

# **Excel-Based Project Control System**

***Business Analysis &  
Solution  
Documentation  
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## 1. Executive Summary

The **Excel-Based Project Control System** is a lightweight, structured solution designed to help small construction and service organizations manage projects, invoices, payments, expenses, change orders, and portfolio-level KPIs in a single, coherent system.

The solution applies **business analysis best practices** to transform fragmented tracking (multiple spreadsheets, emails, and manual follow-ups) into a centralized, decision-support system. While implemented in Excel, the system is designed with clear processes, data structure, and governance that support accuracy, usability, and future scalability.

- Reduce overdue invoice follow-ups by making outstanding items visible
- Improve cash flow predictability with monthly inflow tracking
- Reduce admin time spent reconciling project financials
- Improve decision-making with portfolio KPI dashboard

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**Note:** The live Excel workbook is a commercial product and is not publicly distributed. This document focuses on the analysis, design, and decision-making behind the solution.

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## 2. Business Problem

Small teams often rely on disconnected tools to manage projects and finances. Common challenges include:

- Limited visibility into project status and progress
- Difficulty tracking outstanding invoices and cash flow
- Inconsistent expense and margin tracking
- Poor control over scope and contract value changes
- High administrative effort and manual reconciliation

These issues reduce the quality of decision-making and increase operational risk.

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### **3. Solution Overview**

The Excel-Based Project Control System addresses these challenges by:

- Centralizing project, financial, and operational data
- Enforcing data consistency through validation rules
- Separating data entry from reporting and KPIs
- Providing real-time portfolio visibility via a dashboard

The solution intentionally prioritizes **clarity, adoption, and control** over exhaustive ERP-level complexity.

### **4. Scope & Assumptions**

This section defines the boundaries of the Excel-Based Project Control System and clarifies key assumptions made during analysis and design.

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#### **4.1 In-Scope**

The following capabilities are **explicitly included** in the solution:

- Centralized tracking of projects, invoices, payments, expenses, and change orders
- Portfolio-level KPI reporting through an Excel dashboard
- Data validation rules to ensure data quality and consistency
- Controlled status values (e.g., project status, invoice status, change order status)
- Separation of input fields and calculated fields
- Protection of formulas and calculation logic
- Future-state process flows for Invoice-to-Cash and Change Order Management

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#### **4.2 Out of Scope**

The following items are **intentionally excluded** from the solution:

- Full accounting functionality (e.g., general ledger, tax reporting, payroll)
- Automated invoicing or payment processing integrations
- Multi-user concurrency and real-time collaboration
- Client-facing portals or external system integrations
- Detailed current-state process analysis

- Enterprise-level ERP or CRM functionality

These exclusions were deliberate to maintain simplicity, usability, and rapid adoption.

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### 4.3 Key Assumptions

The solution was designed based on the following assumptions:

- Users follow defined business processes (e.g., invoices are created before payments are recorded)
  - Unique identifiers (ProjectID, InvoiceID, PaymentID, etc.) are consistently used
  - The system is primarily used by a small team within a single organization
  - Excel is accessed by one user at a time or through controlled usage
  - Data is entered manually and reviewed periodically for accuracy
  - Dashboard KPIs are refreshed based on the latest available data
- 

### 4.4 Constraints

The design acknowledges the following constraints:

- Excel is not optimized for concurrent multi-user editing
- Performance may degrade with very large datasets
- Advanced workflow automation is limited within Excel
- Security relies on Excel-level protection rather than enterprise access controls

These constraints informed design decisions and scope boundaries.

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### 4.5 Design Rationale

The scope and assumptions reflect a **pragmatic tradeoff** between functionality, usability, and implementation effort.

The primary objective was to deliver:

- immediate business value
- improved visibility and control
- a structured foundation that can evolve over time

Rather than replacing enterprise systems, the solution complements them and supports future migration if required.

## **4.6 Future Enhancements (Out of Scope)**

The following enhancements were identified during analysis but were intentionally excluded from the current scope. They represent potential future improvements if business needs, scale, or tooling change.

### **Process & Functional Enhancements**

- Automated invoice reminders and aging analysis
  - Enhanced invoice aging buckets (e.g., 0–30, 31–60, 61–90 days)
  - Workflow-driven approval notifications for change orders
  - Configurable KPI thresholds and alerts
- 

### **Reporting & Analytics Enhancements**

- Advanced filtering and drill-down capabilities on dashboards
  - Historical trend analysis and forecasting
  - Export of structured data to external BI tools (e.g., Power BI, Tableau)
  - Scenario analysis for cash flow and profitability
- 

### **Platform & Integration Enhancements**

- Migration from Excel to a centralized database-backed solution
  - Integration with accounting software (e.g., QuickBooks, Xero)
  - API-based data ingestion and automation
  - Role-based access controls beyond Excel-level protection
- 

### **Usability & Scalability Enhancements**

- Multi-user concurrency support
- Audit trail for key financial and status changes
- Enhanced error handling and user guidance
- Mobile-friendly or web-based interface

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## **Enhancement Prioritization Note**

These enhancements were deprioritized to:

- preserve solution simplicity
- reduce implementation effort
- focus on immediate business value

The current design provides a **strong foundation** that can support these enhancements without major rework.

