Four-Storey Wood School Design in British Columbia: An Analysis of Structural System Cost Comparisons

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Disclaimer

1 Introduction

1.1 Background

As land values continue to rise, particularly in higher-density urban environments, schools with smaller footprints will become increasingly necessary to satisfy enrollment demands. There are currently several planned new school projects throughout British Columbia that anticipate requiring either three-or four-storey buildings, and it is forecast that demand for school buildings of this size will continue to rise.

Though timber construction would offer a viable structural material option for these buildings, the British Columbia Building Code (BCBC 2018) currently limits schools comprised of timber construction to a maximum of two storeys, while also imposing limits on the overall floor area. Given these constraints, the development of viable structural options that would accommodate larger and taller schools constructed primarily with timber materials has not been a key focus.

With the above factors in mind, the purpose of this report is to build upon the findings of the previously published *Design Options for Three- and Four-Storey Wood School Buildings in British Columbia* prepared by Fast + Epp and Thinkspace dated November 2019. Specifically, this report supplements the previous one by providing guidance in assessing and comparing the various framing options considered in the previous report primarily on a cost basis.

1.2 Related Studies

This study builds upon two previously issued studies published by Wood *WORKS!* pertaining to the use of timber framing systems in British Columbia school buildings:

+ *Design Options for Three- and Four-Storey Wood School Buildings in British Columbia* prepared by Fast + Epp and Thinkspace dated November 2019, which explores the design implications for timber framing systems in three- and four-storey school buildings.
+ *Outline Approach to Building Code Compliance* – Vancouver Timber Schools prepared by GHL Consultants dated March 2019, which explores the building code-related considerations of timber construction approaches for school buildings that are up to four storeys in height.

The reader is referred to these companion reports for further information regarding design considerations and building code compliance for timber school buildings.

There are also a number of available resources that provide good background information pertaining to the use of wood in Canadian school buildings; these resources include:

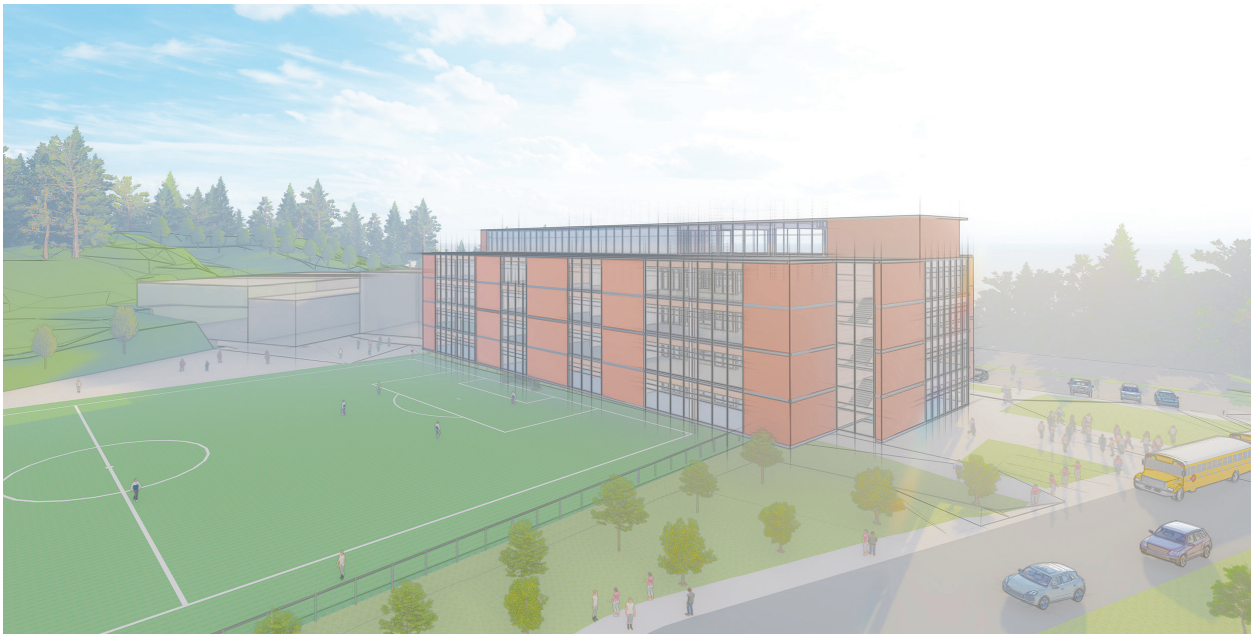
+ *Wood Use in British Columbia Schools* prepared by Stantec & Fast + Epp for Forestry Innovation Investment dated November 2018
+ *2012 Reference Guide: Wood Use in Low-Rise Educational Buildings – Ontario* published by the Canadian Wood Council and Ontario Wood *WORKS!*
+ *Case Study: Crawford Bay Elementary-Secondary School and Richmond Christian School* published by the Canadian Wood Council and Wood *WORKS!* BC
+ *Putting Wood to Work in BC: A User's Guide* published by the Canadian Wood Council and Wood *WORKS! BC*

2 Framing System Conceptual Options

2.1 Overview

In order to highlight some of the possible timber construction approaches for four-storey school building in British Columbia, the classroom block of the prototypical school layout described in Section 2 of *Design Options for Three- and Four-Storey Wood School Buildings in British Columbia* is examined in further detail. The selected framing system combinations presented in this section represent the range of structural approaches most likely to be utilized in the construction of a four-storey school due to their material efficiency, ability to respond to the architectural programming requirements, and the material economics.

The rendering below illustrates the typical classroom block developed for this study. Schematic architectural drawings of this block are provided in Appendix A.



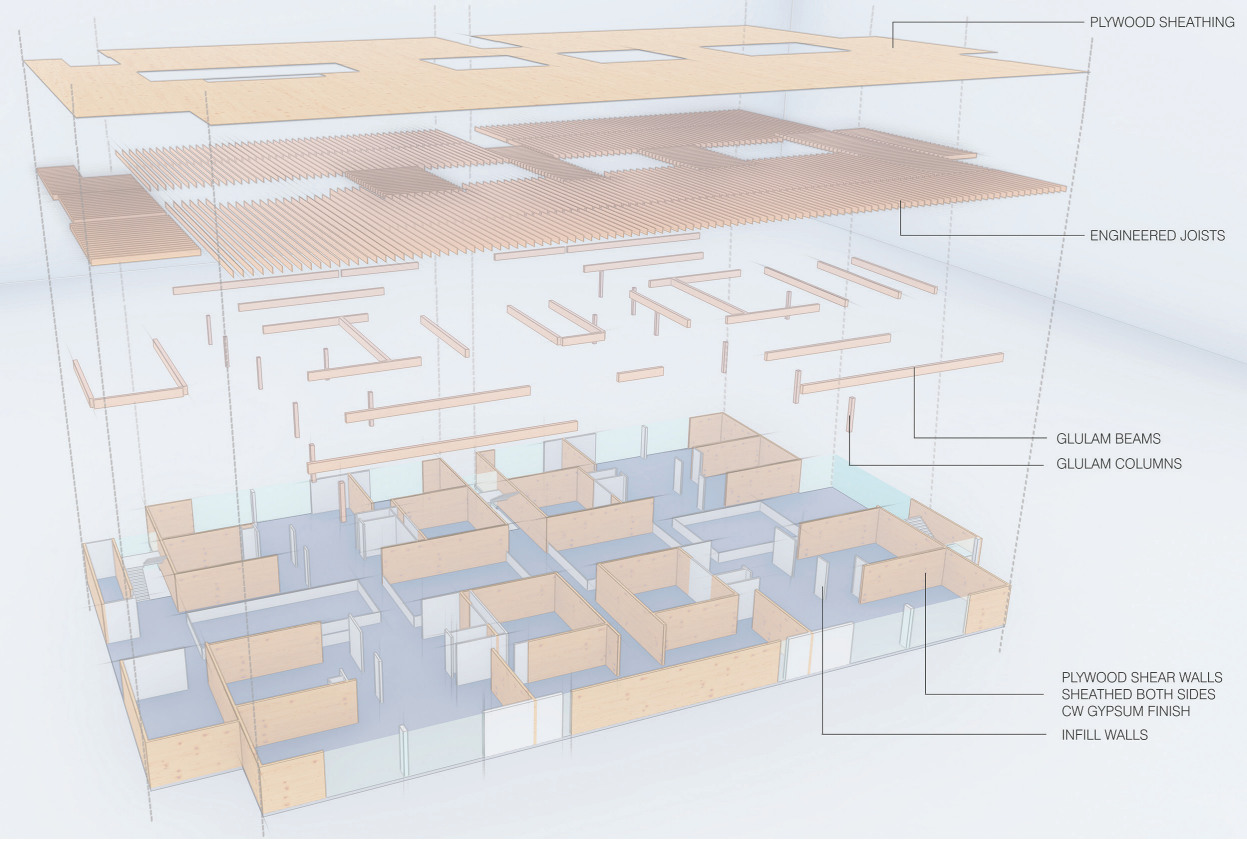
Prototypical School Building: Four-Storey Classroom Block

Using the various timber framing methodologies described in the previous study, three different timber-framed structural concepts were developed for this classroom block. These options, which are described in the following subsections, will be used to illustrate:

- Possible combinations of the timber framing components in complete structural schemes;
- The functional layout and architectural expression that can be achieved through the various framing systems; and
- The relative cost of the potential framing systems.

2.2 Option A: Light Wood-Frame Structure

Option A consists of the light wood-frame system in combination with the light wood-frame shear wall Lateral Force Resisting System (LFRS) described in Section 4.2 and Section 5.2.3 of *Design Options for Three- and Four-Storey Wood School Buildings in British Columbia*, respectively. Schematic structural drawings for this concept are provided in Appendix B-1.



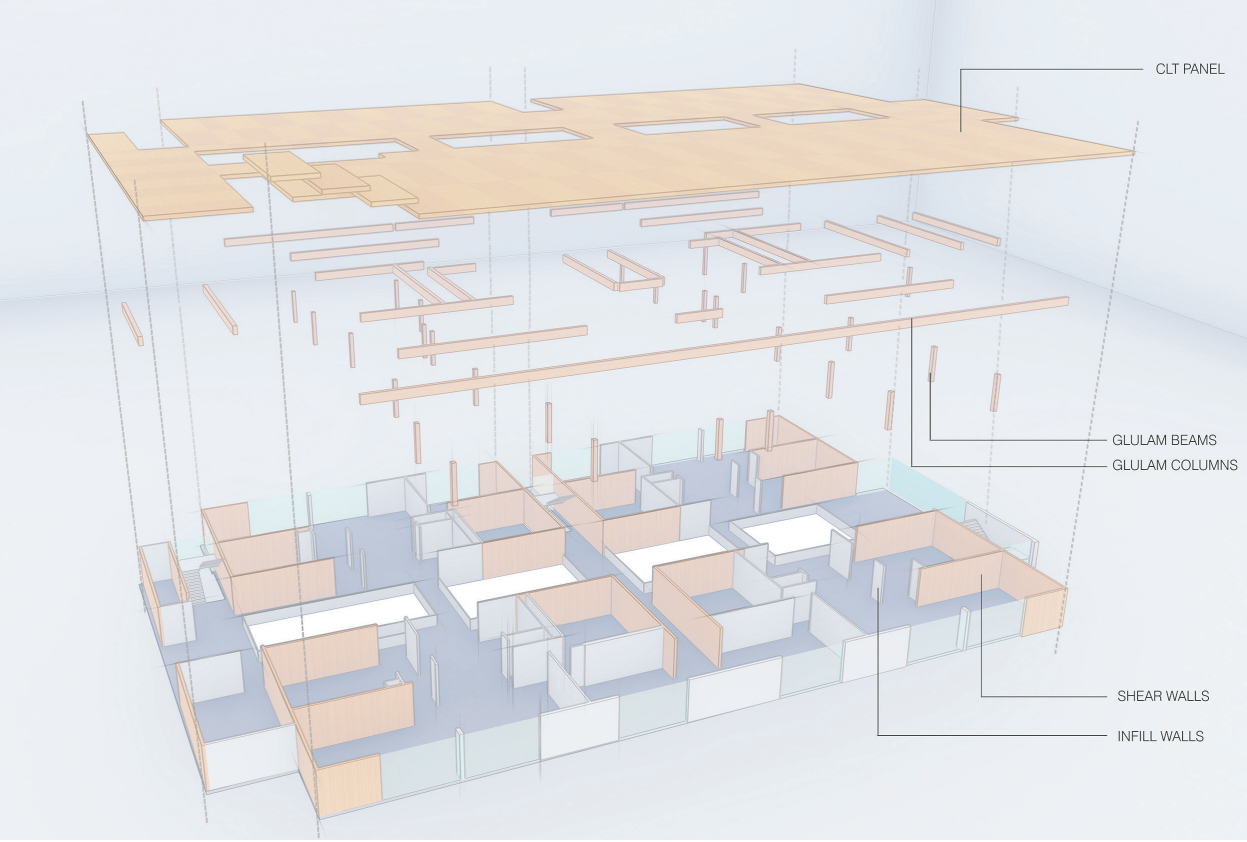
Axonometric Framing Diagram: Light Wood-Frame Structure

As mentioned in the previous study, a three-storey light wood-frame LFRS represents a realistic upper limit of what is feasible with a conventional light wood-frame LFRS in a region of high seismicity. As this design could be applied to a four-storey building not subject to high seismic loading, for the purpose of this framing option comparison, a four-storey building with the noted LFRS scheme is discussed.

In Option A, the light wood-frame LFRS has some inherent issues pertaining to acoustics and the required fire resistance rating. This framing system, if unprotected, is more susceptible to fire. Therefore, the framing requires full coverage with fire resistant finishes (i.e., gypsum wall board). These finishes would conceal the wood members and limit the architectural expression of the wood material. For all framing options, the floor requires a one-hour rating. It is anticipated that keeping the ability to run services in the floor framing cavity will make it difficult to maintain the required ratings for fire separations. As a result, services would need to be routed in a plenum below the structure.

2.3 Option B: CLT Structure

Option B consists of the flat panel CLT floor and roof framing system in combination with the CLT shear wall and CLT diaphragm LFRS described in Section 4.3.1 and Section 5.3.2 of *Design Options for Three- and Four- Storey Wood School Buildings in British Columbia*, respectively. Schematic structural drawings for this concept are provided in Appendix B-2.



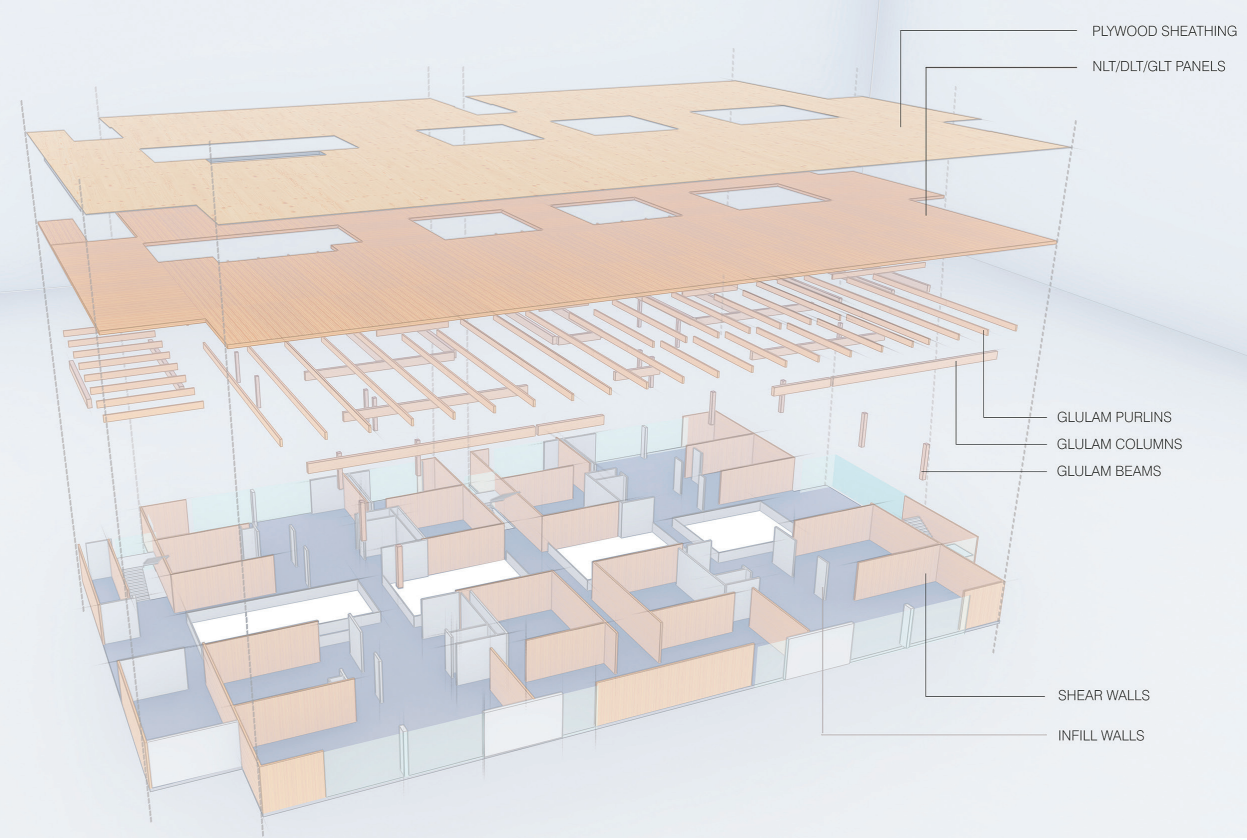
Axonometric Framing Diagram: CLT Structure

In Option B, the flat panel CLT floor and roof system in combination with CLT walls creates an opportunity for reduced interior finishes. Because of the inherent fire-resistant quality of CLT, these mass timber panels can remain exposed in most of the building. Consequently, using a CLT system provides an opportunity to express wood as both a structural component and an architectural finish. This narrative of wood as a material that is both functional and aesthetically pleasing is put at the forefront in Option B, thereby solidifying its effectiveness as a material to consider in future school buildings.

From an acoustic perspective, CLT panels would likely perform better than light wood framing because of their density. However, CLT structures can be susceptible to reverberation and impact-related acoustic transmission if not properly detailed. Consideration for acoustical treatment would potentially conceal portions of the CLT finish.

2.4 Option C: CLT Shear Walls with NLT, DLT, or GLT Panel on Purlin Framing

Option C consists of the mass timber (either NLT, DLT, or GLT) floor and roof panel on a purlin framing system in combination with the CLT shear wall and plywood sheathed diaphragm LFRS described in Section 4.3.2 and Section 5.3.3 of *Design Options for Three- and Four-Storey Wood School Buildings in British Columbia*, respectively. Schematic structural drawings for this concept are provided in Appendix B-3.



Axonometric Framing Diagram: CLT Shear Walls with Panel on Purlin Framing

In Option C, the degree of expression of the timber framing that can be achieved is comparable to that included in Option B. With NLT, DLT, or GLT framing systems, additional options for concealed/integral acoustical treatments are available compared to that with a CLT framing system. In certain cases, NLT, DLT, and GLT would require additional fire protection measures compared to CLT because of the lower wood volume of these products. Despite these points, Option C offers some potential for reduced interior finishes just as in Option B, but to a lesser degree.

2.5 Option D: Conventional Structural Steel Framing

In addition to the timber framing options described above, a framing option for the prototypical classroom block using conventional structural steel framing was also developed. Structural steel framing was selected for this framing system comparison because steel construction is also quite commonly used for school buildings of this scale in British Columbia. Schematic structural drawings for this concept are provided in Appendix B-4.

3 Costing Study

3.1 Scope

In order to develop a realistic understanding of the costs associated with each of the four structural framing options outlined in this document, an independent cost consultant (Turner & Townsend) was engaged. Using the information outlined in this report, including the drawing packages included in the appendices, a Class D cost estimate was prepared for each of the four options. Please refer to the costing report included in Appendix C of this document for a detailed breakdown of this estimate. As with the other components of this study, the cost estimates were developed for the four-storey classroom block only.

3.2 Methodology

The four cost estimates were developed using generally accepted principles on method of measurement as per the Canadian Institute of Quantity Surveyors (CIQS) Elemental Cost Analysis. As part of this methodology, and in accordance with accepted industry standards, a Class D cost estimate is understood to be within +/- 20% accuracy. It should be noted that while 20% seems like a large variance, this degree of costing accuracy reflects the level to which the schematic designs for the four framing options were progressed. However, since it is common for the exploration of different framing systems to take place during the schematic design phase of a project, Class D was selected for this study to reflect the level of information that would be available when comparing framing systems during a given project.

The rates used for this estimate include labour and materials, equipment, subcontractor's overheads and profit. Pricing developed for this project was based upon Turner & Townsend's experience with similar projects, and/or quotes provided by subcontractors and suppliers. These estimates include current price feedback received from concrete / formwork (division 3), masonry (division 4), steel (division 5), wood (division 6), roofing (division 7), glazing (division 8) and drywall and stud (division 9) sub trades. Furthermore, the rates included for mass timber items have been based on actual cost data from a similar project tendered in Q1 2020 as well as discussions with suppliers within the industry.

Upon completion of the cost estimates, Turner & Townsend undertook several reviews with the design team, including line item descriptions, unit prices, allowances, assumptions, exclusions, and contingencies to ensure the appropriate design intent has been accurately captured within the report.

Pricing within the cost estimate reflected Q1 2020 rates and present market/local conditions for Vancouver. An escalation allowance to the anticipated construction start date was excluded from the cost analysis.

3.3 Assumptions and Exclusions

In order to focus the efforts of this costing study on the differences resulting from the various structural framing systems, the following building components were assumed to be consistent throughout all four framing options:

+ Exterior cladding, glazing, and roofing assemblies;
+ Interior finishes (quantities vary in mass timber options);
+ Floor-to-floor and floor-to-ceiling heights;
+ Mechanical and electrical systems (other than allowances for additional hanging costs, etc., within mass timber options);

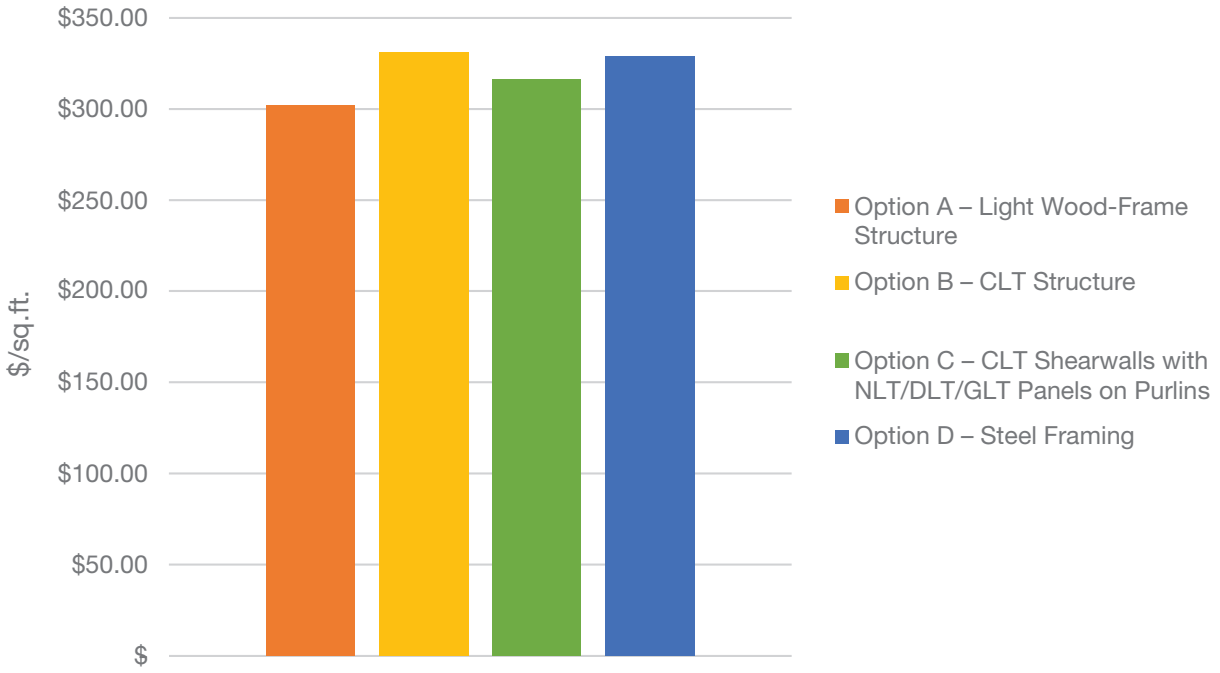
- Shallow foundation type and sizes (other than the number of footings being dependent on the total number of columns);
- Slab-on-grade thickness; and
- General requirements.

