UBC Social Ecological Economic Development Studies (SEEDS) Student Report

Life Cycle Assessment of the New Student Union Building (SUB) Project Ahmed Attieh, Andrew Chutskoff, Brandon Clague, Jonathan Bridle, Tyler Hawkins CIVL 498 November 14, 2012

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PROVISIO

This study has been completed by undergraduate students as part of their coursework at the University of British Columbia (UBC) and is also a contribution to a larger effort – the UBC LCA Project – which aims to support the development of the field of life cycle assessment (LCA).

The information and findings contained in this report have not been through a full critical review and should be considered preliminary.

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Life Cycle Assessment of the New SUB Project

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Abstract

The University of British Columbia's New Student Union Building is to be completed for use by September 2014. It's 222,000 square feet will cost approximately \$103 million, 78% funded by UBC student fees. UBC aims for the New SUB to be LEED Platinum rated an example of UBC's commitment to sustainability, climate change action, and green building innovation.

This Life Cycle Assessment quantifies the environmental impacts associated with the building's materials and energy use as represented in the Issued for Construction drawings dated May 7, 2012. Specifically, we did material takeoffs of the foundations, columns & beams, floors, interior walls, exterior walls and roofs using OnCenter's Onscreen Take-off software. Environmental impacts were then estimated using Athena's Impact Estimator software for the following impact categories: acidification potential, eutrophication potential, fossil fuel consumption, global warming potential, human health criteria, ozone depletion potential, and smog potential.

Sensitivity analysis found that concrete played far and away the largest role in determining environmental impacts. Specifically the use of a 35% fly ash concrete mix, compared to a 9% mix (the minimum accepted for input by the Athena software), will reduce the whole building's associated CO2 emissions by 7.4%, an estimation which likely confirms the concrete supplier's claim of 35% vs 0% achieving a 10% reduction.

This LCA is a preliminary student analysis with rough estimations and not absent of assumptions. However it is intended to be useful both through material impact comparisons and as a baseline study for further evaluation.

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1.0 Introduction

In 1940, the University of British Columbia built Brock Hall to house and host the organizations and social events of its 3,339 strong student population at a cost of \$80,000 (\$1.6 million in today's dollar, adjusted for inflation), raised through student donations and a grant from the board of governors alongside the family of the recently deceased Dr. R.W. Brock, the former Dean of Applied Science.

In 1968, with UBC's student population raised to 28,000, the current Student Union Building was built. Cost: \$5 million, \$3.5 million of which was paid by a \$15 dollar increase in alma mater society student fees (for some number of years, unknown). At that time the SUB included a bank, a barber shop and a bowling alley, but sadly perhaps, no pub, that would come later, partially spurred on by David Suzuki.

In 2008 with the student population approaching 45,000, UBC needed another student union building (SUB).

1.1 The New SUB Project

Canon Design was hired by the Alma Mater Society (AMS), representing UBC students, as renovation consultants. After study, they presented three options: *i*. completely renovate the current SUB, *ii*. partially renovate and partially expand, or *iii*. build a whole new SUB (accompanied by minor current SUB renovations), all at roughly the same price. The AMS council approved the third unanimously and in April 2008 students approved by referendum a fee starting at \$20/year and increasing by \$10/ year until 2016/2017 in order to raise \$80 million of the total budget of \$103 million for this New Student Union Building. In late April 2010, 2800 + students voted to hire Bing Thom Architects, Busby Perkins+Will, and Hotson Bakker Boniface Haden (now Dialog+BH) as the principal architects to draft the designs of the building. Those drawings were (mostly) completed in January 2012.

Construction began in February 2012 and expected completion is September 2014. UBC Properties Trust acts as the project manager (the land owners, privately owned by UBC) with the Alma Mater Society representing UBC students' stake (\$80 mil of \$103 mil) as the primary client. Bird Construction acts as the construction managers. The primary consultants are Reed Jones Christofferson (Structural) AME (Mechanical) and Applied Engineering Solutions (Electrical). The consulting team includes an additional 13 firms responsible for accessibility, acoustics, building

code, building envelope, civil, commissioning, costing, landscape, LEED, specifications, surveying and sustainability.

The primary functional areas include: 60,000 sq ft of social and recreation space, 10,000 sq ft of bookable space, 36,000 sq ft of club office space, and 20,000 sq ft of food and retail. Along with the secondary functional areas the total gross square foot area of the building is 222,000 sq ft, 150% of the size of the current SUB. In addition it will feature a brew pub, a two story climbing wall, a hanging nest theatre, and sustainability themed art installations.

1.2 Building Characteristics

The design of the New SUB incorporates numerous structural, envelope and aesthetic materials and assemblies. The general building characteristics are detailed in Table 1.

| Building System | Specific Building Characteristics |
|-----------------|---|
| Structure | Cast in place concrete footings, columns and slab on grade. Glulam columns and beams. |
| | Structural steel columns and beams. |
| Floors | Cast in place concrete suspended slabs with slab bands. Composite metal deck with |
| | concrete topping. |
| Interior Walls | Light gauge steel stud framing with regular, moisture resistant, or Type X gypsum board. |
| | Light steel gauge steel stud framing with gypsum board and mineral wool or fiberglass |
| | acoustic insulation. Concrete block wall. Fire rated shaft wall system. |
| Exterior Walls | Below grade: Cast in place concrete walls with waterproof membrane. |
| | Above grade: Light gauge steel stud framing, exterior gypsum sheathing, peel and stick |
| | membrane, mineral fibre cavity wall insulation, air barrier and glass fibre reinforced |
| | concrete panels, aluminum cladding, zinc cladding, exterior insulation and stucco system |
| | or louvered wall. |
| Windows | Exterior: Aluminum framed curtain wall with double glazed low-E argon filled, or triple |
| | glazed argon filled glazing. Opaque glass spandrel panels. |
| | Interior: Aluminum store front with 6mm laminated glass or 13mm tempered glass |
| | panels. |
| Roof | Cast in place concrete, metal deck, composite metal deck, acoustical metal deck, or cross |
| | laminated timber panel with polyisocyanurate board insulation and SBS membrane. |
| Mechanical | Natural ventilation. Heat reclamation (from mechanical rooms and kitchen exhausts). |
| | Solar thermal panels. In slab hot water heating. |