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## **5. Stakeholders & User Roles**

### **Owner / Manager**

- Reviews portfolio KPIs and financial performance
- Approves change orders
- Uses dashboards for decision-making

### **Project Manager**

- Maintains project records and progress
- Identifies and submits change orders

### **Office Administrator**

- Creates invoices
  - Records payments and expenses
  - Supports operational data entry
- 

## **6. Use Case Overview**

Use cases define how each role interacts with the system to achieve business goals.

Primary use cases include:

- Maintain Projects
- Create Invoices
- Record Payments

- Track Expenses
- Manage Change Orders
- Review Dashboard & KPIs

### Use Case Diagram – Excel Project Control System

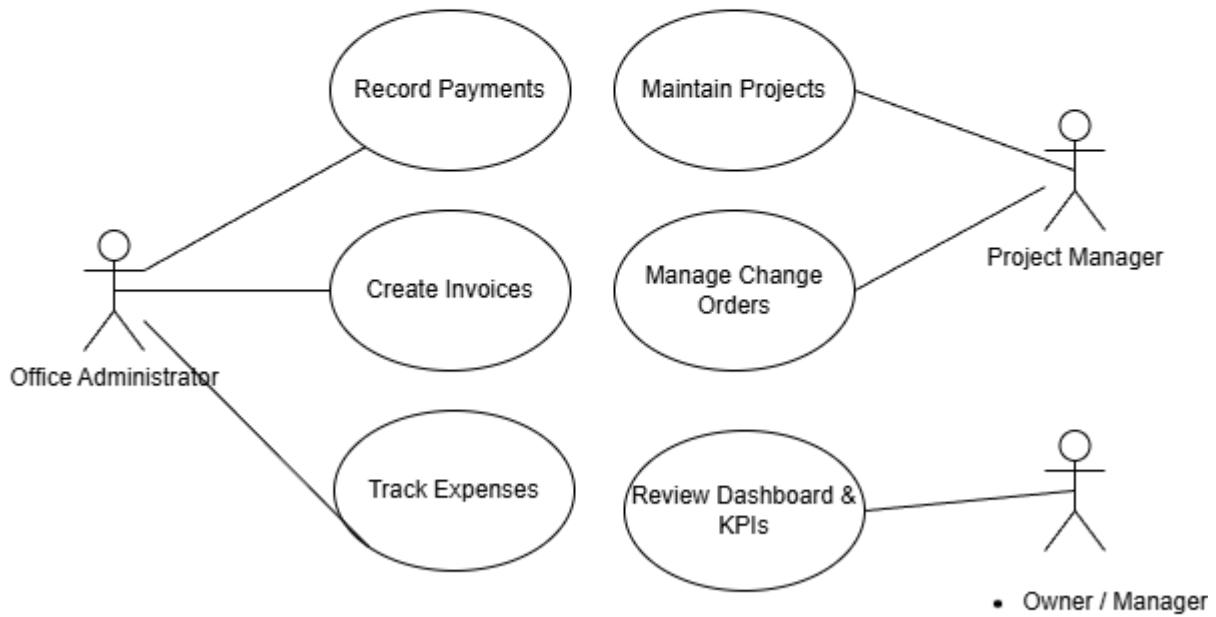


Figure 1: Use Case Diagram

## 7. Use Case Specifications

This section describes the primary interactions between users and the Excel-Based Project Control System. Each use case includes preconditions, a summarized main flow, postconditions, and key exceptions.

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## **UC-01 Maintain Projects**

**Primary Actor:** Project Manager

**Supporting Actor:** Excel Project Control System

### **Goal:**

Create and maintain accurate project records to support progress tracking, financial reporting, and KPI calculation.

### **Preconditions**

- Project has been approved to start, or an existing project requires an update.
- ProjectID is unique and not duplicated.

### **Main Flow (Summary)**

1. Actor creates or updates project details (ProjectID, name, status, dates, contract value, progress).
2. System validates required fields and allowed status values.
3. System recalculates project-level and portfolio KPIs.
4. Dashboard reflects updated project information.

### **Postconditions**

- Project record is saved and available for reporting.
- KPIs and dashboard values are updated.

### **Exceptions**

- Missing required fields → system prompts for correction.
- Invalid status value → entry is rejected.

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## **UC-02 Create Invoices**

**Primary Actor:** Office Administrator

**Supporting Actor:** Excel Project Control System

### **Goal:**

Create invoices linked to projects to support billing and receivables tracking.

## **Preconditions**

- Project exists and is active.
- Contract value is defined for the project.

## **Main Flow (Summary)**

1. Actor creates a new invoice record (InvoiceID, ProjectID, date, amount).
2. System validates ProjectID and invoice amount.
3. System sets invoice status and updates outstanding balances.
4. Dashboard KPIs refresh automatically.

## **Postconditions**

- Invoice is recorded and contributes to receivables metrics.
- Outstanding balance is updated.

## **Exceptions**

- ProjectID not found → system rejects entry.
- Invoice amount  $\leq 0$  → validation error.

---

## **UC-03 Record Payments**

**Primary Actor:** Office Administrator

**Supporting Actor:** Excel Project Control System

### **Goal:**

Record payments against invoices to maintain accurate balances and cash flow reporting.