Similarly, the following components that did not impact the comparison of the framing systems were excluded from this costing study:

- Client and design team fees;
- IT and communication equipment;
- Washrooms/kitchens/serveries;
- Demolition costs;
- Site and landscaping costs; and
- Conveying systems.

3.4 Overall Cost Comparison

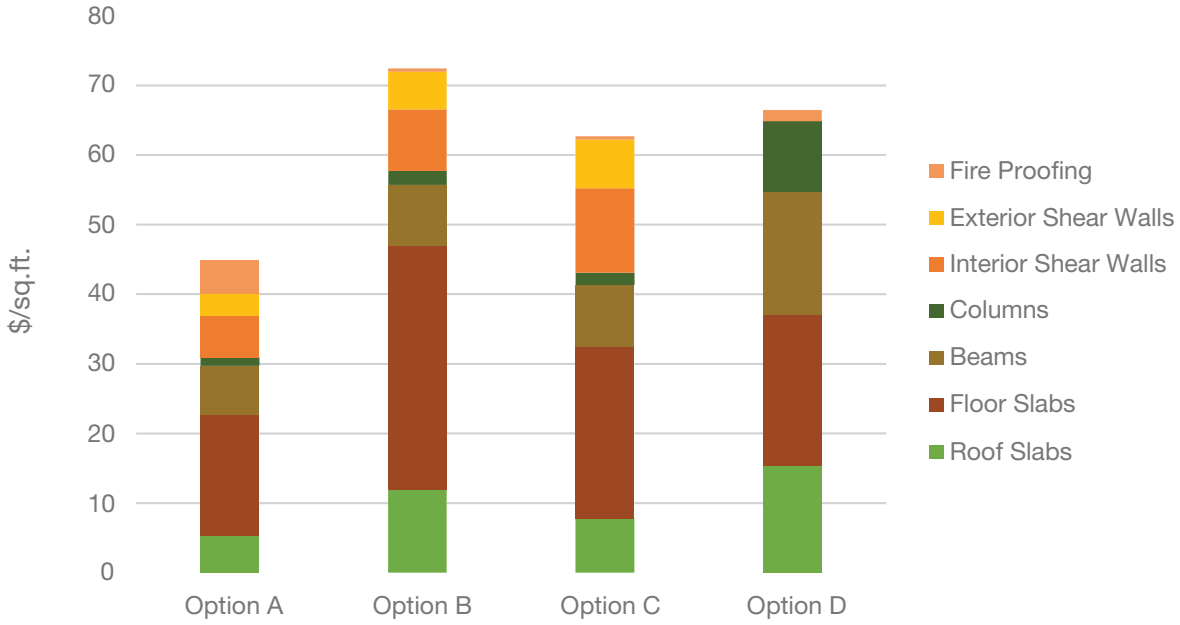
Based on the noted assumptions and limitations, a Class D cost estimate was prepared for each of the four structural framing options. Refer to Appendix C for the detailed costing report prepared for this study. The image below summarizes the overall costs (expressed as cost per square foot of building area) determined in this cost estimate.



Overall Cost per Square Foot Comparison for the Four Structural Framing Options

As illustrated in this chart, the difference in the overall cost per area of all four options is minimal (less than $30 per square foot between the highest and lowest cost options). Although a Class D cost estimate is expected to vary from actual costs by up to 20%, the variance observed between the lowest and highest cost per area across all four options is negligible.

To highlight the structural components of the overall cost per area contributing to each of these four options, the following chart provides a breakdown of the cost per area of the key structural elements within each option.



Cost per Square Foot Breakdown for the Key Structural Elements within the Four Structural Framing Options

3.5 Key Cost Drivers

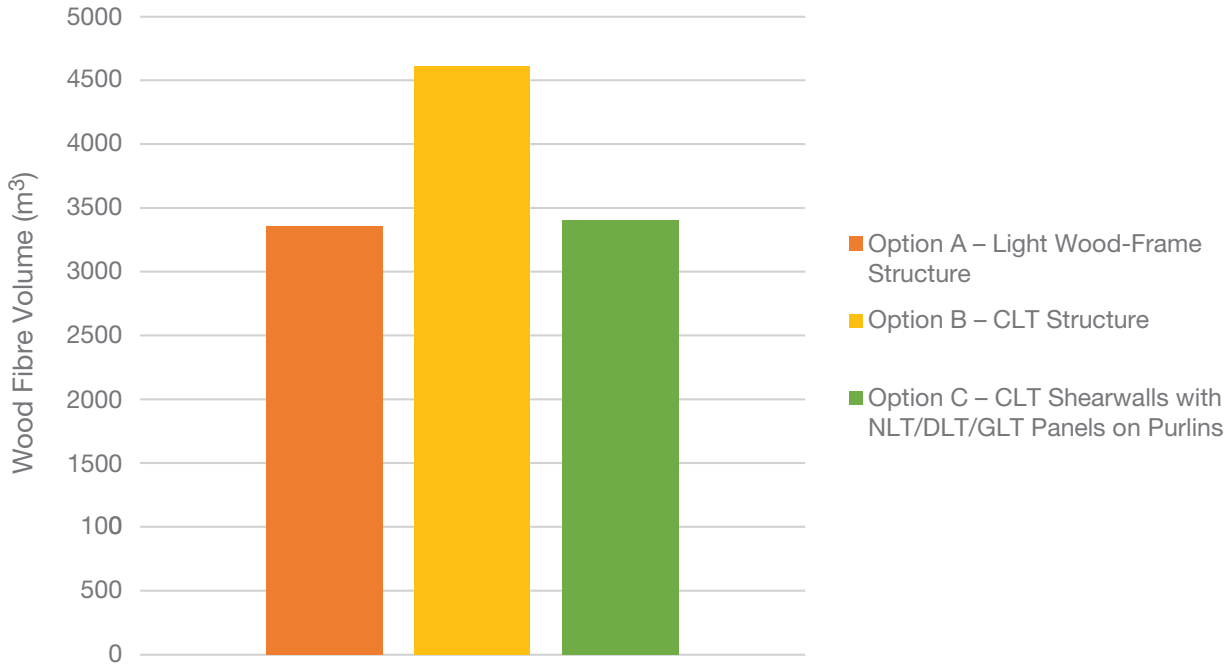
Since the very small difference in the overall building cost across all four options does not provide the opportunity to compare the four options from a cost perspective, key components of the overall building costs were identified and examined in further detail. These key components, which were selected on the basis that they exhibited the most significant cost variance across the four options, are described in the following sections.

3.5.1 BUILDING SIZE CONSIDERATIONS

As indicated in Sections 5.2 and 6.2.1, given the significant demands that would be imposed on the LFRS of a four-storey light wood-frame structure with plywood sheathed shear walls such as Option A, this type of framing system does not scale as well to larger structures as the other systems considered in this study. The more onerous demands that would need to be accommodated in this system, such as double-sheathed shear walls and custom hold-down connections, extend beyond what is considered standard construction practice for this type of framing system. Consequently, it could potentially be misleading for the design team to assume that the efficiencies that can be garnered with light wood-frame systems in smaller buildings (namely cost) can be easily extrapolated into larger structures.

3.5.2 STRUCTURAL CONSIDERATIONS

The most significant characteristic of a given structural framing system that impacts its construction cost is the efficiency of the use of construction materials. For wood-frame systems, this efficiency is often determined by considering the total wood fibre volume required for a given framing system. While wood fibre volume is not the sole factor that impacts the cost of a given structural system, the impact is high enough that it is most commonly considered by designers first when assessing various framing options.



Comparison of Wood Fibre Volume for the Three Floor Framing Options Considered in this Study

The image above illustrates the total wood fibre volume associated with the floor framing systems of Options A, B, and C. As can be seen by comparing this chart to the chart outlining the costs of the structural elements of each of the options provided in Section 3.4 of this document, the total wood fibre volume tends to be proportional to the overall cost of the framing system.

Overall depth of the structural framing system can also have a marked impact on the project cost, since deeper systems can necessitate increased floor-to-floor heights to achieve the required clear ceiling heights within the classroom spaces. Increased floor-to-floor heights can in turn increase the required surface area of interior finishes and exterior cladding elements, which has a direct cost impact. Flat panel mass timber framing systems like that of Option B can provide the most significant reduction in the overall structural depth. Refer to the information provided in Section 3.5.3 of this document for a more detailed breakdown of the costs associated with varying quantities of finishes.

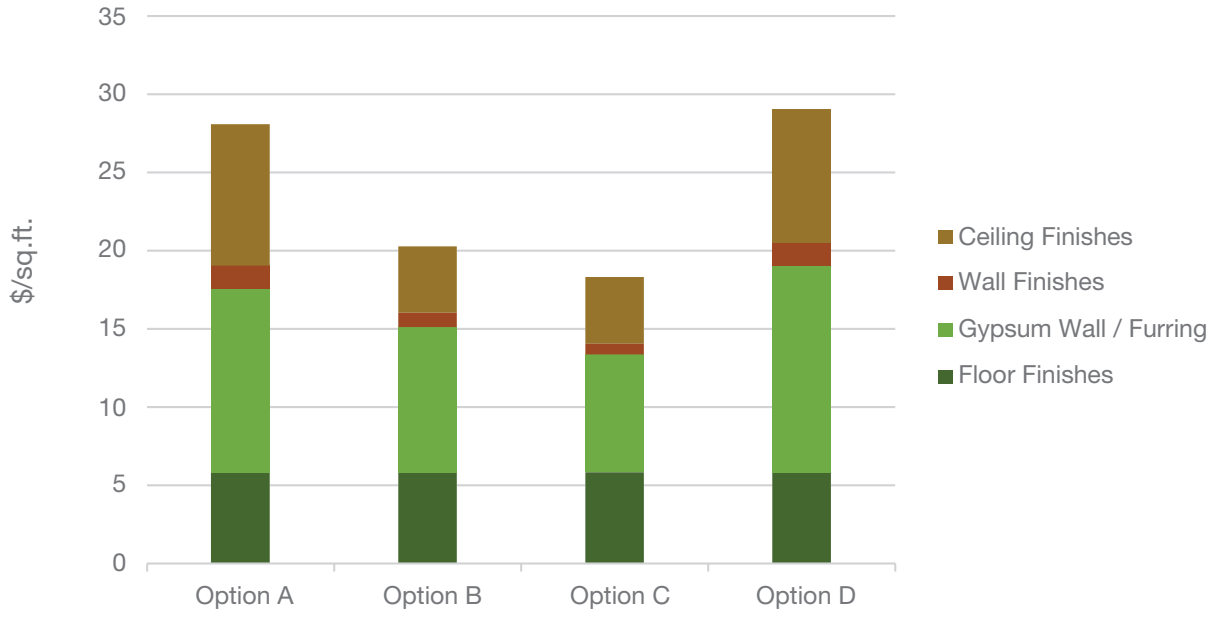
3.5.3 ARCHITECTURAL CONSIDERATIONS

The inherent quality of the structural framing system can sometimes provide the building with a level of finish that doesn't require additional aesthetic treatment. Light wood-frame systems and conventional steel framing, like the systems illustrated by Options A and D in this study respectively, have high finishing requirements because of the low mass nature and combustibility of the materials. These treatments generally include acoustic infill and gypsum board finishes for the walls, and acoustic tiles for the ceiling. These finishes require extra labour and materials due to the extent of coverage required for the finishes.

For the systems illustrated by Options B and C in this study, the surface of mass timber framing systems lend themselves to be used as finishes for the interior without additional treatments. The image below illustrates the extent of the mass timber systems that could be left visually exposed.

Sectional View Illustrating the Reduction of Interior Finishes for Flat Panel Mass Timber Framing Systems

Exposed mass timber options only require roughly 25% of the area to be treated with finishes, mainly in the form of enclosures for mechanical systems. Acoustic treatments of the mass wall and floor-to-ceiling assemblies can also be accomplished through integrated acoustic finishes that do not compromise the appearance of the timber products.



Comparison of Cost of Finishes for the Four Framing Options Considered in this Study

The chart above provides a breakdown of the cost of finishes for each of the four options. As can be seen in these charts, mass timber framing systems like those illustrated by Options B and C can offer the following reductions in cost of finishes:

+ Reduced cost of ceiling finishes, which resulted in a cost reduction of approximately 50% for Options B and C compared to Options A and D.
+ Reduced cost of interior wall finishes, which resulted in a cost reduction of approximately 25% for Options B and C compared to Options A and D.

Although the finishing requirements for light wood-frame systems and conventional steel framing can sometimes act as a means of fireproofing, the need for these finishes themselves points to the susceptibility of these systems to the threat of fire. Primary structures for these systems can easily be compromised because of fires within a building. Therefore, full cladding or encasement with a fire-retardant material is a crucial part of the overall assembly. Mass timber on the other hand, not only provides the designer with an opportunity to showcase the structural systems, but the system itself has an inherent fire-retardant quality, provided that the designer accounts for fire resistance requirements when proportioning members.

3.5.4 SCHEDULING CONSIDERATIONS

Before discussing the scheduling considerations for the framing options reviewed in this study, it should be noted that variations in the anticipated project schedule (i.e. reductions in the cost of general conditions, client carrying costs, etc.) were not incorporated into the cost analysis included in Appendix C of this document. In other words, the cost analysis assumed the same construction duration for all four options.

This type of assumption is commonly encountered with cost estimates for mass timber structures. Quantity surveyors rely on past project experience to predict construction durations, but without a history of completing mass timber structures they are often forced to assume that these structures require a similar duration to erect as similarly sized structures constructed with other framing materials.

However, it is known that one of the key advantages of highly prefabricated mass timber structures, which are represented by Options B and C in this study, is the reduction in the overall construction schedule that can be achieved with these systems. As a result, the challenge lies in providing quantity surveyors with the necessary background information and experience to allow them to more accurately predict the schedule efficiencies that can be realized with mass timber framing systems. By incorporating more accurate schedule predictions, the overall costs of Options B and C would be reduced from what has been indicated in this study.

Another scheduling-related consideration that should be accounted for by the design team are the lead times associated with fabricated mass timber components when compared to more readily available framing materials such as light wood frame. Although these lead times can easily be mitigated by engaging suppliers early enough in the project schedule, if ignored they have the potential to delay the overall project schedule which can in turn result in cost increases during construction.

4 Framing System Comparison Matrix

In order to summarize the key points of comparison that were identified from both a cost and sustainability perspective, the following comparison matrix was developed.

	Criteria	Option A - Light Wood Frame	Option B - CLT Structure	Option C - GLT Structure with CLT Shear Walls	Option D - Conventional Steel Framing
Building Size Considerations	Well-suited to two-storey structures	Excellent	Excellent	Excellent	Excellent
	Well-suited to three-storey structures	Fair	Excellent	Excellent	Excellent
	Well-suited to four-storey structures	Poor	Excellent	Excellent	Excellent
Structural Considerations	Primary structure material efficiency	Excellent	Good	Excellent	Excellent
	Reduced overall structural depth	Fair	Excellent	Good	Good
Architectural Considerations	Reduced finishing requirements	Poor	Excellent	Excellent	Fair
	Cost from Fireproofing	Poor	Excellent	Excellent	Poor
Material Sourcing	Variety/number of suppliers	Excellent	Good	Good	Excellent
	Variety/number of local suppliers	Excellent	Good	Good	Excellent
Scheduling Considerations	Reduced material supply lead time	Excellent	Fair	Fair	Fair
	Speed of erection	Fair	Excellent	Good	Good
Sustainability Considerations	Inherent thermal performance	Good	Excellent	Excellent	Poor
	Displaced CO^2 Emissions	Good	Fair	Fair	Poor
	Embodied Carbon Content	Good	Excellent	Excellent	Poor

Legend: Excellent, Good, Fair, Poor

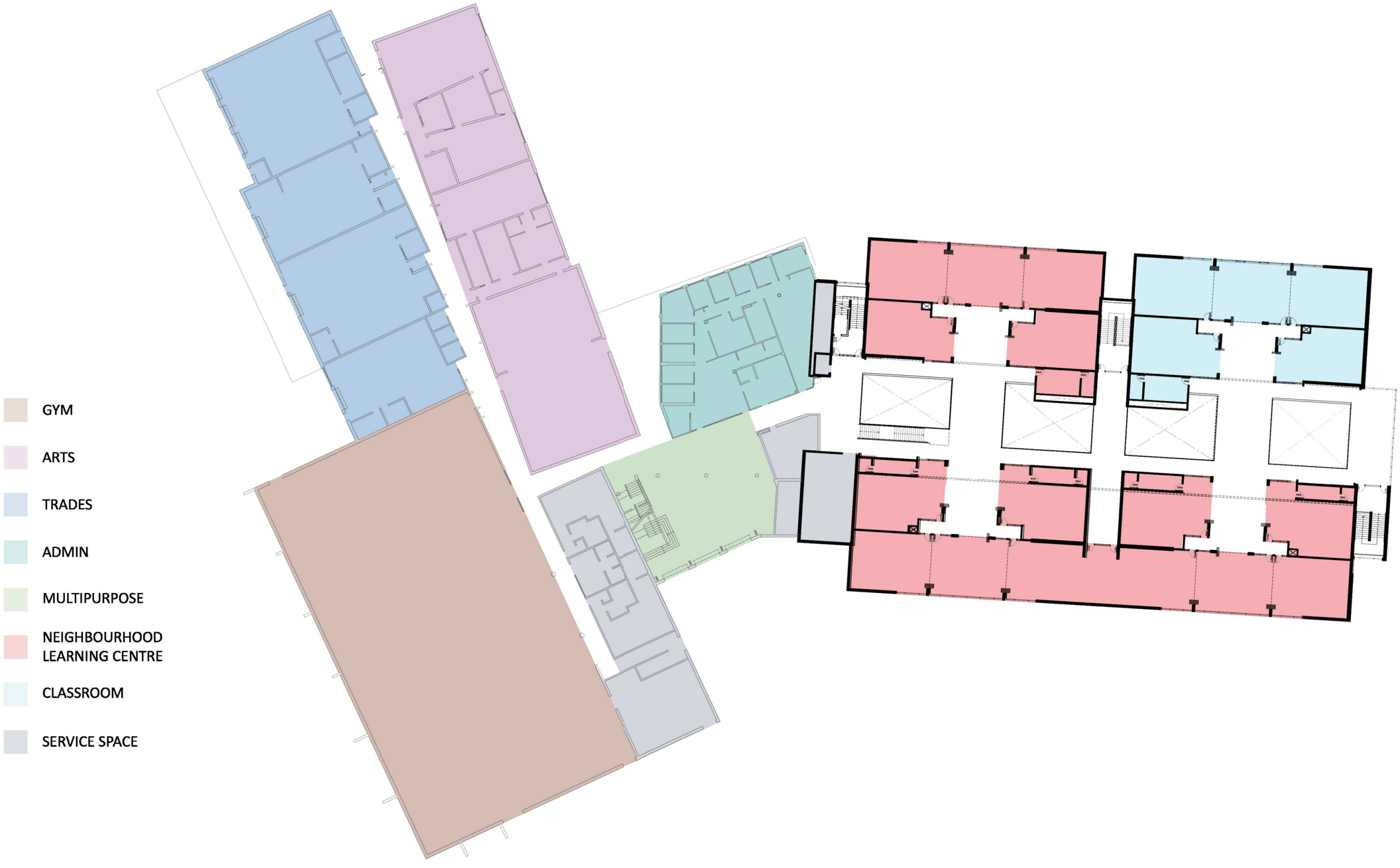
Framing System Comparison Matrix

The intent of this matrix is to provide a quick visual tool for comparing the potential framing systems explored in this study based on the key points that the design team would weigh when considering their design options. For example, consider the following conclusions that could be drawn from this matrix:

+ If reducing the amount of supplemental finishing in order to showcase the timber framing materials is a key consideration for the design team, then framing systems like Options B and C should be developed.
+ Conversely, if pure efficiency of the structural materials used is a key consideration for the design team, then framing systems like Options A, C, and D would make the most sense to explore.
+ For clients that have strong sustainability-based policies, framing systems like Option D should be avoided.

By using this matrix, a project team can select which design considerations are the most crucial for the success of their project, identify the types of framing systems that are best suited to respond to these considerations, and then use the results of this study to better understand how these systems can be designed efficiently.

