready
DWG	Drawing (CAD file format)
E2E	End-to-End (Testing)
FCM	Firestore Cloud Messaging
FE	Frontend
IBAS	Integrated Building Application Submission
IPA	iOS App Store Package
JWT	JSON Web Token
MVP	Minimum Viable Product
PDF	Portable Document Format
PO	Product Owner
POC	Proof of Concept
QA	Quality Assurance
ROI	Return on Investment
S3	Simple Storage Service (Amazon)
SQL	Structured Query Language
UAT	User Acceptance Testing

UI	User Interface
UX	User Experience
WBS	Work Breakdown Structure

1 COMPANY OVERVIEW & VISION

1.1 Objective

Understand the strategic identity of the governing body.

1.2 Core Values

- **Transparency:** Transparent application status of all citizens.
- **Efficiency:** Automation of turnaround time.
- **Responsibility:** Auditing trial on approval or rejection.
- **Innovation:** The use of modern technology (Cloud, Mobile, AI) to address old-fashioned city issues.

1.3 Company Evolution Story

The Department of Municipal Regulation and Urban Planning has been the leading force that has been developing the city for over 40 years. In the past, the department used manual and paper-based workflows where citizens used to hand in architectural drawings in order to get them approved. The department, realizing the inefficiencies of using the physical file storage, long queues, and transparency, began the strategy of digital transformation. The proposed project, the Integrated Building Application System (IBAS) can be regarded as a radical turn towards the past legacy bureaucracy to smart e-governance in the context of modernizing the city management of rapid urbanization.

1.4 Vision

To be a digital excellence model in city governance, establishing an open, effective, and citizen focus environment to develop the city.

1.5 Mission

To improve the building permit life cycle by eliminating the red-tape process with safe digital solutions that facilitate safety compliance, decreased building permit time, and trust between the citizenry and the municipality.

2 PROJECT INTRODUCTION

The real estate and construction industry have a reputation of lagging behind time owing to manual regulation approvals. Integrated Building Application System is a web and mobile solution that is used to digitize all lifecycles of building permit application.

2.1 Problem

At present, house owners have to visit the offices of authorities physically to make large paper drawings. The system is manual and slow in terms of feedback, and the status of an application is hard to track.

2.2 Solution

It is a project that provides a clear, traceable and efficient processing system.

- **For Homeowners:** A mobile application to make accounts, add drawings (PDF, DWG and so on), and follow-ups.
- **For Authorities:** A web dashboard to see submissions, make annotations to drawings digitally, make requests to revise submissions, and approve submissions.

The project employs Agile methodology in order to maintain a constant process of feedback and quick development of functionalities.

2.3 Background and Industry Context

The approval process of building permits is a very important regulatory role that has direct effects on the development schedules of urban areas, and enforcement

of rules and regulations and investor confidence. This process is still very manual in most of the developing countries such as Pakistan and thus it does not only create inefficiencies but also lacks transparency and burden the administration on the applicants and authorities.

Worldwide, municipalities are moving to e-governance solutions in order to computerize approval processes. The online building permit portal systems have been shown to lead to quantifiable decrease in the turnaround time of approvals, increase in auditability, and enhancement in citizen satisfaction. Nevertheless, the adoption of these practices at the local level is minimal because of traditional practices and change resistance.

The current project has filled this gap by suggesting a mobile-first web-integrated solution, which is sensitive to the practical nature of the work of municipal authorities, and user-friendly to homeowners and consultants.

3 JIRA as Project Management Tool

3.1 JIRA Overview

JIRA is a full-fledged project management and issue tracking software created by Atlassian. In the case of the Integrated Building Application System, JIRA is used as the focal point in planning and tracking software increments as well as releasing them. It facilitates the Scrum model enabling the group to handle the Epics (large features such as Reviewer Dashboard) and subdivides them into User Stories and tracks them through the Sprints. It gives an instant visibility of the development lifecycle, which provides that the mobile application to the homeowners and the web portal to the authorities are built concurrently.

3.2 Why JIRA

We have chosen JIRA to be used in the IBAS project because of three main reasons:

1. **Agile Support:** Its inherent support of Scrum boards, backlogs and sprint reports is in line with our requirement of iterative delivery.
2. **Auditability:** JIRA offers a history of all the tasks and bugs. In the case of a government project, it is important to trace how a requirement was modified to be compliant.
3. **Custom Workflows:** The building permit approval procedure is complicated. JIRA permits us to directly translate these particular states

(e.g. Submitted to Under Review to Corrections Needed to be Approved)
into the development process.

4 Project Planning

To make sure that the Integrated Building Application Submission, Review and Approval System is efficiently delivered and satisfies the user requirements, the effectiveness of the planning is required. We applied the Agile Scrum practices instead of the conventional rigid planning. This method enabled us to outline the vision, divide work into small bits that are easy to manage and be flexible to feedback. In this chapter, we will describe how we plan to approach our planning strategy with reference to scope, estimation, scheduling, and resources and quality assurance by use of JIRA as the main management tool.

4.1 Product Vision Statement

To create a complete paperless digital ecosystem that can bridge the communication between homeowners and municipal authorities, guaranteeing transparent, traceable, and faster building permits approvals with the help of a safe mobile and web environment.

4.2 Project Charter

4.2.1 Project Purpose & Justification

The Integrated Building Application Submission, Review and Approval System is designed to transform the municipal building permit system to a paper and pen based system to an entirely digital ecosystem. The reasons why this project is justified include that it helps to cut down the time it takes to process the

applications, remove the physical storage costs and enhance transparency among the homeowners and the contractors.

4.2.2 High-Level Project Objectives

- **Efficiency:** Cut the allowance of permits by 40 percent.
- **Accessibility:** Be available 24/7 with the remote submission of building plans through mobile applications.
- **Compliance:** Fulfilling 100 percent of approved plans to the standards of digital safety code by reviewing the dashboard.

4.2.3 High-Level Requirements

- **Mobile Application:** iOS/Android application used by the homeowners to register and upload PDF/DWG files..
- **Web Portal:** Authority dashboard where authorities can see, comment, and approve/disapprove submissions.
- **Security:** User data and intellectual property (architectural drawings) end to end encryption.

4.2.4 Assigned Project Manager & Authority

- **Project Manager (Scrum Master):** Have the right to control the budget of 570 000 (Total Cost) and distribute the resources to the 4-Sprint schedule.
- **Sponsor:** Municipal Authority Director (Funding Body).

4.3 Product Vision Board

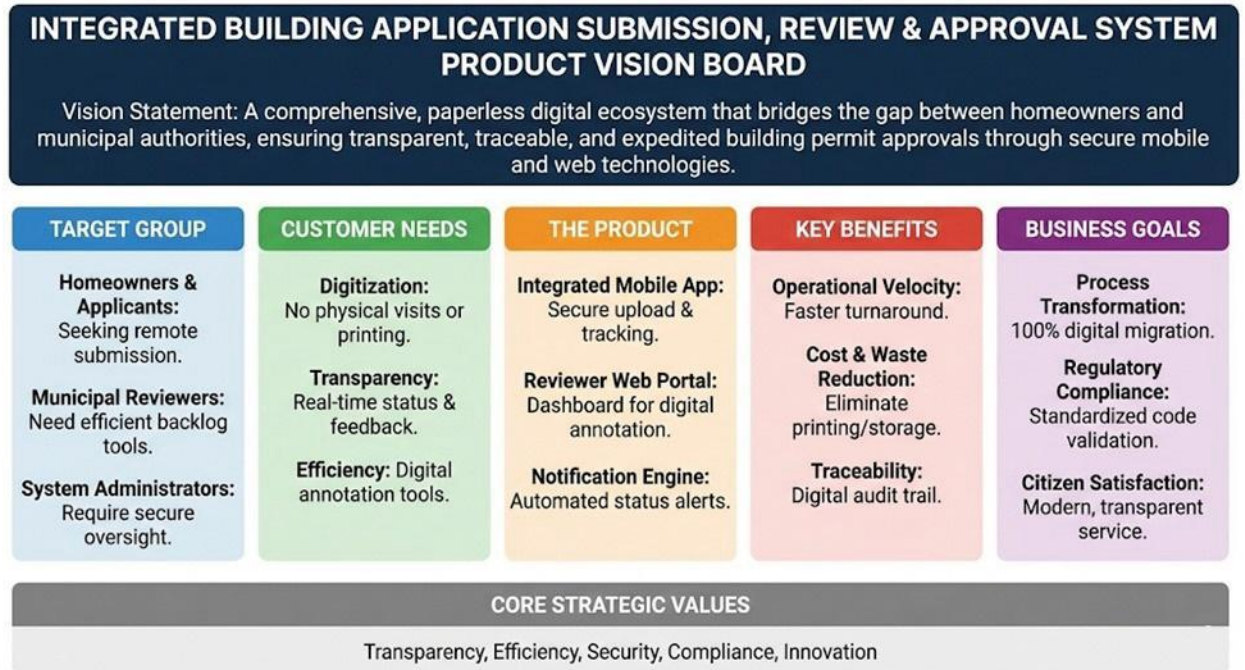


Figure 1 Product Vision Board

4.4 Scrum Methodology

We have used Scrum Framework in this project. Scrum is iterative in nature, which helps to produce functional software regularly. Our approach involved managing requirements using Epics and User Stories, performing work in fixed Sprints and making sure that work was continuously improved using regular reviews.

4.4.1 Rationale for Selecting Scrum over Traditional Models

Scrum has been chosen as opposed to the traditional Waterfall methodology because of the dynamic nature of user requirements and the necessity to constantly have feedback on the stakeholders. The workflows in the municipalities

are subject to change with the interpretation of the regulations and therefore, the initial fixed requirements are not feasible.

Scrum also facilitates a stepwise delivery approach where stakeholders are able to review the working functionality at a very early stage and make modifications. This minimized chances of rework at late stages and guarantee conformity to actual operation requirements.

