

Yellow: information is incorrect
Green: grammatical errors

Requirements Document Drywall Estimation System Gulf Islands Consulting

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Revision History

Name	Date	Reason for Changes	Version
BreadDev Team	Feb. 5	Created initial document	1.0



This history doesn't
seem up to date.

1 Introduction

1.1 Purpose

This requirements document 1.0 covers the requirements for Gulf Islands Consulting's *Drywall Estimation System*. This estimation system is designed to reduce the required time to produce project cost estimations. The system scope will cover the drywall estimation process, from the initial measurements input to the final invoice creation.

1.2 Project Scope

This project is designed to provide support to the Gulf Islands Consulting staff by providing a faster project estimation process.

The system will explore methods of improving identified problem areas that could be addressed to speed up estimation times and maintain the accuracy of current estimates. These include cost calculation and invoice creation. The project consists of the primary goal to reduce the time required to complete a drywall estimate.

To accomplish these goals, the project will analyze the entirety of the estimation process to determine sub-processes that can be improved or eliminated. Given the non-technical background of Gulf Islands Consulting's workers, the project will pursue solutions that integrate into and improve the current process, rather than creating an entirely new process.

1.3 Glossary of Terms

Drywall	A type of board used in the construction of internal walls and ceilings.
Framing	Fitting together components to create a defined shape and structure.
Building Materials	Materials used in the drywall installation process including but not limited to: drywall and insulation.
Quote	An approximation of the project cost calculated from the price and measurements of materials and labour costs.
Sage	Business assistance software used for generating and tracking invoices.
Slegg Building Materials	Building supply retailer located on Vancouver Island.

1.4 References

- [1] Gulf Islands Consulting (22 Jan. 2019). Drywall Estimation System Request for Proposal [Online]. Available: <https://andysmit.github.io/SENG321/RFP-SENG321-Group4.pdf>. [Accessed 30 Jan. 2019].
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- [3] Government of BC (2019). *The Codes - Province of British Columbia* [Online]. Available: <https://www2.gov.bc.ca/gov/content/industry/construction-industry/building-codes-standards/the-codes> [Accessed 5 Feb. 2019].
- [4] Islands Trust BC (24 Jan. 2019). *Gabriola Island Planning Bylaws* [Online]. Available: <http://www.islandstrust.bc.ca/islands/local-trust-areas/gabriola/bylaws/>. [Accessed 5 Feb. 2019].
- [5] City of Nanaimo (2018). *Bylaws Affecting Building Projects* [Online]. Available: <https://www.nanaimo.ca/property-development/building-permits/bylaws-for-building>. [Accessed 5 Feb. 2019].

1.5 Overview

- Section 2: Overall Description
Gulf Islands Consulting requires a new system to reduce the time to produce cost estimates of potential projects. Product features include: cost estimation of potential jobs, a price estimate override, manual material price adjustment, production of a PDF file for customer invoice, user management, and automatic material price updates.
- Section 3: System Features
This section highlights all the system features that must be implemented with any proposed solution system. The features include: generating of price estimates, configuring pricing details and forming a downloadable invoice.
- Section 4: External Interface Requirements
The system's external interface requirements is split into 4 parts, the user interface, the software interface, the hardware interface, and the communications interface. This section specifies requirements related to any object outside of the system that interacts or works with the system. These requirements must be accomplished by the system to ensure functionality with the necessary external objects.
- Section 5: Other Non-Functional Requirements
The system's non-functional requirements are broken down into performance, safety, security, and quality. Each requirement provides a complete and unambiguous description of what the system must accomplish in relation to the requirement.
- Section 6: Other Requirements
No other requirements exist at this time.
- Section 7: Appendix
Outstanding questions regarding the current Gulf Islands Consulting Drywall cost estimation system are listed in this section.

2 Overall Description

2.1 Product Perspective

Currently, Gulf Islands Consulting measures and calculates the cost estimations of drywall installation **by hand**, using a measuring tape, pen-and-paper calculations and personal experience to determine a final estimate. Gulf Islands Consulting must also determine material price and stock data manually **often** through internet searches or phone calls. These written calculations are then transferred into the Sage Invoice software to produce a final document for the customer [2].