APPENDIX A: Prototypical School Architectural Plans



1 TYPICAL FLOOR PLAN

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GYM

MULTIPURPOSE

CLASSROOM

PROJECT SPACE

SCIENCE LAB

SHARED LAB SPACE

SERVICE SPACE

1 LEVEL 2 FLOOR PLAN

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MULTIPURPOSE

CLASSROOM

PROJECT SPACE

SCIENCE LAB

SHARED LAB SPACE

SERVICE SPACE

1 LEVEL 3 FLOOR PLAN

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CLASSROOM

PROJECT SPACE

SCIENCE LAB

SHARED LAB SPACE

SERVICE SPACE

1 LEVEL 4 FLOOR PLAN

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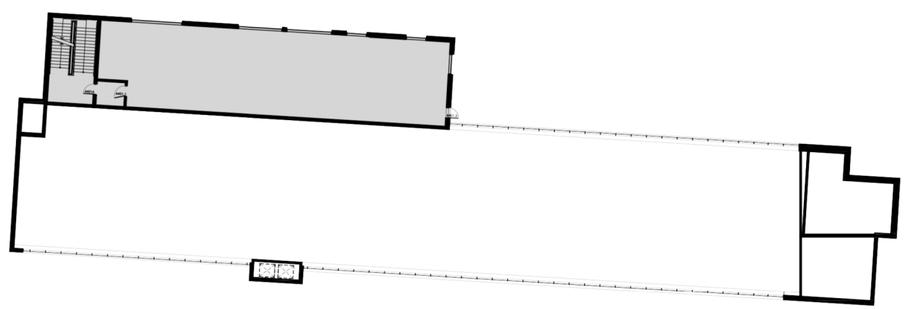
SERVICE SPACE



1 MECHANICAL PENTHOUSE

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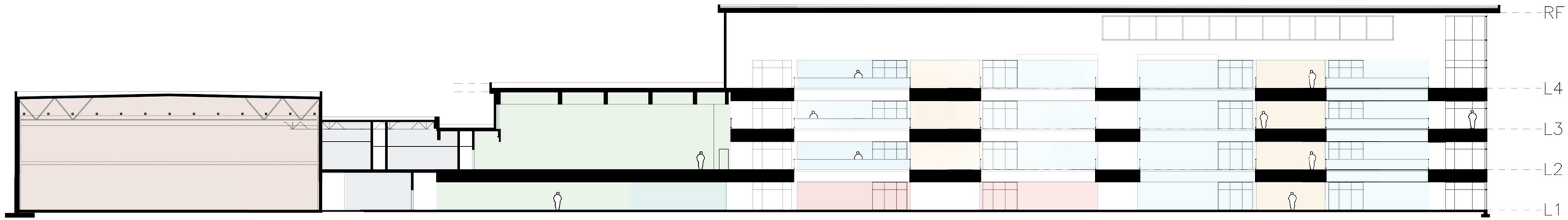


1 SECTION 1

GYM

ADMIN

MULTIPURPOSE

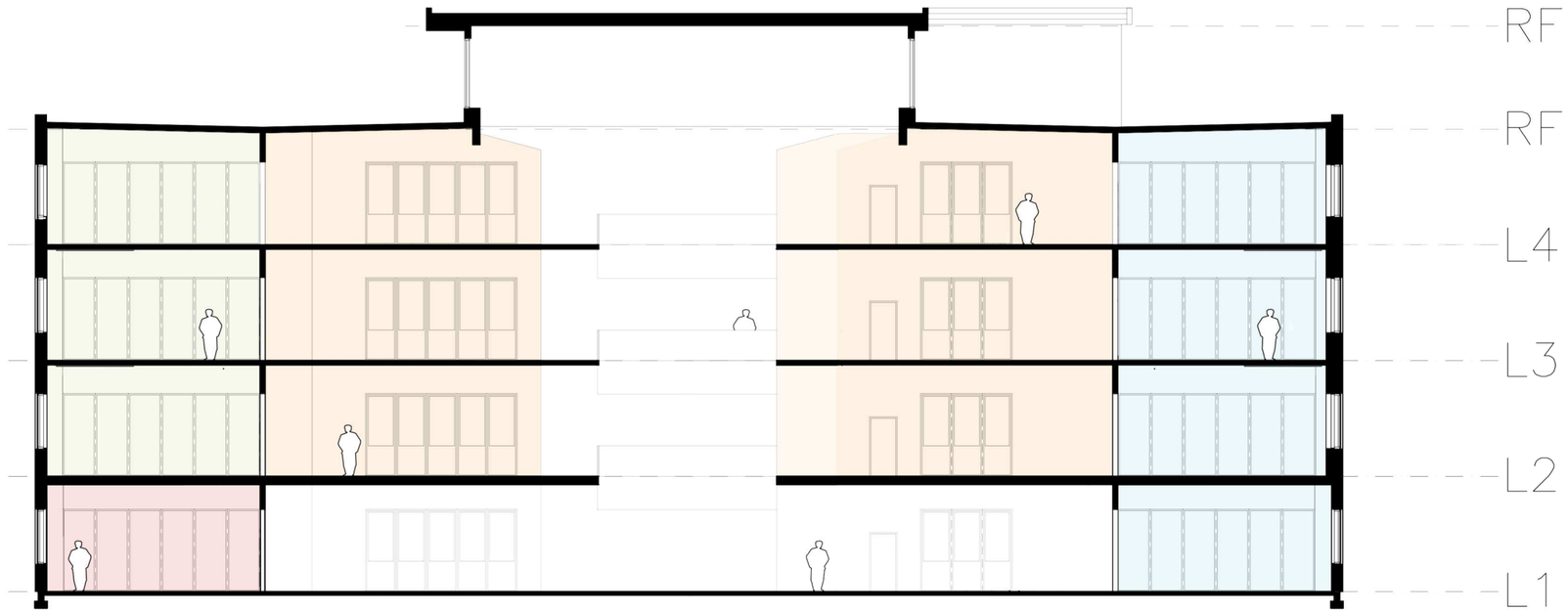
CLASSROOM

PROJECT SPACE

SCIENCE LAB

NEIGHBOURHOOD LEARNING CENTRE

SERVICE SPACE



2 SECTION 2

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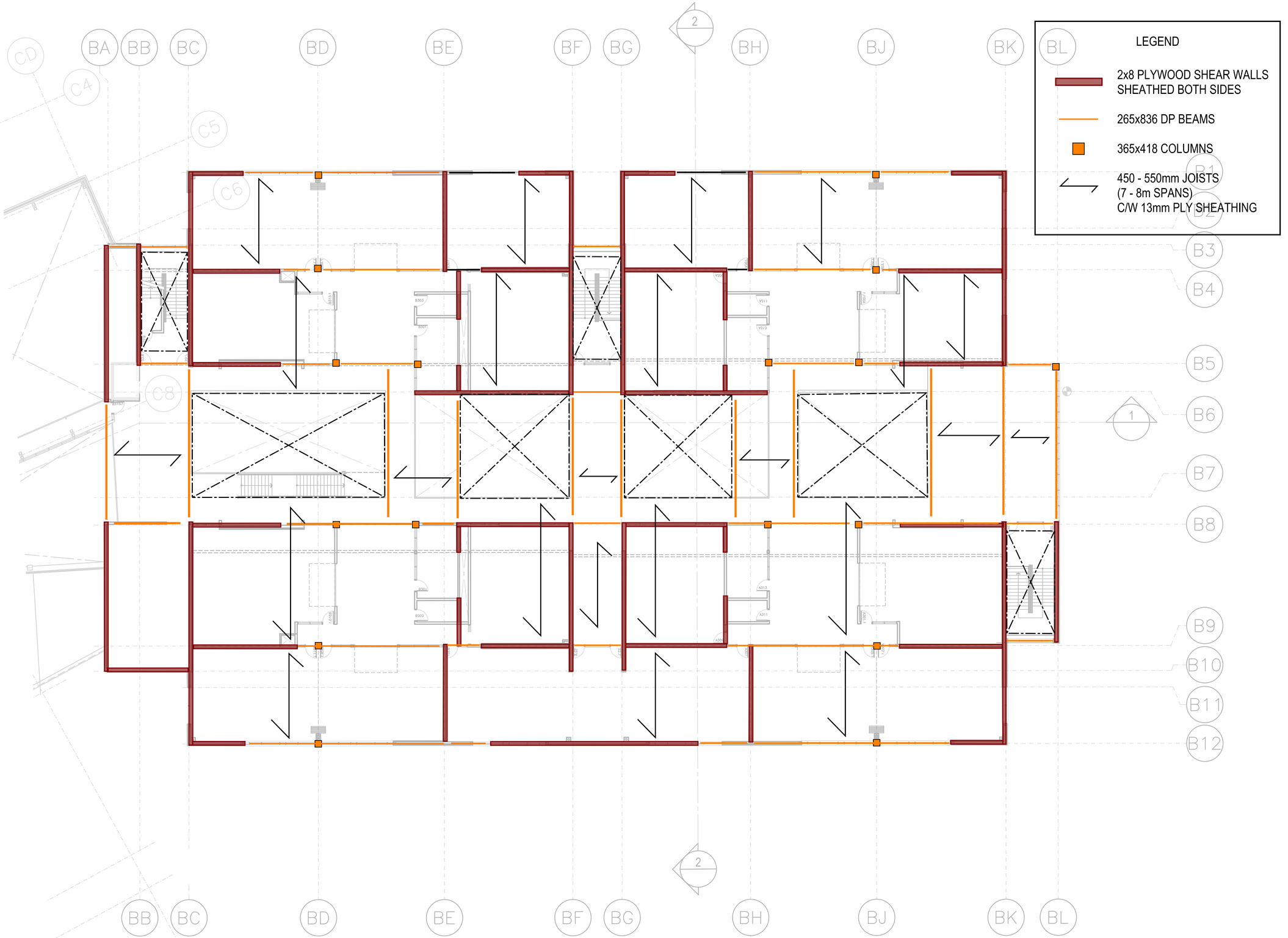
APPENDIX B-1: Three-Storey School with Light Wood-Frame Construction



REV.	DESCRIPTION	DATE
	CONCEPT LAYOUT	NOV. 2019
	ISSUE / REVISION	

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SEAL

PROJECT

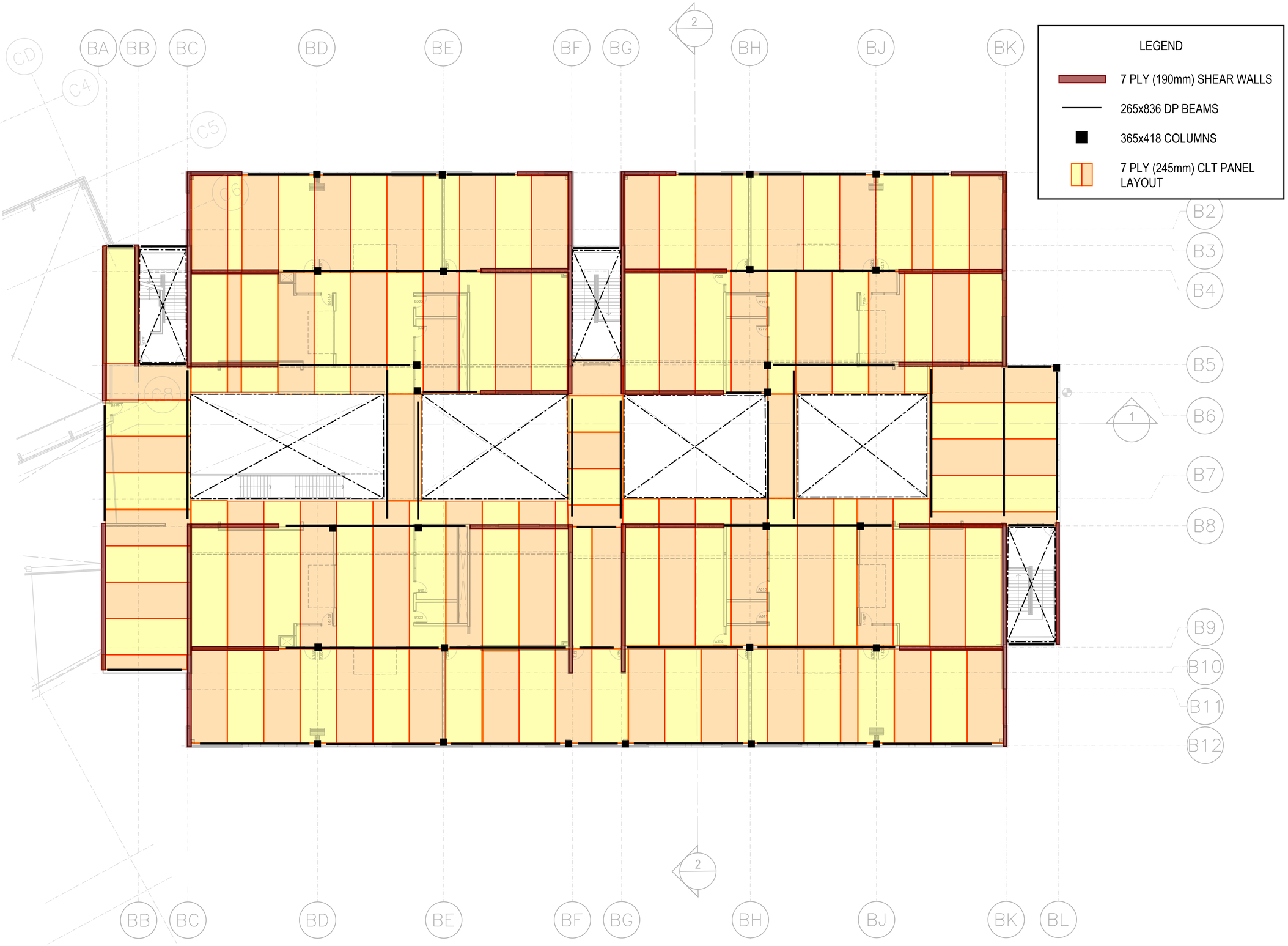
DESIGN OPTIONS FOR THREE AND FOUR STOREY WOOD SCHOOL BUILDINGS IN BRITISH COLUMBIA

TITLE

OPTION A: LIGHT WOOD FRAME STRUCTURE

SCALE: 1:150	JOB No. 2532
DRAWN: AF	DWG. No. CS100 - A
CHECKED: CD	
APPROVED:	
DATE: 11/10/2019	REVISION △
PLOT:	

APPENDIX B-2: Four-Storey School with CLT Diaphragms on CLT Shear Walls



REV.	DESCRIPTION	DATE
	CONCEPT LAYOUT	NOV. 2019

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SEAL

PROJECT

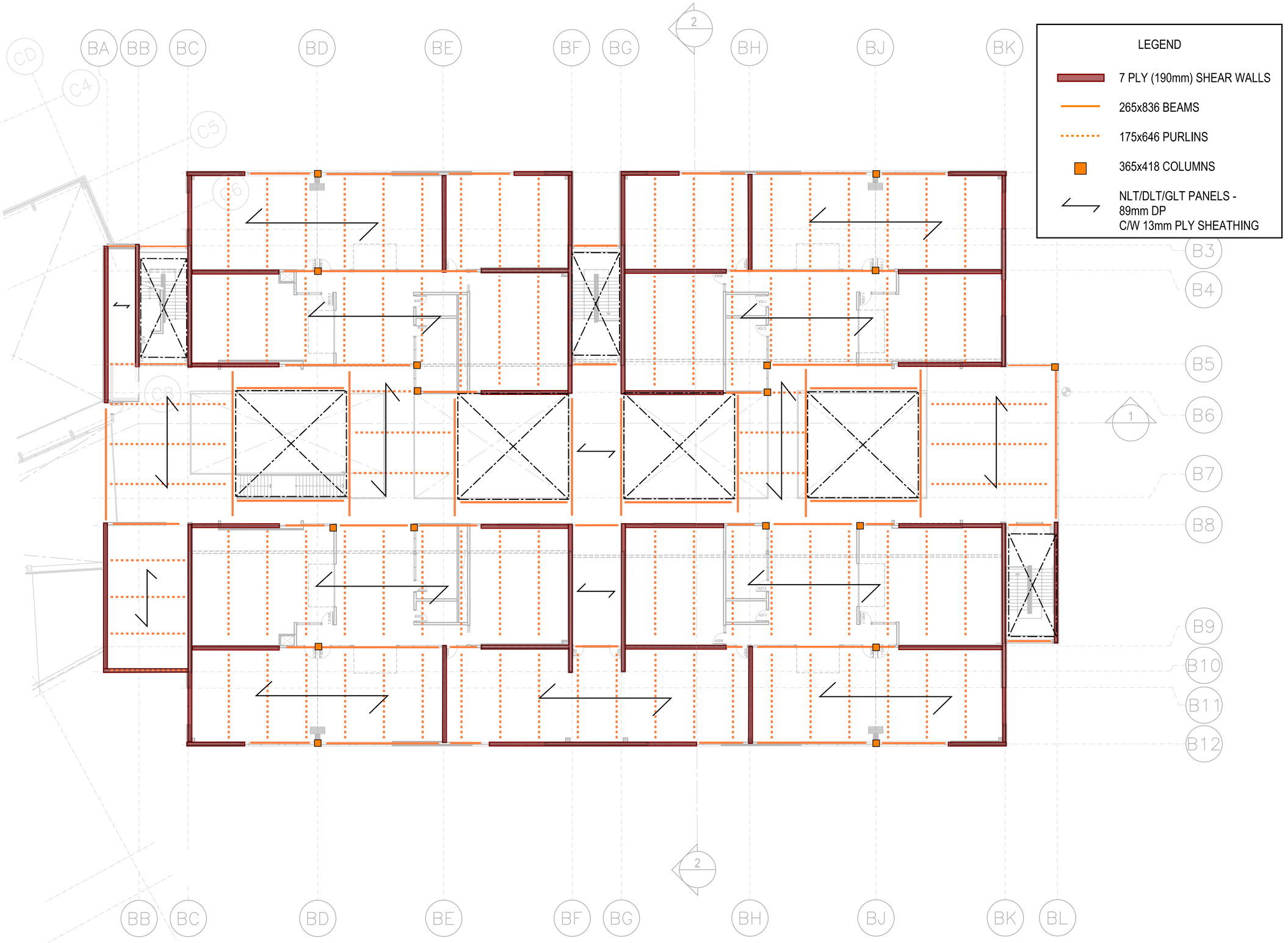
DESIGN OPTIONS FOR THREE AND FOUR STOREY WOOD SCHOOL BUILDINGS IN BRITISH COLUMBIA

TITLE

OPTION B: CLT STRUCTURE

SCALE:	1:150	JOB No.	2532
DRAWN:	AF	DWG. No.	CS100 - B
CHECKED:	CD		
APPROVED:			
DATE:	11/10/2019	REVISION	△
PLOT:			

APPENDIX B-3: Four-Storey School with Plywood Diaphragms and Panel on Purlin Framing on CLT Shear Walls



	CONCEPT LAYOUT	NOV. 2019
REV.	DESCRIPTION	DATE
	ISSUE / REVISION	

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SEAL

PROJECT

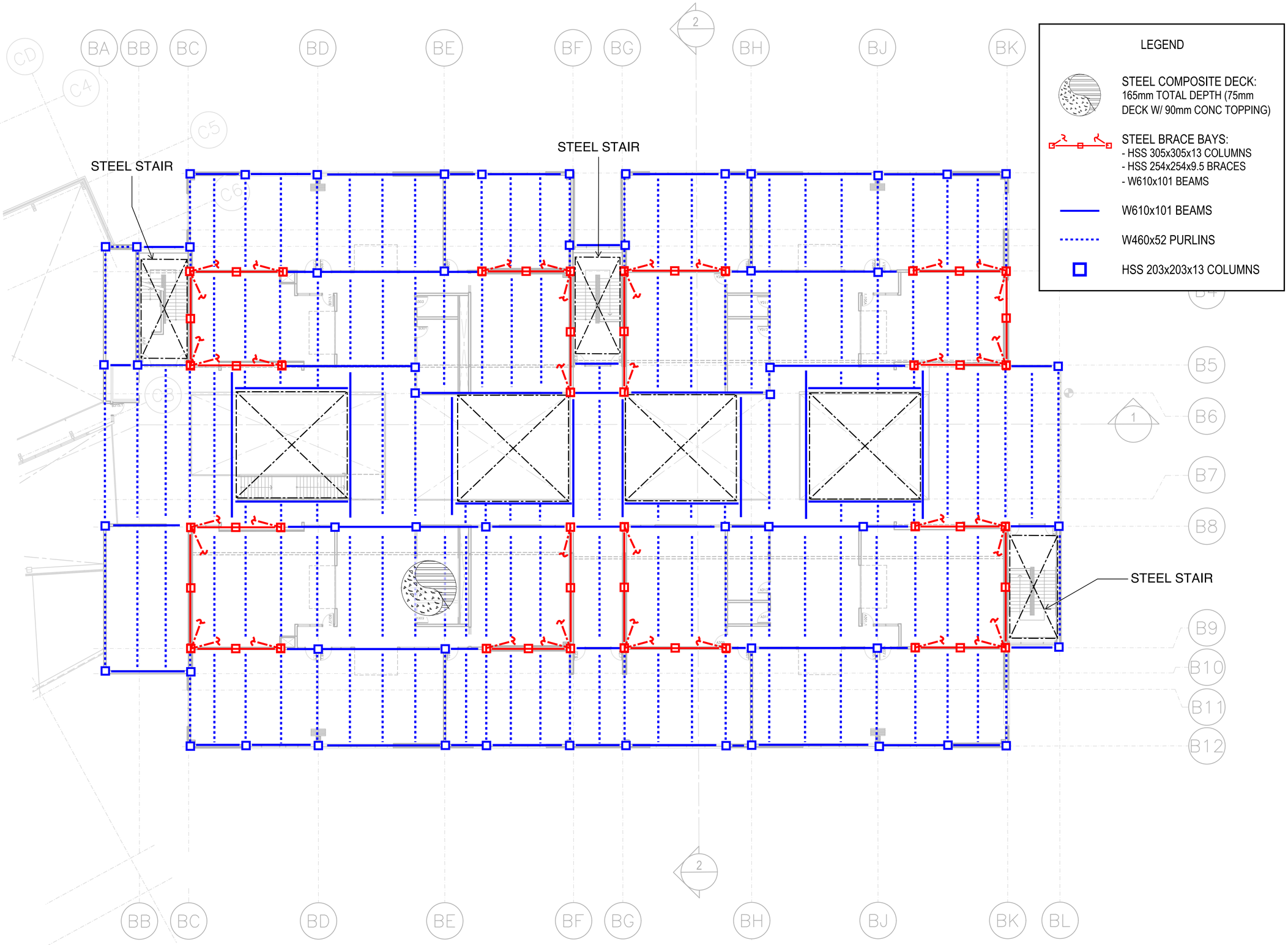
DESIGN OPTIONS FOR THREE AND FOUR STOREY WOOD SCHOOL BUILDINGS IN BRITISH COLUMBIA

TITLE

OPTION C: CLT SHEAR WALLS WITH NLT, DLT, OR GLT PANEL ON PURLIN FRAMING

SCALE:	1:150	JOB No.	2532
DRAWN:	AF	DWG. No.	CS100 - C
CHECKED:	CD		
APPROVED:			
DATE:	11/10/2019	REVISION	△
PLOT:			

APPENDIX B-4: Four-Storey School with Conventional Structural Steel Framing



REV.	DESCRIPTION	DATE
	COSTING ISSUE	17/10/2019
	CONCEPT ISSUE	05/04/2019

ISSUE / REVISION

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SEAL

PROJECT

WOODWORKS 4-STOREY
SCHOOL PROTOTYPE

TITLE

OPTION D: STEEL FRAMING
CONCEPT LAYOUT

SCALE: 1:150	JOB No. 2532
DRAWN: AF	DWG. No. CS100 - D
CHECKED: CD	
APPROVED:	
DATE: 17/10/2019	REVISION △
PLOT:	

APPENDIX C: Example Framing Concepts Costing Report

09 April 2020

Cost Report

Class D Estimate

4 Storey School Prototype
Fast + Epp

making the **difference**

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Program of the Canadian Wood Council

Section 1 - Contents Page

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1	Contents Page
2	Executive Summary
3	Financial overview
4	Basis of Costs
5	Elemental Basis
6	Headline Construction Costs
7	Building Works Elemental Summary
8	Detailed Cost Analysis