Table 1: Building Characteristics of the New SUB

1.3 Sustainability Claims

From the beginning of the process, UBC, the AMS, and the New Sub Committee all pledged allegiance to sustainability in various forms. As cited by BC and UBC's current stated sustainability goals and mandates, new UBC buildings will:

- Achieve a minimum LEED gold standard as per the Province of BC's Energy Efficient Buildings Strategy (2008, with regards to new government buildings).
- Achieve 11 of those 60 mandated LEED credits through LEED's energy & atmosphere category (UBC's Technical Guidelines).
- Reduce greenhouse gas emissions levels to 33% below 2007 levels. (UBC's 2010 Climate Action Plan).
- Divert 50% of campus waste from construction of new institutional buildings from the landfill.
- Reduce water consumption in institutional buildings by 40% from 2000 levels.
- And, reuse/ recycle existing materials, or else include recyclable materials, or use "green/ sustainable materials", as verified by a third party. (All from UBC's February 2010 Climate Action Plan and UBC Sustainability's Technical Guidelines).

Additionally, the New Sub Committee has stated aims to exceed the mandates by:

- Building not a LEED Gold but rather a LEED Platinum building (80 points minimum compared to 60 points).
- Designing the structural elements for a 100 year life span and interior elements for a 50 year life, i.e. for durability and adaptability.
- Using no materials which might threaten human or ecological health or rights (International Labour Organization etc.).
- Produce a building which will have a "net positive ecological impact" on energy, water, and local ecosystems.
- Provide a healthy culturally enriching environment for students (including 100% of rooms receiving natural sunlight). (From UBC's technical guidelines.)

For example, in conversation with the architects we discovered that the interior spaces and facade have been designed to be predominantly free from structural importance (in fact the first floor façade's foundation is to be entirely separate from the rest of the building), enabling easy

future retrofits in the interests of changing functionality and changing perceptions of aesthetics. Furthermore they're using a Portland lime cement mix with reduces the cement content in concrete by a minimum of %35 and is claimed by its producer to reduce greenhouse gas emissions from associated production by 10%. This claim is further evaluated in the sensitivity analysis of our report.

2.0 Goal and Scope

In accordance with the ISO 14040 and 14044 standards, this report will provide sections to describe the Goal and Scope. The following Goal and Scope section outlines the details of the LCA study that was carried out on the New UBC Student Union Building.

The Goal & Scope is critical to documenting the context and guiding an LCA study's execution. The purpose of defining the Goal of the study is to unambiguously state the context of the study, whereas the Scope details how the actual modeling of the study was carried out. For this New SUB LCA study report, the format immediately below has been used to unambiguously outline the details of the parameters outlined in ISO 14040 and 14044.

Parameter Name Parameter definition.

Details of how this item is defined for the New SUB Building LCA study.

This format has been followed throughout the Goal & Scope in order to provide the audience with an explanation each parameter and transparently state how it is defined for the New SUB LCA study.

2.1 Goal of Study

The following are descriptions for a set of parameters which unambiguously state the context of the New SUB LCA study.

Intended application

Describes the purpose of the LCA study.

This LCA study will be used to evaluate the environmental impacts of the new SUB building.

Reasons for carrying out the study Describes the motivation for carrying out the study.

The report itself is an educational asset to help disseminate education on LCA and help further the development of this scientific method into sustainability in building construction practices at UBC and the green building industry as LCA is rapidly gaining acceptance at all scales of sustainable construction standards and corporate social responsibility policy.

Intended audience

Describes those who the LCA study is intended to be interpreted by.

The results of this study are to be primarily communicated to the public. In addition to the general public, the LCA report is intended to be communicated to industry and governments groups observing and involved in green building, as LCA is an emerging topic of significance in this area. The results should also be helpful for projects stake holders such as the UBC Alma Mater Society and the New SUB Committee (project clients) representing UBC Students generally, UBC Properties Trust (project managers), and Dialog & B+H (the principal architects) and Bird Construction (acting as construction managers).

Intended for comparative assertions

State whether the results of this LCA study are to be compared with the results of other LCA studies.

The results of this LCA study are not intended for comparative assertions. However; it will act as a benchmark to be used to drive development toward performance based green design, and potentially further LCA(s) likely to be conducted of this building.

2.2 Scope of Study

Product system to be studied

Describes the collection of unit processes that will be included in the study.

A unit process is a measurable activity that consumes inputs and emits outputs as a result of providing a product or service. The main processes that make up the product system to be studied in this LCA study are: the manufacturing of construction products (Figure 1)), the construction of a building (Figure 2), maintenance (a combination of demolition, manufacturing and construction itself), operating energy (Figure 3) and expected demolition (Figure 4). These three processes are the building blocks of the LCA models that have been developed to describe the impacts associated with the New SUB. The unit processes and inputs and outputs considered within these three main processes are outlined below.



Figure 1: Generic unit processes considered within Construction Product manufacturing process by Impact Estimator software



Figure 2: Generic unit processes considered within Building Construction process by Impact Estimator software



Figure 3: Generic unit processes considered within Energy Production process by Impact Estimator software



Figure 4: Generic unit processes considered within Building Demolition process by Impact Estimator software

As seen in the above figures, the inputs and outputs occurring at the various stages in a buildings life cycle are captured. The construction product manufacturing, building construction processes, energy production processes, building maintenance process, and the building demolition unit process capture the capture the cradle to grave process. The organization of these processes into the product systems to describe the environmental impacts of the new building requires the definition of a system boundary. Thus, the product system studied in this new SUB building LCA study is further defined in the system boundary section below.

System boundary

Details the extent of the product system to be studied in terms of product components, life cycle stages, and unit processes.

This study includes the construction products used to create their structures and envelopes. This indicates that product components must be defined and the materials within the products studied.

The material product components (i.e. building assemblies) that were included from the products (i.e. buildings) are the footings, slabs on grade, walls, columns and beams, roofs, as well as all associated doors and windows, gypsum board, vapour barriers, insulation, cladding, roofing, and curtain walls. These material product components are in turn assemblies of construction product



Figure 5: System boundary for Renovation and Building New scenarios

The life cycle stages we consider with regards to the New Student Union Building include those spanning from cradle-to-grave. The process begins from site preparation, starting with resource extraction and manufacturing of construction products, the building construction process then it goes to the maintenance and operating energy phase and it ends with building demolition process.