First sentence and second sentence have awkward wording. Recommend to remove 'by hand' + 'often'.

The product being developed will look to streamline the cost estimation process by automating many of the manual cases including: price estimation, searching material costs, and the delivery of a price estimate to the customer.

2.2 Product Features

The **system** shall produce cost estimates for potential drywall work based on data entered by the user. The user will be able to input the pricing of the materials for calculation either manually or by letting the system **web scrape** hardware retailer websites to find the most current pricing on materials. The system will allow Gulf Islands Consulting to create and delete user profiles of the staff to allow for quick labour calculations. Finally, the system will produce a PDF version of the created invoice to send to the customers of Gulf Islands Consulting.

remove space here

add to glossary.

2.3 User Classes and Characteristics

Only staff members will have access to a potential software solution. Both current staff members are drywallers with varying levels of experience **from expert to intermediate**. These staff members will share the 'Experienced Drywallers' class. Temporary staff members hired for peak periods are labeled under the 'Temporary Laborer' class. These members will use a potential system less frequently and will have a subset of the functionality compared to the 'Experience Drywallers'.

Consider removal.

2.3.1 User Class: Experienced Drywallers

The Drywallers user class is the **most frequent, prominent**, and currently the **only class with use for the system**. This class has the most experience within the business and the installing and quoting of drywall. **Most users of this class will not have an education exceeding a post-secondary bachelor's degree and may not be familiar with using software solutions.** The Drywallers class will have no limitations for access to the entire potential system features.

should be 'Experienced'.

unnecessary

should be based on drywall experience, not education.

awkward, Consider revision.

2.3.2 User Class: Temporary Laborer

temporary laborers should not have access to the system. Only one class.

The Laborer user class is defined by temporary employees, as students are hired for the summer or part-time employees for busier periods. This user class has less experience than the Drywall class and will receive less functionality. The Laborer user class will only have access to a simplified version of the estimation system and will be unable to change material prices or add new ones. This class' functionality will consist of producing cost estimates from entering required values and nothing else.

2.4 Operating Environment

A potential system must operate on popular hardware platforms, including Macintosh, PC, iPhones, and Androids. Support should be given to all operating systems for these devices released in the last three years or the last release currently supported if a release has not occurred in the last 3 years. These Operating Systems include:

- Mac OS Mojave (10.14), High Sierra (10.13), and Sierra (10.12)
- Windows 10
- iOS 12, 11, and 10
- Android Version 9, 8, 7

we do not need support for Apple products.

2.5 Design and Implementation Constraints

A potential software solution must account for laws and regulations regarding drywall installation. These requirements are outlined in Safety Requirements - Section 5.2. Given the small maintenance budget, a potential solution must be maintainable from a client with no programming experience and a general unfamiliarity with computing machines.

↓ client or system user?

2.6 Assumptions and Dependencies

↓ computers?

A-1: The user has a basic knowledge of computer application use and the purpose of a potential solution system.

A-2: User inputs for cost estimations are correct regarding measurement and unit.

D-1: The web scraping feature for finding out current prices of materials would depend on the sources of the material pricing to be correct and up to date.

3 System Features

3.1 Generate Drywall Job Cost Estimate

3.1.1 Description and Priority

Allow the user to input measurements of the job site, required materials, and estimated work hours needed. Estimates are generated based off of these factors and current building material prices.

Priority: Very High

3.1.2 Functional Requirements

R-F-01: Users shall have the ability to enter building measurement information as well as details relative to potential work.

Vague, what details?

R-F-02: The system shall be able to produce cost estimates based off of user inputted measurements.

R-F-03: Estimated employee working hours shall be inputted manually by the user.

R-F-04: Cost estimates shall be available while the worker is on site.

→ may be non-functional

R-F-05: Cost estimates shall be within a +/-10% range of the actual cost.

R-F-06: The system shall allow all inputted data to be reverted or re-entered.