## **Preconditions**

- Invoice exists and has an outstanding balance.
- Invoice status is not closed or fully paid.

## **Main Flow (Summary)**

1. Actor enters payment details (PaymentID, InvoiceID, date, amount).
2. System validates InvoiceID and payment amount.
3. System updates invoice status and outstanding balance.

4. KPIs and dashboard values refresh automatically.

## **Postconditions**

- Payment is recorded.
- Invoice balance and status reflect the payment.

## **Exceptions**

- Payment amount exceeds outstanding balance → system blocks entry.
  - Invoice already closed → system rejects entry.
- 

## **UC-04 Track Expenses**

**Primary Actor:** Office Administrator

**Supporting Actor:** Excel Project Control System

### **Goal:**

Capture project expenses to support profitability and margin analysis.

## **Preconditions**

- Project exists and is active.
- Expense categories are defined.

## **Main Flow (Summary)**

1. Actor records expense details (ExpenseID, ProjectID, date, amount, category).
2. System validates ProjectID and expense amount.
3. System aggregates expenses at the project and portfolio level.
4. Profitability KPIs update automatically.

## **Postconditions**

- Expense is recorded and included in margin calculations.
- Dashboard reflects updated cost and margin metrics.

## **Exceptions**

- Invalid ProjectID → entry is rejected.
- Expense amount  $\leq 0$  → validation error.

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## **UC-05 Manage Change Orders**

**Primary Actor:** Project Manager

**Secondary Actor:** Owner / Manager

**Supporting Actor:** Excel Project Control System

**Goal:**

Control scope and contract value changes to maintain financial accuracy and governance.

**Preconditions**

- Project exists.
- Original contract value is defined.

**Main Flow (Summary)**

1. Project Manager submits a change order (ChangeOrderID, ProjectID, amount, description).
2. Owner / Manager reviews and approves or rejects the change order.
3. If approved, system updates contract value and recalculates KPIs.
4. Dashboard reflects updated financial impact.

**Postconditions**

- Approved change orders update contract value.
- Rejected or deferred change orders do not affect financials.

**Exceptions**

- Change order rejected → no financial updates applied.
- Invalid ProjectID → system rejects entry.

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## **UC-06 Review Dashboard & KPIs**

**Primary Actor:** Owner / Manager

**Goal:**

Review portfolio-level KPIs to support informed decision-making.

## **Preconditions**

- Project, invoice, payment, expense, and change order data exists.
- Dashboard calculations are up to date.

## **Main Flow (Summary)**

1. Actor opens the dashboard.
2. Actor reviews KPIs (cash flow, outstanding invoices, progress, margin).
3. Actor identifies trends, risks, or required actions.

## **Postconditions**

- Management decisions are made using current data.
- No data changes occur.

## **Exceptions**

- Incomplete or missing source data → KPIs may be partially populated.
- 

## **8. Business Process Flows (Future State)**

Future-state process flows were created to clearly show **responsibilities between users and the system** and to reduce ambiguity.