Functions of the product system

Describes the functions served by the product focused on in the LCA study.

A description of the New SUB's major functions has been outlined in the introduction of this report.

Functional unit

A performance characteristic of the product system being studied that will be used as a reference unit to normalize the results of the study.

The functional units used in this study to normalize the LCA results for the New SUB include:

- per gross square foot area constructed
- per cubic foot constructed
- per specific functional use area

Further discussion of these functional units and their application are contained in the Impact Assessment sub-section under Functions and Impacts.

Allocation procedures

Describes how the input and output flows of the studied product system (and unit processes within it) are distributed between it and other related product systems.

The problem of allocation arises in three situations – i) when a process produces more than one product, ii) a waste treatment process collectively treats multiple waste products and iii) when materials are recycled or reused in subsequent life cycles. An allocation problem arises in these situations because the input and output flows from the processes must be shared amongst the products and subsequent life cycles.

In this study, the cut-off allocation method was used, which entails that only the impacts directly caused by a product within a given life cycle stage are allocated to that product. The LCA starts from extracting the raw material and doesn't include the process that the raw material is created and ends with the demolition phase and doesn't include the treatment of the demolished materials.

Impact assessment methodology and categories selected State the methodology used to characterize the LCI results and the impact categories that will address the environmental and other issues of concern.

The primary impact assessment method used in the New SUB LCA study was the Athena Impact Estimator developed by the Athena Institute with input and database information/ characterization factors from the Tool for the Reduction and Assessment of Chemical and other environmental Impacts (TRACI), developed by the US Environmental Protection Agency (US EPA).

The impact categories selected and the units used to express them (i.e. category indicators) are listed below.

- Acidification potential H⁺ mol equivalents
- Eutrophication potential kg N equivalents
- Fossil fuel consumption MJ
- Global warming potential kg CO₂ equivalents
- Human health respiratory effects potential kg PM₁₀ equivalents
- Ozone depletion potential kg CFC⁻¹¹ equivalents
- Smog potential kg O₃ equivalents

Short descriptions of each of these impact categories are provided in the Impact Assessment sub-section in Results and Interpretation.

Interpretation to be used

Statement of significant issues, model evaluation results and concluding remarks.

Analysis and discussions of uncertainty, sensitivity, and functional units of this LCA study are contained in the Results and Interpretation section of this report, whereas concluding remarks are contained in the Conclusion.

Assumptions

Explicit statement of all assumptions used by the modeller to measure, calculate or estimate information in order to complete the study of the product system.

As with data sources, there were two main areas where assumptions were integrated, which include – performing materials takeoffs of building assemblies and those contained within the Impact Estimator.

The details of the methods used in completing the material take offs on the building drawings are summarized in the Model Development section of this report.

All of the inputs and assumptions associated with interfacing these takeoffs with the Impact Estimator are documented in the Input Document (Appendix A) and the Assumptions Document (Appendix B) Assumptions were typically required in the development of building assembly information due to missing information as well as limitations in construction product Life Cycle Inventory (LCI) data and assembly characteristics in the Impact Estimator.

Assumptions regarding the completion of take offs to estimate material use, referenced LCI data and transportation networks have all been developed by the Athena Institute and are built into the Impact Estimator version 4.2 This information is proprietary; however, parts can be accessed through the inner workings report found on the Athena Institute webpage.¹

Value choices and optional elements

Details the application and use of normalization, grouping, weighting and further data quality analysis used to better understand the LCA study results.

Value choices and optional elements were not included in this study due to limited time and resources; however, this report does provide sufficient documentation for its audience to carry out these types of analyses.

Limitations

Describe the extents to which the results of the modeling carried out on the product system accurately estimate the impacts created by the product system defined by the system boundary of the study.

The following limitations should be considered when interpreting the results of this LCA study: System Boundary – Any of the impacts created or avoided through the reuse, recycling or waste treatment of the construction or demolition wastes emitted were outside the scope of this study.

Data Sources and Assumptions – This LCA study used original architectural and structural drawings obtained to develop information on the building assemblies in the partial construction of the New SUB. The resulting LCA models are specific to this building as their bill of materials

reflect its unique design. Furthermore, the life cycle inventory flows and their characterization predominantly reflect averages of industry processes and their impacts for North America.

¹–V4.1 Software and Database Overview

http://www.athenasmi.org/wp-content/uploads/2011/10/ImpactEstimatorSoftwareAndDatabaseOverview.pdf

Data quality requirements

Qualitative and quantitative description of the sourced data used in the study including its age, geographical and technological coverage, precision, completeness, reproducibility and uncertainty.

The sources of data used in the development of this LCA study include those used to estimate results for the bill of materials, life cycle inventory (LCI) flows and the characterization of LCI flows.

Bill of materials - Architectural and structural drawings were obtained to develop information on the building assemblies. The precision of the quantity take offs does rely somewhat on the quantity takeoffs built into the Impact Estimator, as the quantity take offs from the drawings are input and completed by the Impact Estimator. However, the use of the Impact Estimator does enable these results to be reproduced due to all results being documented in the Inputs and Assumptions Documents contained in Appendix A and B in this report.

LCI flows – The Athena LCI Database was the source of LCI data. The quality of the data and modeling assumptions used to develop the Athena LCI Database (which is built into the Impact Estimator) was outside the time and resource constraints of this study. However, some of this information can be accessed through the Athena Institute webpage's Software database overview and the LCI Databases². Generally speaking, this database is specific to the current North American context, and thus does create some geographic and temporal limitations on this study. For instance, i) The construction product manufacturing as well as fuel refining and production LCI data is based on North American averages ii) The transportation matrix that estimates distances and modes for construction product transportation as well as construction and demolition wastes is specific to Vancouver, British Columbia iii) The LCI data and modeling parameters in the Impact Estimator were developed by the Athena Institute to reflect current circumstances and technologies.