3.2 Manual Update in Drywall Job Detail

3.2.1 Description and Priority

Allow employees to manually update prices of the drywalling job. The user has the ability to update the configuration of the system for details such as price of goods, cost of manhours, and the total number of manhours needed for a section of wall.

Priority: Medium

→ High

man-hours?
man hours?

3.2.2 Functional Requirements

R-F-07: The users shall be able to manually change the inputted price for the building materials.

R-F-08: Automated and manual override cost estimates shall be approved by an administrator prior to invoice.

no admin class

3.3 Generating PDF Invoice for Client

3.3.1 Description and Priority

Allow the user to format the price estimate into a selected invoice template. The newly created invoice will be downloaded, and the user can then email the invoice to the client. This is to reduce the user's reliance on a separate invoice formatting software such as Sage.

Priority: Low → High

3.3.2 Functional Requirements

R-F-09: Users shall be able to make changes to the invoice's client information prior to the client's access to said invoice.

R-F-10: Generated invoices shall match the selected template.

R-F-11: Validation from the administrator is needed before the invoice is available to the client.

R-F-12: Generated invoices shall be accessible in PDF form.

R-F-13: Generated invoices shall be accessible by a home computer.

no admins

Clarify when/how it is editable

→ Remove

3.4 Automatic price updates

3.4.1 Description and Priority

The system has the ability to automatically update cost of goods from trusted sources. This will reduce time spent acquiring such data and provide a more accurate price estimation.

Priority: Very low → capitalize.

Specify Home Depot, Slegg, Rona.

3.4.2 Functional Requirements

R-F-14: The system shall be able to check user-defined building material supplier websites for updated building material accessibility status and price.

4 External Interface Requirements

4.1 User Interfaces

4.1.1 Description and Priority

The user interface must be designed to maximize the learnability and productivity of the system. This will reduce time spent on learning the system and provide a satisfactory user experience.

Priority: Medium

4.1.2 External Interface Requirements

R-EI-01: If an error is triggered all affected users are immediately notified.

R-EI-02: Warnings are displayed to the user when a user input triggers an invalid output.

R-EI-03: New users shall be able to efficiently navigate the GUI.

R-EI-04: The system shall provide text boxes for user input.

R-EI-05: The user shall be able to re-enter any input data.

What errors?
What users?
What defines affected?

→ glossary.

→ ambiguous

→ redundant (R-F-06)

4.2 Hardware Interfaces

4.2.1 Description and Priority

The system must be built such that it is compatible with the defined work devices, which are low-end computers and mobile phones. Thus, the system should not demand a high level of hardware performance.

Priority: High

→ not required.

cheap, old, or both?

→ Contradicts 2.4

4.2.2 External Interface Requirements

R-EI-06: The system shall be compatible with common low-end mobile phones (minimum: 512MB RAM, 1GB free disk space).

R-EI-07: The system shall be compatible with low-end computers (minimum: 1GB RAM, Intel® Core 2 or AMD Athlon® 64 processor; 2 GHz or faster processor, 1GB free disk space).

R-EI-08: The system layout shall be functional with all aspect ratios of the following monitor displays: 5:4, 4:3, 16:10, 16:9.

R-EI-09: The system shall support touch-screen input.

R-EI-10: The system shall support keyboard and mouse inputs.

4.3 Software Interfaces

4.3.1 Description and Priority

The system is required to be compatible with any software that are currently used by Gulf Islands Consulting. Common file types should also be supported. Finally, the system must be compatible with all operating systems of the defined devices. → no defined devices.

Priority: Medium

→ Contradicts
section 2.4

4.3.2 External Interface Requirements

R-EI-11: The system shall be able to extract building materials price information from retail websites specified by users. → shall.

R-EI-12: Pricing data can be imported from a Microsoft Excel spreadsheet.

R-EI-13: The system shall export a detailed price quote as a PDF file.

R-EI-14: The system shall be compatible with any operating system versions released within the past 3 years (Android 7.0+, iOS 10+, macOS 10.12+, Windows 10).