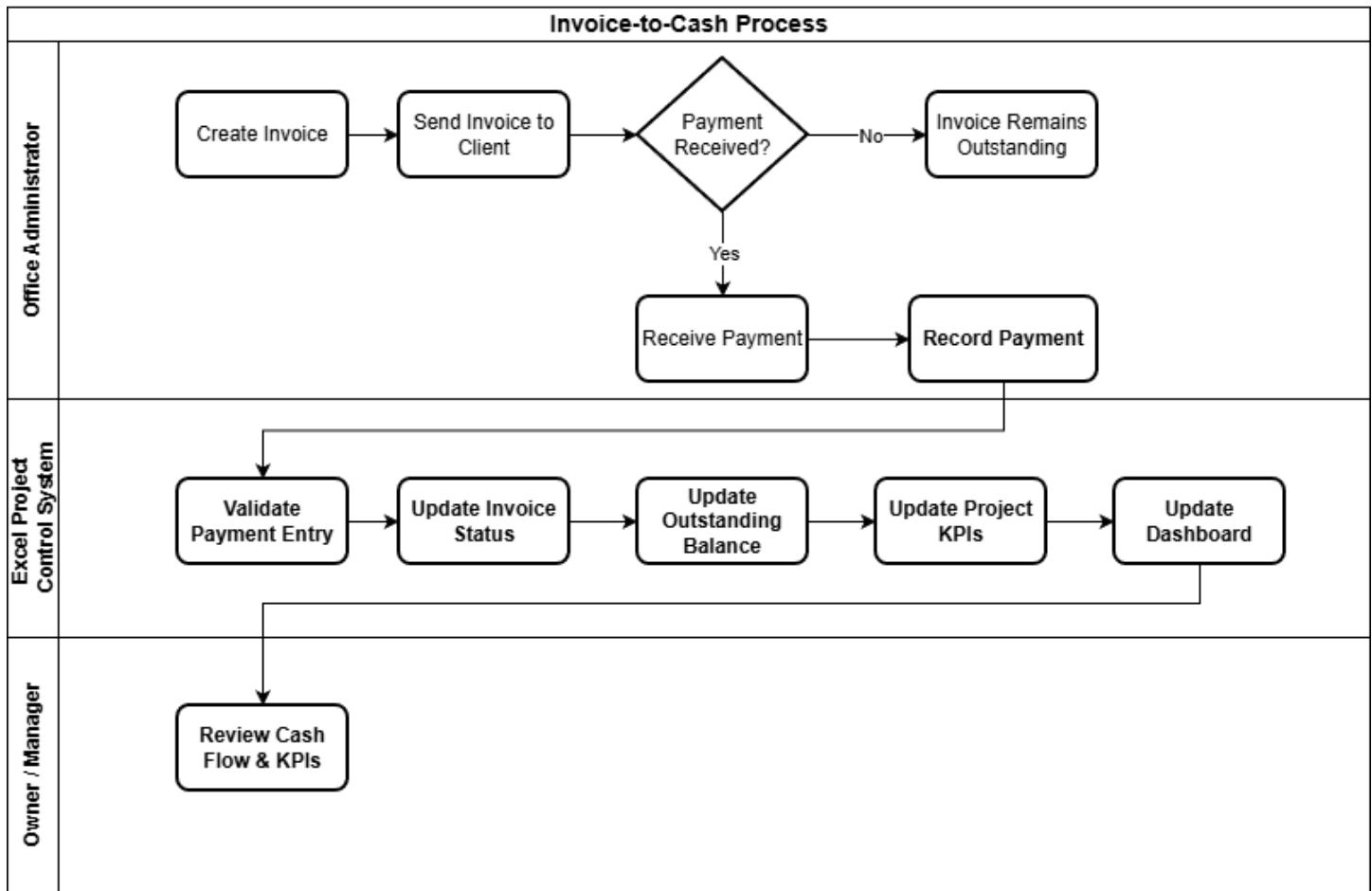
### **7.1 Invoice-to-Cash Process**

This process illustrates how invoices are issued, payments are recorded, balances updated, and KPIs refreshed.

#### **Key characteristics:**

- Clear ownership across roles
- System-driven validation and recalculation
- Minimal exception handling for clarity

## Invoice-to-Cash Process – Future State



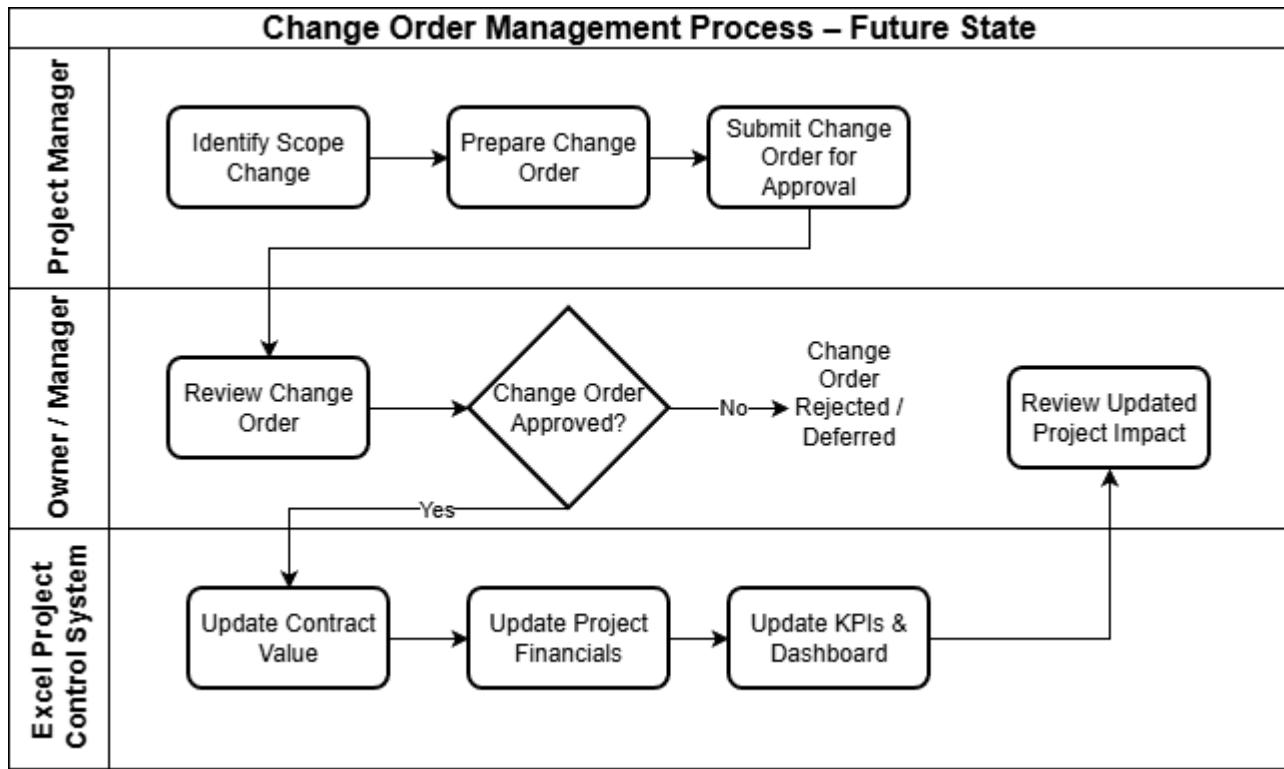
*Figure 2: Invoice-to-Cash Process Flow Diagram*

## 7.2 Change Order Management Process

This process ensures scope and contract value changes are approved before impacting financials.