Appendices

A	Area schedule
B	Information used register

Quality Check

Rev	Status	Prepared by	Checked by	Date
0	Draft For Comment	Gareth Miller	Marcos Sibal	2019-11-04
1	Draft For Comment	Gareth Miller	Marcos Sibal	2019-11-29
2	For Issue	Gareth Miller	Marcos Sibal	2020-01-10
3	For Issue	Gareth Miller	Marcos Sibal	2020-03-01
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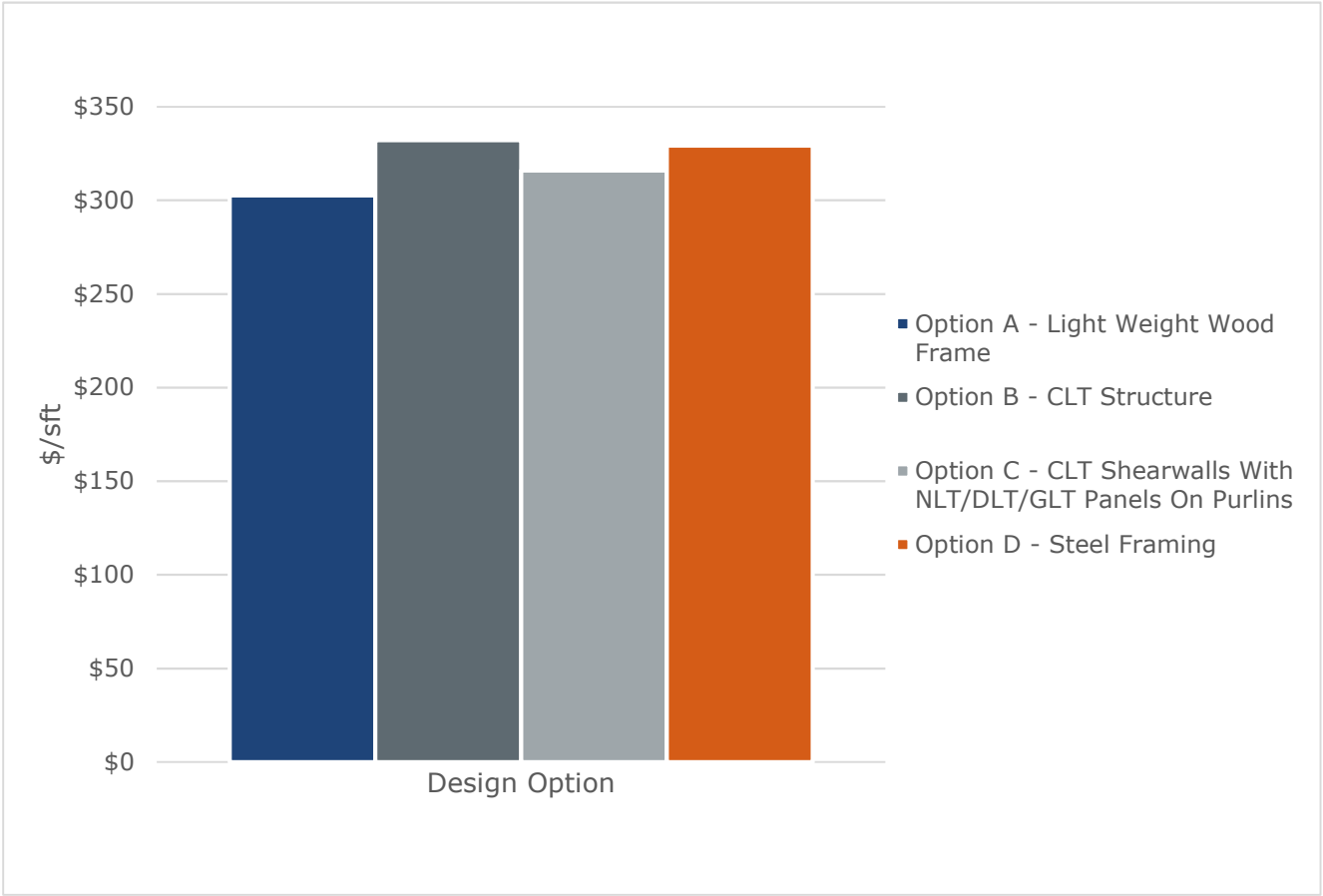
Lynn Embury-Williams	Wood WORKS! BC	e-mail	2020-04-09
Nick Bevilacqua	Fast + Epp	e-mail	2020-04-09
Ray Wolfe	Think Space	e-mail	2020-04-09

Section 2 - Executive Summary

Gross Floor Area Per Option: **53,328 m²** **574,023 ft²**

Ref	Element	TOTAL	$/m²	$/ft²	Variance to Average
A	Option A - Light Weight Wood Frame	$43,430,000	$3,258	$303	-5%
B	Option B - CLT Structure	$47,665,000	$3,575	$332	4%
C	Option C - CLT Shearwalls With NLT/DLT/GLT Panels On Purlins	$45,342,000	$3,401	$316	-1%
D	Option D - Steel Framing	$47,245,000	$3,544	$329	3%
	AVERAGE COST	**$45,920,500**	**$3,444**	**$320**	
E	Escalation Allowance	Excluded	Excluded	Excluded	Excluded
F	Post Contract Contingency	Excluded	Excluded	Excluded	Excluded
G	Land Costs	Excluded	Excluded	Excluded	Excluded
H	Client Costs	Excluded	Excluded	Excluded	Excluded
I	Soft Costs	Excluded	Excluded	Excluded	Excluded
TAX	Tax Assessment	Excluded	Excluded	Excluded	Excluded



2 Cost Report

2.1 Project Introduction

The purpose of this Cost Plan is to provide Fast + Epp with an Opinion of Probable Cost only of the four proposed design solutions at Class D and reflects current local market rates and conditions.

The Cost Plans provide indicative construction costs costs for the 4 Storey School Prototype project in Vancouver, for Fast + Epp at Class D correct to a magnitude of +/-20%.

The estimate reflects the design which is based upon a prototype school block and does not reflect the cost of a complete school.

Each Option has been based upon the information listed in Appendix B and a Gross Floor Area of 143,506 ft2 as indicated in Appendix A.

The Cost Plan has been prepared solely for the use of Fast + Epp and shall not be relied upon by any third party.

This Cost Plan is subject to review, confirmation and/or amendments following revisions to the information stated and discussion(s) with the Client and Design Consultants at which time this report will be reviewed and may be re-issued if required.

2.2 Financial overview

The General Contractor's General Conditions have been assumed at 12% and General Contractor's Fee at 5%

2.3 Key cost drivers

- Proposed Structural Solution
- Assumed Foundation Requirements
- Use of Glazing
- Assumed M&E Requirement
- Extent of Required Finishes
- Assumed Duration

2.4 Contingency summary

The Design Contingency for each Option is set at 10%
The Post Contract Contingency has been excluded from this estimate

2.5 Risks

The Key risks have been considered are summarised below:
- Stage of the design process
- Current market conditions

2.6 Escalation Summary

Works are priced at a Base Date of Q1 2020

Escalation has been excluded from these estimates

2.7 General Conditions

We have included an allowance of 12% for General Conditions within our estimate which represents the current market levels for a project of this nature.

At this design stage no schedule assessment has been undertaken hence no variance in the percentage applied for General Conditions has been included between the options.

Our allowance for General Conditions includes:-

- Site Set Up
- Contractor Staff
- Hoarding
- Mobilization and Demobilization
- Bonding and Insurance
- Temporary Power
- Temporary Heating
- Scaffolding
- Regular and Final Cleaning
- Traffic Control and Management
- Small Tools and Equipment
- Site Signage
- Temporary Office

2.8 Procurement strategy

This estimate assumes that the project will be procured on a Stipulated Lump sum basis, and that bids will be received from a minimum of five pre-qualified general contractors. We also assume that the project will be completed in a reasonable time frame and have not included any premiums related to "fast-tracking" the project, if required. The unit rates in our estimate are based on construction activities occurring during normal working hours and proceeding within a non-accelerated schedule.

Our estimate includes current price feedback received from concrete / formwork (division 3) , masonry (division 4) steel (division 5) , wood (division 6), roofing (division 7) , glazing (division 8) and drywall + stud (division 9) sub trades indicating increased prices for these trades due to market volatility related to aluminium, steel , drywall products as well increased market demand.

2.9 Measurement and Pricing

The estimate has been developed using generally accepted principles on method of measurement as per the Canadian Institute of Quantity Surveyors (CIQS) Elemental Cost Analysis.

The rates used for this estimate include labour and material, equipment, and subcontractor's overheads and profit. Pricing developed for this project is based upon our company's experience with similar projects, and/or quotes provided by subcontractors and suppliers as noted within the estimate. It does not take into account extraordinary market conditions, where bidders may be limited and may include in their tenders disproportionate contingencies and profit margins.

2.10 General Statement of Liability

Turner & Townsend strongly recommends the owner and/or design team review the cost estimate report including line item descriptions, unit prices, allowances, assumptions, exclusions, and contingencies to ensure the appropriate design intent has been accurately captured within the report.

Turner & Townsend does not guarantee that tenders or actual construction costs will not vary from this estimate. Adverse market conditions, proprietary and/or sole source specifications, single sourcing of materials and equipment or reduced competition among contractors may cause bids to vary from reasonable estimates based on assumed current market conditions.

2.11 Outstanding actions / information

- None at this design stage

4 Basis of Costs

4.1 Information used and outstanding

The Cost Plan has been prepared solely in accordance with the documentation outlined within this document and as specified in Appendix B.

4.2 Assumptions

The following Assumptions have been made in the preparation of the Cost Estimates

1. Works are priced at Q1 2020 with no Escalation applied
2. The Cost Plan assumes that the works will be procured by a single stage Competitive Tender process. The tender will on based on Class A information or equivalent.
3. Regular working hours
4. No major site grading allowed; relatively flat site is assumed
5. No major phasing requirements
6. No 'Accelerated' schedule premiums allowed
7. Non-union labour

4.3 Exclusions

The following items are specifically excluded from the Cost Estimate:

1. Legal Fees and Expenses
2. Owner's Administration Expenses
3. Removal of Contaminated Material, if any
4. Fixtures, Fittings & Equipment
5. Construction Price Escalation Beyond Q1 2020
6. IT & Communication Equipment
7. Premiums for Single Sourced Materials
8. Schedule Acceleration Premium
9. LEED Premiums
10. AESS Grade Steel
11. Out of Hours Woking (other than where stated)
12. Hazardous Material
13. Digital / TV Screens
14. Marketing
15. Demolition of Existing Structures
16. Premiums included by either the General Contractor or sub trades due to any prohibitive contractual clauses such as Liquidated Damages or penalties for non completion of the work
17. Asbestos
18. Landscaping Costs
19. Site Costs
20. Washrooms / Kitchens / Servery's - this project only focuses on the classroom portion of the proposed school

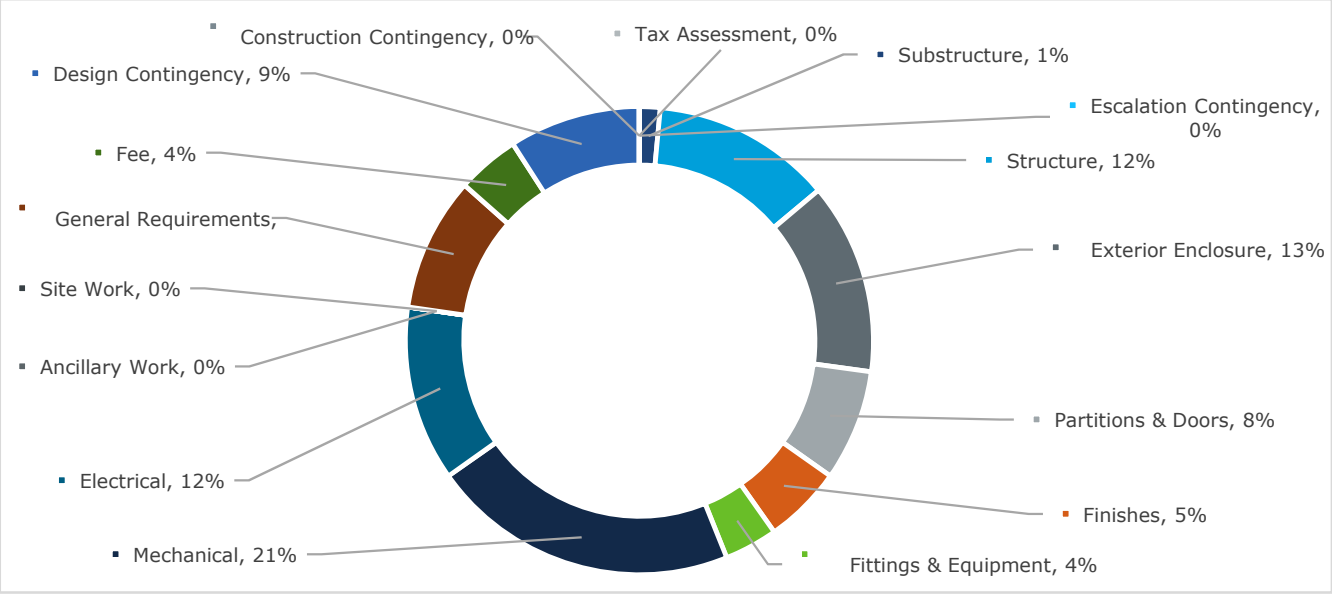
5 Elemental Basis

The following Assumptions have been made in the preparation of the Cost Estimate

A	**Shell**	
A1	Substructure	All Options are assumed to have the following: - 700mm x 600mm ground beam - 200mm x 1200mm foundation wall - 600mm x 450mm internal strip footing - 700mm x 700mm x 450mm pad footing The number of pad footings is dependent of the total number of columns for each option
A2	Structure	Each structure has been priced as per the designs provided and assumes a Floor-to-Ceiling height of 3.8m Additional fire-proofing allowances have been included to Option A & Option D For each of the timber options it is assumed that none LEED accredited timber sources are to be utilized. E-rated CLT & GLT panels have been assumed.
A3	Exterior Enclosure	Each option assumes a Floor-to-Floor Height of 4.2m It is assumed that each option will be a combination of Metal Cladding & Glazed Façade with a ratio of 62% to 38%
B	**Interiors**	
B1	Partitions & Doors	It is assumed that the CLT in Options B & C will be exposed on each face. Each option assumes a Floor-to-Ceiling height of 3.8m. Furring has been included to exterior walls for all options. In lieu of a finalized design we have assumed the requirement for Type-X Partitions in each Option.
B2	Finishes	Each option has been priced as per the Reflected Ceiling Plan. Allowances have been included for Floor Finishes. In lieu of washrooms / kitchens / etc. all Wall Finishes are assumed to be paint.
B3	Fittings & Equipment	Allowances have been included for Millwork, Hand/Guard Rail and Wayfinding. No Equipment is assumed. A lift has been included for access from 4 nr floors.
C	**Services**	
C1	Mechanical	All Options have been priced the same based on Benchmark Data
C2	Electrical	All Options have been priced the same based on Benchmark Data
D	**Site Work**	
D1	Site Work	Site Work has been Excluded from this Analysis
D2	Ancillary Work	Ancillary Work has been Excluded from this Analysis

Section 6 - Option A Headline Construction Costs

		Gross Floor Area:	13,332 m²	143,506 ft²
Ref	**Element**	**TOTAL**	**$/m²**	**$/ft²**
A1	Substructure	$618,000	$46	$4
A2	Structure	$5,412,000	$406	$38
A3	Exterior Enclosure	$5,749,000	$431	$40
B1	Partitions & Doors	$3,345,000	$251	$23
B2	Finishes	$2,347,000	$176	$16
B3	Fittings & Equipment	$1,596,000	$120	$11
C1	Mechanical	$9,240,000	$693	$64
C2	Electrical	$5,266,000	$395	$37
D1	Site Work	$0	$0	$0
D2	Ancillary Work	$0	$0	$0
	SUB-TOTAL: BUILDING WORKS	**$33,573,000**	**$2,518**	**$234**
Z11	General Requirements	$4,029,000	$302	$28
Z12	Fee	$1,880,000	$141	$13
	TOTAL: BUILDING WORKS ESTIMATE	**$39,482,000**	**$2,961**	**$275**
Z21	Design Contingency	$3,948,000	$296	$28
Z22	Escalation Contingency	$0	$0	$0
Z23	Construction Contingency	$0	$0	$0
	TOTAL: CONSTRUCTION COST	**$43,430,000**	**$3,258**	**$303**
TAX	Tax Assessment	$0	$0	$0
	TOTAL: CONSTRUCTION COST (Inc TAX)	**$43,430,000**	**$3,258**	**$303**



Section 7 - Building Works Elemental Summary

Option A - Light Weight Wood Frame

Ref	Element	Ratio To GFA	Elemental Quantity	Elemental Unit Rate	Total	Cost / m2	Cost / ft2	Cost Ratio
A	**Shell**				**$11,779,000**	**$884**	**$82**	**27%**
A1	**Substructure**				**$618,000**	**$46**	**$4**	**1%**
A11	Foundation	26%	3,523 m^2	$175	$618,000	$46	$4	1%
A12	Basement excavation	0%	0 m^3	$0	$0	$0	$0	0%
A2	**Structure**				**$5,412,000**	**$406**	**$38**	**12%**
A21	Lowest Floor Construction	26%	3,523 m^2	$77	$272,000	$20	$2	1%
A22	Upper Floor Construction	74%	9,809 m^2	$420	$4,119,000	$309	$29	9%
A23	Roof Construction	26%	3,523 m^2	$290	$1,021,000	$77	$7	2%
A3	**Exterior Enclosure**				**$5,749,000**	**$431**	**$40**	**13%**
A31	Walls Below Grade	0%	0 m^2	$0	$0	$0	$0	0%
A32	Walls Above Grade	22%	2,877 m^2	$613	$1,765,000	$132	$12	4%
A33	Windows & Entrances	13%	1,760 m^2	$1,212	$2,133,000	$160	$15	5%
A34	Roof Covering	26%	3,523 m^2	$305	$1,075,000	$81	$7	2%
A35	Projections	100%	13,332 m^2	$58	$776,000	$58	$5	2%
B	**Interiors**				**$7,288,000**	**$547**	**$51**	**17%**
B1	**Partitions & Doors**				**$3,345,000**	**$251**	**$23**	**8%**
B11	Partitions	85%	11,333 m^2	$275	$3,111,000	$233	$22	7%
B12	Doors	1%	142 nr	$1,648	$234,000	$18	$2	1%
B2	**Finishes**				**$2,347,000**	**$176**	**$16**	**5%**
B21	Floor Finishes	92%	12,230 m^2	$68	$836,000	$63	$6	2%
B22	Ceiling Finishes	92%	12,230 m^2	$106	$1,298,000	$97	$9	3%
B23	Wall Finishes	133%	17,761 m^2	$12	$213,000	$16	$1	0%
B3	**Fittings & Equipment**				**$1,596,000**	**$120**	**$11**	**4%**
B31	Fittings & Fixtures	100%	13,332 m^2	$108	$1,436,000	$108	$10	3%
B32	Equipment	100%	13,332 m^2	$0	$0	$0	$0	0%
B33	Conveying Systems	0%	4 stp	$40,000	$160,000	$12	$1	0%
C	**Services**				**$14,506,000**	**$1,088**	**$101**	**33%**
C1	**Mechanical**				**$9,240,000**	**$693**	**$64**	**21%**
C11	Plumbing & Drainage	100%	13,332 m^2	$95	$1,267,000	$95	$9	3%
C12	Fire Protection	100%	13,332 m^2	$45	$600,000	$45	$4	1%
C13	HVAC	100%	13,332 m^2	$475	$6,333,000	$475	$44	15%
C14	Controls	100%	13,332 m^2	$78	$1,040,000	$78	$7	2%
C2	**Electrical**				**$5,266,000**	**$395**	**$37**	**12%**
C21	Service & Distribution	100%	13,332 m^2	$85	$1,133,000	$85	$8	3%
C22	Lighting, Devices & Heating	100%	13,332 m^2	$190	$2,533,000	$190	$18	6%
C23	Systems & Ancillaries	100%	13,332 m^2	$120	$1,600,000	$120	$11	4%
D	**Site & Ancillary Work**				**$0**	**$0**	**$0**	**0%**
D2	**Ancillary Work**				**$0**	**$0**	**$0**	**0%**
D21	Demolition	0%	0 m^2	$0	$0	$0	$0	0%
D22	Alterations	0%	0 m^2	$0	$0	$0	$0	0%
	SUB-TOTAL: NET BUILDING WORKS				**$33,573,000**	**$2,518**	**$234**	**77%**
Z	**General Requirements & Allowances**							
Z1	**General Requirements & Fee**				**$5,909,000**	**$443**	**$41**	**14%**
Z11	General Requirements		12.0 %		$4,029,000	$302	$28	9%
Z12	Fee		5.0 %		$1,880,000	$141	$13	4%
	TOTAL: BUILDING WORKS ESTIMATE				**$39,482,000**	**$2,961**	**$275**	**91%**
Z2	**Allowances**				**$3,948,000**	**$296**	**$28**	**9%**
Z21	Design Allowance		10.0 %		$3,948,000	$296	$28	9%
Z22	Escalation Allowance		0.0 %		$0	$0	$0	0%
Z23	Construction Allowance		0.0 %		$0	$0	$0	0%
	TOTAL BUILDING COST				**$43,430,000**	**$3,258**	**$303**	**100%**
TAX	**ASSESSMENT**		**0.0%**		**$0**	**$0**	**$0**	**0%**
	TOTAL BUILDING COST INC TAX				**$43,430,000**	**$3,258**	**$303**	**100%**
	GFA							
	Gross Floor Area (m2):	**13,332 m^2**						
	Gross Floor Area (ft2):	**143,506 ft^2**						

Section 8 - Detailed Cost Analysis

Estimate - Option A - Light Weight Wood Frame

Ref	Description	Qty	Unit	Rate	Total	Notes
A	**SHELL**				**11,779,000**	
A1	**SUBSTRUCTURE**				**618,000**	
A11	**Foundation**	**3,523**	**m2**	**175.42**	**618,000**	
A 11.01	Grade Beam; 700 x 600mm Deep	266	m			Assumed
A 11.02	Concrete	112	m3	270	30,160	
A 11.03	Formwork	319	m2	210	67,030	
A 11.04	Rebar - allowance for 110kg/m3	12,289	kg	2.60	31,950	
A 11.05	Excavation	134	m3	100	13,410	
A 11.06	Backfill	22	m3	80	1,790	
A 11.07	Foundation wall assumed 200mm x 1.20m deep	266	m	690		Assumed
A 11.08	Concrete supply and place	64	m3	270	17,240	
A 11.09	Formwork	638	m2	210	134,060	
A 11.10	Reinforcement - assumed 45kg/m3	2,873	kg	2.60	7,470	
A 11.11	Rigid insulation - assumes 600mm around perimeter	160	m2	20	3,190	
A 11.12	Waterproofing	319	m2	40	12,770	
A 11.13	Excavation	77	m3	100	7,660	
A 11.14	Granular backfill	13	m3	80	1,020	
A 11.01	Interior Strip Foundation; 600 x 450mm Deep	444	m			Assumed
A 11.15	Concrete	120	m3	270	32,370	
A 11.16	Formwork	400	m2	210	83,920	
A 11.17	Rebar - allowance for 110kg/m3	13,187	kg	2.60	34,290	
A 11.18	Excavation	144	m3	100	14,390	
A 11.19	Backfill	24	m3	80	1,920	
A 11.20	Pad Footing; 700 x 700 x 450mm Deep	16	nr			
A 11.21	Concrete	3	m3	270	850	
A 11.22	Formwork	20	m2	210	4,230	
A 11.23	Rebar - allowance for 110kg/m3	345	kg	2.60	900	
A 11.24	Excavation	4	m3	100	380	
A 11.25	Backfill	1	m3	80	50	
A 11.26	Elevator Footing	1	sum	25,000	25,000	
A 11.27	Staircase Footing	4	nr	15,000	60,000	
A 11.28	Dewatering Allowance	3	mnts	5,000	15,000	
A 11.29	Perimeter Drainage	266	m	65	17,290	
A 11.30	Building Footprint	3,523	m2			
A12	**Basement Excavation**	**0**	**m3**	**0.00**	**0**	
A 12.01	Assume No Requirement					
A2	**STRUCTURE**				**5,412,000**	
A21	**Lowest Floor Construction**	**3,523**	**m2**	**77.21**	**272,000**	
A 21.01	Slab on grade; 125mm deep	3,523	m2			
A 21.02	Concrete	440	m3	270.00	118,900	
A 21.03	Rebar @ 40kg/m3	17,615	kg	2.60	45,800	
A 21.04	6mm poly moisture barrier	3,523	m2	7.00	24,660	
A 21.05	150mm deep granular fill	528	m3	90.00	47,560	
A 21.06	Finish	3,523	m2	10.00	35,230	
A22	**Upper Floor Construction**	**9,809**	**m2**	**419.92**	**4,119,000**	
A 22.01	Glulam Beams;					
A 22.02	265mmx836mm	239	m3	2,550.00	608,430	
A 22.03	Installation	20	%	608,430.00	121,686	
	Columns;					
A 22.04	365mmx418mm	37	m3	2,550.00	94,620	Assumed Size. Assumes 3.8m Floor-to-Ceiling Height
A 22.05	Installation	20	%	94,620.00	18,924	