Characterization factors – Documentation of the US EPA TRACI impact assessment method can be found on the US EPA website³. Generally speaking, this method characterized LCI flows to reflect their potential to cause damage on average in North America. Qualitative discussion of

² <u>http://www.athenasmi.org/our-software-data/lca-databases/</u>

³ US EPA TRACI documentation - http://www.epa.gov/nrmrl/std/traci/traci.html

the uncertainties present in the impact assessment results are contained in this report in the Impact Assessment sub-section of Results and Interpretation.

Type of critical review

A review of the methods, data, interpretations, transparency, and consistency of the LCA study.

A critical review has not been carried out in the study; however, every effort has been made to be transparent about how the LCA study was developed.

Type and format of the report required for the study Statement of the type and format followed by the report.

This report followed the final report outline provided by Rob Sianchuk - the instructor of the LCA course this project was carried out under in the UBC Civil Engineering department.

3.0 Model Development

The impact assessment model is developed from both the structure and envelope of the building, as well as the operational energy use of the building. The Athena Impact Estimator (IE) was the program used to generate the model of the New SUB Project.

3.1 Structure and envelope

The structure and envelope portion of the model considers the physical materials incorporated into the structure.

3.1.1 Material Take-off Development

The initial phase of the Life Cycle Assessment was the material take-off, the quantifying of all materials included within the scope of the study. To complete this, OnCenter's Onscreen Take-off (OST) software was utilized.

The OST software is a tool in which digital drawings are uploaded and serve as a backdrop for digitizing. Area, line and/or count conditions are created and elements of interest are traced, while the software utilizes the selected scale to output the measurements of the traced areas (Figure 6).



Figure 6: On Screen Takeoff User Interface

Each condition has subsequent input fields where height, thickness and slope can be set to enable OST to generate the final quantities of interest as seen in Figure 7. Unlimited conditions can be created and organized through the use of layers and folders and the cumulative results can be displayed in the take-off tab of the software. Results can then be read directly from OST or exported in a spread sheet format for further organization/ manipulation in a program such as Excel.

| <u>Style</u> Linear <u>Name</u> Perimeter <u>General</u> <u>Ad</u> Dimension <u>H</u> eight | Wall_GFRC Cladding_EW1_4300h vanced 4.300 Thickness | ▼ 🔍 | <u>T</u> ype La <u>v</u> er <u>C</u> ond. No. | Default 35 | |
|---|---|-----------|---|---------------|-----|
| Name Perimeter | Wall_GFRC Cladding_EW1_4300h vanced 4,300 Thickness | Slope : | La <u>v</u> er <u>C</u> ond. No. | Default 35 | |
| <u>G</u> eneral <u>A</u> d Dimension <u>H</u> eight | 4.300 Thickness | Slope : | <u>C</u> ond. No. | 35 | |
| <u>G</u> eneral <u>A</u> d Dimension <u>H</u> eight | 4,300 Thickness | Slope : | | | |
| <u>H</u> eight | 4,300 Thickness | Slope : | | | |
| | | ← | | | |
| Appearance | | | | | |
| Color | Patte <u>r</u> n 🔲 Transparent | • | | | |
| Results | | | | | |
| Quantity 1 | Length | ▼ UOM m ▼ | | | |
| Quantity 2 | (no result) | • | | | |
| Quantity 3 | (no result) | • | | | |
| Notes | | | | | |
| EW1 | | | | - | • |
| 13mm GFRC Horizontal S | Panel uspension Rail | | | | - |
| Previous | Next | ОК | C | ancel App | bly |

Figure 7: On Screen Takeoff - Condition Properties Window

When creating conditions in OST the general nomenclature was used:

Assembly Group _ Assembly Type _ Assembly Name _ Additional Descriptors

For example, the condition entitled "Exterior Wall _ GFRC Cladding _ EW1 _ 4300h" corresponds to an exterior wall with GFRC cladding. The assembly is defined as "EW1" in the architectural drawings and has a height of 4300mm.

Since several OST conditions were combined to produce single inputs in the IE the nomenclature was modified slightly to better represent the input logic used for the modeling:

Assembly Group _ Modeled Assembly Sub-Structure _ Assembly Name _ Additional Descriptors

The modified nomenclature for the above example appears as following "Exterior Wall _ Steel Stud _ EW1 _ GFRC Cladding".

The modified nomenclature is used in both the IE software and the inputs and assumptions document. Correlation can be made from the OST nomenclature and the modified nomenclature by use of the Assembly Group, and the Assembly Name.

Area, line and count conditions are the basis of all the material take-off conducted but were utilized in different ways to generate the results of interest, the details of which are described in section 3.1.2 Material Take-off Assumptions of this report.

The material-takeoff component was complete with no significant challenges. Since The NEW SUB is currently in construction the drawings were developed, detailed, clear and complete. Being provided the architectural drawings (Issued for Construction, May 7, 2012), specifications (Issued for Construction, May 7, 2012), schedules (Issued for Construction, May 7, 2012) and structural drawings (Issued for Construction, May 7 2012) we were able to extract all of the required information.

3.1.2 Material Take-off Assumptions

This section further defines the take-off methods used for the different assembly groups as defined by the Athena Impact Estimator as well as the underlining assumptions which were made during modelling. The specific modeling inputs and assumptions for each input in the IE can be found in Appendix A and Appendix B respectively.

3.1.2.1 Foundations

The Foundation assembly group includes the slab on grade (SOG), strip footings, pad footings and core footings as classified in the IE.

Area, linear and count conditions were used in the most basic form to complete the footing take-off. Area to measure the SOG and irregular shaped core footings, linear to measure the length of strip footings and count to count the different types of standardized pad footings. Conditions were created for the different footing depths so volumes could be determined.

The footing inputs in the IE are restricted to specified depths which did not always correspond to the actual depth. Because of this the unrestricted inputs were adjusted to maintain the overall volume of the structural element as described below.

Slab on grade input is limited to 100mm and 200mm thickness, for this building, it was primarily 125mm and 225mm thick slabs. In order to correlate the correct volumes, the area was factored up as the thickness of 100mm was chosen. There is no allowance to select reinforcement for this area.

Strip footings were input as long linear sections. No input restrictions were encountered during modeling and so the appropriate length, width and height were entered into the IE.