4.4.2 Scrum Roles and Responsibilities in This Project

Table 1 Scrum Roles and Responsibilities

Role	Assigned To	Responsibilities
Product Owner	Municipal Rep	Backlog prioritization, ROI decisions
Scrum Master	Team Lead	Ceremony facilitation, impediment removal
Dev Team	FE, BE, QA	Design, build, test increments

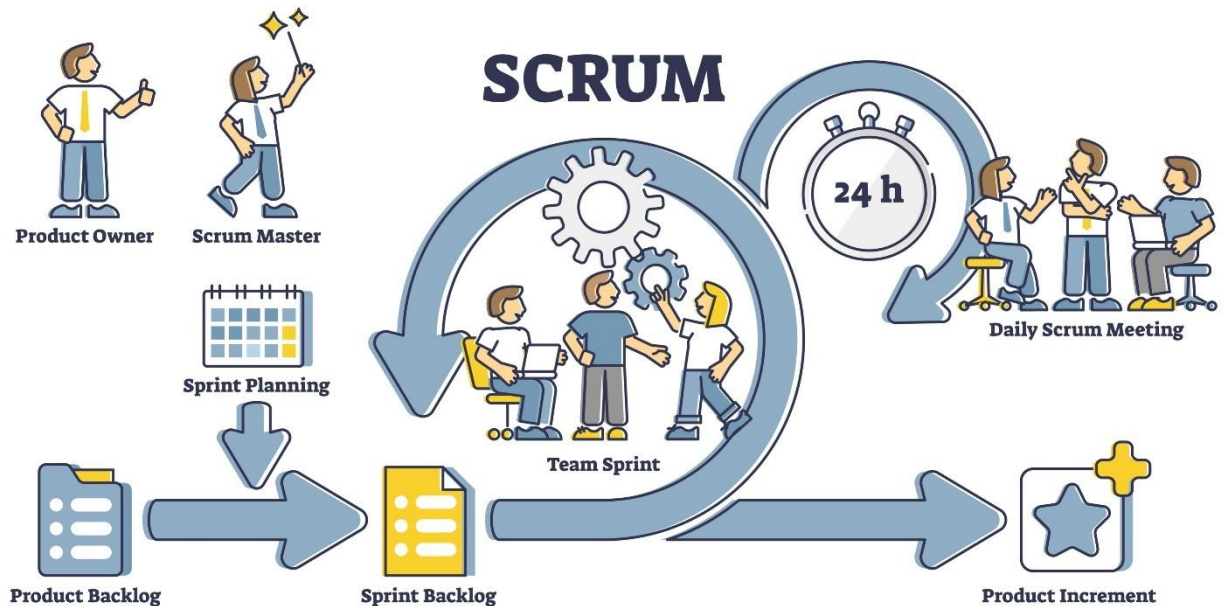


Figure 2 Overview of the Scrum Framework

4.5 Personas

To make sure that the system can respond to the real needs of the users, we identified three major personas.

Persona 1: The Homeowner (User)

- **Name:** Sarah Khan (Property Owner)
- **Goal:** Wants to get building plans approved quickly without multiple trips to government offices.
- **Pain Points:** Long queues, inability to locate status updates and high printing expenses.
- **Ideal Flow:** Uploads a PDF through mobile device, gets a Submitted message and monitors the approval in real time.

Persona 2: The Authority Reviewer (Admin)

- **Name:** Mr. Ahmed (Senior Building Inspector)
- **Goal:** Desires to eliminate the application backlog and provide compliance with safety codes.
- **Pain Points:** Space occupied by physical files, handwriting of letters to make corrections and lost documents.
- **Ideal Flow:** Sees a dashboard of assigned cases and marks errors using digital red-lining tools and asks to get a revision immediately.

Persona 3: The Release Manager (Technical)

- **Name:** Jessica Lin (DevOps Lead)
- **Goal:** No critical bugs during production and adherence to App Store guidelines.
- **Pain Points:** Buggy last-minute, device fragmentation (crashes on certain Android versions).
- **Ideal Flow:** Checks regression tests, ensures that Must-Have stories are completed and resorts to the stable build to app stores.

Persona-to-Feature Mapping

All personas had a direct impact on the prioritization of backlog. The mapping of features in the context of personas was performed to guarantee business value alignment and eliminate gold-plating.

Table 2 Persona-to-Feature Mapping

Persona	Key Features Influenced
Homeowner	File upload, status tracking, notifications
Reviewer	Dashboard, annotations, revision workflow
Release Manager	Stability fixes, E2E testing

4.6 Project Scope & Backlog Planning

The scope was specified to cover all the essential features required to develop a Minimum Viable Product (MVP) to work with the entire permit lifecycle. Out-of-scope items, such as on-site logistics and old paper digitization, were clearly out of scope to keep us focused.

4.6.1 Work Breakdown Structure (WBS)

We separated the project into an Epics, User Story, and Sub-task hierarchy.

- **Epic 1:** Integrated Building Application Submission and Review System (Intervention Workflow)
- **Epic 2:** Finalization, Quality Assurance and App Release (Stabilization)

4.6.2 Task Level Hourly Estimates

Basis of Estimate:

- **Sprint Duration:** 1 Week (40 working hours per resource).
- **Active Development Team:** 1 Frontend, 1 Backend, 1 QA (Capacity: - 120hours/sprint no Scrum Master overhead).

- **Contingency:** 10% buffer in complex tasks (indicated with a star).

Sprint 1: Submission Foundation

Goal: Allow homeowners to log-in and post building plans safely.

Table 3 Sprint 1 Task Breakdown and Hourly Estimates (Submission Foundation)

Task ID	Task Description	Role	Est. Hours
S1-01	User Story: Secure Account Creation		
S1-01.1	Design Login & Registration Screens (UI/UX).	Frontend	4.0
S1-01.2	Setup Auth0/Firebase for secure authentication.	Backend	6.0
S1-01.3	Implement JWT Token management for session security.	Backend	4.0
S1-01.4	Integrate Login API with Mobile App.	Frontend	4.0
S1-02	User Story: Multi-Format Drawing Upload		
S1-02.1	Develop Mobile File Picker (Limit to PDF/DWG).	Frontend	5.0
S1-02.2	Create S3 Bucket & API for file storage.*	Backend	6.0
S1-02.3	Implement file compression & validation logic.	Backend	5.0
S1-03	QA & Testing		
S1-03.1	Write Test Cases for Login & Upload flows.	QA	6.0
S1-03.2	Execute Functional Testing (Positive/Negative).	QA	8.0

Task ID	Task Description	Role	Est. Hours
Total	Sprint 1 Total Effort		48.0 Hours

Sprint 2: Reviewer Tools

Goal: Give authorities the ability to see submissions and make notes on drawings.

Table 4 Sprint 2 Task Breakdown and Hourly Estimates (Reviewer Tools)

Task ID	Task Description	Role	Est. Hours
S2-01	User Story: Reviewer Dashboard		
S2-01.1	Develop Web Dashboard Table (Sort/Filter Applications).	Frontend	8.0
S2-01.2	Create "Get All Applications" API with pagination.*	Backend	6.0
S2-02	User Story: Digital Annotation (Red-Lining)		
S2-02.1	Integrate PDF/Canvas Viewer library for web.	Frontend	8.0
S2-02.2	Build "Draw/Mark" tool overlay (Red pen tool).*	Frontend	10.0
S2-02.3	Save annotation coordinates (X,Y) to database.	Backend	6.0
S2-03	User Story: Request Revision		
S2-03.1	Create "Return for Correction" Status workflow.	Backend	4.0
S2-03.2	Trigger email notification on status change.	Backend	3.0

Task ID	Task Description	Role	Est. Hours
S2-04	QA & Testing		
S2-04.1	Verify Coordinate mapping (Does the mark stay in place?)	QA	6.0
Total	Sprint 2 Total Effort		51.0 Hours

Sprint 3: Stabilization & Optimization

Goal: Enhance reliability, background process, and user profile.

Table 5 Sprint 3 Task Breakdown and Hourly Estimates (Stabilization & Optimization)

Task ID	Task Description	Role	Est. Hours
S3-01	User Story: Profile Management		
S3-01.1	Build "Edit Profile" and "Change Password" screens.	Frontend	5.0
S3-01.2	Update User API endpoints (PUT request).	Backend	3.0
S3-02	User Story: Notification Deep-Linking		
S3-02.1	Implement Push Notification Service (FCM/APNS).*	Backend	8.0
S3-02.2	Handle Deep-linking (Clicking notification opens specific app).	Frontend	6.0
S3-03	Technical Debt & Bug Fixes		
S3-03.1	Fix Background Crash on large file upload (Android).	Frontend	8.0

Task ID	Task Description	Role	Est. Hours
S3-03.2	Optimize Database Queries for Dashboard speed.	Backend	4.0
S3-04	QA & Testing		
S3-04.1	Stress Test: Upload 50MB file on slow network.	QA	5.0
S3-04.2	Regression Testing of Sprint 1 & 2 features.	QA	8.0
Total	Sprint 3 Total Effort		47.0 Hours