### Key characteristics:

- Approval-based control
- Separation of decision-making and system updates
- Immediate KPI recalculation after approval



*Figure 3: Change Order Process Diagram*

## 9. High-Level Data Model

A high-level data model defines the core entities and relationships used by the system.

### Core Entities

- Projects
- Invoices
- Payments
- Expenses
- Change Orders

### Key Relationships

- Projects → Invoices (1-to-many)
- Invoices → Payments (1-to-many)
- Projects → Expenses (1-to-many)
- Projects → Change Orders (1-to-many)

Although implemented in Excel, this structure supports data integrity, scalability, and future BI integration.

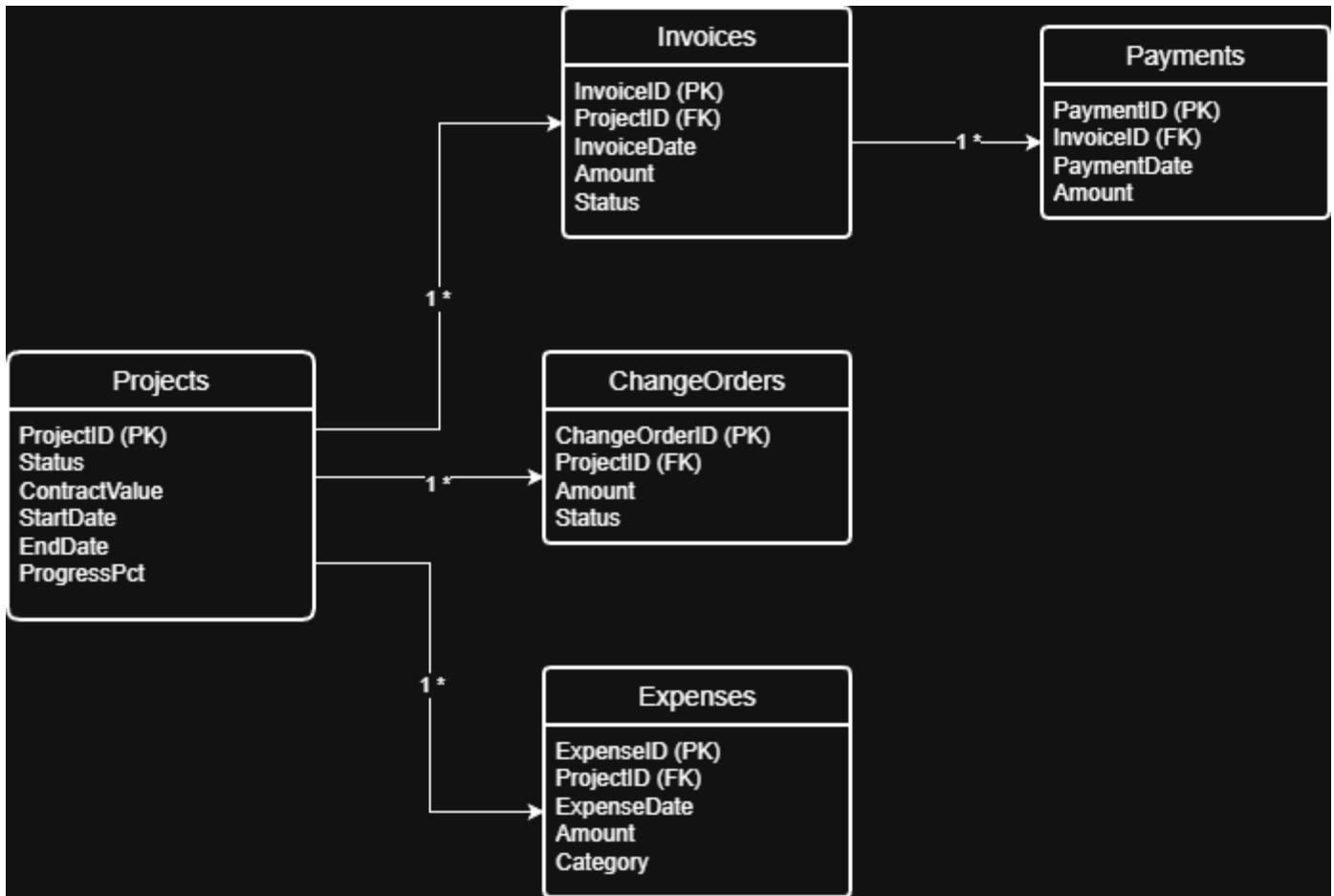


Figure 4: High-Level Data Model (ERD)

## 10. Requirements Summary

### Functional Requirements

- Project tracking with status, dates, value, and progress
- Invoice creation and outstanding balance tracking
- Payment recording with validation and status updates
- Expense tracking for margin analysis
- Change order management with approval controls
- Portfolio dashboard with real-time KPIs

### Non-Functional Requirements

- Usability for non-technical users

- Data quality through validation rules
  - Protection of formulas and calculations
  - Maintainable, structured data model
- 

## 11. User Stories & Delivery Approach

Use cases were translated into **Jira-style user stories** with acceptance criteria to support realistic delivery planning.