Concrete footings are limited to a range of 190 to 500mm thick in the Impact Estimator. The majority of footings were thicker than this, therefore the width of the footings were increased to make the equivalent volume of concrete match. Multiple identical footings were input by multiplying the length of the footing by the number of footings counted. Rebar size was primarily 25M and 30M in the footings however the inputs were limited to 20M.

3.1.2.2 Beams and Columns

The Beams and Columns assembly group includes all concrete columns (beams are included in the floor assembly group as slab bands were utilized in the design), all glulam columns and beams, and structural steel columns and beams (not included in the composite metal floor and roof assemblies)

Count conditions were used in OST to track the quantity of each column type, and area conditions were used to determine the supported area of the columns.

The IE uses the following primary input variables: number of beams, number of columns, floor to floor height, bay size, span and live load. Due to the irregular layout of columns and supported areas the average bay and span spacing was used by taking the square root of the total supported floor area divided by the number of columns supporting the area. Furthermore, the IE assumes an average flyash content for concrete columns and was unable to be changed to %35 as per drawing specifications.

3.1.2.3 Floors

The Floor assembly group is defined as any horizontal structural component confined by the exterior walls of the building. This includes both suspended concrete slabs and composite metal deck structures.

The area conditions in OST were used to quantify the floor slabs and to determine total material volume a layered approach was taken. The entire area of a given floor was measured and assigned the minimum thickness found in the slab. Any areas with a thickness above the minimum were subsequently measured and the difference in thickness was used to calculate the extra/over volume. While the take-off was conducted in this manor, the IE only utilizes the plan area for suspended slab inputs.

Due to the irregular layout of suspended slabs, the measured total area was divided by the average span to determine the floor width to be input in the IE.

The specified concrete strength for suspended slabs is 35MPa which was modeled as 30MPa as it was the closest available input in the IE.

3.1.2.4 Interior walls

Interior walls consist of all walls within the building envelope including steel stud, wood stud, shaft walls, masonry walls, concrete walls and interior curtain walls. The components from sub structure up to and including paint were considered. Additional wall finishes such as decorative wood or acoustic panels were beyond the scope of this study.

The interior wall take-off consisted of three parts. Linear conditions were used on the plan drawings to measure the length of a wall type (including all doors and window openings) and the subsequent "height" field was filled with the appropriate height so the total wall area could be generated. Area conditions were used on the elevation drawings to measure the window area within the walls and count conditions were used on the plan drawings to count the doors within the walls.

Conditions were created for each wall type, each window type within a given wall type and each door type within a given wall type. Figure 8 illustrates the condition combinations used to quantify a given wall assembly.

| Name | Height | Quantity 1 | UOM1 | Quantity 2 | UOM2 | |
|---|----------------------------|------------|------|------------|------|---|
| InteriorWall_SteelStud_W6-22_4300 | 4,300 mm | 37 | m | 0 | | |
| InteriorWall_SteelStud_W6-22_6100 | 6,100 mm | 12 | m | 0 | | |
| InteriorWall_SteelStud_W6-22_Door_HollowMetal | 0 mm | 2 | EA | 0 | | Γ |
| InteriorWall_SteelStud_W6-22_Door_Wood | 0 mm | 2 | EA | 0 | | |
| InteriorWall_SteelStud_W6-22_Window_GL1 | 0 mm | 19 | m ² | 3 | EA | Γ |

Figure 8: On Screen Take-Off - Interior Wall Conditions for a Given Wall Type

There were several underline assumptions made to all interior wall material take-offs.

- Wall heights were assumed to span floor to floor and no reduction was made for slab thickenings or slab bands.
- Doors were modeled as standard 812mm x 2133mm size. Double doors were counted as two standard doors.

- The specified abuse resistant gypsum board in corridors to a height of 1200mm above finished floor was ignored due to the inability of the IE to model different materials for a given layer.
- Bulk heads and dropped ceilings were not included in the scope of this study.

Due to the limited size of the IE data base surrogate materials were required to model particular interior wall components. Surrogates were materials selected with the most similar material products. In the worst case some components could not be modeled at all. Table 2 lists the most common surrogates used for the interior walls

| Material Specification | IE Surrogate Material |
|--------------------------------------|---|
| Black Mat Acoustical Blanket | Rockwool Bat Insulation (50mm) |
| Coated Glass Mat Backer Board (16mm) | Moisture Resistant Gypsum Board (16mm) |
| Fireboard (16mm) | Type X Fire Resistant Gypsum Board (16mm) |
| Steel C-H Studs (100mm, 152mm) | Steel Stud (92mm, 152mm) |
| Steel Furring Channel (22mm, 41mm) | Steel Stud (92mm, 92mm) |
| Shaft Liner (19mm) | Type X Fire Resistant Gypsum Board (16mm) |
| Acoustic Sealant | Omitted from Study |
| Fabric Wrapped Acoustic Panels | Omitted from Study |
| Veneer Plywood Panels | Omitted from study |

Table 2: IE Surrogates for Interior Wall Components

3.1.2.5 Exterior Walls

The exterior wall assembly group consists of all exterior facing walls and roof parapets (the projection of exterior wall above the roof line). The components from sub structure up to and including the exterior finishes were considered.

The exterior wall take-off consisted of three parts. Linear conditions were used on the plan drawings to measure the length of a wall type (including all doors and window openings) and the subsequent "height" field was filled with the appropriate height so the total wall area could be generated. Area conditions were used on the elevation drawings to measure the window area (for punch windows only, curtain walls were measured linearly) within the walls and count conditions were used on the plan drawings to count the doors within the walls. Careful consideration of wall height had to be made when conducting the exterior wall take-off. For a systematic approach, the assemblies were broken down on a floor by floor basis. The elevation and sections drawings were used to identify the given height of a wall type which was then measured on the plan view, one condition for each height. The area was generated from the length and height for each condition and the final quantity for each assembly was generated by the sum of these areas. Once the total area was determined for a given wall type, it was divided by the total length of that wall type to approximate the average height for input into the IE.

There were no general assumptions applied to all exterior wall types, however, due to the limited size of the IE data base surrogate materials were required to model particular exterior wall components. Surrogates were materials selected with the most similar material products. Table 3 lists the most common surrogates used for the exterior walls.