Sprint 4: Release Readiness

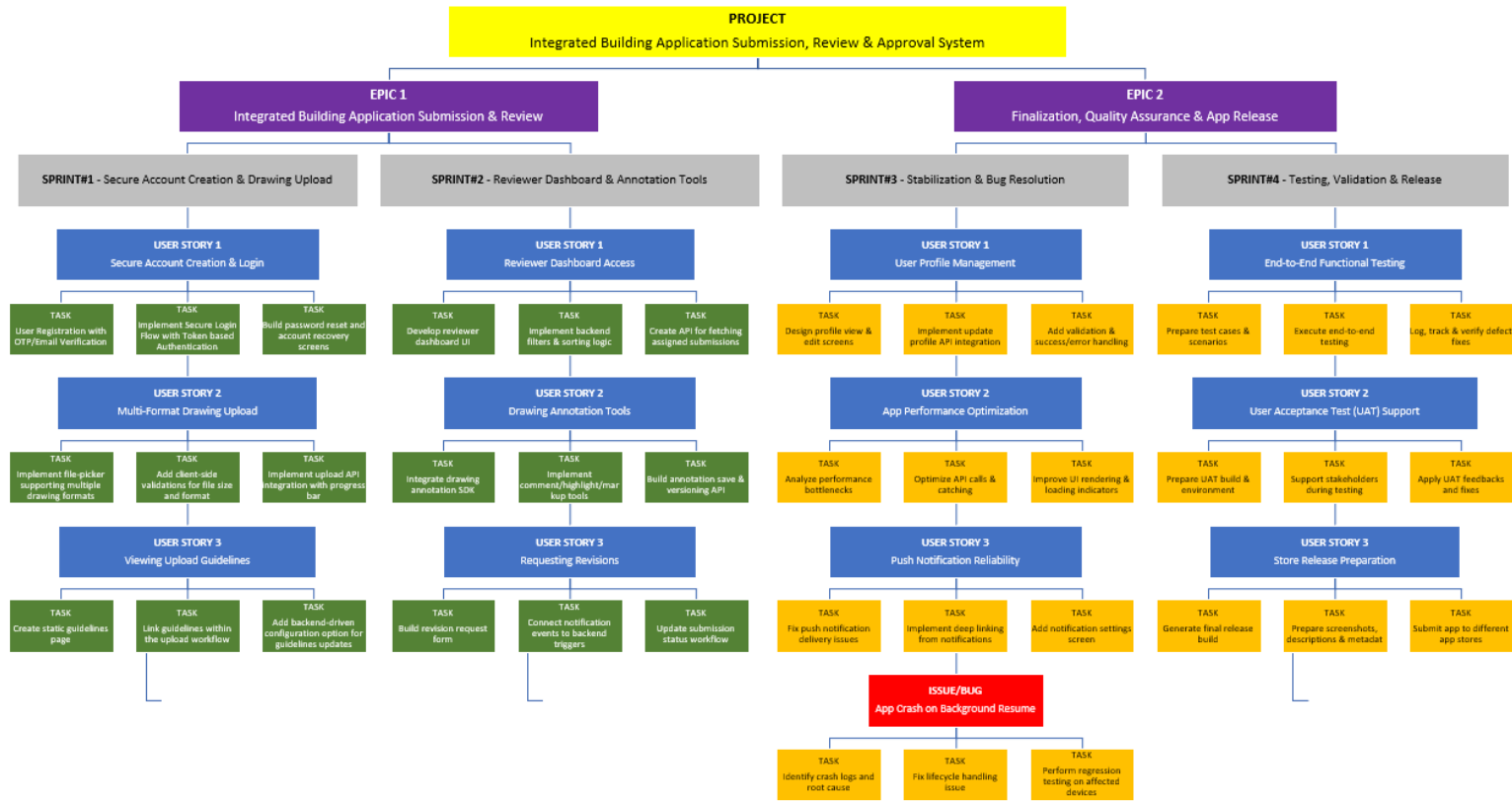
Goal: Finally End-to-End (E2E) testing and submitting to App Store.

Table 6 Sprint 4 Task Breakdown and Hourly Estimates (Release Readiness)

Task ID	Task Description	Role	Est. Hours
S4-01	User Story: Final Polish		
S4-01.1	UI Cleanup (Alignment, Font consistency, Loading spinners).	Frontend	6.0
S4-01.2	Security Audit (SQL Injection check, API throttling).	Backend	6.0
S4-02	User Story: App Store Submission		
S4-02.1	Prepare Apple App Store Metadata & Screenshots.	Product Owner	4.0
S4-02.2	Generate Signed Build (.IPA / .AAB) & Upload.	DevOps/FE	4.0
S4-03	Quality Assurance (Final Pass)		

Task ID	Task Description	Role	Est. Hours
S4-03.1	Full End-to-End (E2E) Test Cycle (Homeowner to Reviewer).	QA	10.0
S4-03.2	UAT Session with Client (Municipal Authority).	QA/PO	4.0
S4-03.3	Fix critical bugs found during UAT.	Dev Team	8.0
Total	Sprint 4 Total Effort		42.0 Hours

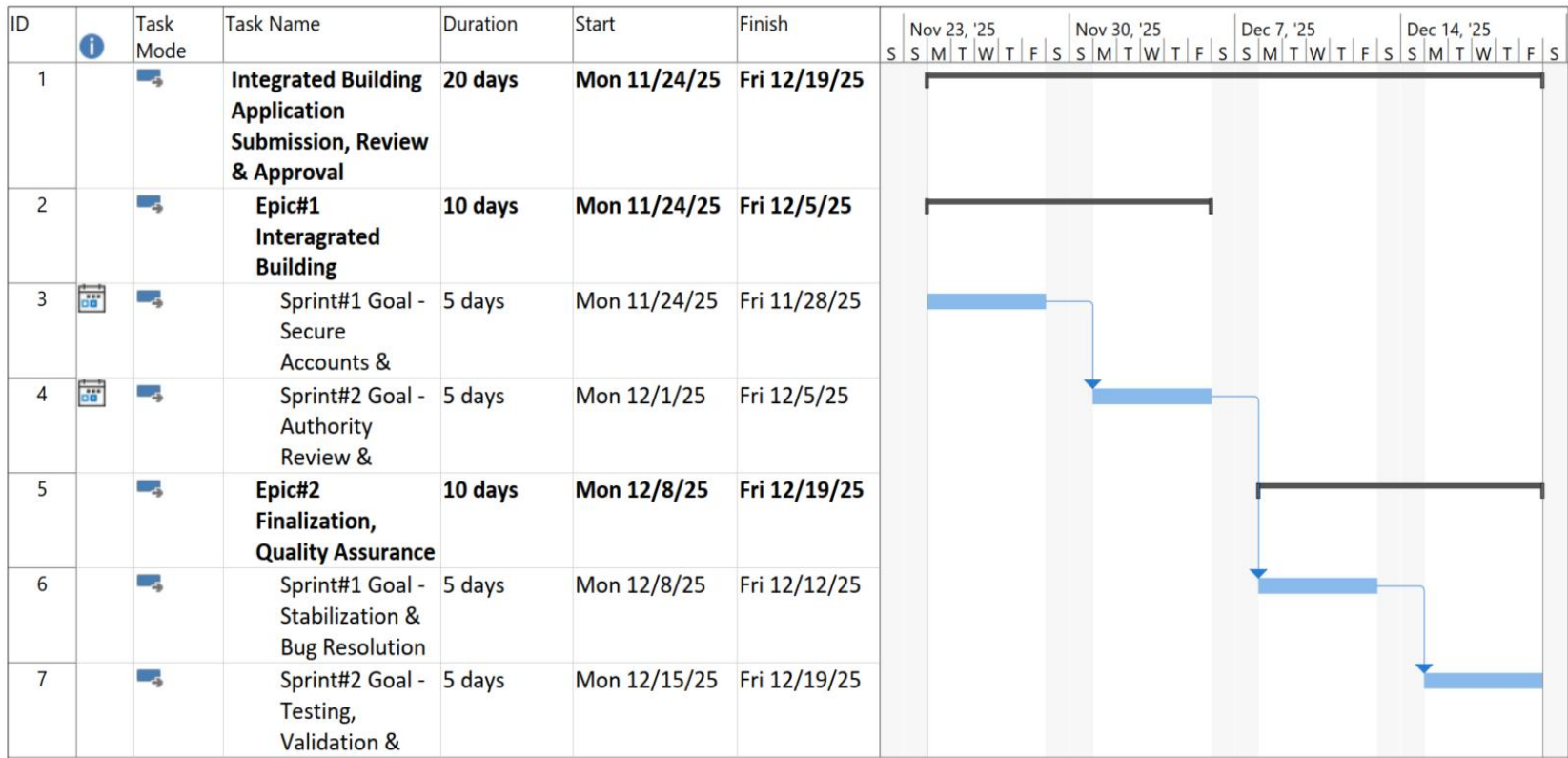
4.6.3 Agile Work Level Hierarchy



ISSUE/BUG
App Crash on Background Resume

- TASK: Identify crash logs and root cause
- TASK: Fix lifecycle handling issue
- TASK: Perform regression testing on affected devices

4.7 Product Roadmap



4.9 Wireframes

To see the size of the scope prior to development we developed low-fidelity wireframes.

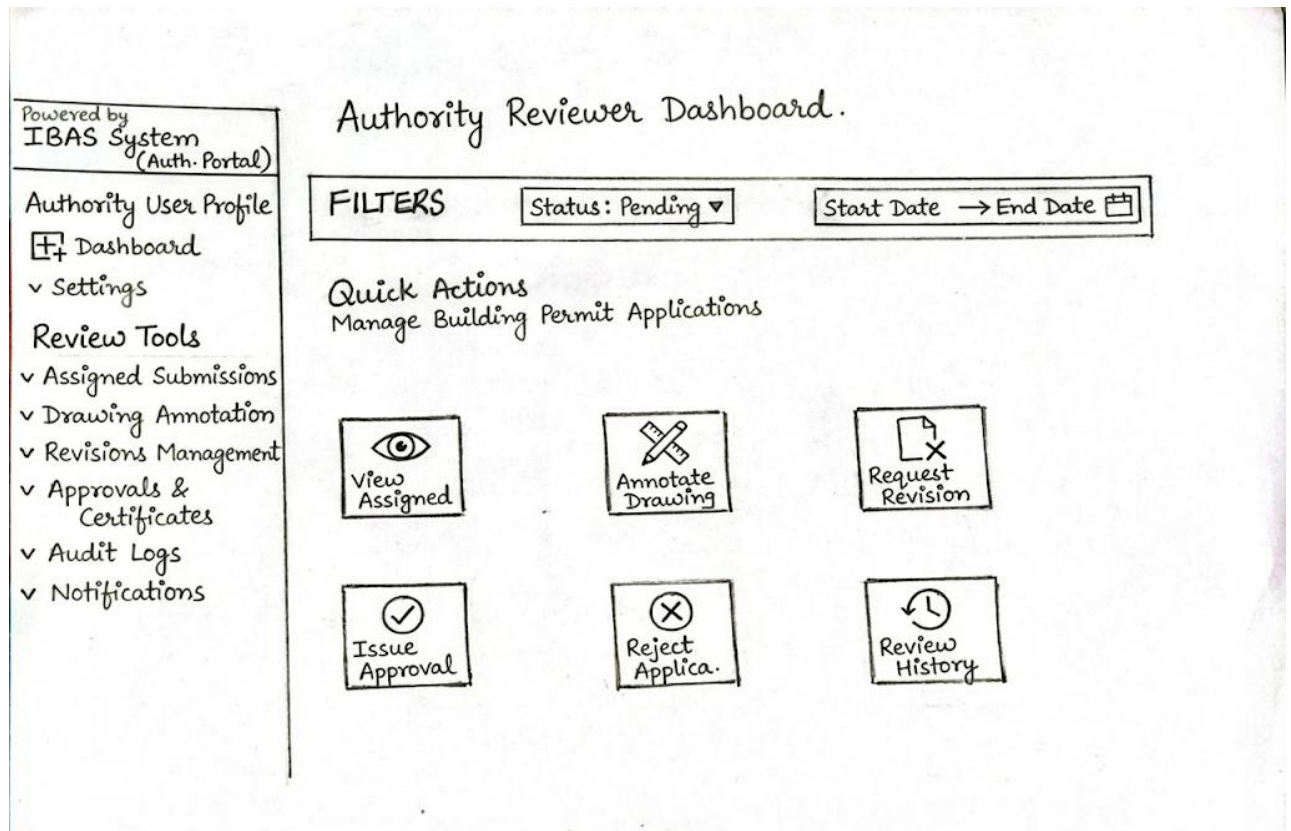


Figure 3 Wireframes

4.10 Value-Based Analysis (Prioritization)

We prioritized backlog by using Value-Based Analysis. The features were prioritized by ranking them based on their Business Value (level of impact on efficiency and user experience) and the Development Effort.