A mock Jira board was created to illustrate:

- Backlog prioritization
- Work-in-progress limits
- Delivery sequencing

This artifact demonstrates familiarity with Agile delivery workflows without over-claiming tooling usage.

Mock Jira Board – Excel Project Control System Illustrative backlog based on defined user stories			
Backlog	Selected for Development	In Progress	Done
US-07 Record Project Expense US-06 Prevent Overpayment US-10 Review Portfolio KPIs	US-08 Submit Change Order US-09 Approve Change Order	US-05 Record Payment US-04 View Outstanding Invoices	US-01 Create / Update Project US-02 Track Project Progress US-03 Create Invoice

Figure 5: Mock Jira Board Screenshot

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## 12. Validation & Data Quality Controls

The system enforces data quality through:

- Required IDs and reference validation
- Positive amount checks
- Controlled status values

- Protected formulas and calculated fields

These controls reduce manual errors and increase confidence in reported KPIs.

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## 13. Lessons Learned & Tradeoffs

### Simplicity vs. Completeness

The solution intentionally avoids modeling every edge case or accounting detail.

- **Benefit:** Faster adoption, lower complexity
  - **Tradeoff:** Not a full ERP replacement
- 

### Excel as a Platform

Excel was selected for rapid delivery and familiarity.

- **Benefit:** Low cost, immediate value
  - **Tradeoff:** Limited multi-user scalability
- 

### Validation vs. Flexibility

Controls were prioritized over unrestricted editing.

- **Benefit:** Improved data integrity
  - **Tradeoff:** Slightly reduced flexibility for advanced users
- 

### Future-State Focus

Documentation emphasizes future-state processes rather than detailed current-state analysis.

- **Benefit:** Clear target operating model
  - **Tradeoff:** Less emphasis on legacy inefficiencies
- 

## 14. Conclusion

This project demonstrates an **end-to-end business analysis approach**, including:

- Stakeholder identification
- Use cases and process modeling
- Data modeling
- Requirements and user stories
- Delivery and governance considerations

The Excel-Based Project Control System delivers measurable business value while remaining adaptable for future growth or system migration.

Appendices include illustrative Excel snapshots to demonstrate system structure and controls.

## APPENDIX A – Excel System Snapshots

The following screenshots provide illustrative examples of the Excel-Based Project Control System's structure and functionality. These snapshots are included to demonstrate layout, data organization, validation controls, and reporting outputs.

**Note:** The live Excel workbook is a commercial product and is not distributed publicly.

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### A.1 Project Master Sheet

#### Purpose:

Central repository for project-level data used across the system.

#### Key Elements Illustrated:

- ProjectID as a primary identifier
- Controlled project status values
- Contract value and progress tracking
- Structured table design for scalability

ProjectID	ProjectName	ClientName	Address	City	StartDate	EndDate	Project Description	Contract Initial Amount	Total Approved Change	Contract Final Amount	Holdback Percent	Holdback Release Date	Holdback Outstanding	Project Status	Progress Rate %	Last FollowUp Date	Project Notes	Invoice count	Submitted Invoice Total
1	1 Project 1	George Smith	1452 Marine Dr	Vancouver	2025-11-14	2026-02-30	Flooring	10,000	2,800	12,800	10.00%	2026-07-30	1,280	In Progress	34%			1	\$12,800
2	2 Project 2	Jack Carter	110 Main street	Burnaby	2025-12-14	2026-03-30	Tile	12,000	4,500	16,500	10.00%	2026-08-30	1,650	Approved	20%			1	\$16,500
3	3 Project 3	Alice		North															
4	McDonald		3245 15th st	Vancouver	2026-01-07	2026-03-30	Plumbing	14,000	0	14,000	10.00%	2026-08-23	1,400	suspend	15%			1	\$14,000
5																			
6																			
7																			

Figure 6: Projects Sheet

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### A.2 Invoice Tracking Sheet

#### Purpose:

Tracks invoices linked to projects and supports receivables reporting.

#### Key Elements Illustrated:

- Invoice-to-Project relationship
- Invoice status tracking
- Outstanding balance calculation
- Validation to prevent invalid ProjectID entries

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	InvoiceNo	ProjectID	Project Name	Project Status	Invoice Date	Submission Date	Invoice Amount	Holdback %	Holdback Amount	Net Invoice Amount	DueDate	Invoice Status	Paid To Date	Outstanding Amount	Notes
2	1	1	Project 1 - Vancouver	In Progress	2025-11-27	2025-11-27	\$4,800.00	10.00%	\$480.00	\$4,320.00	2025-11-30	Not Due	\$4,000.00	\$320.00	
3	2	2	Project 2 - Burnaby	Approved	2025-12-24	2025-12-24	\$3,600.00	10.00%	\$360.00	\$3,240.00	2025-12-27	Not Due	\$3,000.00	\$240.00	
4	3	3	Project 3 - North Vancouver	suspend	2026-01-24	2026-01-25	\$2,400.00	10.00%	\$240.00	\$2,160.00	2026-01-30	Overdue	\$2,200.00	\$0.00	
5															
6															

Figure 7: Invoices Sheet

### A.3 Payment Recording Sheet

#### Purpose:

Records payments and updates invoice balances and KPIs.