Section 8 - Detailed Cost Analysis

Estimate - Option A - Light Weight Wood Frame

Ref	Description	Qty	Unit	Rate	Total	Notes
A 22.06	Allowance for connections, fasteners and hold-downs etc.	10	%	703,050.00	70,305	
	Floor Panels;					
A 22.07	Engineered Joists	9,260	m2	175.00	1,620,500	
A 22.08	Plywood Sheathing	9,260	m2	40.00	370,400	
A 22.09	Rubber Membrane	9,260	m2	15.00	138,900	
A 22.10	50mm Concrete Topping	463	m3	270.00	125,010	
A 22.11	Finish	9,260	m2	15.00	138,900	
A 22.12	Painted GWB - Type X	9,260	m2	75.00	694,500	Includes allowance for fire taping
A 22.13	Design Space	549	m2			
A 22.14	Allowance for stairs	13	flt	9,000.00	117,000	
A23	**Roof Construction**	**3,523**	**m2**	**289.81**	**1,021,000**	
A 23.01	Glulam Beams;					
A 23.02	265mmx836mm	80	m3	2,550.00	202,810	
A 23.03	Installation	15	%	202,810.00	30,422	
A 23.04	Allowance for connections, fasteners and hold-downs etc.	15	%	202,810.00	30,422	
	Roof Panels;					
A 23.05	Engineered Joists	3,523	m2	175.00	616,530	
A 23.06	Plywood Sheathing	3,523	m2	40.00	140,920	
A3	**EXTERIOR ENCLOSURE**				**5,749,000**	
A31	**Walls Below Grade**	**0**	**m2**	**0.00**	**0**	
A 31.01	Assume Not Required					
A32	**Walls Above Grade**	**2,877**	**m2**	**613.49**	**1,765,000**	
						* Assumed
A 32.01	Metal Cladding	2,877	m2			Assumes 4.2m Floor-to-Floor Height
A 32.02	Flat lock metal cladding	2,877	m2	400.00	1,150,800	Assumes that the area of Cladding accounts for 62% of the total exterior wall area
A 32.03	25mm air space	2,877	m2	0.00	0	
A 32.04	1 layer semi rigid insulation	2,877	m2	40.00	115,080	
A 32.05	Vapour barrier	2,877	m2	10.00	28,770	
A 32.05	2x8 Plywood shear wall - plywood to both faces	2,440	m2	175.00	427,040	
A 32.06	Metal framing to cladding in lieu of shear wall	437	m2	100.00	43,680	
A33	**Windows & Entrances**	**1,760**	**m2**	**1,212.07**	**2,133,000**	
A 33.01	Curtain Wall System	1,760	m2	1,200.00	2,111,760	Assumes that the area of Glazing accounts for 38% of the total exterior wall area
A 33.02	Glazed aluminium door; double	2	nr	5,000.00	10,000	
A 33.03	Hollow Metal Door	1	nr	2,400.00	2,400	
A 33.03	Automatic door openers	2	nr	4,500.00	9,000	
A34	**Roof Covering**	**3,523**	**m2**	**305.14**	**1,075,000**	
A 34.01	SBS Roofing System	3,523	m2	290.00	1,021,670	
A 34.02	Allowance for cants, flashing and accessories	3,523	m2	15.00	52,850	
A35	**Projections**	**13,332**	**m2**	**58.21**	**776,000**	
A 35.01	Raised Roof					
A 35.02	Clerestory Window	395	m2	1,200.00	473,760	
A 35.03	Metal Cladding to Clerestory Window Area	231	m2		0	
A 35.04	Flat lock metal cladding	231	m2	400.00	92,400	
A 35.05	25mm air space	231	m2	0.00	0	

Section 8 - Detailed Cost Analysis

Estimate - Option A - Light Weight Wood Frame

Ref	Description	Qty	Unit	Rate	Total	Notes
A 35.06	1 layer semi rigid insulation	231	m2	40.00	9,240	
A 35.07	Vapour barrier	231	m2	10.00	2,310	
A 35.08	Plywood shear wall - plywood to both faces	231	m2	175.00	40,430	
A 35.09	16mm gypsum wall board - Type X	231	m2	45.00	10,400	
A 35.10	16mm gypsum wall board - Type X	179	m2	45.00	8,040	
A 35.11	Plywood shear wall - plywood to both faces	179	m2	175.00	31,260	
A 35.12	16mm gypsum wall board - Type X	179	m2	45.00	8,040	
A 35.13	Sunshade Allowance	1	sum	100,000.00	100,000	
B	**INTERIOR**				**7,288,000**	
B1	**PARTITIONS & DOORS**				**3,345,000**	
B11	**Partitions**	**11,333**	**m2**	**274.51**	**3,111,000**	
						* Assumed Build-ups
	Structural Walls					
B 11.01	16mm gypsum wall board - Type X	4,393	m2	45.00	197,680	
B 11.02	2x8 Plywood shear wall - plywood to both faces	4,393	m2	175.00	768,740	
B 35.14	16mm gypsum wall board - Type X	4,393	m2	45.00	197,680	
	Gypsum Partition					
B 35.15	16mm gypsum wall board - Type X	2,556	m2	45.00	115,020	
B 35.16	152mm stud	2,556	m2	70.00	178,920	
B 35.17	16mm gypsum wall board - Type X	2,556	m2	45.00	115,020	
	Furring					
B 35.18	16mm gypsum wall board - Type X	3,108	m2	45.00	139,860	
B 35.19	150mm mineral insulation	3,108	m2	55.00	170,940	
B 35.20	150mm stud	3,108	m2	70.00	217,560	
	Elevator Shaft Walls					
B 35.21	Masonry Wall	167	m2	250.00	41,800	
B 35.22	16mm gypsum wall board - Type X	167	m2	45.00	7,520	
	Glazed Partition					
B 35.23	Internal Glazing	806	m2	500.00	403,200	
	Operable Partition					
B 35.24	Operable Partition	302	m2	800.00	241,920	
	Misc.					
B 35.25	Rough carpentry	1	sum	126,085.20	126,090	
B 35.26	Sealing and caulking	1	sum	63,042.60	63,040	
B 35.27	Furring and boxing	1	sum	126,085.20	126,090	
B12	**Doors**	**142**	**nr**	**1,647.89**	**234,000**	
B 12.01	Aluminium Door with Glazing	72	nr	2,250.00	162,000	
B 35.28	Single Wood Door	68	nr	1,000.00	68,000	
B 35.17	Hollow Metal Door	2	nr	1,800.00	3,600	
B2	**FINISHES**				**2,347,000**	
B21	**Floor Finishes**	**12,230**	**m2**	**68.36**	**836,000**	
B 21.01	Carpet Tile	4,548	m2	55.00	250,140	
B 35.29	Resilient Flooring	7,036	m2	60.00	422,160	
B 35.30	Anti-static Flooring	646	m2	85.00	54,910	
B 35.31	Base	1	sum	109,081.50	109,080	
B22	**Ceiling Finishes**	**12,230**	**m2**	**106.13**	**1,298,000**	
B 22.01	Acoustic Ceiling Tiles	6,712	m2	50.00	335,600	

Section 8 - Detailed Cost Analysis

Estimate - Option A - Light Weight Wood Frame

Ref	Description	Qty	Unit	Rate	Total	Notes
B 22.02	Painted GWB	4,067	m2	130.00	528,710	Balance of GIFA due to unfinished design
B 22.03	Wood Grille	1,196	m2	300.00	358,800	
B 22.04	Unfinished	255	m2	0.00	0	
B 22.05	Bulkhead Allowance	1	sum	75,000.00	75,000	
B23	**Wall Finishes**	**17,761**	**m2**	**11.99**	**213,000**	
B 23.01	Paint	17,761	m2	12.00	213,130	
B3	**FITTINGS & EQUIPMENT**				**1,596,000**	
B31	**Fittings & Fixtures**	**13,332**	**m2**	**107.71**	**1,436,000**	
B 31.001	Allowance per Classroom	76	nr	15,000.00	1,140,000	
B 35.311	Allowance for Support Spaces	16	nr	2,000.00	32,000	
B 35.312	Handrail to Stairs	407	m	160.00	65,090	
B 35.313	Guardrail to Voids	459	m	200.00	91,800	
B 35.314	Windows Blinds to Exterior Glazing	1,760	m2	55.00	96,790	
B 35.314	Wayfinding	1	sum	10,000.00	10,000	
	Loose Furniture					Excluded
B32	**Equipment**	**13,332**	**m2**	**0.00**	**0**	
B 32.01	Servery Appliances / Gym Equipment					Excluded
B33	**Conveying Systems**	**4**	**stp**	**40,000.00**	**160,000**	
B 33.01	Passenger Elevator - 1 no - 4 stops	4	stp	40,000.00	160,000	
C	**SERVICES**				**14,506,000**	
C1	**MECHANICAL**				**9,240,000**	
C11	**Plumbing & Drainage**	**13,332**	**m2**	**95.03**	**1,267,000**	
C 11.01	Allowance Based on Benchmark Rates	13,332	m2	95.00	1,266,540	Allowance excludes washrooms but assumes sinks to the classrooms
C12	**Fire Protection**	**13,332**	**m2**	**45.00**	**600,000**	
C 12.01	Allowance Based on Benchmark Rates	13,332	m2	45.00	599,940	
C13	**HVAC**	**13,332**	**m2**	**475.02**	**6,333,000**	
C 13.01	Allowance Based on Benchmark Rates	13,332	m2	475.00	6,332,700	Includes allowance for cooling equipment
C14	**Controls**	**13,332**	**m2**	**78.01**	**1,040,000**	
C 14.01	Allowance Based on Benchmark Rates	13,332	m2	78.00	1,039,900	
C2	**ELECTRICAL**				**5,266,000**	
C21	**Service & Distribution**	**13,332**	**m2**	**84.98**	**1,133,000**	
C 21.01	Allowance Based on Benchmark Rates	13,332	m2	85.00	1,133,220	
C22	**Lighting, Devices & Heating**	**13,332**	**m2**	**189.99**	**2,533,000**	
C 22.01	Allowance Based on Benchmark Rates	13,332	m2	190.00	2,533,080	

Class D Cost Report

Fast + Epp

4 Storey School Prototype

Turner & Townsend

Revision: 4

Date: 09/04/2020

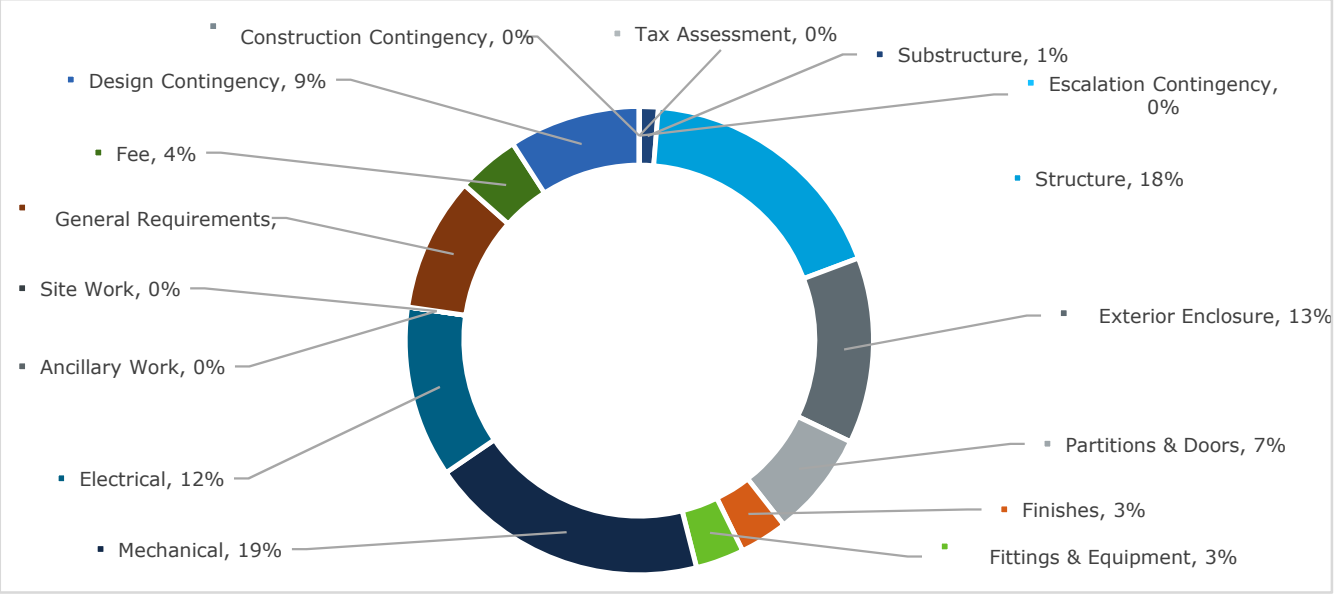
Section 8 - Detailed Cost Analysis

Estimate - Option A - Light Weight Wood Frame

Ref	Description	Qty	Unit	Rate	Total	Notes
C23	Systems & Ancillaries	13,332	m2	120.01	1,600,000	
C 23.01	Allowance Based on Benchmark Rates	13,332	m2	120.00	1,599,840	
D	SITE & ANCILLARY WORK				0	
D1	SITE WORK - See Site Cost Plan				0	
D2	ANCILLARY WORK				0	
D21	Demolition	0	m2	0.00	0	
D 21.01	No Work Required					
D22	Alterations	0	m2	0.00	0	
D 22.01	No Work Required					
	SUB-TOTAL: NET BUILDING WORKS				33,573,000	
Z1	GENERAL REQUIREMENTS & FEE				5,909,000	
Z11	General Requirements				4,029,000	
Z 11.01	Contractors General Requirements	12.0	%	33,573,000.00	4,029,000	
Z12	Fee				1,880,000	
Z 12.01	Contractors Fee	5.0	%	37,602,000.00	1,880,000	
	TOTAL: BUILDING WORKS ESTIMATE				39,482,000	
Z2	ALLOWANCES				3,948,000	
Z21	Design Allowance				3,948,000	
Z 21.01	Design Contingency	10.0	%	39,482,000.00	3,948,000	
Z22	Escalation Allowance				0	
Z 22.01	Tender Price Inflation	0.0	%	43,430,000.00	0	
Z 22.02	Construction Inflation	0.0	%	43,430,000.00	0	
Z23	Construction Allowance				0	
Z 23.01	Construction Contingency	0.0	%	43,430,000.00	0	
	TOTAL CONSTRUCTION COST (including inflation)				43,430,000	
TAX	ASSESSMENT	0%	%	43,430,000.00	0	
	Estimated Overall Construction Cost				43,430,000	

Section 6 - Option B Headline Construction Costs

		Gross Floor Area:	13,332 m²	143,506 ft²
Ref	**Element**	**TOTAL**	**$/m²**	**$/ft²**
A1	Substructure	$623,000	$47	$4
A2	Structure	$8,554,000	$642	$60
A3	Exterior Enclosure	$6,129,000	$460	$43
B1	Partitions & Doors	$3,480,000	$261	$24
B2	Finishes	$1,579,000	$118	$11
B3	Fittings & Equipment	$1,596,000	$120	$11
C1	Mechanical	$9,240,000	$693	$64
C2	Electrical	$5,646,000	$423	$39
D1	Site Work	$0	$0	$0
D2	Ancillary Work	$0	$0	$0
	SUB-TOTAL: BUILDING WORKS	**$36,847,000**	**$2,764**	**$257**
Z11	General Requirements	$4,422,000	$332	$31
Z12	Fee	$2,063,000	$155	$14
	TOTAL: BUILDING WORKS ESTIMATE	**$43,332,000**	**$3,250**	**$302**
Z21	Design Contingency	$4,333,000	$325	$30
Z22	Escalation Contingency	$0	$0	$0
Z23	Construction Contingency	$0	$0	$0
	TOTAL: CONSTRUCTION COST	**$47,665,000**	**$3,575**	**$332**
TAX	Tax Assessment	$0	$0	$0
	TOTAL: CONSTRUCTION COST (Inc TAX)	**$47,665,000**	**$3,575**	**$332**



Section 7 - Building Works Elemental Summary

Option B - CLT Structure

Ref	Element	Ratio To GFA	Elemental Quantity	Elemental Unit Rate	Total	Cost / m2	Cost / ft2	Cost Ratio
A	**Shell**				**$15,306,000**	**$1,148**	**$107**	**32%**
A1	**Substructure**				**$623,000**	**$47**	**$4**	**1%**
A11	Foundation	26%	3,523 m^2	$177	$623,000	$47	$4	1%
A12	Basement excavation	0%	0 m^3	$0	$0	$0	$0	0%
A2	**Structure**				**$8,554,000**	**$642**	**$60**	**18%**
A21	Lowest Floor Construction	26%	3,523 m^2	$77	$272,000	$20	$2	1%
A22	Upper Floor Construction	74%	9,809 m^2	$636	$6,236,000	$468	$43	13%
A23	Roof Construction	26%	3,523 m^2	$581	$2,046,000	$153	$14	4%
A3	**Exterior Enclosure**				**$6,129,000**	**$460**	**$43**	**13%**
A31	Walls Below Grade	0%	0 m^2	$0	$0	$0	$0	0%
A32	Walls Above Grade	22%	2,877 m^2	$726	$2,089,000	$157	$15	4%
A33	Windows & Entrances	13%	1,760 m^2	$1,212	$2,133,000	$160	$15	4%
A34	Roof Covering	26%	3,523 m^2	$305	$1,075,000	$81	$7	2%
A35	Projections	100%	13,332 m^2	$62	$832,000	$62	$6	2%
B	**Interiors**				**$6,655,000**	**$499**	**$46**	**14%**
B1	**Partitions & Doors**				**$3,480,000**	**$261**	**$24**	**7%**
B11	Partitions	85%	11,333 m^2	$286	$3,246,000	$243	$23	7%
B12	Doors	1%	142 nr	$1,648	$234,000	$18	$2	0%
B2	**Finishes**				**$1,579,000**	**$118**	**$11**	**3%**
B21	Floor Finishes	92%	12,230 m^2	$68	$836,000	$63	$6	2%
B22	Ceiling Finishes	92%	12,230 m^2	$50	$610,000	$46	$4	1%
B23	Wall Finishes	83%	11,123 m^2	$12	$133,000	$10	$1	0%
B3	**Fittings & Equipment**				**$1,596,000**	**$120**	**$11**	**3%**
B31	Fittings & Fixtures	100%	13,332 m^2	$108	$1,436,000	$108	$10	3%
B32	Equipment	100%	13,332 m^2	$0	$0	$0	$0	0%
B33	Conveying Systems	0%	4 stp	$40,000	$160,000	$12	$1	0%
C	**Services**				**$14,886,000**	**$1,117**	**$104**	**31%**
C1	**Mechanical**				**$9,240,000**	**$693**	**$64**	**19%**
C11	Plumbing & Drainage	100%	13,332 m^2	$95	$1,267,000	$95	$9	3%
C12	Fire Protection	100%	13,332 m^2	$45	$600,000	$45	$4	1%
C13	HVAC	100%	13,332 m^2	$475	$6,333,000	$475	$44	13%
C14	Controls	100%	13,332 m^2	$78	$1,040,000	$78	$7	2%
C2	**Electrical**				**$5,646,000**	**$423**	**$39**	**12%**
C21	Service & Distribution	100%	13,332 m^2	$85	$1,133,000	$85	$8	2%
C22	Lighting, Devices & Heating	100%	13,332 m^2	$218	$2,913,000	$218	$20	6%
C23	Systems & Ancillaries	100%	13,332 m^2	$120	$1,600,000	$120	$11	3%
D	**Site & Ancillary Work**				**$0**	**$0**	**$0**	**0%**
D2	**Ancillary Work**				**$0**	**$0**	**$0**	**0%**
D21	Demolition	0%	0 m2	$0	$0	$0	$0	0%
D22	Alterations	0%	0 m2	$0	$0	$0	$0	0%
	SUB-TOTAL: NET BUILDING WORKS				**$36,847,000**	**$2,764**	**$257**	**77%**
Z	**General Requirements & Allowances**							
Z1	**General Requirements & Fee**				**$6,485,000**	**$486**	**$45**	**14%**
Z11	General Requirements		12.0 %		$4,422,000	$332	$31	9%
Z12	Fee		5.0 %		$2,063,000	$155	$14	4%
	TOTAL: BUILDING WORKS ESTIMATE				**$43,332,000**	**$3,250**	**$302**	**91%**
Z2	**Allowances**				**$4,333,000**	**$325**	**$30**	**9%**
Z21	Design Allowance		10.0 %		$4,333,000	$325	$30	9%
Z22	Escalation Allowance		0.0 %		$0	$0	$0	0%
Z23	Construction Allowance		0.0 %		$0	$0	$0	0%
	TOTAL BUILDING COST				**$47,665,000**	**$3,575**	**$332**	**100%**
TAX	**ASSESSMENT**		**0.0%**		**$0**	**$0**	**$0**	**0%**
	TOTAL BUILDING COST INC TAX				**$47,665,000**	**$3,575**	**$332**	**100%**

GFA		
Gross Floor Area (m2):	**13,332 m²**	
Gross Floor Area (ft2):	**143,506 ft²**	

Section 8 - Detailed Cost Analysis

Estimate - Option B - CLT Structure

Ref	Description	Qty	Unit	Rate	Total	Notes
A	**SHELL**				**15,306,000**	
A1	**SUBSTRUCTURE**				**623,000**	
A11	**Foundation**	**3,523**	**m2**	**176.84**	**623,000**	
A 11.01	Grade Beam; 700 x 600mm Deep	266	m			Assumed
A 11.02	Concrete	112	m3	270	30,160	
A 11.03	Formwork	319	m2	210	67,030	
A 11.04	Rebar - allowance for 110kg/m3	12,289	kg	2.60	31,950	
A 11.05	Excavation	134	m3	100	13,410	
A 11.06	Backfill	22	m3	80	1,790	
A 11.07	Foundation wall assumed 200mm x 1.20m deep	266	m	690		Assumed
A 11.08	Concrete supply and place	64	m3	270	17,240	
A 11.09	Formwork	638	m2	210	134,060	
A 11.10	Reinforcement - assumed 45kg/m3	2,873	kg	2.60	7,470	
A 11.11	Rigid insulation - assumes 600mm around perimeter	160	m2	20	3,190	
A 11.12	Waterproofing	319	m2	40	12,770	
A 11.13	Excavation	77	m3	100	7,660	
A 11.14	Granular backfill	13	m3	80	1,020	
A 11.07	Interior Strip Foundation; 600 x 450mm Deep	444	m			Assumed
A 11.15	Concrete	120	m3	270	32,370	
A 11.16	Formwork	400	m2	210	83,920	
A 11.17	Rebar - allowance for 110kg/m3	13,187	kg	2.60	34,290	
A 11.18	Excavation	144	m3	100	14,390	
A 11.19	Backfill	24	m3	80	1,920	
A 11.20	Pad Footing; 700 x 700 x 450mm Deep	27	nr			
A 11.21	Concrete	5	m3	270	1,430	
A 11.22	Formwork	34	m2	210	7,140	
A 11.23	Rebar - allowance for 110kg/m3	582	kg	2.60	1,510	
A 11.24	Excavation	6	m3	100	640	
A 11.25	Backfill	1	m3	80	80	
A 11.26	Elevator Footing	1	sum	25,000	25,000	
A 11.27	Staircase Footing	4	nr	15,000	60,000	
A 11.28	Dewatering Allowance	3	mnts	5,000	15,000	
A 11.29	Perimeter Drainage	266	m	65	17,290	
A 11.30	Building Footprint	3,523	m2			
A12	**Basement Excavation**	**0**	**m3**	**0.00**	**0**	
A 12.01	Assume No Requirement					
A2	**STRUCTURE**				**8,554,000**	
A21	**Lowest Floor Construction**	**3,523**	**m2**	**77.21**	**272,000**	
A 21.01	Slab on grade; 125mm deep	3,523	m2			
A 21.02	Concrete	440	m3	270.00	118,900	
A 21.03	Rebar @ 40kg/m3	17,615	kg	2.60	45,800	
A 21.04	6mm poly moisture barrier	3,523	m2	7.00	24,660	
A 21.05	150mm deep granular fill	528	m3	90.00	47,560	
A 21.06	Finish	3,523	m2	10.00	35,230	
A22	**Upper Floor Construction**	**9,809**	**m2**	**635.74**	**6,236,000**	
A 22.01	Glulam Beams;					
A 22.02	265mmx836mm	286	m3	2,550.00	730,450	
A 22.03	Installation	25	%	730,450.00	182,613	
	Columns;					
A 22.04	365mmx418mm	63	m3	2,550.00	159,670	Assumed Size. Assumes 3.8m Floor-to-Ceiling Height