Table 7 Value-Based Prioritization and ROI Ranking

Feature	Business Value	Effort (Points)	ROI Rank
Secure Account Creation	High (800)	20	1
Multi-Format Drawing Upload	High (750)	20	2
Reviewer Dashboard Access	High (700)	20	3
Drawing Annotation Tools	Med-High (600)	20	4
Requesting Revisions	Med (500)	20	5
User Profile Management	Low (300)	20	6
Notification Reliability	Low (250)	20	7
Performance Optimization	Low (100)	20	8

Note: The most important features such as Account Creation had the best ROI and were taken first priority.

4.11 Estimation Planning (Story Points)

We have used Story Points as an estimation of the relative complexity of work rather than on time estimates. This will take into consideration risk and uncertainty.

- **Total Project Scope:** 160 Story Points.
- **Velocity:** It is predicted that the team will clear 40 points in a given sprint.
- **Cadence:** 4 Sprints total.

4.12 Resource Planning

The cross-functional team also makes sure to have all the required skills available to provide the Increment.

Table 8 Resource Planning and Hourly Rates

Role	Responsibility	Hourly Rate	Daily Cost
Product Owner	Define Vision & ROI	3,750	30,000
Scrum Master	Remove Blockers	3,000	24,000
Frontend Dev	Mobile/Web UI	2,500	20,000
Backend Dev	API & Database	2,812.5	22,500
QA Engineer	Testing & Automation	2,175	17,400

4.12.1 Backup Scrum Team

A cross-functional backup plan was implemented to reduce the threat of unavailability of resources (sickness, turnover).

Table 9 Cross-Functional Backup Team Strategy

Primary Role	Primary Resource	Backup Strategy / Resource
Product Owner	<i>Appointed PO</i>	Scrum Master: Has shadowed all client meetings and can temporarily prioritize the backlog based on ROI.
Frontend Dev	<i>Mobile/Web Specialist</i>	Backend Dev: Has basic knowledge of the frontend framework (React/Flutter) to handle minor UI bugs if the lead is absent.
Backend Dev	<i>API Specialist</i>	DevOps Lead (Jessica Lin): Can handle server-side deployment and database queries in emergencies.

QA Engineer	<i>Test Specialist</i>	Product Owner: Capable of performing manual User Acceptance Testing (UAT) to validate "Happy Path" workflows.
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4.13 Sprint Schedule & Cadence

The implementation of the project is carried out in four 1-week Sprints. This cycle is very short and makes the municipal authorities respond quickly.

Table 10 Sprint Schedule, Goals, and Key Deliverables

Sprint	Goal	Key Deliverables
Sprint 1	Submission Foundation	Mobile login, Secure file picker (DWG/PDF), Static guidelines.
Sprint 2	Reviewer Tools	Web dashboard, Annotation tools (Red-lining), Revision workflow.
Sprint 3	Stabilization	Profile management, Notification deep-linking, Background crash fix.
Sprint 4	Release Readiness	Final E2E Testing, UAT Sign-off, App Store submission build.

4.14 Project Costing

The fully burdened labor cost of the Scrum Team was used to calculate the cost that was incurred on each iteration.

Table 11 Project Costing and Labor Estimates Per Sprint

Role	Annual Ref	Salary	Burdened Ref	Cost	Cost Per Sprint (1 Week)
Product Owner	500,000		600,000		150,000
Scrum Master	400,000		500,000		120,000
Frontend Dev	300,000		400,000		100,000
Backend Dev	350,000		450,000		112,500
QA Engineer	280,000		350,000		87,500
Total Project Cost					(Sum of 4 Sprints)

4.15 Definition of Ready (DoR)

Ready A User Story should be defined in a way that it is understandable to be included in a Sprint. Sprint Planning requires a story to fulfill the following requirements:

- **Actionable:** The story is well-written in the format of "As a [User], I want [Feature], so that [Benefit] would do"
- **Acceptance Criteria Defined:** There is a list of specific pass/fail criteria (e.g. "File size limit 50MB).
- **Dependencies Resolved:** There are no external blockers (e.g., API access is verified to be available).
- **Estimated:** Story Points have been assigned in the team (e.g., Planning Poker).

- **UX/UI Ready:** wireframes or mockups will be fixed to the JIRA ticket.
- **Testable:** QA ascertains that the requirement can be tested.

4.16 Quality Planning (Definition of Done)

In a bid to have high standards, no story is received unless it satisfies the Definition of Done (DoD).

1. Peer reviewed and developed code.
2. Unit and Regression Tests: pass.
3. Certified on Android and iOS.
4. There are no Critical or High-priority bugs open.
5. Sprint Review- Product Owner accepts the feature.

4.17 Risk Planning

We recognized possible obstacles in time to reduce disturbance:

- **Technical Risk:** Displaying heavy DWG files in mobile. Mitigation: POC in Sprint 1.
- **Integration Risk:** Slowness in access to authority database. Mitigation: Simulated APIs during the initial development.
- **Stability Risk:** Background crash. Mitigation: Stabilization focus in Sprint 3.

Risk Register Table

Table 12 Project Risk Register and Mitigation Strategies

Risk ID	Risk Description	Probability	Impact	Mitigation
R1	Large file upload crashes	Medium	High	Compression & stress testing
R2	Reviewer resistance to digital tools	Medium	Medium	Simple UI & training
R3	Notification delivery failure	Low	High	FCM/APNS fallback

4.18 Communication & Monitoring

We use normal Scrum Ceremonies in order to keep things on track and JIRA to track.

Table 13 Agile Ceremonies and Communication Plan

Ceremony	Objective	Frequency	Duration
Sprint Planning	Define the Sprint Backlog and Goals.	Once at Start of Sprint	2 hrs
Daily Stand-up	Sync on progress and flag impediments.	Daily	15 min
Backlog Refinement	Groom upcoming stories and re-estimate.	Once at Mid-Sprint	1 hr
Sprint Review	Demo the product increment to stakeholders.	Once at End of Sprint	1.5 hrs
Sprint Retrospective	Improve team process and velocity.	Once at End of Sprint	1 hr

4.19 JIRA Workflow

Our JIRA board represents the working flow in the To Do -> In Progress -> Done. Burndown Charts and Cumulative Flow Diagrams (CFD) are some of the tools we use to monitor the remaining efforts and bottlenecks respectively.



Figure 4 Jira Workflow

5 Execution of Project on JIRA

Currently the project is underway; 3 sprints are implemented successfully. The information on the project status and progress is presented below.

5.1 Scrum Artifacts

Product Backlog: The overall list of all the desired work on the project. It comprises all the way through to "User Registration" and "Code Compliance Checking by AI). The Product Owner re-prioritizes it on a dynamic basis.

Sprint Backlog: The part of the items chosen of the Product Backlog to be covered within a particular Sprint. In the Sprint 1, we only had Sprint Backlog that had only one story which was "Login" and one story which was File Upload.

Increment: The software that may be released at the conclusion of a Sprint. After Sprint 2, we had a functional web dashboard at the conclusion of the sprint at which the reviewers could see and open mobile-user-uploaded files.

5.2 Scrum Events

Sprint Planning: An event that is held at the beginning of the week. The team will talk about the top priority user stories (e.g., "Digital Annotations") and further subdivide them into technical tasks (e.g., "Integrate PDF.js library).

Daily Scrum: A 15-minute session that is run daily in the morning at the time of 10: 00 AM.

- *What did I do yesterday?* (Added the compression logic to the file).
- *What will I do today?* (Connect it to the S3 bucket).
- *Do I have any blockers?* (Waiting for AWS credentials).

Sprint Review: Weekly Held. The team shows the live software to the Municipal Authority Director to receive direct feedback (e.g. The red lining tool should be fatter).

Sprint Retrospective: This will be an internal meeting to talk about improvements in processes. As an example, we had to add the buffer time in testing heavy file uploads after Sprint 1.

5.3 Work Breakdown Structure

The Work Breakdown Structure is shown in section 3.6 of the report.

5.4 Project Road Map Overview

The roadmap gives the execution of the project in four 1-week Sprints. It gives a summary of the major outputs of each phase:

- **Sprint 1:** Submission Foundation (Mobile login, Secure file picker).
- **Sprint 2:** Reviewer Tools (Web dashboard, Annotation tools).
- **Sprint 3:** Stabilization (Profile management, Notification deep-linking).
- **Sprint 4:** Release Readiness (E2E Testing, App Store submission).

5.5 Jira Configuration and Sprint Setup

The Jira was set to refer to Scrum-based execution. The project backlog has been developed by breaking down the project requirements into user stories each having acceptance criteria. There were four time-boxed sprints designed and appropriate user stories allocated to each sprint during the Sprint Planning.

5.6 Sprint Backlogs & User Stories

This segment illustrates how work was scheduled during the beginning of a sprint and the tasks and user stories were organized in sprint backlog.

These are the sprint backlog screen shots that depict:

- Chosen user stories targeted on the sprint.
- Breakdown of tasks under every user story.
- Assigned team members

5.6.1 Sprint 1 – Submission Foundation

Sprint 1 was concerned with the development of the fundamental submission service, such as the ability to log in as a mobile user and a secure file picker, to

allow the simplest end-user interaction with the application and test the technical basis of the application.

The screenshot shows the Jira interface for a project named 'Mobile App for Maps/Drawings Approval'. The view is set to 'Backlog' for 'MOB Sprint 1' (Dec 1 - 8 Dec) which contains 12 work items. The items are listed in a table with columns for ID, Name, Assignee, and Status.