#### Key Elements Illustrated:

- InvoiceID validation
- Prevention of overpayment
- Automatic status updates
- Separation of input vs calculated fields

	A	B	C	D	E	F	G	H	L
1	PaymentID	ProjectID	ProjectName	Project Status	InvoiceNo	Payment Date	PaymentAmount	Payment Type	Notes
2	1	1	Project 1 - Vancouver	In Progress	1	2025-11-26	\$2,000.00	Cash	
3	2	2	Project 2 - Burnaby	Approved	2	2025-12-26	\$3,000.00	Cheque	
4	3	3	Project 3 - North Vancouver	suspend	3	2026-01-10	\$2,200.00	E-transfer	
5	4	1	Project 1 - Vancouver	In Progress	1	2026-01-22	\$2,000.00	Cash	
6									

Figure 8: Payments Sheet

### A.4 Expense Tracking Sheet

#### Purpose:

Captures project expenses to support margin and profitability analysis.

#### Key Elements Illustrated:

- Expense categories
- Project-level expense aggregation
- Integration with profitability KPIs

ExpenseID	ProjectID	ProjectName	Project Status	Expense Date	Category	Vendor	Description	Hours	Amount	Paid	Notes
1	1	Project 1 - 1 Vancouver	In Progress	2026-01-12	Labour	james		22	\$1,400.00	Paid	
2	2	Project 2 - 2 Burnaby	Approved	2026-01-22	Equipment	Home depot		3	\$120.00	Paid	
3	3	Project 3 - North 3 Vancouver	suspend	2025-10-22	Labour	John		10	\$300.00	Paid	

Figure 9: Expenses Sheet

## A.5 Change Order Tracking Sheet

### Purpose:

Controls scope and contract value changes through approval status.

### Key Elements Illustrated:

- Change order status (Pending / Approved / Rejected)
- Impact on contract value
- Controlled update of financial KPIs

ChangeID	ProjectID	ProjectName -City	Project Status	Change Date	Description	Justification	Amount	Approval Date	ApprovalStatus	Notes
1	1	Project 1 - 1 Vancouver	In Progress	2026-02-02	change material	change material	\$2,800.00	2026-01-30	Approved	
2	2	Project 2 - Burnaby	Approved	2026-02-04	new order		\$4,500.00	2026-01-30	Approved	

Figure 10: Change Orders Sheet

## A.6 Dashboard & KPIs

### Purpose:

Provides portfolio-level visibility for management decision-making.