Table 3: IE Surrogates for Exterior Wall Components

| Material Specification | IE Surrogate Material |
|--|--|
| Aluminum Louver Cladding | Steel Cladding – Commercial (26Ga) |
| Corrugated Plastic Drainage Sheet | Polyethylene Vapor Barrier (6mil) |
| Curtain Wall – Double Glazed, Low-E, Argon | Curtain Wall – Double Glazed Standard |
| Curtain Wall - Triple Glazed Argon | Curtain Wall – Double Glazed Standard |
| Fiberglass Faced Exterior Sheathing (16mm) | Moisture Resistant Gypsum Board (16mm) |
| GFRC Cladding | Fibre Cement Siding |
| High Density Polyethylene Drainage Mat | Polyethylene Vapor Barrier (6mill) |
| HSS Support Framing | Heavy Gauge, Load Bearing Steel Stud |
| Mineral Fibre Board Insulation | Rockwool Batt Insulation |
| Prefinished Aluminum Cladding | Steel Cladding – Commercial (26Ga) |
| Protection Board (25mm) | Extruded Polystyrene Insulation (25mm) |
| Self-Adhesive Air/Vapour Barrier | Polyethylene Vapor Barrier (6mil) |
| Spray Applied Rubber Transition Membrane | EPDM Membrane |
| Standing Seam Zinc Roof Wall | Steel Cladding – Commercial (26Ga) |
| Torch-on Sheet Waterproofing | 2-ply SBS membrane |

3.1.2.6 Roofs

The roof assemblies include all horizontal surfaces exposed to exterior space including roofs, terraces, and patios and soffits. The components from sub structure (excluding beams except for composite deck, and wood truss assemblies) up to and including the exterior finishes were considered.

The roof take-off utilized the area condition to measure the roof area from the plan drawings. If the roof contained a slope, it was determined from the sections/elevations and input into the "slope" field of the area condition. With this information, the OST software automatically adjusts the measured plan area to account for the roof slope.

All of the roofing assemblies utilized a modified bitumen membrane which was modeled with a pre-defined envelope assembly in the "Modified Bitumen Membrane Roofing System" category of the IE. To determine the materials included in this assembly an isolated system was created and bill of materials generated. As a result it was noted that the pre-defined system includes a modified bitumen membrane, protection board, insulation, and roof sheathing. Furthermore, it was noted that the insulation quantity is the only one which varied with the input thickness and so the specified roof insulation thickness was used as the governing value for the input roof assembly. If a roofing assembly did not contain one of the above material components it was unable to be removed from the IE. If the assembly contained more material components, they were added as subsequent envelope materials.

Due to the limited size of the IE data base surrogate materials were required to model particular roof and soffit components. Surrogates were materials selected with the most similar material products. In the worst case some components could not be modeled at all. Table 4 lists the most common surrogates used for the roofs and soffits.

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Table 4: IE Surrogates for Roof Components

| Material Specification | IE Surrogate Material |
|------------------------------------|---|
| Acoustic Metal Deck | Pre-Engineered Metal Deck System + Acoustic |
| | Insulation (92mm) |
| CLT Wood Deck | Plywood Deck |
| Entangled Nylon Fibre Drainage Mat | Spunbond Polyethylene Air barrier |
| GFRC Cladding | Fiber Cement Siding |
| Gravel Fill (75mm) | Roof Ballast |
| HDPE Drainage Board | Polyethylene Vapor Barrier (6mil) |
| Metal Deck | Pre-Engineered Metal Deck System |
| Mineral Fibre Board Insulation | Rockwool Bat |
| Standing Seam Zinc Roof wall | Steel Cladding – Commercial 26 (Ga) + Pre- |
| | Engineered Metal Roof System |
| Spray Fireproofing | Type X Fire Resistant Gypsum Board (16mm) |
| Play Surface | Omitted from Study |
| Landscape Buildup | Omitted from Study |
| Leak Detection System | Omitted from Study |

3.2 Energy Use Phase

The energy use phase of the model considers the operational energy consumed by the building by source.

3.2.1 Energy Use Development

In our model, the energy consumption during the use phase of the New SUB Project was based on an energy simulation report generated by the energy consultants, Halsall, dated June 14, 2012.

The energy simulation is based on the following modelling inputs:

Building Envelope

- R-25 wall
- R-30 roof
- Triple glazed windows
- High efficiency curtain wall
- Skylights along central atrium

• 49% window to wall ratio

Lighting

- 6.8W/m² lighting power density
- Occupancy sensors located throughout the building
- Daylight harvesting along perimeter and in atrium

Heating

- 81.2% seasonal efficiency
- Heat recovery from electrical rooms (150kW of heat reclaim)

Cooling

- High efficiency heat pumps
- Water cooled chillers
- Solar driven absorption chiller

Fans & pumps

- Premium efficiency motors
- Variable speed drives

Service Hot Water

- Low flow fixtures
- 75 Viessmann solar thermal panels (generating approx.. 135,000 ekWh/yr)

Detail assumptions, uncertainties and sources of error within the energy model are beyond the scope of this report.

3.2.2 Energy use Assumptions

The results of the energy report were presented in ekWh/yr. The electrical consumption was input directly into the IE however the natural gas consumption had to be converted from eKwh/year to $m^3/year$ using the following conversion:

$$\frac{ekWh}{yr}x\frac{therm}{29.307ekWh}x\frac{2.7902m^3}{therm}$$

4.0 Results and Interpretation

The following section presents the quantified results of material quantities and energy consumption of the model generated in section 3.0 Model Development.

4.1 Inventory Analysis

Inventory analysis is the phase of LCA in which inputs and outputs are compiled and quantified.

4.1.1 Bill of Materials

Once the building model was developed as described in section 3.0 Model Development the Athena IE was used to generate a Bill of Materials (BOM), a list of materials and quantities which fall within the scope of the study. The complete Bill of Materials for the New SUB Project by assembly type and for the total building can be found in Appendix C.

Since the materials are presented with different functional units it is difficult to make a finite comparison to determine which materials are present in the greatest quantity, however, there are several values which stand out in importance and in magnitude. The five main materials of interest are Concrete 30 MPa (flyash 35%), 1/2" Fire-Rated Type X Gypsum Board, Ballast (aggregate stone), Modified Bitumen Membrane and Rebar, Rod, Light Sections. The validity of these quantities is discussed below, and a sensitivity analysis of these materials is conducted in section 4.2 Sensitivity Analysis.