ID	Name	Assignee	Status
MOB-1	USER STORY 1 — Secure Account Creation & Login	EPIC 1: HOMEOWNER	DONE
MOB-2	T1: Develop registration form + OTP/email verification		DONE
MOB-3	T2: Implement secure login flow with token-based auth		DONE
MOB-6	T1: Build file-picker supporting 4 formats		DONE
MOB-4	T3: Build password reset and account recovery screens		DONE
MOB-9	USER STORY 3 — Viewing Upload Guidelines	EPIC 1: HOMEOWNER	IN PROGRESS
MOB-10	T1: Create static guidelines page		DONE
MOB-5	USER STORY 2 — Multi-Format Drawing Upload	EPIC 1: HOMEOWNER	DONE
MOB-7	T2: Add client-side validations for size/format		DONE
MOB-8	T3: Implement upload API integration with progress bar		DONE
MOB-11	T2: Link guidelines within the upload workflow		DONE
MOB-12	T3: Add backend-driven configuration option		IN PROGRESS

Figure 5 Sprint 1 Backlog for Drawings Approval App

The screenshot shows the details of 'USER STORY 1 — Secure Account Creation & Login' in Jira. The story is assigned to 'EPIC 1: HOMEOWNER' and is marked as 'DONE'. The description and acceptance criteria are as follows:

Description
As a homeowner
I want to create an account and log in securely
So that I can access the mobile app and submit my drawings.

Acceptance Criteria

- User can register using email/phone.
- User receives verification code.
- User can securely log in after verification.
- Password reset and account recovery available.

Linked work items

relates to

- MOB-2 T... DONE
- MOB-3 T... DONE
- MOB-4 T... DONE

Figure 6 Sprint 1 - User Story 1 for Drawings Approval App

The screenshot shows the Jira interface for a project named 'Mobile App for Maps/Drawings Approval'. The main view is the 'Backlog' for 'MOB Sprint 1' (1 Dec - 8 Dec), which is marked as 'Complete sprint'. The selected item is 'USER STORY 2 — Multi-Format Drawing Upload' (MOB-5), assigned to 'HOMEOWNER'. The story is in a 'DONE' state. The right sidebar provides details for this story, including a description: 'I want to upload drawings in PDF, JPEG, PNG, or DWG So that I can submit my property documents digitally.' and acceptance criteria: 'App supports PDF, JPEG, PNG, DWG.', 'File size limit validation enforced.', 'User can upload multiple files.', and 'Upload progress indicator available.'.

Figure 7 Sprint 1 - User Story 2 for Drawings Approval App

The screenshot shows the Jira interface for the same project. The main view is the 'Backlog' for 'MOB Sprint 1', which is 'Complete sprint'. The selected item is 'USER STORY 3 — Viewing Upload Guidelines' (MOB-9), assigned to 'HOMEOWNER'. The story is in a 'DONE' state. The right sidebar provides details for this story, including a description: 'I want to see upload guidelines So that I can prepare my documents correctly.' and acceptance criteria: 'Guidelines screen includes size, resolution, and format rules.', 'Accessible before and during upload.', and 'Admin can update guidelines from backend (optional).'

Figure 8 Sprint 1 - User Story 3 for Drawings Approval App

5.6.2 Sprint 2 – Reviewer Tools

Sprint 2 also provided reviewer side features in the form of a web-based dashboard and annotation tools that facilitated content review processes and facilitated the end-to-end process of submitting and reviewing.

The screenshot shows the Jira interface for the 'Mobile App for Maps/Drawings Approval' project. The main view is the 'Backlog' for 'MOB Sprint 2' (8 Dec - 15 Dec) containing 13 work items. The selected item is 'MOB-17 USER STORY 1 — Reviewer Dashboard Access', which is in a 'DONE' state. The right-hand pane displays the details for this user story, including a description: 'As an authority reviewer I want to access a dashboard showing assigned submissions So that I can efficiently manage my review workload.' and acceptance criteria: 'Reviewer sees only their assigned cases.', 'Dashboard includes filters (Pending, Under Review, Revised).', and 'Quick access to applicant details and documents.' The 'Subtasks' section is empty, and 'Linked work items' shows related items like 'MOB-29 T.' and 'MOB-27 T.'.

Figure 9 Sprint 2 - User Story 1 for Drawings Approval App

The screenshot shows the Jira interface for the 'Mobile App for Maps/Drawings Approval' project, similar to Figure 9. The selected item is 'MOB-19 USER STORY 3 — Requesting Revisions', which is in an 'IN PROGRESS' state. The right-hand pane displays the details for this user story, including a description: 'As a reviewer I want to request revisions with a clear message So that homeowners understand what must be fixed.' and acceptance criteria: 'Reviewer can send structured revision notes.', 'Homeowner receives push/email notifications.', and 'Status updates to "Revisions Required."' The 'Subtasks' section is empty, and 'Linked work items' shows related items like 'MOB-26 T.', 'MOB-27 T.', and 'MOB-28 T.'.

Figure 10 Sprint 2 - User Story 3 for Drawings Approval App

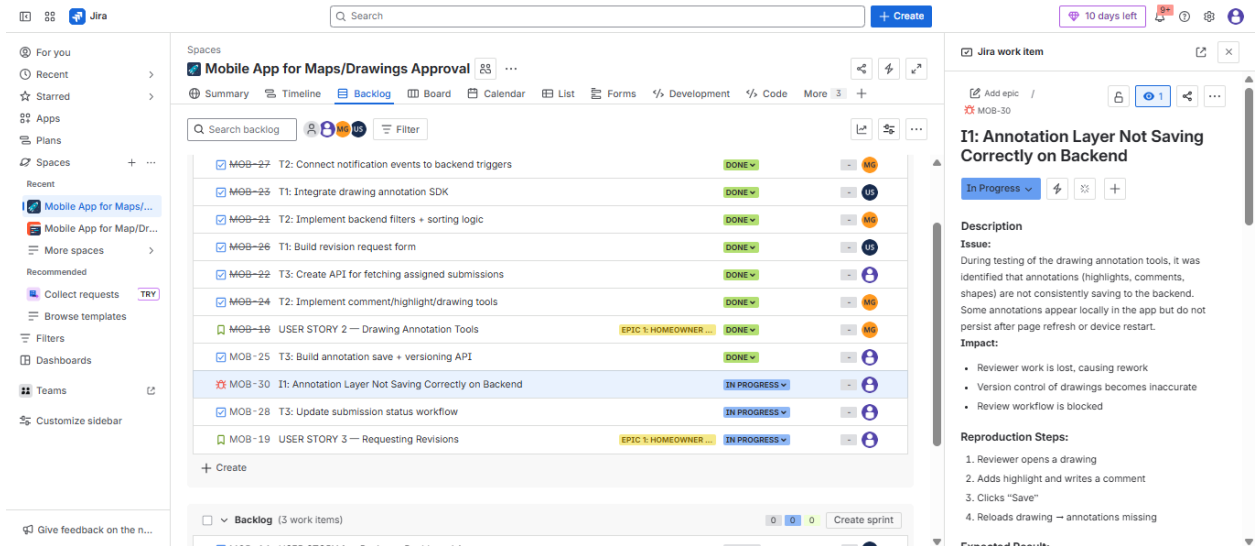


Figure 11 Sprint 2 - Issue 1 in Drawings Approval App

5.6.3 Sprint 3 - Stabilization

The focus of Sprint 3 was the stabilization of the system and improvement of its usability, such as profile management and deep-linking of notifications, to enhance reliability, user experience, and operational readiness.

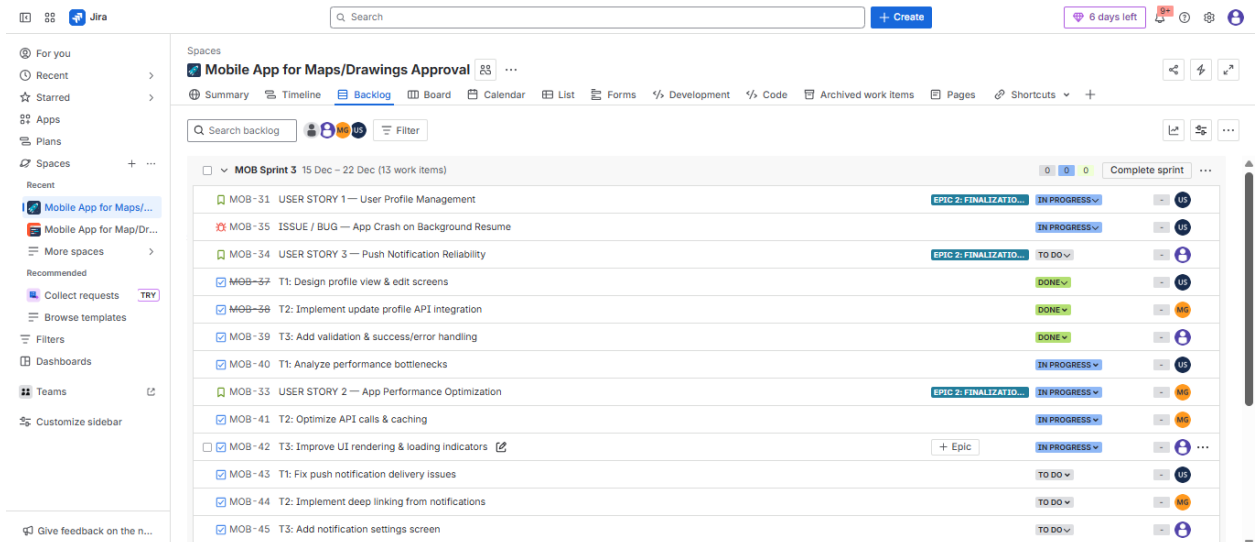


Figure 12 Sprint 3 Backlog for Drawings Approval App

The screenshot displays the Jira interface for a project named "Mobile App for Maps/Drawings Approval". The main view is the "MOB Sprint 3" backlog, which lists 13 work items. The first item, "USER STORY 1 - User Profile Management" (MOB-31), is highlighted. To the right, a detailed view of this user story is shown, including its description, acceptance criteria, and subtasks.

Item ID	Title	Status	Assignee
MOB-31	USER STORY 1 - User Profile Management	EPIC 2: FINA... DONE	US
MOB-37	T1: Design profile view & edit screens	DONE	US
MOB-38	T2: Implement update profile API integration	DONE	MR
MOB-39	T3: Add validation & success/error handling	DONE	US
MOB-36	ISSUE / BUG - App Crash on Background Resume	DONE	US
MOB-40	T1: Analyze performance bottlenecks	DONE	US
MOB-34	USER STORY 3 - Push Notification Reliability	EPIC 2: FINA... DONE	US
MOB-42	T3: Improve UI rendering & loading indicators	DONE	US
MOB-35	USER STORY 2 - App Performance Optimization	EPIC 2: FINA... DONE	MR
MOB-41	T2: Optimize API calls & caching	DONE	MR
MOB-44	T2: Implement deep linking from notifications	DONE	MR
MOB-43	T1: Fix push notification delivery issues	IN PROGRES...	US
MOB-45	T3: Add notification settings screen	DONE	US

USER STORY 1 - User Profile Management
 Done ✓ Done ⚡ ⚙️ +

Description
 As a user
 I want to view and update my profile details
 So that my personal information stays accurate.