4.4 Communications Interfaces

4.4.1 Description and Priority

Currently, all communications and transfers of documents between Gulf Islands Consulting and their customers are done through email. Email functionality must be included into the system to provide transfer of invoice between Gulf Island Consulting and their customers.

Priority: Low

4.4.2 External Interface Requirements

R-EI-15: The system shall have an email functionality to send and receive documents from the customers of Gulf Island Consulting.

↓ not a requirement.

5 Other Non-Functional Requirements

5.1 Performance Requirements

5.1.1 Description and Priority

The current estimation process for Gulf Island Consulting takes approximately 4 hours according to Gulf Island Consulting's customer's estimates. This process includes measurement, calculation, and invoice completion. The system should reduce the time taken by the complete process to half of what it currently is.

Priority: Medium

5.1.2 Non-functional Requirements

quote generation < 2 hours,
not business site time.

R-NF-01: The entire estimation process, measured from the time the contractor arrives at the business site to the time that the client receives their quote, shall last no longer than 2 hours.

5.2 Safety Requirements

5.2.1 Description and Priority

Drywall projects undergone by Gulf Islands Consulting take place in BC, primarily in the Gabriola Islands and Nanaimo and must comply to all applicable laws. This always includes the BC Building, Fire, and Plumbing codes [3], and often will include local municipal bylaws, dependent on location.

comma here

Priority: High

remove
space

5.2.2 Non-functional Requirements

R-NF-02: All estimations shall be compliant to the BC Building, Fire, and Plumbing Codes [3].

R-NF-03: All estimations shall be compliant to all municipal bylaws that govern drywall installation [4,5].

R-NF-04: In cases of conflict between BC code and municipal bylaws, the municipal bylaws shall take precedence over the BC code.

R-NF-05: All user inputs into the system that produce non-regulation compliant results shall be highlighted as such and immediately apparent to the user of the system.

R-NF-06: A user can override regulation warnings from the system.

5.3 Security Requirements

5.3.1 Description and Priority

Currently, only the owner of Gulf Islands Consulting calculates drywall project estimates. However, it would be of benefit for all **GIC** staff to be able to complete estimates, thus a verification process should be in place ensure only qualified staff may access and utilize the system.

Priority: Medium

← remove space

just say the full name, or always abbreviate.

5.3.2 Non-functional Requirements

R-NF-07: No individual, other than approved Gulf Islands Consulting staff, shall be able to access the system.

R-NF-08: The system shall authenticate the identity of the user to confirm their status as a valid Gulf Islands Consulting employee before allowing access to the system.

5.4 Software Quality Attributes

5.4.1 Description and Priority

The numbers used in **Drywall** project estimation, including material cost and labor cost are subject to change at any time. Similarly, the provincial regulations that apply to **Drywall** installation are typically updated yearly, while municipal bylaws can be updated multiple times per year. Therefore, it is important to allow these values within the system to be fluid. As well, errors in both regulation compliance and estimation results are possible, therefore the logging and correction of both is necessary.

Priority: Medium

→ just need password, not identity.

don't capitalize.

5.4.2 Non-functional Requirements

R-NF-09: All automatically updated prices for: materials, labor, and other factors such as special equipment, shall be updated daily.

R-NF-10: Prices can be manually editable by system users.

R-NF-11: An estimation shall be manually editable through the system without the need to start the estimation process over again.

R-NF-12: Any regulation associated with estimation shall be updateable to reflect changes made to this regulation.

R-NF-13: New regulations associated with estimation shall be able to be added to the system.

R-NF-15: All system errors including regulation errors, must be logged, stored, and accessible by the user.

6 Other Requirements

Appendix: Issues List

In order to ensure that all requirements are compliant with the current system and potential solution, a complete, front to back, procedure for calculating drywall project estimates must be provided. This will include all input and output values, all equations used in calculations, and any other considerations that are taken into account when estimations are completed.

$$\sum (\text{all materials})(\text{Cost of respective material})$$

→ labour cost
inputted
manually.