4.1.1.1 Concrete 30MPa (flyash %35)

Cast in place concrete is the primary construction material of the New SUB project and as such, deserves critical evaluation. A quick check can be made on concrete volumes by use of the volume to gross square foot ratio. Industry standard for large scale commercial buildings lies in a range between 0.041 m³/GSF and 0.044m³/GSF. Since composite deck, metal deck and cross laminated panels are used in addition to cast in place concrete, one would expect the ratio of the New SUB Project to be at the lower end of the range. With the generated bill of materials the concrete volume to gross square foot ratio was determined to be 0.061 m³/GSF.

With a concrete ratio well above industry average, it is important to identify where an over estimate may have occurred. As described in section 3.0 Model Development above, the actual concrete volume was maintained for the input of footing assemblies and for the most part, the wall assemblies as well. The main source of uncertainty lies within the floors, roofs and columns and beams assemblies.

The method used to determine column and beam sizing is completely dependent upon the metrics built into the Impact Estimator. That is, the IE calculates the sizing of beams and columns based on the following inputs; number of beams, number of columns, floor to floor height, bay size, supported span and live load. The IE uses this information to internally develop a basic symmetrical column layout and conduct calculations to determine the column size. Additionally these calculations don't consider the shear walls throughout the building (which provide most of the support to the floors) and would likely result in larger column size estimates than required.

Similar to the columns the IE calculates suspended slab sizes based on several inputs: floor width, span, concrete strength, concrete flyash content and live load. With this information the IE develops a slab layout and determines the required slab thickness. Since the built in calculations are unknown, it provides substantial uncertainty in the results.

4.1.1.2 Rebar

Like concrete volume, a quick check can be made on the rebar quantity based on a ratio. The ratio of interest is rebar weight to concrete volume with the average value for a concrete structure being 190 lb/cy – 210 lb/cy. Based on our bill of materials, the weight per volume ratio of our structure is 99 lb/cy. Since the concrete is suspected to be high, naturally the rebar weight to concrete volume ratio would be skewed on the low end. However, a difference of %100 is far too great to be associated entirely with an over estimate of concrete.

Similarly to concrete volume, the rebar quantity is calculated based on the built in metrics of the IE. The rebar input for foundation, columns and beams, floors, walls and roofs is a single choice of rebar size, either 15M or 20M. Based on the modelling assumptions made, it is known that the rebar in the footing assembly is under estimated since 20M bar was used in place of 25M and 30M bar, however without being familiar with the inner workings of the IE it is difficult to trace any potential source of error for the remaining assemblies which used the correct rebar size input.

4.1.1.3 Modified Bitumen Membrane

The modified bitumen membrane is mostly prevalent in the roof structure with additional contributions from the exterior walls. The quantity presented in the bill of materials is greater than many of the other materials and so a closer look is warranted.

The location of modified bitumen specified by the drawings was very clear and no assumptions had to be made during the roofing take-off. A Modified bitumen membrane was, however, used as a surrogate material for the torch on sheet waterproofing below grade. However, since this product also contains modified bitumen, the choice of surrogate would have little impact on the results.

The key uncertainty in the presented value is based on the built in metrics of the IE which converts an input roof area into a weight of modified bitumen. The assumptions made in the conversion are untraceable and so the validity of the output is hard to verify.

4.1.1.4 Roof Ballast

The roof ballast is another material in the bill of materials with a quantity magnitude greater than others. Similar to the bitumen membrane the location of roof ballast is well defined and leaves no uncertainty at the material take-off stage.

The key uncertainty in the final value is based on the built in metrics of the IE which converts an input roof area into a weight of modified bitumen. The assumptions made in the conversion are untraceable and so the validity of the output is hard to verify.

4.1.1.5 Type X Gypsum

Type X Gypsum board is present in the greatest quantity over the other gypsum products and the primary contributor are the interior wall assemblies. Due to the assumptions and substitutions made at the modelling stage, it is known that the quantity in our materials is an over estimate.

Since the wall height was assumed to be top of slab to top of slab the actual wall height was not accurately represented. In reality the interior walls span from top of slab to bottom of slab and thus the height was over estimated by the floor thickness (200mm on average). Additionally, since the abuse resistant drywall to 1200mm in all corridors was omitted there was no reduction to the outer gypsum board layer (where abuse resistant drywall would be located instead) which was most commonly Type X gypsum board.

Type X gypsum board was also used a surrogate for several fire resistant materials (fireboard, shaft liner and spray fireproofing) which would also contribute to an over estimate of material.

4.1.2 Energy Use

The results extracted from the Halsall energy simulation report are displayed in Figure 9. Discussions with the consultant clarified that the energy used by heating and hot water is supplied by natural gas and the remainder of the energy is supplied by electricity. Table 5 summarizes the energy consumption by source per year and by total over the 50 year design life of the building.

| Energy Sin | ulation Results | |
|------------|--|-----------|
| Lighting | 791,730 | |
| Equipment | 112,178 | |
| Heating | 668,193 (-60%) | |
| Cooling | 9,678 (-74%) | |
| Pumps | 150,750 35,452 (-76%) | |
| Fans | 260,469 132,407 (-49%) | |
| Hot Water | 207.816 1,379 (-99%) | |
| Total | 1,294,918 (-60%) | 3,225,821 |
| | MNECB Reference Building | |
| | Proposed Building with Design Fan Airflows, Reduced SHW load, 92%-Condensing boilers | |



| End Use | Electricity | Natural Gas |
|--------------|-------------|-------------|
| | ekWh/yr | ekWh/yr |
| Lighting | 335,631.00 | - |
| Equipment | 112,178.00 | - |
| Heating | - | 668,193.00 |
| Cooling | 9,678.00 | - |
| Pumps | 35,452.00 | - |
| Fans | 132,407.00 | - |
| Hot Water | - | 1,379.00 |
| Annual Total | 625,346.00 | 669,572.00 |
| | | |

Table 5: Energy Consumption by Source

4.2 Impact Assessment

Impact assessment is the phase on LCA aimed at understanding and evaluating the magnitude and significance of the potential environmental impacts for a product system through the life cycle of a product. For the New SUB Project the impact assessment included a review of the impact categories, a sensitivity analysis, uncertainties, and the functions and impacts.