Acceptance Criteria
 User can view profile details.
 User can edit name, contact info, and password.
 Changes are saved securely.

Subtasks
 Add subtask

Figure 13 Sprint 3 - User Story 1 for Drawings Approval App

The screenshot displays the Jira interface for the same project. The main view is the "MOB Sprint 3" backlog, with "USER STORY 2 - App Performance Optimization" (MOB-35) highlighted. The detailed view on the right shows its description, acceptance criteria, and subtasks.

Item ID	Title	Status	Assignee
MOB-31	USER STORY 1 - User Profile Management	EPIC 2: FINA... DONE	US
MOB-37	T1: Design profile view & edit screens	DONE	US
MOB-38	T2: Implement update profile API integration	DONE	MR
MOB-39	T3: Add validation & success/error handling	DONE	US
MOB-36	ISSUE / BUG - App Crash on Background Resume	DONE	US
MOB-40	T1: Analyze performance bottlenecks	DONE	US
MOB-34	USER STORY 3 - Push Notification Reliability	EPIC 2: FINA... DONE	US
MOB-42	T3: Improve UI rendering & loading indicators	DONE	US
MOB-35	USER STORY 2 - App Performance Optimization	EPIC 2: FINA... DONE	MR
MOB-41	T2: Optimize API calls & caching	DONE	MR
MOB-44	T2: Implement deep linking from notifications	DONE	MR
MOB-43	T1: Fix push notification delivery issues	IN PROGRES...	US
MOB-45	T3: Add notification settings screen	DONE	US

USER STORY 2 - App Performance Optimization
 Done ✓ Done ⚡ ⚙️ +

Description
 As a user
 I want the app to load quickly and run smoothly
 So that I have a seamless experience.

Acceptance Criteria
 App launch time is reduced.
 Screen transitions are smooth.
 No UI freezing during API calls.

Subtasks
 Add subtask

Figure 14 Sprint 3 - User Story 2 for Drawings Approval App

The screenshot shows the Jira interface for a sprint titled "Mobile App for Maps/Drawings Approval". The sprint is "MOB Sprint 3" running from Dec 15 to Dec 22, with 13 work items. The backlog is ordered by priority, with User Story 3 (MOB-34) highlighted. The right-hand pane shows the details for "USER STORY 3 — Push Notification Reliability", which is marked as "Done".

ID	Title	Progress	Status
MOB-33	USER STORY 1 — User Profile Management	EPIC 2: FINA... DONE	UP
MOB-37	T1: Design profile view & edit screens	DONE	UP
MOB-38	T2: Implement update profile API integration	DONE	UP
MOB-39	T3: Add validation & success/error handling	DONE	UP
MOB-35	ISSUE / BUG — App Crash on Background Resume	DONE	UP
MOB-40	T1: Analyze performance bottlenecks	DONE	UP
MOB-34	USER STORY 3 — Push Notification Reliability	EPIC 2: FINA... DONE	UP
MOB-42	T3: Improve UI rendering & loading indicators	DONE	UP
MOB-33	USER STORY 2 — App Performance Optimization	EPIC 2: FINA... DONE	UP
MOB-43	T2: Optimize API calls & caching	DONE	UP
MOB-44	T2: Implement deep linking from notifications	DONE	UP
MOB-43	T1: Fix push notification delivery issues	IN PROGRES...	UP
MOB-45	T3: Add notification settings screen	DONE	UP

USER STORY 3 — Push Notification Reliability
 Done ✓ Done ⚡ ⚙ +

Description
 As a user
 I want to reliably receive push notifications
 So that I stay updated on important actions.

Acceptance Criteria
 Notifications are received on Android & iOS.
 Notifications open the correct screen.
 Notification preferences can be enabled/disabled.

Subtasks
 Add subtask

Figure 15 Sprint 3 - User Story 3 for Drawings Approval App

The screenshot shows the Jira interface for the same sprint. The backlog is ordered by priority, with the issue "MOB-35" (ISSUE / BUG — App Crash on Background Resume) highlighted. The right-hand pane shows the details for this issue, which is marked as "Done".

ID	Title	Progress	Status
MOB-33	USER STORY 1 — User Profile Management	EPIC 2: FINA... DONE	UP
MOB-37	T1: Design profile view & edit screens	DONE	UP
MOB-38	T2: Implement update profile API integration	DONE	UP
MOB-39	T3: Add validation & success/error handling	DONE	UP
MOB-35	ISSUE / BUG — App Crash on Background Resume	DONE	UP
MOB-40	T1: Analyze performance bottlenecks	DONE	UP
MOB-34	USER STORY 3 — Push Notification Reliability	EPIC 2: FINA... DONE	UP
MOB-42	T3: Improve UI rendering & loading indicators	DONE	UP
MOB-33	USER STORY 2 — App Performance Optimization	EPIC 2: FINA... DONE	UP
MOB-43	T2: Optimize API calls & caching	DONE	UP
MOB-44	T2: Implement deep linking from notifications	DONE	UP
MOB-43	T1: Fix push notification delivery issues	IN PROGRES...	UP
MOB-45	T3: Add notification settings screen	DONE	UP

ISSUE / BUG — App Crash on Background Resume
 Done ✓ Done ⚡ ⚙ +

Description
 Issue Description:
 App crashes when returning from background state on certain devices.

Acceptance Criteria
 App resumes without crashing.
 No data loss after resume.
 Issue verified across devices.

Subtasks
 Add subtask

Figure 16 Sprint 3 - Issue in Drawings Approval App

These sprint backlogs are realistic in regard to capacity planning and incremental delivery. The ranking of user stories was done according to business value and technical requirements.

5.6.4 Sprint 4 – Release Readiness (Cancelled)

Sprint 4 was to be end-to-end tested and submitted to the app store, but it was cancelled officially after a client decision to delay production release as business requirements changed. This led to Sprint 4 not being implemented and monitored in Jira.

5.7 Project Board Overview

There were three daily work which are described in this section of how they were tracked in the process of sprint implementation.

- The JIRA board represents the workflow from **To Do** → **In Progress** → **Done** (Real-time task movement across workflow columns).
- It follows the status of User Stories that is given to certain personas.

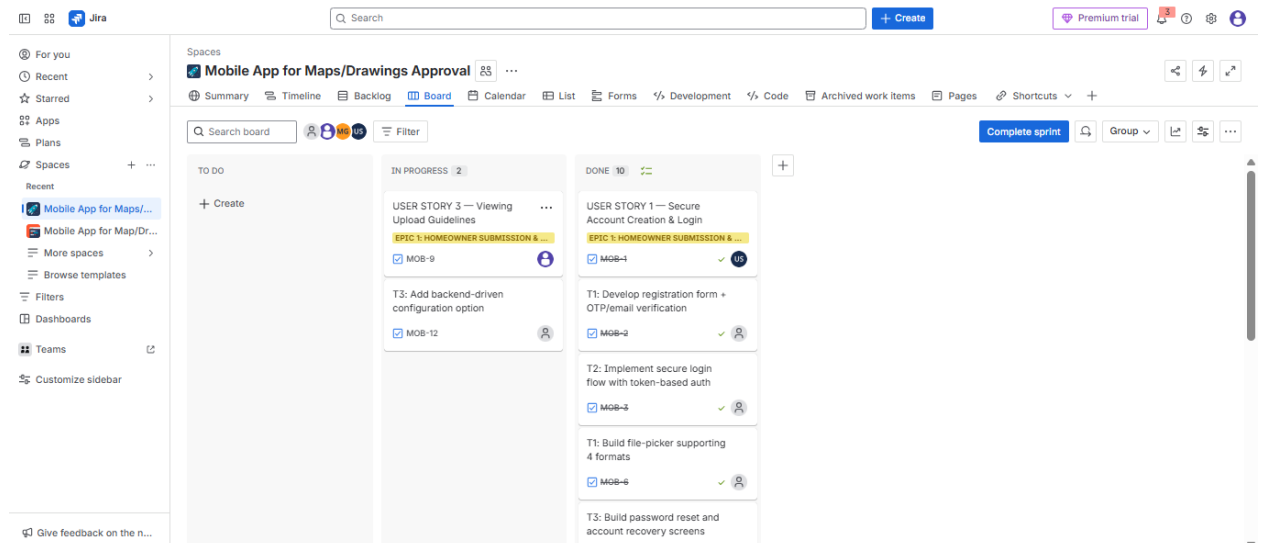


Figure 17 Sprint 1 Board – User Stories in Progress

The screenshot shows a Jira board for a sprint titled "Mobile App for Maps/Drawings Approval". The board is organized into three columns: "TO DO", "IN PROGRESS", and "DONE".

- TO DO:** A "+ Create" button is visible.
- IN PROGRESS (4 items):**
 - T3: Build annotation save + versioning API (MOB-25)
 - I1: Annotation Layer Not Saving Correctly on Backend (MOB-30)
 - T3: Update submission status workflow (MOB-28)
 - USER STORY 3 - Requesting Revisions (MOB-19)
- DONE (9 items):**
 - USER STORY 1 - Reviewer Dashboard Access (MOB-47)
 - T1: Develop reviewer dashboard UI (MOB-29)
 - T2: Connect notification events to backend triggers (MOB-27)
 - T1: Integrate drawing annotation SDK (MOB-24)
 - T2: Implement backend filters + sorting logic

Figure 18 Sprint 2 Board – User Stories in Progress

The screenshot shows a Jira board for a sprint titled "Mobile App for Maps/Drawings Approval". The board is organized into three columns: "TO DO", "IN PROGRESS", and "DONE".

- TO DO:** A "+ Create" button is visible.
- IN PROGRESS (1 item):**
 - T1: Fix push notification delivery issues (MOB-43)
- DONE (12 items):**
 - USER STORY 1 - User Profile Management (MOB-21)
 - T1: Design profile view & edit screens (MOB-27)
 - T2: Implement update profile API integration (MOB-24)
 - T3: Add validation & success/error handling (MOB-20)
 - ISSUE / BUG - App Crash on Background Resume

Figure 19 Sprint 3 Board – User Stories in Progress

The Jira board facilitated the transparency and day-to-day observation of the progress. Daily Stand-ups updated the tasks, and there was alignment and prompt identification of blockers.