Section 8 - Detailed Cost Analysis

Estimate - Option B - CLT Structure

Ref	Description	Qty	Unit	Rate	Total	Notes
A 22.05	Installation	25	%	159,670.00	39,918	
A 22.06	Allowance for connections, fasteners and hold-downs etc.	10	%	890,120.00	89,012	
	Floor Panels;					
A 22.07	CLT Panels - 7-Ply, 245mm	9,260	m2	390.00	3,611,400	
A 22.08	Installation	25	%	3,611,400.00	902,850	
A 22.09	Rubber Membrane	9,260	m2	15.00	138,900	
A 22.10	50mm Concrete Topping	463	m3	270.00	125,010	
A 22.11	Finish	9,260	m2	15.00	138,900	
22.12	Design Space	549	m2			
A 22.13	Allowance for stairs	13	flt	9,000.00	117,000	
A 22.14	Roof Area	9,260	m2			
A23	**Roof Construction**	**3,523**	**m2**	**580.76**	**2,046,000**	
A 23.01	Glulam Beams;					
A 23.02	265mmx836mm	95	m3	2,550.00	243,480	
A 23.03	Installation	25	%	243,480.00	60,870	
A 23.04	Allowance for connections, fasteners and hold-downs etc.	10	%	243,480.00	24,348	
	Roof Panels;					
A 23.05	CLT Panels - 7-Ply, 245mm	3,523	m3	390.00	1,373,970	
A 23.06	Installation	25	%	1,373,970.00	343,493	
A 23.06	Roof Area	3,523				
A3	**EXTERIOR ENCLOSURE**				**6,129,000**	
A31	**Walls Below Grade**	**0**	**m2**	**0.00**	**0**	
A 31.01	Assume Not Required					
A32	**Walls Above Grade**	**2,877**	**m2**	**726.10**	**2,089,000**	
A 32.01	Metal Cladding	2,877	m2			Assumes 4.2m Floor-to-Floor Height
A 32.02	Flat lock metal cladding	2,877	m2	400.00	1,150,800	Assumes that the area of Cladding accounts for 62% of the total exterior wall area
A 32.03	25mm air space	2,877	m2	0.00	0	
A 32.04	1 layer semi rigid insulation	2,877	m2	40.00	115,080	
A 32.05	Vapour barrier	2,877	m2	10.00	28,770	
A 32.06	CLT shear wall - 7-Ply 190mm	1,835	m2	376.00	690,110	
A 32.06	Metal framing to cladding in lieu of shear wall	1,042	m2	100.00	104,160	
A33	**Windows & Entrances**	**1,760**	**m2**	**1,212.07**	**2,133,000**	
A 33.01	Curtain Wall System	1,760	m2	1,200.00	2,111,760	Assumes that the area of Glazing accounts for 38% of the total exterior wall area
A 33.02	Glazed aluminium door; double	2	nr	5,000.00	10,000	
A 33.03	Hollow Metal Door	1	nr	2,400.00	2,400	
A 33.03	Automatic door openers	2	nr	4,500.00	9,000	
A34	**Roof Covering**	**3,523**	**m2**	**305.14**	**1,075,000**	
A 34.01	SBS Roofing System	3,523	m2	290.00	1,021,670	
A 34.02	Allowance for cants, flashing and accessories	3,523	m2	15.00	52,850	
A35	**Projections**	**13,332**	**m2**	**62.41**	**832,000**	
A 35.01	Raised Roof					

Section 8 - Detailed Cost Analysis

Estimate - Option B - CLT Structure

Ref	Description	Qty	Unit	Rate	Total	Notes
A 35.02	Clerestory Window	395	m2	1,200.00	473,760	
A 35.03	Metal Cladding to Clerestory Window Area	231	m2		0	
A 35.04	Flat lock metal cladding	231	m2	400.00	92,400	
A 35.05	25mm air space	231	m2	0.00	0	
A 35.06	1 layer semi rigid insulation	231	m2	40.00	9,240	
A 35.07	Vapour barrier	231	m2	10.00	2,310	
A 35.08	CLT shear wall - 7-Ply 190mm	231	m2	376.00	86,860	
A 35.09	16mm gypsum wall board - Type X	179	m2	45.00		
A 35.10	CLT shear wall - 7-Ply 190mm	179	m2	376.00	67,150	
A 35.11	16mm gypsum wall board - Type X	179	m2	45.00		
A 35.12	Sunshade Allowance	1	sum	100,000.00	100,000	
B	**INTERIOR**				**6,655,000**	
B1	**PARTITIONS & DOORS**				**3,480,000**	
B11	**Partitions**	**11,333**	**m2**	**286.43**	**3,246,000**	
	Structural Walls					
B 11.01	16mm gypsum wall board - Type X	3,025	m2	45.00		Assumes exposed CLT to both faces
B 11.02	CLT shear wall - 7-Ply 190mm	3,025	m2	376.00	1,137,320	
B 11.03	16mm gypsum wall board - Type X	3,025	m2	45.00		Assumes exposed CLT to both faces
B 11.04	e/o fire rating allowance to stairwells	1,246	m2	50.00	62,320	
	Gypsum Partition					
B 11.05	16mm gypsum wall board - Type X	3,924	m2	45.00	176,570	
B 11.06	152mm stud	3,924	m2	70.00	274,670	
B 11.07	16mm gypsum wall board - Type X	3,924	m2	45.00	176,570	
	Furring					
B 11.08	16mm gypsum wall board - Type X	3,108	m2	45.00	139,860	
B 11.09	150mm mineral insulation	3,108	m2	55.00	170,940	
B 11.10	152mm stud	3,108	m2	70.00	217,560	
	Elevator Shaft Walls					
B 11.11	16mm gypsum wall board - Type X	167	m2	45.00		Exposed - FR allowance included below
B 11.12	CLT shear wall - 7-Ply 190mm	167	m2	376.00	62,870	
B 11.13	Fire Rating Allowance	167	m2	50.00	8,360	
	Glazed Partition					
B 11.14	Internal Glazing	806	m2	500.00	403,200	
	Operable Partition					
B 11.15	Operable Partition	302	m2	800.00	241,920	
	Misc.					
B 11.16	Rough carpentry	1	sum	69,370.20	69,370	
B 11.17	Sealing and caulking	1	sum	34,685.10	34,690	
B 11.18	Furring and boxing	1	sum	69,370.20	69,370	
B12	**Doors**	**142**	**nr**	**1,647.89**	**234,000**	
B 12.01	Aluminium Door with Glazing	72	nr	2,250.00	162,000	
B 12.02	Single Wood Door	68	nr	1,000.00	68,000	
B 12.03	Hollow Metal Door	2	nr	1,800.00	3,600	
B2	**FINISHES**				**1,579,000**	
B21	**Floor Finishes**	**12,230**	**m2**	**68.36**	**836,000**	
B 21.01	Carpet Tile	4,548	m2	55.00	250,140	
B 21.02	Resilient Flooring	7,036	m2	60.00	422,160	

Section 8 - Detailed Cost Analysis

Estimate - Option B - CLT Structure

Ref	Description	Qty	Unit	Rate	Total	Notes
B 21.03	Anti-static Flooring	646	m2	85.00	54,910	
B 21.04	Base	1	sum	109,081.50	109,080	
B22	**Ceiling Finishes**	**12,230**	**m2**	**49.88**	**610,000**	
B 22.01	Acoustic Ceiling Tiles	1,764	m2	50.00	88,200	
B 22.02	Painted GWB	1,080	m2	130.00	140,400	
B 22.03	Wood Grille	1,104	m2	300.00	331,200	
B 22.04	Unfinished	8,282	m2	0.00	0	
B 22.05	Bulkhead Allowance	1	sum	50,000.00	50,000	
B23	**Wall Finishes**	**11,123**	**m2**	**11.96**	**133,000**	
B 23.01	Paint	11,123	m2	12.00	133,470	
B3	**FITTINGS & EQUIPMENT**				**1,596,000**	
B31	**Fittings & Fixtures**	**13,332**	**m2**	**107.71**	**1,436,000**	
B 31.001	Allowance per Classroom	76	nr	15,000.00	1,140,000	
B 31.002	Allowance for Support Spaces	16	nr	2,000.00	32,000	
B 31.003	Handrail to Stairs	407	m	160.00	65,090	
B 31.004	Guardrail to Voids	459	m	200.00	91,800	
B 31.005	Windows Blinds to Exterior Glazing	1,760	m2	55.00	96,790	
B 37.983	Wayfinding	1	sum	10,000.00	10,000	
	Loose Furniture					Excluded
B32	**Equipment**	**13,332**	**m2**	**0.00**	**0**	
B 32.01	Servery Appliances / Gym Equipment					Excluded
B33	**Conveying Systems**	**4**	**stp**	**40,000.00**	**160,000**	
B 33.01	Passenger E\elevator - 1 no - 4 stops	4	stp	40,000.00	160,000	
C	**SERVICES**				**14,886,000**	
C1	**MECHANICAL**				**9,240,000**	
C11	**Plumbing & Drainage**	**13,332**	**m2**	**95.03**	**1,267,000**	
C 11.01	Allowance based on Benchmark Rates	13,332	m2	95.00	1,266,540	Allowance excludes washrooms but assumes sinks to the classrooms
C12	**Fire Protection**	**13,332**	**m2**	**45.00**	**600,000**	
C 12.01	Allowance based on Benchmark Rates	13,332	m2	45.00	599,940	
C13	**HVAC**	**13,332**	**m2**	**475.02**	**6,333,000**	
C 13.01	Allowance based on Benchmark Rates	13,332	m2	475.00	6,332,700	Includes allowance for cooling equipment
C14	**Controls**	**13,332**	**m2**	**78.01**	**1,040,000**	
C 14.01	Allowance based on Benchmark Rates	13,332	m2	78.00	1,039,900	

Section 8 - Detailed Cost Analysis

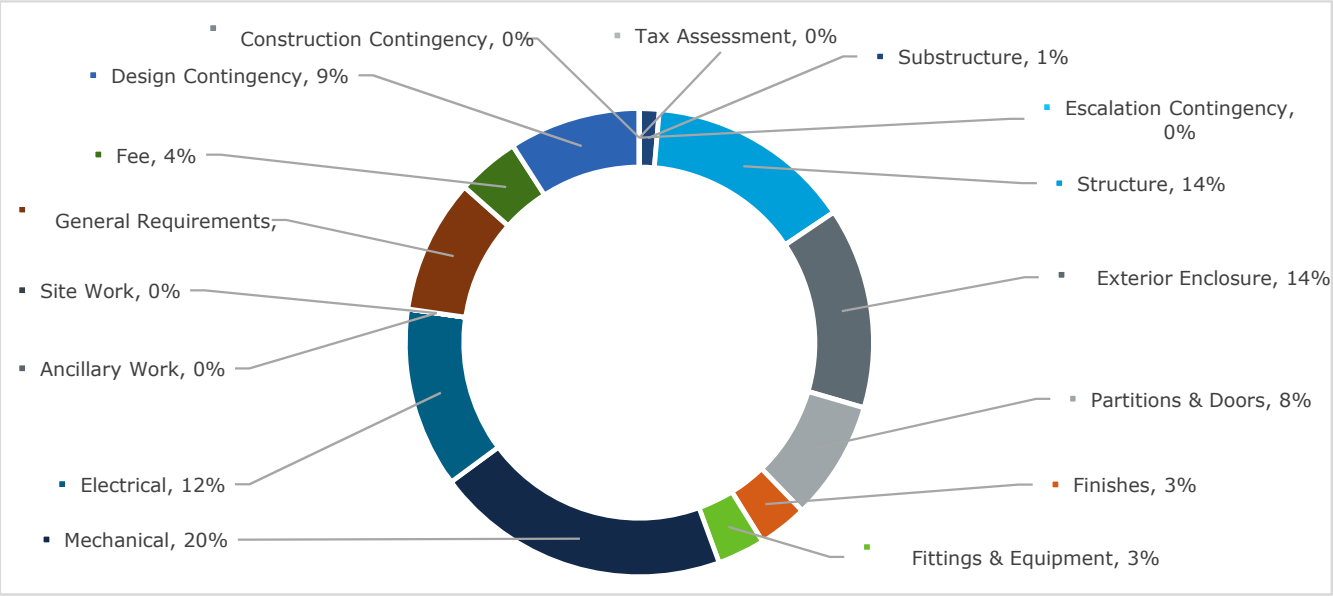
Estimate - Option B - CLT Structure

Ref	Description	Qty	Unit	Rate	Total	Notes
C2	**ELECTRICAL**				**5,646,000**	
C21	**Service & Distribution**	**13,332**	**m2**	**84.98**	**1,133,000**	
C 21.01	Allowance based on Benchmark Rates	13,332	m2	85.00	1,133,220	
C22	**Lighting, Devices & Heating**	**13,332**	**m2**	**218.50**	**2,913,000**	
C 22.01	Allowance based on Benchmark Rates	13,332	m2	218.50	2,913,040	Increased allowance to account for hanging light fixtures from CLT
C23	**Systems & Ancillaries**	**13,332**	**m2**	**120.01**	**1,600,000**	
C 23.01	Allowance based on Benchmark Rates	13,332	m2	120.00	1,599,840	
D	**SITE & ANCILLARY WORK**				**0**	
D1	**SITE WORK - See Site Cost Plan**				**0**	
D2	**ANCILLARY WORK**				**0**	
D21	**Demolition**	**0**	**m2**	**0.00**	**0**	
D 21.01	No Work Required					
D22	**Alterations**	**0**	**m2**	**0.00**	**0**	
D 22.01	No Work Required					
	SUB-TOTAL: NET BUILDING WORKS				**36,847,000**	
Z1	**GENERAL REQUIREMENTS & FEE**				**6,485,000**	
Z11	**General Requirements**				**4,422,000**	
Z 11.01	Contractors General Requirements	12.0	%	36,847,000.00	4,422,000	
Z12	**Fee**				**2,063,000**	
Z 12.01	Contractors Fee	5.0	%	41,269,000.00	2,063,000	
	TOTAL: BUILDING WORKS ESTIMATE				**43,332,000**	
Z2	**ALLOWANCES**				**4,333,000**	
Z21	**Design Allowance**				**4,333,000**	
Z 21.01	Design Contingency	10.0	%	43,332,000.00	4,333,000	
Z22	**Escalation Allowance**				**0**	
Z 22.01	Tender Price Inflation	0.0	%	47,665,000.00	0	
Z 22.02	Construction Inflation	0.0	%	47,665,000.00	0	
Z23	**Construction Allowance**				**0**	
Z 23.01	Construction Contingency	0.0	%	47,665,000.00	0	
	TOTAL CONSTRUCTION COST (including inflation)				**47,665,000**	
TAX	**ASSESSMENT**	**0%**	**%**	**47,665,000.00**	**0**	
	Estimated Overall Construction Cost				**47,665,000**	

Section 6 - Option C Headline Construction Costs

Gross Floor Area: 13,332 m² 143,506 ft²

Ref	Element	TOTAL	$/m²	$/ft²
A1	Substructure	$619,000	$46	$4
A2	Structure	$6,454,000	$484	$45
A3	Exterior Enclosure	$6,296,000	$472	$44
B1	Partitions & Doors	$3,750,000	$281	$26
B2	Finishes	$1,547,000	$116	$11
B3	Fittings & Equipment	$1,499,000	$112	$10
C1	Mechanical	$9,240,000	$693	$64
C2	Electrical	$5,646,000	$423	$39
D1	Site Work	$0	$0	$0
D2	Ancillary Work	$0	$0	$0
	SUB-TOTAL: BUILDING WORKS	**$35,051,000**	**$2,629**	**$244**
Z11	General Requirements	$4,206,000	$315	$29
Z12	Fee	$1,963,000	$147	$14
	TOTAL: BUILDING WORKS ESTIMATE	**$41,220,000**	**$3,092**	**$287**
Z21	Design Contingency	$4,122,000	$309	$29
Z22	Escalation Contingency	$0	$0	$0
Z23	Construction Contingency	$0	$0	$0
	TOTAL: CONSTRUCTION COST	**$45,342,000**	**$3,401**	**$316**
TAX	Tax Assessment	$0	$0	$0
	TOTAL: CONSTRUCTION COST (Inc TAX)	**$45,342,000**	**$3,401**	**$316**



Section 7 - Building Works Elemental Summary

Option C - CLT Shearwalls With NLT/DLT/GLT Panels On Purlins

Ref	Element	Ratio To GFA	Elemental Quantity	Elemental Unit Rate	Total	Cost / m2	Cost / ft2	Cost Ratio
A	**Shell**				**$13,369,000**	**$1,003**	**$93**	**29%**
A1	**Substructure**				**$619,000**	**$46**	**$4**	**1%**
A11	Foundation	26%	3,523 m^2	$176	$619,000	$46	$4	1%
A12	Basement excavation	0%	0 m^3	$0	$0	$0	$0	0%
A2	**Structure**				**$6,454,000**	**$484**	**$45**	**14%**
A21	Lowest Floor Construction	26%	3,523 m^2	$77	$272,000	$20	$2	1%
A22	Upper Floor Construction	74%	9,809 m^2	$480	$4,704,000	$353	$33	10%
A23	Roof Construction	26%	3,523 m^2	$420	$1,478,000	$111	$10	3%
A3	**Exterior Enclosure**				**$6,296,000**	**$472**	**$44**	**14%**
A31	Walls Below Grade	0%	0 m^2	$0	$0	$0	$0	0%
A32	Walls Above Grade	22%	2,877 m^2	$784	$2,256,000	$169	$16	5%
A33	Windows & Entrances	13%	1,760 m^2	$1,212	$2,133,000	$160	$15	5%
A34	Roof Covering	26%	3,523 m^2	$305	$1,075,000	$81	$7	2%
A35	Projections	100%	13,332 m^2	$62	$832,000	$62	$6	2%
B	**Interiors**				**$6,796,000**	**$510**	**$47**	**15%**
B1	**Partitions & Doors**				**$3,750,000**	**$281**	**$26**	**8%**
B11	Partitions	85%	11,333 m^2	$310	$3,516,000	$264	$25	8%
B12	Doors	1%	142 nr	$1,648	$234,000	$18	$2	1%
B2	**Finishes**				**$1,547,000**	**$116**	**$11**	**3%**
B21	Floor Finishes	92%	12,230 m^2	$68	$836,000	$63	$6	2%
B22	Ceiling Finishes	92%	12,230 m^2	$50	$610,000	$46	$4	1%
B23	Wall Finishes	63%	8,421 m^2	$12	$101,000	$8	$1	0%
B3	**Fittings & Equipment**				**$1,499,000**	**$112**	**$10**	**3%**
B31	Fittings & Fixtures	100%	13,332 m^2	$100	$1,339,000	$100	$9	3%
B32	Equipment	100%	13,332 m^2	$0	$0	$0	$0	0%
B33	Conveying Systems	0%	4 stp	$40,000	$160,000	$12	$1	0%
C	**Services**				**$14,886,000**	**$1,117**	**$104**	**33%**
C1	**Mechanical**				**$9,240,000**	**$693**	**$64**	**20%**
C11	Plumbing & Drainage	100%	13,332 m^2	$95	$1,267,000	$95	$9	3%
C12	Fire Protection	100%	13,332 m^2	$45	$600,000	$45	$4	1%
C13	HVAC	100%	13,332 m^2	$475	$6,333,000	$475	$44	14%
C14	Controls	100%	13,332 m^2	$78	$1,040,000	$78	$7	2%
C2	**Electrical**				**$5,646,000**	**$423**	**$39**	**12%**
C21	Service & Distribution	100%	13,332 m^2	$85	$1,133,000	$85	$8	2%
C22	Lighting, Devices & Heating	100%	13,332 m^2	$218	$2,913,000	$218	$20	6%
C23	Systems & Ancillaries	100%	13,332 m^2	$120	$1,600,000	$120	$11	4%
D	**Site & Ancillary Work**				**$0**	**$0**	**$0**	**0%**
D2	**Ancillary Work**				**$0**	**$0**	**$0**	**0%**
D21	Demolition	0%	0 m2	$0	$0	$0	$0	0%
D22	Alterations	0%	0 m2	$0	$0	$0	$0	0%
	SUB-TOTAL: NET BUILDING WORKS				**$35,051,000**	**$2,629**	**$244**	**77%**
Z	**General Requirements & Allowances**							
Z1	**General Requirements & Fee**				**$6,169,000**	**$463**	**$43**	**14%**
Z11	General Requirements		12.0 %		$4,206,000	$315	$29	9%
Z12	Fee		5.0 %		$1,963,000	$147	$14	4%
	TOTAL: BUILDING WORKS ESTIMATE				**$41,220,000**	**$3,092**	**$287**	**91%**
Z2	**Allowances**				**$4,122,000**	**$309**	**$29**	**9%**
Z21	Design Allowance		10.0 %		$4,122,000	$309	$29	9%
Z22	Escalation Allowance		0.0 %		$0	$0	$0	0%
Z23	Construction Allowance		0.0 %		$0	$0	$0	0%
	TOTAL BUILDING COST				**$45,342,000**	**$3,401**	**$316**	**100%**
TAX	**ASSESSMENT**		**0.0%**		**$0**	**$0**	**$0**	**0%**
	TOTAL BUILDING COST INC TAX				**$45,342,000**	**$3,401**	**$316**	**100%**
	GFA							
	Gross Floor Area (m2):	**13,332 m^2**						
	Gross Floor Area (ft2):	**143,506 ft^2**						