### Key Elements Illustrated:

- Cash flow and outstanding invoices

- Project progress and margin KPIs
- Automated refresh from source data

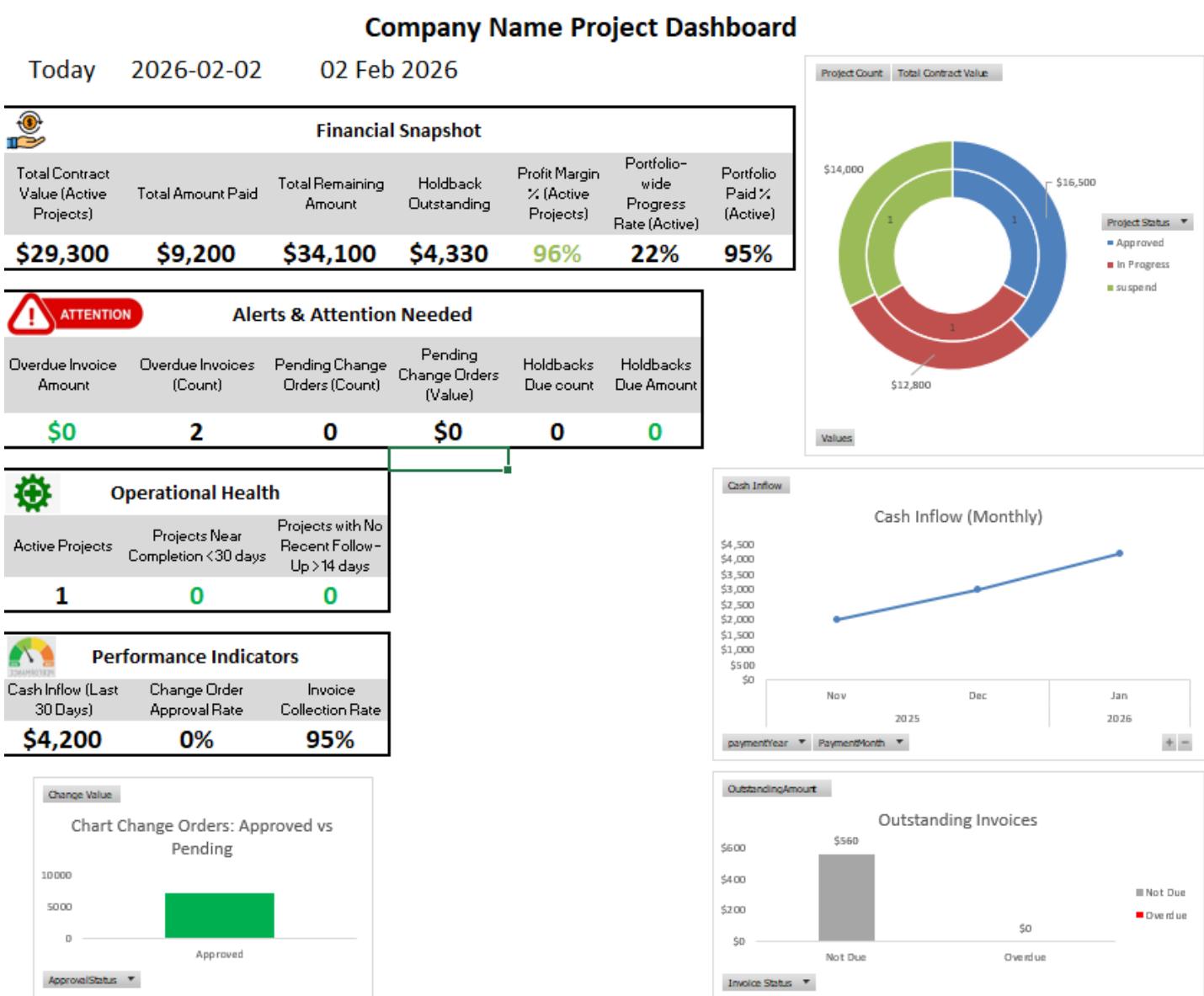


Figure 11: Dashboard Sheet

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## Portfolio-level KPIs (Dashboard)

### **Total Contract Value (Active Projects)**

Sum of final contract values for all projects that are not completed.

### **Total Amount Paid**

Total cash received across all projects to date.

### **Total Remaining Amount**

Total contract value minus total amount paid across projects.

### **Holdback Outstanding**

Total unpaid holdback amount for all projects where holdback has not yet been released.

### **Profit Margin % (Active Projects)**

Overall profitability of active projects, calculated as total gross profit divided by total contract value.

### **Portfolio-wide Progress Rate (Active)**

Financial progress across active projects, based on submitted invoices relative to total contract value.

### **Portfolio Paid % (Active)**

How much of the submitted invoices for active projects have been collected (cash received).

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## Invoices & Change Orders (Portfolio KPIs)

### **Overdue Invoice Amount**

Total value of invoices past their due date and not fully paid.

### **Overdue Invoices (Count)**

Number of invoices that are past due.

### **Pending Change Orders (Count)**

Number of change orders that have not yet been approved.

*Figure 12: Definitions sheet*

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## **APPENDIX B – Validation & Protection Examples**

This appendix highlights selected data quality and protection mechanisms implemented within the system.

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### **B.1 Data Validation Rules**

## Examples:

- Dropdown lists for status fields
- Numeric validation for amounts
- Required ID fields

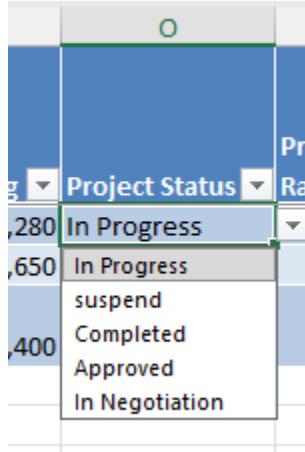


Figure 13: Data Validation Example

## B.2 Formula Protection

### Examples:

- Locked calculation columns
- Protected sheets
- Clear separation of input vs logic

A screenshot of a Microsoft Excel spreadsheet titled 'Project Data'. The ribbon shows the 'Review' tab selected. The formula bar contains the formula `=[@[Contract Final Amount]] * [@[Holdback Percent]]`. The spreadsheet has several columns: Project, ProjectName, ClientName, Address, City, StartDate, EndDate, Project Description, Contract Initial Amount, Total Approved Change Amount, Contract Final Amount, Holdback Percent, Holdback Release Date, Holdback Outstanding, and Project Status. Row 1 contains column headers. Rows 2, 3, and 4 contain data for three projects: Project 1, Project 2, and Project 3. A warning dialog box from Microsoft Excel is overlaid on the bottom right, stating: 'The cell or chart you're trying to change is on a protected sheet. To make a change, unprotect the sheet. You might be requested to enter a password.' with 'OK' and 'Cancel' buttons.

Project	ProjectName	ClientName	Address	City	StartDate	EndDate	Project Description	Contract Initial Amount	Total Approved Change Amount	Contract Final Amount	Holdback Percent	Holdback Release Date	Holdback Outstanding	Project Status
1	Project 1	George Smith	1452 Marine Dr	Vancouver	2025-11-14	2026-02-30	Flooring	10,000	2,800	12,800	10.00%	2026-07-30	1,280	In Progress
2	Project 2	Jack Carter	110 Main street	Burnaby	2025-12-14	2026-03-30	Tile	12,000	4,500	16,500	10.00%	2026-08-30	1,650	Approved
3	Project 3	Alice McDonald	3245 15th st	North Vancouver	2026-01-07	2026-03-30	Plumbing	14,000	0	14,000	10.00%	2026-08-23	1,400	suspend

Figure 14: Protected Sheet / Formula Area