5.8 Sprint Completion and Delivery Status

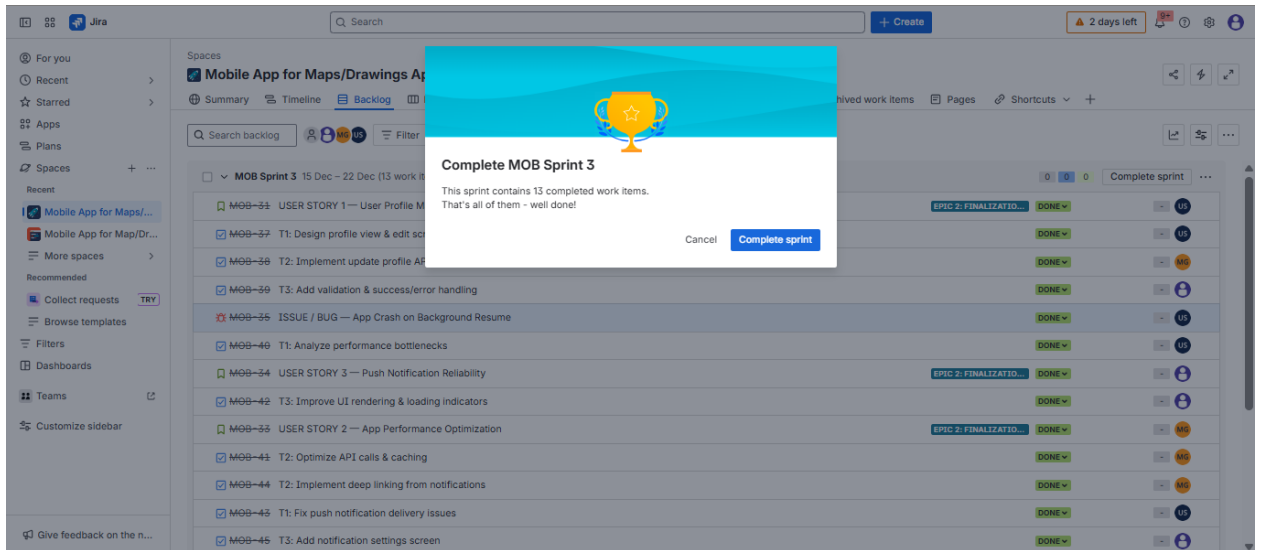


Figure 20 Sprint 3 Completion Status

The sprint completion screen shot will confirm that dedicated user stories were finished within the sprint timebox and this could be a sign of a mature sprint planning and implementation, achieved by the last iteration.

5.9 Sprint Burndown Analysis



Figure 21 Sprint 1 Burndown Chart

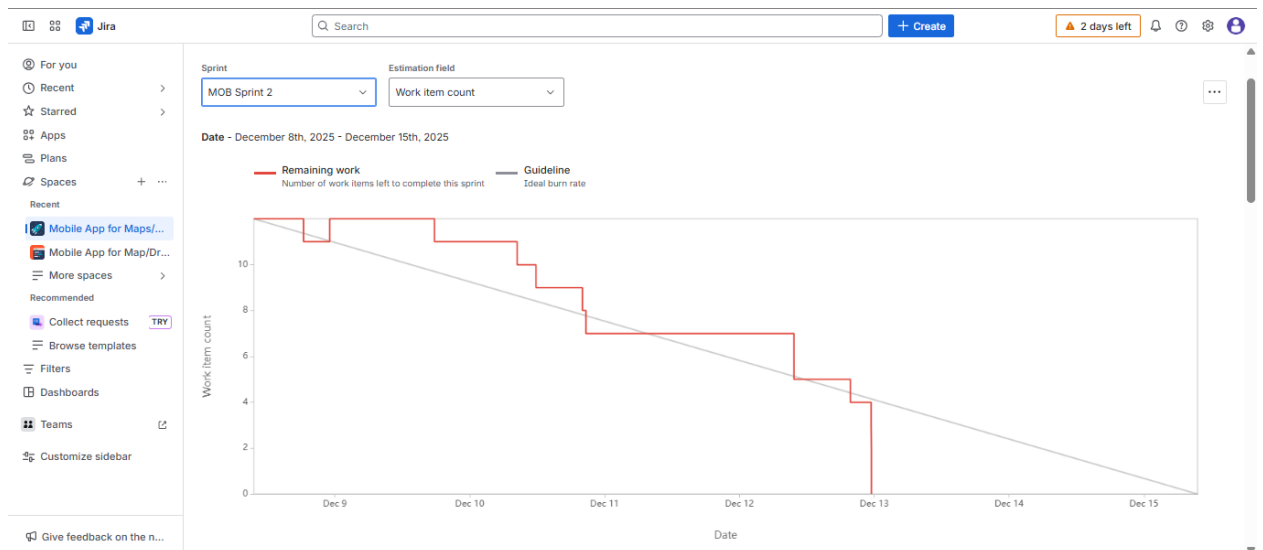


Figure 22 Sprint 2 Burndown Chart



Figure 23 Sprint 3 Burndown Chart

The burndown charts denote the residual work against time. The difference in the initial sprints will indicate learning and adaptation, whereas Sprint 3 is a better estimation and gradual advancement.