Section 8 - Detailed Cost Analysis

Estimate - Option C - CLT Shearwalls With NLT/DLT/GLT Panels On Purlins

Ref	Description	Qty	Unit	Rate	Total	Notes
A	**SHELL**				**13,369,000**	
A1	**SUBSTRUCTURE**				**619,000**	
A11	**Foundation**	**3,523**	**m2**	**175.70**	**619,000**	
A 11.01	Grade Beam; 700 x 600mm Deep	266	m			Assumed
A 11.02	Concrete	112	m3	270	30,160	
A 11.03	Formwork	319	m2	210	67,030	
A 11.04	Rebar - allowance for 110kg/m3	12,289	kg	2.60	31,950	
A 11.05	Excavation	134	m3	100	13,410	
A 11.06	Backfill	22	m3	80	1,790	
A 11.07	Foundation wall assumed 200mm x 1.20m deep	266	m	690		Assumed
A 11.08	Concrete supply and place	64	m3	270	17,240	
A 11.09	Formwork	638	m2	210	134,060	
A 11.10	Reinforcement - assumed 45kg/m3	2,873	kg	2.60	7,470	
A 11.11	Rigid insulation - assumes 600mm around perimeter	160	m2	20	3,190	
A 11.12	Waterproofing	319	m2	40	12,770	
A 11.13	Excavation	77	m3	100	7,660	
A 11.14	Granular backfill	13	m3	80	1,020	
A 11.07	Interior Strip Foundation; 600 x 450mm Deep	444	m			Assumed
A 11.15	Concrete	120	m3	270	32,370	
A 11.16	Formwork	400	m2	210	83,920	
A 11.17	Rebar - allowance for 110kg/m3	13,187	kg	2.60	34,290	
A 11.18	Excavation	144	m3	100	14,390	
A 11.19	Backfill	24	m3	80	1,920	
A 11.20	Pad Footing; 700 x 700 x 450mm Deep	17	nr			
A 11.21	Concrete	3	m3	270	900	
A 11.22	Formwork	21	m2	210	4,500	
A 11.23	Rebar - allowance for 110kg/m3	367	kg	2.60	950	
A 11.24	Excavation	4	m3	100	400	
A 11.25	Backfill	1	m3	80	50	
A 11.26	Elevator Footing	1	sum	25,000	25,000	
A 11.27	Staircase Footing	4	nr	15,000	60,000	
A 11.28	Dewatering Allowance	3	mnts	5,000	15,000	
A 11.29	Perimeter Drainage	266	m	65	17,290	
A 11.30	Building Footprint	3,523	m2			
A12	**Basement Excavation**	**0**	**m3**	**0.00**	**0**	
A 12.01	Assume No Requirement					
A2	**STRUCTURE**				**6,454,000**	
A21	**Lowest Floor Construction**	**3,523**	**m2**	**77.21**	**272,000**	
A 21.01	Slab on grade; 125mm deep	3,523	m2			
A 21.02	Concrete	440	m3	270.00	118,900	
A 21.03	Rebar @ 40kg/m3	17,615	kg	2.60	45,800	
A 21.04	6mm poly moisture barrier	3,523	m2	7.00	24,660	
A 21.05	150mm deep granular fill	528	m3	90.00	47,560	
A 21.06	Finish	3,523	m2	10.00	35,230	
A22	**Upper Floor Construction**	**9,809**	**m2**	**479.56**	**4,704,000**	
A 22.01	Glulam Beams;					
A 22.02	265mmx836mm	283	m3	2,550.00	721,980	
A 22.03	Installation	25	%	721,980.00	180,495	
	Columns;					
A 22.04	365mmx418mm	39	m3	2,550.00	100,530	

Section 8 - Detailed Cost Analysis

Estimate - Option C - CLT Shearwalls With NLT/DLT/GLT Panels On Purlins

Ref	Description	Qty	Unit	Rate	Total	Notes
A 22.05	Installation	25	%	100,530.00	25,133	
A 22.06	Allowance for connections, fasteners and hold-downs etc.	15	%	822,510.00	123,377	
	Floor Panels;					
A 22.07	Glulam Purlin - 175mmx646mm	243	m3	2,550.00	620,080	
A 22.07	GLT Panels - 89mm Nominal Depth Mass Timber Panels	9,260	m2	163.00	1,509,380	
A 22.08	Installation & Connection, etc.	25	%	2,129,460.00	532,365	
A 22.09	13mm Plywood Sheathing	9,260	m2	40.00	370,400	
A 22.10	Rubber Membrane	9,260	m2	15.00	138,900	
A 22.11	50mm Concrete Topping	463	m3	270.00	125,010	
A 22.12	Finish	9,260	m2	15.00	138,900	
A 22.13	Design Space	549	m2			
A 22.14	Allowance for stairs	13	flt	9,000.00	117,000	
A 22.15	Area	9,260	m2			
A23	**Roof Construction**	**3,523**	**m2**	**419.53**	**1,478,000**	
A 23.01	Glulam Beams;					
A 23.02	265mmx836mm	94	m3	2,550.00	240,660	Assumed Size
A 23.03	Installation	25	%	240,660.00	60,165	
A 23.04	Allowance for connections, fasteners and hold-downs etc.	25	%	240,660.00	60,165	
	Floor Panels;					
A 23.05	Glulam Purlin - 175mmx646mm	81	m3	2,550.00	206,690	
A 23.06	GLT Panels - 89mm Nominal Depth Mass Timber Panels	3,523	m2	163.00	574,250	
A 23.07	Installation & Connection, etc.	25	%	780,940.00	195,235	
A 23.08	13mm Plywood Sheathing	3,523	m2	40.00	140,920	
A 23.09	Roof Area	3,523	m2			
A3	**EXTERIOR ENCLOSURE**				**6,296,000**	
A31	**Walls Below Grade**	**0**	**m2**	**0.00**	**0**	
A 31.01	Assume Not Required					
A32	**Walls Above Grade**	**2,877**	**m2**	**784.15**	**2,256,000**	
A 32.01	Metal Cladding	2,877	m2			Assumes 4.2m Floor-to-Floor Height
A 32.02	Flat lock metal cladding	2,877	m2	400.00	1,150,800	Assumes that the area of Cladding accounts for 62% of the total exterior wall area
A 32.03	25mm air space	2,877	m2	0.00	0	
A 32.04	1 layer semi rigid insulation	2,877	m2	40.00	115,080	
A 32.05	Vapour barrier	2,877	m2	10.00	28,770	
A 32.06	CLT shear wall - 7-Ply 190mm	2,440	m2	376.00	917,520	
A 32.06	Metal framing to cladding in lieu of shear wall	437	m2	100.00	43,680	
A33	**Windows & Entrances**	**1,760**	**m2**	**1,212.07**	**2,133,000**	
A 33.01	Curtain Wall System	1,760	m2	1,200.00	2,111,760	Assumes that the area of Glazing accounts for 38% of the total exterior wall area
A 33.02	Glazed aluminium door; double	2	nr	5,000.00	10,000	
A 33.03	Hollow Metal Door	1	nr	2,400.00	2,400	
A 33.03	Automatic door openers	2	nr	4,500.00	9,000	
A34	**Roof Covering**	**3,523**	**m2**	**305.14**	**1,075,000**	
A 34.01	SBS Roofing System	3,523	m2	290.00	1,021,670	
A 34.02	Allowance for cants, flashing and accessories	3,523	m2	15.00	52,850	

Section 8 - Detailed Cost Analysis

Estimate - Option C - CLT Shearwalls With NLT/DLT/GLT Panels On Purlins

Ref	Description	Qty	Unit	Rate	Total	Notes
A35	**Projections**	**13,332**	**m2**	**62.41**	**832,000**	
A 35.01	Raised Roof					
A 35.02	Clerestory Window	395	m2	1,200.00	473,760	
A 35.03	Metal Cladding to Clerestory Window Area	231	m2		0	
A 35.04	Flat lock metal cladding	231	m2	400.00	92,400	
A 35.05	25mm air space	231	m2	0.00	0	
A 35.06	1 layer semi rigid insulation	231	m2	40.00	9,240	
A 35.07	Vapour barrier	231	m2	10.00	2,310	
A 35.08	CLT shear wall - 7-Ply 190mm	231	m2	376.00	86,860	
A 35.09	CLT shear wall - 7-Ply 190mm	179	m2	376.00	67,150	Assume exposed CLT
A 35.10	Sunshade Allowance	1	sum	100,000.00	100,000	
B	**INTERIOR**				**6,796,000**	
B1	**PARTITIONS & DOORS**				**3,750,000**	
B11	**Partitions**	**11,333**	**m2**	**310.24**	**3,516,000**	
	Structural Walls					
B 11.01	16mm gypsum wall board - Type X	4,286	m2	45.00		Assume exposed CLT to both faces
B 11.02	CLT shear wall - 7-Ply 190mm	4,286	m2	376.00	1,611,690	
B 11.03	16mm gypsum wall board - Type X	4,286	m2	45.00		Assume exposed CLT to both faces
B 11.04	e/o fire rating allowance to stairwells	1,246	m2	50.00	62,320	
	Gypsum Partition					
B 11.05	16mm gypsum wall board - Type X	2,573	m2	45.00	115,790	
B 11.06	152mm stud	2,573	m2	70.00	180,110	
B 11.07	16mm gypsum wall board - Type X	2,573	m2	45.00	115,790	
	Furring					
B 11.08	16mm gypsum wall board - Type X	3,108	m2	45.00	139,860	
B 11.09	150mm mineral insulation	3,108	m2	55.00	170,940	
B 11.10	152mm stud	3,108	m2	70.00	217,560	
	Elevator Shaft Walls					
B 11.11	16mm gypsum wall board - Type X	167	m2	45.00		Exposed - FR allowance included below
B 11.12	CLT shear wall - 7-Ply 190mm	167	m2	376.00	62,870	
B 11.13	e/o fire rating allowance	167	m2	50.00	8,360	
	Glazed Partition					
B 11.14	Internal Glazing	896	m2	500.00	448,000	
	Operable Partition					
B 11.15	Operable Partition	302	m2	800.00	241,920	
	Misc.					
B 11.16	Rough carpentry	1	sum	56,403.00	56,400	
B 11.17	Sealing and caulking	1	sum	28,201.50	28,200	
B 11.18	Furring and boxing	1	sum	56,403.00	56,400	
B12	**Doors**	**142**	**no**	**1,647.89**	**234,000**	
B 12.01	Aluminium Door with Glazing	72	nr	2,250.00	162,000	
B 12.02	Single Wood Door	68	nr	1,000.00	68,000	
B 12.03	Hollow Metal Door	2	nr	1,800.00	3,600	
B2	**FINISHES**				**1,547,000**	
B21	**Floor Finishes**	**12,230**	**m2**	**68.36**	**836,000**	
B 21.01	Carpet Tile	4,548	m2	55.00	250,140	

Section 8 - Detailed Cost Analysis

Estimate - Option C - CLT Shearwalls With NLT/DLT/GLT Panels On Purlins

Ref	Description	Qty	Unit	Rate	Total	Notes
B 21.02	Resilient Flooring	7,036	m2	60.00	422,160	
B 21.03	Anti-static Flooring	646	m2	85.00	54,910	
B 21.04	Base	1	sum	109,081.50	109,080	
B22	**Ceiling Finishes**	**12,230**	**m2**	**49.88**	**610,000**	
B 22.01	Acoustic Ceiling Tiles	1,764	m2	50.00	88,200	
B 22.02	Painted GWB	1,080	m2	130.00	140,400	
B 22.03	Wood Grille	1,104	m2	300.00	331,200	
B 22.04	Unfinished	8,282	m2	0.00	0	
B 22.05	Bulkhead Allowance	1	sum	50,000.00	50,000	
B23	**Wall Finishes**	**8,421**	**m2**	**11.99**	**101,000**	
B 23.01	Paint	8,421	m2	12.00	101,050	
B3	**FITTINGS & EQUIPMENT**				**1,499,000**	
B31	**Fittings & Fixtures**	**13,332**	**m2**	**100.44**	**1,339,000**	
B 31.001	Allowance per Classroom	76	nr	15,000.00	1,140,000	
B 31.002	Allowance for Support Spaces	16	nr	2,000.00	32,000	
B 31.003	Handrail to Stairs	407	m	160.00	65,090	
B 31.004	Guardrail to Voids	459	m	200.00	91,800	
B 31.005	Windows Blinds to Exterior Glazing	0	m2	55.00	0	
B 37.076	Wayfinding	1	sum	10,000.00	10,000	
	Loose Furniture					Excluded
B32	**Equipment**	**13,332**	**m2**	**0.00**	**0**	
B 32.01	Servery Appliances / Gym Equipment					Excluded
B33	**Conveying Systems**	**4**	**stp**	**40,000.00**	**160,000**	
B 33.01	Passenger E\elevator - 1 no - 4 stops	4	stp	40,000.00	160,000	
C	**SERVICES**				**14,886,000**	
C1	**MECHANICAL**				**9,240,000**	
C11	**Plumbing & Drainage**	**13,332**	**m2**	**95.03**	**1,267,000**	
C 11.01	Allowance based on Benchmark Rates	13,332	m2	95.00	1,266,540	Allowance excludes washrooms but assumes sinks to the classrooms
C12	**Fire Protection**	**13,332**	**m2**	**45.00**	**600,000**	
C 12.01	Allowance based on Benchmark Rates	13,332	m2	45.00	599,940	
C13	**HVAC**	**13,332**	**m2**	**475.02**	**6,333,000**	
C 13.01	Allowance based on Benchmark Rates	13,332	m2	475.00	6,332,700	Includes allowance for cooling equipment
C14	**Controls**	**13,332**	**m2**	**78.01**	**1,040,000**	
C 14.01	Allowance based on Benchmark Rates	13,332	m2	78.00	1,039,900	

Section 8 - Detailed Cost Analysis

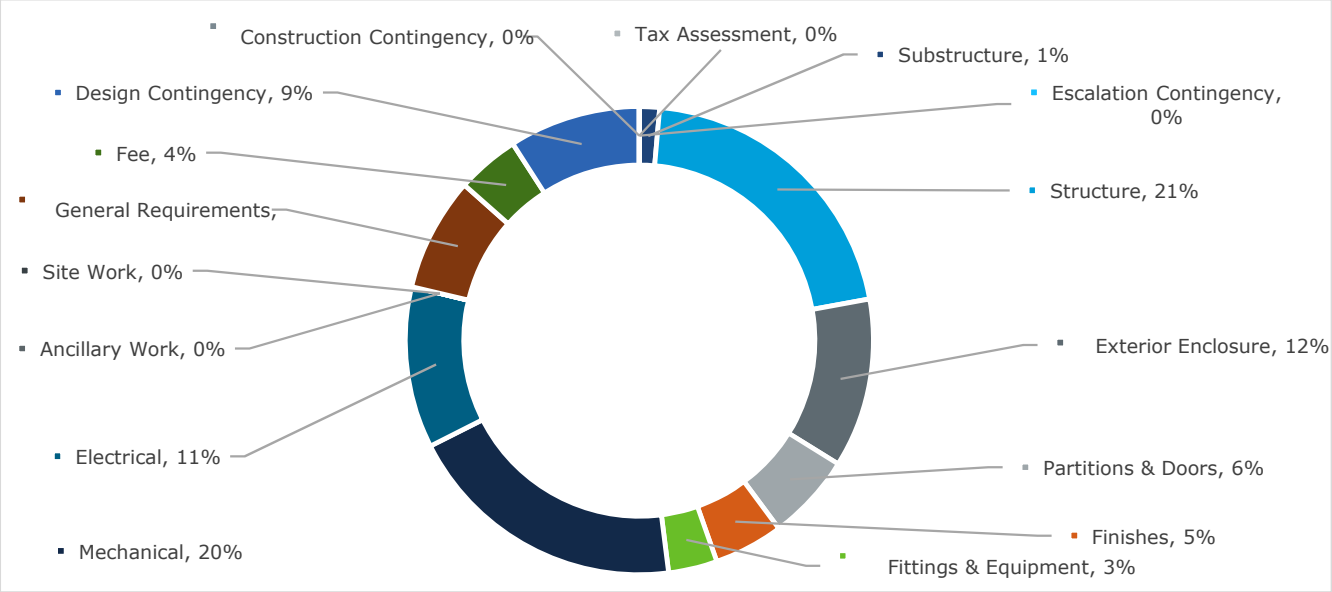
Estimate - Option C - CLT Shearwalls With NLT/DLT/GLT Panels On Purlins

Ref	Description	Qty	Unit	Rate	Total	Notes
C2	ELECTRICAL				5,646,000	
C21	Service & Distribution	13,332	m2	84.98	1,133,000	
C 21.01	Allowance based on Benchmark Rates	13,332	m2	85.00	1,133,220	
C22	Lighting, Devices & Heating	13,332	m2	218.50	2,913,000	
C 22.01	Allowance based on Benchmark Rates	13,332	m2	218.50	2,913,040	Increased allowance to account for hanging light fixtures from GLT
C23	Systems & Ancillaries	13,332	m2	120.01	1,600,000	
C 23.01	Allowance based on Benchmark Rates	13,332	m2	120.00	1,599,840	
D	SITE & ANCILLARY WORK				0	
D1	SITE WORK - See Site Cost Plan				0	
D2	ANCILLARY WORK				0	
D21	Demolition	0	m2	0.00	0	
D 21.01	No Work Required					
D22	Alterations	0	m2	0.00	0	
D 22.01	No Work Required					
	SUB-TOTAL: NET BUILDING WORKS				35,051,000	
Z1	GENERAL REQUIREMENTS & FEE				6,169,000	
Z11	General Requirements				4,206,000	
Z 11.01	Contractors General Requirements	12	%	35,051,000.00	4,206,000	
Z12	Fee				1,963,000	
Z 12.01	Contractors Fee	5	%	39,257,000.00	1,963,000	
	TOTAL: BUILDING WORKS ESTIMATE				41,220,000	
Z2	ALLOWANCES				4,122,000	
Z21	Design Allowance				4,122,000	
Z 21.01	Design Contingency	10	%	41,220,000.00	4,122,000	
Z22	Escalation Allowance				0	
Z 22.01	Tender Price Inflation	0.0	%	45,342,000.00	0	
Z 22.02	Construction Inflation	0.0	%	45,342,000.00	0	
Z23	Construction Allowance				0	
Z 23.01	Construction Contingency	0	%	45,342,000.00	0	
	TOTAL CONSTRUCTION COST (including inflation)				45,342,000	
TAX	ASSESSMENT	0%	%	45,342,000.00	0	Excluded - See Client Direct
	Estimated Overall Construction Cost				45,342,000	

Section 6 - Option D Headline Construction Costs

Gross Floor Area: 13,332 m² 143,506 ft²

Ref	Element	TOTAL	$/m²	$/ft²
A1	Substructure	$657,000	$49	$5
A2	Structure	$9,807,000	$736	$68
A3	Exterior Enclosure	$5,519,000	$414	$38
B1	Partitions & Doors	$2,835,000	$213	$20
B2	Finishes	$2,266,000	$170	$16
B3	Fittings & Equipment	$1,596,000	$120	$11
C1	Mechanical	$9,240,000	$693	$64
C2	Electrical	$5,266,000	$395	$37
D1	Site Work	$0	$0	$0
D2	Ancillary Work	$0	$0	$0
	SUB-TOTAL: BUILDING WORKS	**$37,186,000**	**$2,789**	**$259**
Z11	General Requirements	$3,719,000	$279	$26
Z12	Fee	$2,045,000	$153	$14
	TOTAL: BUILDING WORKS ESTIMATE	**$42,950,000**	**$3,222**	**$299**
Z21	Design Contingency	$4,295,000	$322	$30
Z22	Escalation Contingency	$0	$0	$0
Z23	Construction Contingency	$0	$0	$0
	TOTAL: CONSTRUCTION COST	**$47,245,000**	**$3,544**	**$329**
TAX	Tax Assessment	$0	$0	$0
	TOTAL: CONSTRUCTION COST (Inc TAX)	**$47,245,000**	**$3,544**	**$329**



Section 7 - Building Works Elemental Summary

Option D - Steel Framing								
Ref	**Element**	**Ratio To GFA**	**Elemental Quantity**	**Elemental Unit Rate**	**Total**	**Cost / m2**	**Cost / ft2**	**Cost Ratio**
A	**Shell**				**$15,983,000**	**$1,199**	**$111**	**34%**
A1	**Substructure**				**$657,000**	**$49**	**$5**	**1%**
A11	Foundation	26%	3,523 m^2	$186	$657,000	$49	$5	1%
A12	Basement excavation	0%	0 m^3	$0	$0	$0	$0	0%
A2	**Structure**				**$9,807,000**	**$736**	**$68**	**21%**
A21	Lowest Floor Construction	26%	3,523 m^2	$77	$272,000	$20	$2	1%
A22	Upper Floor Construction	74%	9,809 m^2	$683	$6,696,000	$502	$47	14%
A23	Roof Construction	26%	3,523 m^2	$806	$2,839,000	$213	$20	6%
A3	**Exterior Enclosure**				**$5,519,000**	**$414**	**$38**	**12%**
A31	Walls Below Grade	0%	0 m^2	$0	$0	$0	$0	0%
A32	Walls Above Grade	22%	2,877 m^2	$550	$1,582,000	$119	$11	3%
A33	Windows & Entrances	13%	1,760 m^2	$1,212	$2,133,000	$160	$15	5%
A34	Roof Covering	26%	3,523 m^2	$305	$1,075,000	$81	$7	2%
A35	Projections	100%	13,332 m^2	$55	$729,000	$55	$5	2%
B	**Interiors**				**$6,697,000**	**$502**	**$47**	**14%**
B1	**Partitions & Doors**				**$2,835,000**	**$213**	**$20**	**6%**
B11	Partitions	85%	11,333 m^2	$230	$2,601,000	$195	$18	6%
B12	Doors	1%	142 nr	$1,648	$234,000	$18	$2	0%
B2	**Finishes**				**$2,266,000**	**$170**	**$16**	**5%**
B21	Floor Finishes	92%	12,230 m^2	$68	$836,000	$63	$6	2%
B22	Ceiling Finishes	92%	12,230 m^2	$100	$1,222,000	$92	$9	3%
B23	Wall Finishes	130%	17,351 m^2	$12	$208,000	$16	$1	0%
B3	**Fittings & Equipment**				**$1,596,000**	**$120**	**$11**	**3%**
B31	Fittings & Fixtures	100%	13,332 m^2	$108	$1,436,000	$108	$10	3%
B32	Equipment	100%	13,332 m^2	$0	$0	$0	$0	0%
B33	Conveying Systems	0%	4 stp	$40,000	$160,000	$12	$1	0%
C	**Services**				**$14,506,000**	**$1,088**	**$101**	**31%**
C1	**Mechanical**				**$9,240,000**	**$693**	**$64**	**20%**
C11	Plumbing & Drainage	100%	13,332 m^2	$95	$1,267,000	$95	$9	3%
C12	Fire Protection	100%	13,332 m^2	$45	$600,000	$45	$4	1%
C13	HVAC	100%	13,332 m^2	$475	$6,333,000	$475	$44	13%
C14	Controls	100%	13,332 m^2	$78	$1,040,000	$78	$7	2%
C2	**Electrical**				**$5,266,000**	**$395**	**$37**	**11%**
C21	Service & Distribution	100%	13,332 m^2	$85	$1,133,000	$85	$8	2%
C22	Lighting, Devices & Heating	100%	13,332 m^2	$190	$2,533,000	$190	$18	5%
C23	Systems & Ancillaries	100%	13,332 m^2	$120	$1,600,000	$120	$11	3%
D	**Site & Ancillary Work**				**$0**	**$0**	**$0**	**0%**
D2	**Ancillary Work**				**$0**	**$0**	**$0**	**0%**
D21	Demolition	0%	0 m2	$0	$0	$0	$0	0%
D22	Alterations	0%	0 m2	$0	$0	$0	$0	0%
	SUB-TOTAL: NET BUILDING WORKS				**$37,186,000**	**$2,789**	**$259**	**79%**
Z	**General Requirements & Allowances**							
Z1	**General Requirements & Fee**				**$5,764,000**	**$432**	**$40**	**12%**
Z11	General Requirements		10.0 %		$3,719,000	$279	$26	8%
Z12	Fee		5.0 %		$2,045,000	$153	$14	4%
	TOTAL: BUILDING WORKS ESTIMATE				**$42,950,000**	**$3,222**	**$299**	**91%**
Z2	**Allowances**				**$4,295,000**	**$322**	**$30**	**9%**
Z21	Design Allowance		10.0 %		$4,295,000	$322	$30	9%
Z22	Escalation Allowance		0.0 %		$0	$0	$0	0%
Z23	Construction Allowance		0.0 %		$0	$0	$0	0%
	TOTAL BUILDING COST				**$47,245,000**	**$3,544**	**$329**	**100%**
TAX	**ASSESSMENT**		**0.0%**		**$0**	**$0**	**$0**	**0%**
	TOTAL BUILDING COST INC TAX				**$47,245,000**	**$3,544**	**$329**	**100%**
	GFA							
	Gross Floor Area (m2):	**13,332 m^2**						
	Gross Floor Area (ft2):	**143,506 ft^2**						

Section 8 - Detailed Cost Analysis

Estimate - Option D - Steel Framing

Ref	Description	Qty	Unit	Rate	Total	Notes
A	**SHELL**				**15,983,000**	
A1	**SUBSTRUCTURE**				**657,000**	
A11	**Foundation**	**3,523**	**m2**	**186.49**	**657,000**	
A 11.01	Grade Beam; 700 x 600mm Deep	266	m			Assumed
A 11.02	Concrete	112	m3	270	30,160	
A 11.03	Formwork	319	m2	210	67,030	
A 11.04	Rebar - allowance for 110kg/m3	12,289	kg	2.6	31,950	
A 11.05	Excavation	134	m3	100	13,410	
A 11.06	Backfill	22	m3	80	1,790	
A 11.07	Foundation wall assumed 200mm x 1.20m deep	266	m	690		Assumed
A 11.08	Concrete supply and place	64	m3	270	17,240	
A 11.09	Formwork	638	m2	210	134,060	
A 11.10	Reinforcement - assumed 45kg/m3	2,873	kg	2.6	7,470	
A 11.11	Rigid insulation - assumes 600mm around perimeter	160	m2	20	3,190	
A 11.12	Waterproofing	319	m2	40	12,770	
A 11.13	Excavation	77	m3	100	7,660	
A 11.14	Granular backfill	13	m3	80	1,020	
A 11.07	Interior Strip Foundation; 600 x 450mm Deep	444	m			Assumed
A 11.15	Concrete	120	m3	270	32,370	
A 11.16	Formwork	400	m2	210	83,920	
A 11.17	Rebar - allowance for 110kg/m3	13,187	kg	2.6	34,290	
A 11.18	Excavation	144	m3	100	14,390	
A 11.19	Backfill	24	m3	80	1,920	
A 11.20	Pad Footing; 700 x 700 x 450mm Deep	102	nr			
A 11.21	Concrete	20	m3	270	5,400	
A 11.22	Formwork	129	m2	240	30,840	
A 11.23	Rebar - allowance for 110kg/m3	2,199	kg	2.6	5,720	
A 11.24	Excavation	24	m3	100	2,400	
A 11.25	Backfill	4	m3	80	320	
A 11.26	Elevator Footing	1	sum	25,000	25,000	
A 11.27	Staircase Footing	4	nr	15,000	60,000	
A 11.28	Dewatering Allowance	3	mnts	5,000	15,000	
A 11.29	Perimeter Drainage	266	m	65	17,290	
A 11.30	Building Footprint	3,523	m2			
A12	**Basement Excavation**	**0**	**m3**	**0.00**	**0**	
A 12.01	Assume No Requirement					
A2	**STRUCTURE**				**9,807,000**	
A21	**Lowest Floor Construction**	**3,523**	**m2**	**77.21**	**272,000**	
A 21.01	Slab on grade; 125mm deep	3,523	m2			
A 21.02	Concrete	440	m3	270.00	118,900	
A 21.03	Rebar @ 40kg/m3	17,615	kg	2.60	45,800	
A 21.04	6mm poly moisture barrier	3,523	m2	7.00	24,660	
A 21.05	150mm deep granular fill	528	m3	90.00	47,560	
A 21.06	Finish	3,523	m2	10.00	35,230	
A22	**Upper Floor Construction**	**9,809**	**m2**	**682.64**	**6,696,000**	
	Structural Steel					
A 22.01	Steel Beams;					
A 22.02	W610x101	143,622	kg	7.50	1,077,170	Assumed Size
A 22.02	Connections	10	%	1,077,170.00	107,717	
A 22.03	Wastage	15	%	1,184,887.00	177,733	

Section 8 - Detailed Cost Analysis

Estimate - Option D - Steel Framing

Ref	Description	Qty	Unit	Rate	Total	Notes
	Steel Columns;					
A 22.04	HSS 203x203x13	59,664	kg	7.50	447,480	Assumed Size. Assumes 3.8m Floor-to-Ceiling Height
A 22.04	Connections	10	%	447,480.00	44,748	
A 22.05	Wastage	15	%	492,228.00	73,834	
	Steel Brace Beam Sections					
A 22.06	Steel Brace HSS 254x254x9.4	9,441	kg	7.50	70,810	
A 22.01	Steel Beams;					
A 22.07	W610x101	50,298	kg	7.50	377,240	Assumed Size
A 22.07	Connections	10	%	377,240.00	37,724	
A 22.08	Wastage	15	%	414,964.00	62,245	
	Steel Columns;					
A 22.09	HSS 305x305x13	92,915	kg	7.50	696,860	Assumed Size. Assumes 3.8m Floor-to-Ceiling Height
A 22.09	Connections	10	%	696,860.00	69,686	
A 22.10	Wastage	15	%	766,546.00	114,982	
	Composite Deck					
	Floor Panels;					
A 22.06	Purlin - W460x52	238,992	kg	7.50	1,792,440	
A 22.11	75mm Steel Composite Deck	9,260	m2	90.00	833,400	
A 22.11	90mm Concrete Topping	833	m3	270.00	225,020	
A 22.11	Finish	9,260	m2	15.00	138,900	
A 22.11	Fire-Proofing Allowance	9,260	m2	25.00	231,500	
A 22.12	Design Space	549	m2			
A 22.13	Allowance for stairs	13	flt	9,000.00	117,000	
A23	**Roof Construction**	**3,523**	**m2**	**805.85**	**2,839,000**	
	Structural Steel					
A 23.01	Steel Beams;					
A 23.02	W610x101	47,874	kg	7.50	359,060	Assumed Size
A 23.03	Connections	10	%	359,060.00	35,906	
A 23.04	Wastage	15	%	394,966.00	59,245	
	Steel Brace Beam Sections					
A 23.05	Steel Brace HSS 254x254x9.4	3,147	kg	7.50	23,600	
A 23.06	Connections	10	%	23,600.00	2,360	
A 23.07	Wastage	15	%	25,960.00	3,894	
	Steel Beams;					
A 23.08	W610x101	16,766	kg	7.50	125,750	Assumed Size
A 23.09	Connections	10	%	125,750.00	12,575	
A 23.10	Wastage	15	%	138,325.00	20,749	
	Roof					
A 23.10	Additional Framing to Penthouse	290	m2	400.00	116,000	Not detailed on Drawings
A 23.09	Fire-Proofing Allowance	290	m2	25.00	7,250	
	Floor Panels;					
A 23.11	Purlin - W460x52	227,042	kg	7.50	1,702,820	
A 23.12	75mm Steel Composite Deck	3,523	m2	90.00	317,070	
A 23.13	Finish	3,523	m2	15.00	52,850	
A3	**EXTERIOR ENCLOSURE**				**5,519,000**	
A31	**Walls Below Grade**	**0**	**m2**	**0.00**	**0**	
A 31.01	Assume Not Required					

Section 8 - Detailed Cost Analysis

Estimate - Option D - Steel Framing

Ref	Description	Qty	Unit	Rate	Total	Notes
A32	**Walls Above Grade**	**2,877**	**m2**	**549.88**	**1,582,000**	
A 32.01	Metal Cladding	2,877	m2			Assumes 4.2m Floor-to-Floor Height
A 32.02	Flat lock metal cladding	2,877	m2	500.00	1,438,500	Includes framing
A 32.03	25mm air space	2,877	m2	0.00	0	Assumes that the area of Cladding accounts for 62% of the total exterior wall area
A 32.04	1 layer semi rigid insulation	2,877	m2	40.00	115,080	
A 32.05	Vapour barrier	2,877	m2	10.00	28,770	
A33	**Windows & Entrances**	**1,760**	**m2**	**1,212.07**	**2,133,000**	
A 33.01	Curtain Wall System	1,760	m2	1,200.00	2,111,760	Assumes that the area of Glazing accounts for 38% of the total exterior wall area
A 33.02	Glazed aluminium door; double	2	nr	5,000.00	10,000	
A 33.03	Hollow Metal Door	1	nr	2,400.00	2,400	
A 33.03	Automatic door openers	2	nr	4,500.00	9,000	
A34	**Roof Covering**	**3,523**	**m2**	**305.14**	**1,075,000**	
A 34.01	SBS Roofing System	3,523	m2	290.00	1,021,670	
A 34.02	Allowance for cants, flashing and accessories	3,523	m2	15.00	52,850	
A35	**Projections**	**13,332**	**m2**	**54.68**	**729,000**	
A 35.01	Raised Roof					
A 35.02	Clerestory Window	395	m2	1,200.00	473,760	
A 35.03	Metal Cladding to Clerestory Window Area	231	m2		0	
A 35.04	Flat lock metal cladding	231	m2	500.00	115,500	
A 35.05	25mm air space	231	m2	0.00	0	
A 35.06	1 layer semi rigid insulation	231	m2	40.00	9,240	
A 35.07	Vapour barrier	231	m2	10.00	2,310	
A 35.08	16mm gypsum wall board - Type X	179	m2	45.00	8,040	
A 35.09	Metal Stud	179	m2	70.00	12,500	
A 35.10	16mm gypsum wall board - Type X	179	m2	45.00	8,040	
A 35.11	Sunshade Allowance	1	sum	100,000.00	100,000	
B	**INTERIOR**				**6,697,000**	
B1	**PARTITIONS & DOORS**				**2,835,000**	
B11	**Partitions**	**11,333**	**m2**	**229.51**	**2,601,000**	
11.10	**Gypsum Partition**					
B 11.11	16mm gypsum wall board - Type X	6,859	m2	45.00	308,670	
B 11.12	152mm stud	6,859	m2	70.00	480,160	
B 11.13	16mm gypsum wall board - Type X	6,859	m2	45.00	308,670	
	Furring					
B 11.14	16mm gypsum wall board - Type X	3,108	m2	45.00	139,860	
B 11.15	150mm mineral insulation	3,108	m2	55.00	170,940	
B 11.16	150mm stud	3,108	m2	70.00	217,560	
	Elevator Shaft Walls					
B 11.17	Masonry Wall	167	m2	250.00	41,800	
	Glazed Partition					
B 11.18	Internal Glazing	896	m2	500.00	448,000	
	Operable Partition					
B 11.19	Operable Partition	302	m2	800.00	241,920	
	Misc.					

Section 8 - Detailed Cost Analysis

Estimate - Option D - Steel Framing

Ref	Description	Qty	Unit	Rate	Total	Notes
B 11.20	Rough carpentry	1	sum	97,551.60	97,550	
B 11.21	Sealing and caulking	1	sum	48,775.80	48,780	
B 11.22	Furring and boxing	1	sum	97,551.60	97,550	
B12	**Doors**	**142**	**No**	**1,647.89**	**234,000**	
B 12.01	Aluminium Door with Glazing	72	nr	2,250.00	162,000	
B 12.02	Single Wood Door	68	nr	1,000.00	68,000	
B 12.03	Hollow Metal Door	2	nr	1,800.00	3,600	
B2	**FINISHES**				**2,266,000**	
B21	**Floor Finishes**	**12,230**	**m2**	**68.36**	**836,000**	
B 21.01	Carpet Tile	4,548	m2	55.00	250,140	
B 21.02	Resilient Flooring	7,036	m2	60.00	422,160	
B 21.03	Anti-static Flooring	646	m2	85.00	54,910	
B 21.04	Base	1	sum	109,081.50	109,080	
B22	**Ceiling Finishes**	**12,230**	**m2**	**99.92**	**1,222,000**	
B 22.01	Acoustic Ceiling Tiles	6,712	m2	50.00	335,600	
B 22.02	Painted GWB	3,676	m2	130.00	477,880	
B 22.03	Wood Grille	1,196	m2	300.00	358,800	
B 22.04	Unfinished	646	m2	0.00	0	
B 22.05	Bulkhead Allowance	1	sum	50,000.00	50,000	
B23	**Wall Finishes**	**17,351**	**m2**	**11.99**	**208,000**	
B 23.01	Paint	17,351	m2	12.00	208,210	
B3	**FITTINGS & EQUIPMENT**				**1,596,000**	
B31	**Fittings & Fixtures**	**13,332**	**m2**	**107.71**	**1,436,000**	
B 31.001	Allowance per Classroom	76	nr	15,000.00	1,140,000	
B 31.002	Allowance for Support Spaces	16	nr	2,000.00	32,000	
B 31.003	Handrail to Stairs	407	m	160.00	65,090	
B 31.004	Guardrail to Voids	459	m	200.00	91,800	
B 31.005	Windows Blinds to Exterior Glazing	1,760	m2	55.00	96,790	
B 31.005	Wayfinding	1	sum	10,000.00	10,000	
	Loose Furniture					Excluded
B32	**Equipment**	**13,332**	**m2**	**0.00**	**0**	
B 32.01	Servery Appliances / Gym Equipment					Excluded
B33	**Conveying Systems**	**4**	**stp**	**40,000.00**	**160,000**	
B 33.01	Passenger E\elevator - 1 no - 4 stops	4	stp	40,000.00	160,000	
C	**SERVICES**				**14,506,000**	

Section 8 - Detailed Cost Analysis

Estimate - Option D - Steel Framing

Ref	Description	Qty	Unit	Rate	Total	Notes
C1	**MECHANICAL**				**9,240,000**	
C11	**Plumbing & Drainage**	**13,332**	**m2**	**95.03**	**1,267,000**	
C 11.01	Allowance based on Benchmark Rates	13,332	m2	95.00	1,266,540	Allowance excludes washrooms but assumes sinks to the classrooms
C12	**Fire Protection**	**13,332**	**m2**	**45.00**	**600,000**	
C 12.01	Allowance based on Benchmark Rates	13,332	m2	45.00	599,940	
C13	**HVAC**	**13,332**	**m2**	**475.02**	**6,333,000**	
C 13.01	Allowance based on Benchmark Rates	13,332	m2	475.00	6,332,700	Includes allowance for cooling equipment
C14	**Controls**	**13,332**	**m2**	**78.01**	**1,040,000**	
C 14.01	Allowance based on Benchmark Rates	13,332	m2	78.00	1,039,900	
C2	**ELECTRICAL**				**5,266,000**	
C21	**Service & Distribution**	**13,332**	**m2**	**84.98**	**1,133,000**	
C 21.01	Allowance based on Benchmark Rates	13,332	m2	85.00	1,133,220	
C22	**Lighting, Devices & Heating**	**13,332**	**m2**	**189.99**	**2,533,000**	
C 22.01	Allowance based on Benchmark Rates	13,332	m2	190.00	2,533,080	
C23	**Systems & Ancillaries**	**13,332**	**m2**	**120.01**	**1,600,000**	
C 23.01	Allowance based on Benchmark Rates	13,332	m2	120.00	1,599,840	
D	**SITE & ANCILLARY WORK**				**0**	
D1	**SITE WORK - See Site Cost Plan**				**0**	
D2	**ANCILLARY WORK**				**0**	
D21	**Demolition**	**0**	**m2**	**0.00**	**0**	
D 21.01	No Work Required					
D22	**Alterations**	**0**	**m2**	**0.00**	**0**	
D 22.01	No Work Required					
	SUB-TOTAL: NET BUILDING WORKS				**37,186,000**	
Z1	**GENERAL REQUIREMENTS & FEE**				**5,764,000**	
Z11	**General Requirements**				**3,719,000**	
Z 11.01	Contractors General Requirements	10	%	37,186,000.00	3,719,000	
Z12	**Fee**				**2,045,000**	
Z 12.01	Contractors Fee	5	%	40,905,000.00	2,045,000	
	TOTAL: BUILDING WORKS ESTIMATE				**42,950,000**	
Z2	**ALLOWANCES**				**4,295,000**	
Z21	**Design Allowance**				**4,295,000**	
Z 21.01	Design Contingency	10	%	42,950,000.00	4,295,000	

Section 8 - Detailed Cost Analysis

Estimate - Option D - Steel Framing

Ref	Description	Qty	Unit	Rate	Total	Notes
Z22	**Escalation Allowance**				**0**	
Z 22.01	Tender Price Inflation	0.0	%	47,245,000.00	0	
Z 22.02	Construction Inflation	0.0	%	47,245,000.00	0	
Z23	**Construction Allowance**				**0**	
Z 23.01	Construction Contingency	0	%	47,245,000.00	0	
	TOTAL CONSTRUCTION COST (including inflation)				**47,245,000**	
TAX	**ASSESSMENT**	**0%**	**%**	**47,245,000.00**	**0**	
	Estimated Overall Construction Cost				**47,245,000**	

Appendix A - Area schedule

Estimate - Option A - Light Weight Wood Frame

LEVEL	Ground Floor	2nd Floor	3rd Floor	4th Floor	Mech Pent	TOTAL (m^2)	TOTAL (ft^2)	%
PERIMETER (m)	**266**	**266**	**266**	**266**	**88**			
Total GFA (m2)	**3,523**	**3,173**	**3,173**	**3,173**	**290**	**13,332**	**143,506**	**100%**
Total GFA (ft2)	**37,922**	**34,154**	**34,154**	**34,154**	**3,122**			
GIFA								
						0	**0**	**0%**
Classroom / Lab Space	1,759	1,759	1,759	1,759		**7,036**	**75,736**	**53%**
Project Space	273	273	273	273		**1,092**	**11,754**	**8%**
						0	**0**	**0%**
Service Space	105	105	105	105	226	**646**	**6,954**	**5%**
						0	**0**	**0%**
Circulation	990	639	639	639		**2,907**	**31,291**	**22%**
						0	**0**	**0%**
Stairwells	130	130	130	130	29	**549**	**5,909**	**4%**
						0	**0**	**0%**
TOTAL GIFA (m2)	**3,257**	**2,906**	**2,906**	**2,906**	**255**	**12,230**	**131,644**	**92%**
Walls / Shafts	266	267	267	267	35	**1,102**	**11,862**	**8%**
Last Report (m2)	**0**	**0**	**0**	**0**	**0**	**13,332**	**143,506**	
Movement (m2)	**3,523**	**3,173**	**3,173**	**3,173**	**290**			

Appendix A - Area schedule

Estimate - Option B - CLT Structure

LEVEL	Ground Floor	2nd Floor	3rd Floor	4th Floor	Mech Pent	TOTAL (m^2)	TOTAL (ft^2)	%
PERIMETER (m)	**266**	**266**	**266**	**266**	**88**			
Total GFA (m2)	**3,523**	**3,173**	**3,173**	**3,173**	**290**	**13,332**	**143,506**	**100%**
Total GFA (ft2)	**37,922**	**34,154**	**34,154**	**34,154**	**3,122**			
GIFA								
Classroom / Lab Space	1,759	1,759	1,759	1,759		**7,036**	**75,736**	**53%**
Project Space	273	273	273	273		**1,092**	**11,754**	**8%**
Service Space	105	105	105	105	226	**646**	**6,954**	**5%**
Circulation	990	639	639	639		**2,907**	**31,291**	**22%**
Stairwells	130	130	130	130	29	**549**	**5,909**	**4%**
TOTAL GIFA (m2)	**3,257**	**2,906**	**2,906**	**2,906**	**255**	**12,230**	**131,644**	**92%**
Walls / Void Space	266	267	267	267	35	**1,102**	**11,862**	**8%**
Last Report	**0**	**0**	**0**	**0**	**0**	**13,332**	**143,506**	
Movement	**3,523**	**3,173**	**3,173**	**3,173**	**290**			

Appendix A - Area schedule

Estimate - Option C - CLT Shearwalls With NLT/DLT/GLT Panels On Purlins

LEVEL	Ground Floor	2nd Floor	3rd Floor	4th Floor	Mech Pent	TOTAL (m^2)	TOTAL (ft^2)	%
PERIMETER (m)	**266**	**266**	**266**	**266**	**88**			
Total GFA (m2)	**3,523**	**3,173**	**3,173**	**3,173**	**290**	**13,332**	**143,506**	**100%**
Total GFA (ft2)	**37,922**	**34,154**	**34,154**	**34,154**	**3,122**			
GIFA								
Classroom / Lab Space	1,759	1,759	1,759	1,759		**7,036**	**75,736**	**53%**
Project Space	273	273	273	273		**1,092**	**11,754**	**8%**
Service Space	105	105	105	105	226	**646**	**6,954**	**5%**
Circulation	990	639	639	639		**2,907**	**31,291**	**22%**
Stairwells	130	130	130	130	29	**549**	**5,909**	**4%**
TOTAL GIFA (m2)	**3,257**	**2,906**	**2,906**	**2,906**	**255**	**12,230**	**131,644**	**92%**
Walls / Void Space	266	267	267	267	35	**1,102**	**11,862**	**8%**
Last Report	**0**	**0**	**0**	**0**	**0**	**13,332**	**143,506**	
Movement	**3,523**	**3,173**	**3,173**	**3,173**	**290**			

Appendix A - Area schedule

Estimate - Option D - Steel Framing

LEVEL	Ground Floor	2nd Floor	3rd Floor	4th Floor	Mech Pent	TOTAL (m^2)	TOTAL (ft^2)	%
PERIMETER (m)	**266**	**266**	**266**	**266**	**88**			
Total GFA (m2)	**3,523**	**3,173**	**3,173**	**3,173**	**290**	**13,332**	**143,506**	**100%**
Total GFA (ft2)	**37,922**	**34,154**	**34,154**	**34,154**	**3,122**			
GIFA								
Classroom / Lab Space	1,759	1,759	1,759	1,759		**7,036**	**75,736**	**53%**
Project Space	273	273	273	273		**1,092**	**11,754**	**8%**
Service Space	105	105	105	105	226	**646**	**6,954**	**5%**
Circulation	990	639	639	639		**2,907**	**31,291**	**22%**
Stairwells	130	130	130	130	29	**549**	**5,909**	**4%**
TOTAL GIFA (m2)	**3,257**	**2,906**	**2,906**	**2,906**	**255**	**12,230**	**131,644**	**92%**
Walls / Void Space	266	267	267	267	35	**1,102**	**11,862**	**8%**
Last Report	**0**	**0**	**0**	**0**	**0**	**13,332**	**143,506**	
Movement	**3,523**	**3,173**	**3,173**	**3,173**	**290**			

Appendix B - Information used register

Document Type	Author	Document Ref.	Title / Description	Date	Revision
Architectural					
PDF	thinkspace		4 Storey School Prototype - 2019-04-11 - Appendix A	04-11-19	
PDF	thinkspace		Wood Prototype Option A RCP		
PDF	thinkspace		Wood Prototype Option B&C RCP		
Structural			School Prototype - 2019 10 11 - Option A - Light Wood Frame	2019 10 11	
PDF	Fast + Epp		School Prototype - 2019 10 11 - Option B - CLT Structure Layout -	2019 10 11	
PDF	Fast + Epp		School Prototype - 2019 11 10 - Option C - CLT Shearwalls w plywood diaphragm - Final	2019 10 11	
PDF	Fast + Epp		School Prototype - 2019 10 17 - Option D - Steel Framing	2019 10 17	
Mechanical					
			No Information Issued		
Electrical					
			No Information Issued		
Civil					
			No Information Issued		