5.10 Sprint Burnup Analysis

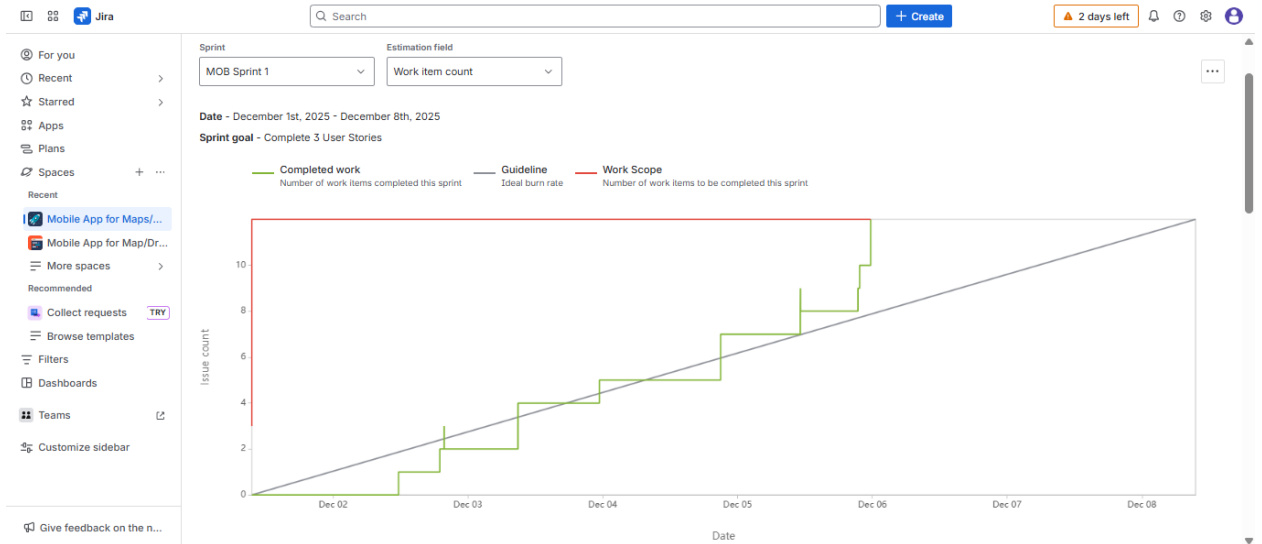


Figure 24 Sprint 1 Burnup Chart

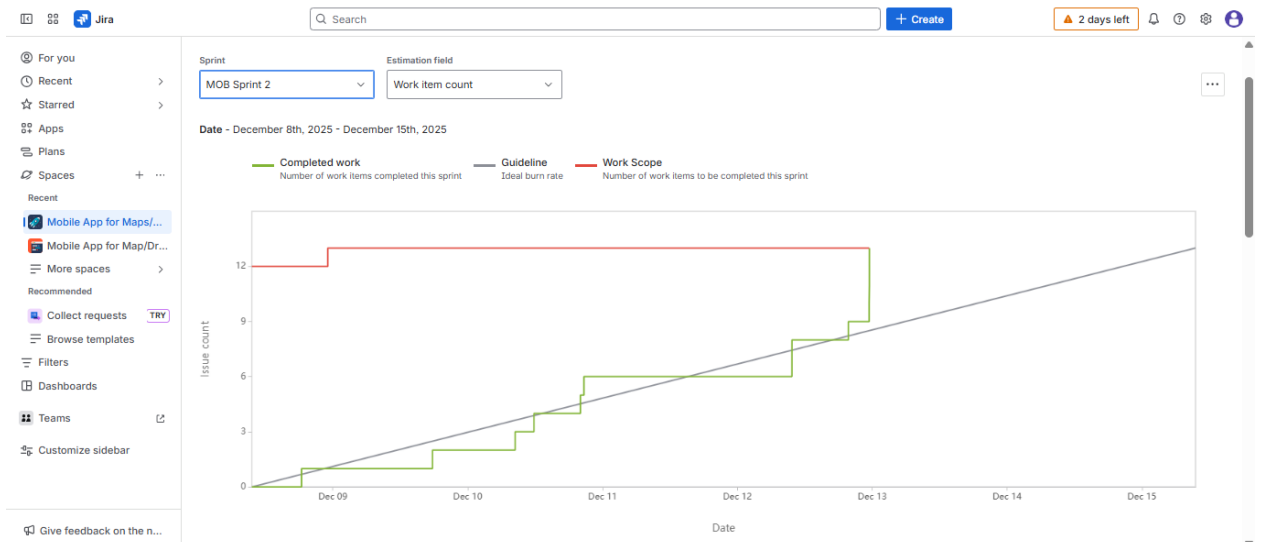


Figure 25 Sprint 2 Burnup Chart

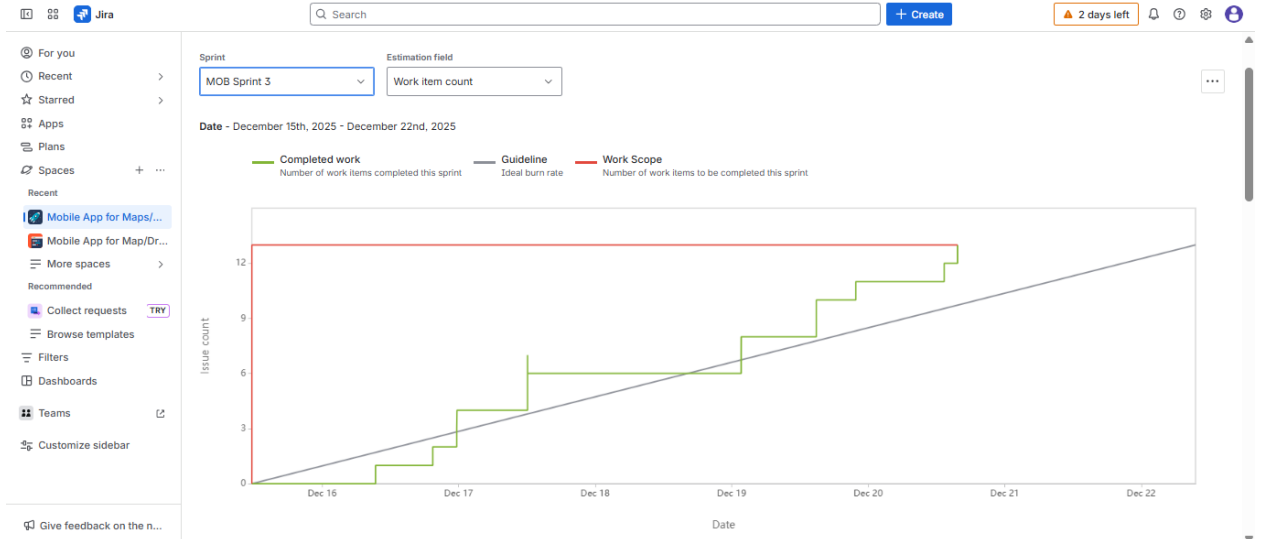


Figure 26 Sprint 3 Burnup Chart

Burnup charts make a clear differentiation between the total scope and the work done. They affirm directed reach and gradual worth delivery throughout sprints.

5.11 Velocity Report & Team Performance

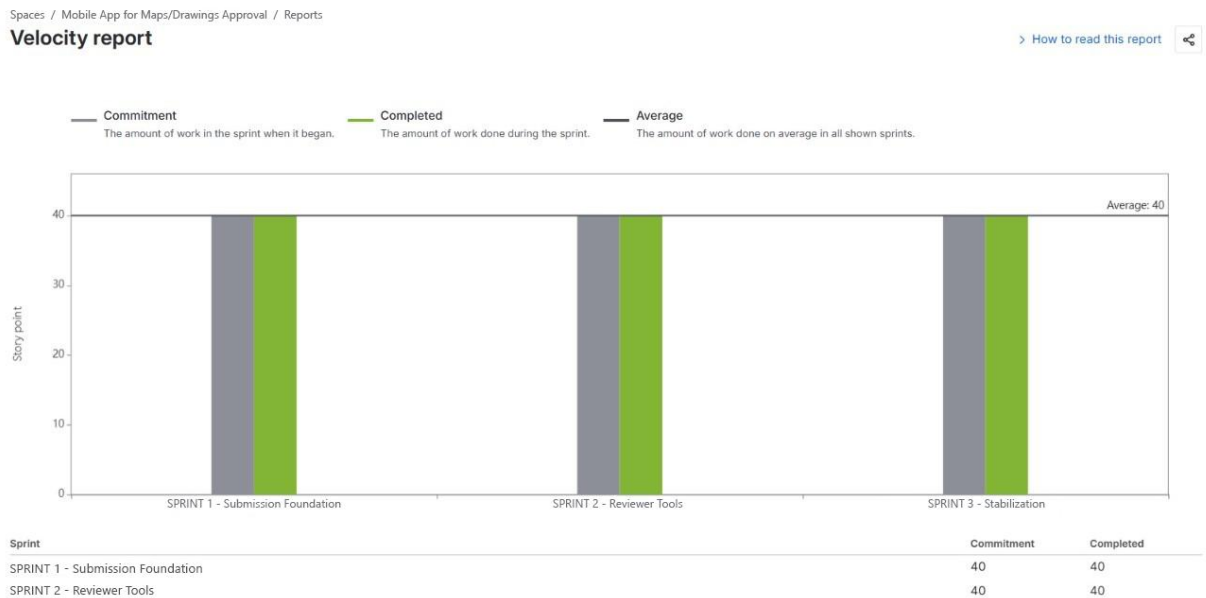


Figure 27 Velocity Report for Drawings Approval App

The Velocity Report reveals that there is a balanced amount of story points that are accomplished in this sprint and all the promised work has been fulfilled. The lack of deviation between scheduled and finished points implies proper estimation, proper planning of the capacity, and the strict adherence to the sprinting performance. The fact that all three sprints have the same velocity is an indication of a consistent workflow, good team coordination, and a high degree of predictability in the delivery based on the use of Jira in the Scrum model.

5.12 Quality and Release Tracking

The following definitions were used in the project to measure quality:

- **Definition of Ready (DoR):** Makes sure that stories are actionable, have estimated costs and are testable.
- **Definition of Done (DoD):** Must pass review of code peers, regression tests and must pass on Android/iOS platforms.

5.13 Dashboard View

- The project encompasses dashboard views pertaining to Authority Reviewer persona.
- This has a web dashboard to see submissions, filter applications, and has red-lining digital tools to annotate drawings.

MUNICIPAL AUTHORITY REVIEW PORTAL - SUBMISSION OVERVIEW

Recent Applications

Project Name ↑	Applicant	Status	Date Submitted ↓	Actions
Project Name 1	Esise Densiks	Approved	12/14/2022	Actions ▾
Project Name 2	Jesien Pent	Approved	12/18/2022	Actions ▾
Project Name 3	Jesen Alelienk	Approved	12/15/2023	Actions ▾
Project Name 4	Jeson Jesson	Approved	12/15/2023	Actions ▾
Project Name 5	Gloack Warnoan	Approved	12/15/2023	Actions ▾
Project Name 6	Eofrin Marth	Approved	13/15/2022	Actions ▾
Project Name 7	Project Beikt	Approved	12/15/2022	Actions ▾
Project Name 8	Jetses Wetch	Approved	12/19/2022	Actions ▾
Project Name 9	Project Genor	Approved	12/19/2022	Actions ▾
Project Name 10	Amon Falowenn	Approved	11/18/2022	Actions ▾

DIGITAL RED-LINING TOOLS

Line Rect Highlight Text Comment

Annotations on drawing:

- This assign orgins actuals arrows and flag small central text comments related revolving. No set locations.
- This assign can number of sending but comment about colors consistated its weights if each regis and assign.

MUNICIPAL AUTHORITY REVIEW APP SUBMISSIONS

Figure 28 Drawings Approval App Dashboard View

5.14 Overall Execution Summary

Jira made it possible to organize, bring transparency and data-driven monitoring to the project. The fact that the incremental change was noticed after successive sprints indicates successful adoption of Agile, coordination of the team and controlled delivery, in accordance with the concept of Scrums.

5.15 Agile Ceremonies Execution on Jira

Jira artifacts were actively used to support the scrum ceremonies. Sprint Planning applied the use of backlog grooming and story point estimation. The board of the Jira was used to conduct daily stand-ups allowing the purposeful identification of blockers. Sprint Reviews were performed with the help of the completed Jira tickets as the evidences of the acceptance, and Sprint Retrospectives paid attention to making the estimation more precise and the workflow more balanced.

6 Conclusion and Lessons Learned

6.1 Project Summary

The Integrated Building Application System project was implemented to put the important regulatory role of building permit approvals under the computer. During 3 active Sprints (the 4th Sprint was cancelled because of the strategic reprioritization), the team was able to create a working MVP. We created a secure mobile application that allowed homeowners to submit the plans and an effective web dashboard that allows authorities to go through it. The Scrum framework enabled successful implementation of the project as a concept to a working software product.

6.2 Achievement of Project Objectives

- **Sprint 1 Achievement:** Provided the Submission Foundation. House owners were able to open accounts and upload complicated file formats (DWG/ PDF) without any difficulties.
- **Sprint 2 Achievement:** Provided "Reviewer Tools. Red-pen manual process was also successfully digitized, enabling the officials to draw on a screen.
- **Sprint 3 Achievement:** Provided "Stabilization." The system was crash resistant and deep-linking notifications were also added to enhance user interaction.

6.3 Value Delivered by the Project

- **Operational Efficiency:** It is possible to say that operational efficiency decreased the theoretical time of receiving an application (from days (physical travel) to seconds (mobile upload)).
- **Transparency:** Developed a digital audit trail in which all submission and review activities are time-stamped and logged.
- **Accessibility:** 24/7 submission, which has eliminated the limit of government office hours by citizens.

6.4 Challenges Faced During the Project

- **Technical Complexity:** Mobile devices at first had a problem with handling large architectural files (50MB+). This was made possible through introduction of server side compression.
- **Scope Ambiguity:** The requirements of the Reviewer Dashboard changed change of the spring because the stakeholders saw that they needed to have certain options to filter. Agile has enabled us to quickly adapt to this.
- **Sprint 4 Cancellation:** The move by the client to halt the Release stage was considered a logistical nightmare since we had to record the prevailing situation to be resumed later.

6.5 Lessons Learned

- **Early Testing is Critical:** Sprint 1 Testing with real-life, large DWG files helped us to avoid great architectural failures in the future.

- **Stakeholder Engagement:** Frequent demos in the Sprint Review made the client stay on track, without which the "Annotation Tool" would have been developed in an incorrect way.
- **Dependence on Third-Party APIs:** We were taught to mock APIs (such as payment gateway) early in order to avoid stalling the frontend team when the backend was still being developed.

6.6 Future Enhancements

- **GIS Integration:** An overlay of submissions to a map of the city to check zoning.
- **AI Compliance Check:** Scanning of drawings to identify simple breaches of code (ex: a lack of setback).
- **Payment Gateway:** Complete online fee payment.

6.7 Final Conclusion

The IBAS project is an effective example of the application of Agile Scrum to government technology projects. The team was able to produce high-quality and functioning product increment despite the complexity of the domain and the cancellation of the final release sprint to satisfy core needs of the citizens and regulators. The artefacts created within JIRA offer a decent starting point to any subsequent team to pick the solution to production.

-The END-