4.2.1 Impact Categories

The model created in the Impact Estimator was used to produce outputs indicating the impacts across seven categories through each lifecycle stage. The categories are referred to as impact categories and consist of: acidification potential, eutrophication potential, fossil fuel consumption, global warming potential, human health criteria, ozone depletion potential, and smog potential.

4.2.1.1 Acidification Potential

Acidification potential describes the ability of certain gases to react with water to produce compounds dangerous to human, animal, and plant health. Such reactions include: CO2 (aq) + H2O = CO32– + 2 H+, the 2 H+ decreasing the ph and increasing the acidity of sea water leading to disrupted biological processes, and extinction. Other implicated gasses include sulfur dioxide (SO2), nitrogen oxides (NOx), ammonia (NH3). The category indicator is H+ equivalence (moles of H+ eq).

Figure 10 presents the acidification potential of the New SUB Project, as calculated from our building model, broken down by assembly group. These results are expanded upon in Appendix D by including a breakout by life cycle stage.



Figure 10: Category Indicator - Acidification Potential
4.2.1.2 Eutrophication Potential

Eutrophication potential is defined by weight of nitrogen equivalence (kg N eq). Nitrogen and associated compounds runoff into aquatic ecosystems and encourages the growth of algae and aquatic weeds which can crowd out existing species and lead to oxygen depletion and effective poisoning. A common contributor is nitrogen heavy fertilizer for use in agriculture. Effects include toxicity to human, aquatic mammals and potential death in fish and shellfish.

Figure 11 presents the eutrophication potential of the New SUB Project, as calculated from our building model, broken down by assembly group. These results are expanded upon in Appendix D by including a breakout by life cycle stage.



Figure 11: Category Indicator - Eutrophication Potential

4.2.1.3 Fossil Fuel Consumption

Fossil fuels (coal, petroleum, and natural gas) are decomposed organic compounds which, when burnt, produce high energy per mass yields and high emissions (carbon, methane, sulphur etc.). They account for approximately 80% of global energy use and have several impacts: emission of ecologically damaging compounds (including those above and those implicated as detrimental to human health, and ecosystem health, oceans, forests, etc.), depletion of non-renewable resources, and important international relations/ diplomatic issues (war, etc.). The category indicator is megajoules (MJ) which describes energy expended through these sources.

Figure 12 presents the fossil fuel consumption equivalent of the New SUB Project, as calculated from our building model, broken down by assembly group. These results are expanded upon in Appendix D by including a breakout by life cycle stage.





4.2.1.4 Global Warming Potential

Global warming describes high and rising temperatures worldwide due to a complex weave of dynamic earth processes, some attributed to human activities: the greenhouse effect. Here we use a category indicator of weight of CO2 equivalence (kg CO2 eq) to describe carbon dioxide's role in increasing the atmospheres capacity to absorb infrared radiation (i.e. warming). Endpoints include agricultural effects (draught), species effects (diseases such as malaria), and increasing tropical storms.

Figure 13 presents the global warming potential of the New SUB Project, as calculated from our building model, broken down by assembly group. These results are expanded upon in Appendix D by including a breakout by life cycle stage.





4.2.1.5 Human Health Respiratory Effects Potential

Human health criteria describe the weight of air borne particulate matter less than 10 μ m (kg PM10 eq). Particulate emissions can contribute to respiratory problems, asthma and chronic bronchitis, as well as birth defects: premature and low weight births. The endpoint recipient is human health, and the midpoint would be particulate matter such as fly ash, tobacco smoke, smog contributor (S02) etc.

Figure 14 presents the human health respiratory effects potential of the New SUB Project, as calculated from our building model, broken down by assembly group. These results are expanded upon in Appendix D by including a breakout by life cycle stage.



Figure 14: Category Indicator - Human Health Respiratory Effects

4.2.1.6 Ozone Depletion Potential

Ozone depletion potential describes the emission of certain substances' potential to change stratospheric ozone levels from steady state, increasing the atmospheres absorption of infrared radiation. We use kg of CFC-11 equivalence, chlorofluorocarbons being the major contributor implicated in ozone depletion. Endpoints include agricultural and human health effects and material damage

Figure 15 presents the ozone depletion potential of the New SUB Project, as calculated from our building model, broken down by assembly group. These results are expanded upon in Appendix D by including a breakout by life cycle stage.



Figure 15: Category Indicator - Ozone Depletion Potential

4.2.1.7 Smog Potential

Smog potential describes a given emissions' influence on photo-chemical ozone formation which contributes to human health effects: emphysema, bronchitis and asthma and possible plant and animal effects. It's represented in terms of kg O3 eq. Implicated compounds include nitrogen oxides and volatile organic matter associated with industrial activity and fossil fuel consumption.

Figure 16 presents the smog potential of the New SUB Project, as calculated from our building model, broken down by assembly group. These results are expanded upon in Appendix D by including a breakout by life cycle stage.



Figure 16: Category Indicator - Smog Potential

4.2.2 Uncertainty

Uncertainty exists in all phases of life cycle assessment from the definition of the Goal and Scope, to the Inventory Analysis and to the Impact Assessment itself. Uncertainly in these phases occurs primarily due to data uncertainty, model uncertainty, uncertainty due to choices, temporal variability, spatial variability, variability between objects/ sources and human mistakes.

The focus of uncertainty for this report is that attributed to data uncertainty, model uncertainty, uncertainty due to choices and uncertainty due to mistakes.

Data uncertainty occurs in our project at the material take-off level as a result of unknown information. Since the drawings and specifications for the New SUB Project were complete and well detailed there was no significant unknown information in regards to the material composition of the building.

Modeling uncertainty is most prevalent in this study given the layout of the Athena Impact Estimator software. The IE was developed with preliminary design in mind and because of this; it requires minimal inputs for specific assembly groups and conducts various back ground calculations to fill in the missing information. When a complete set of information is known, it becomes difficult to properly model in the IE without careful analysis at each step of the process to very that the calculated quantity is within acceptable limits of the actual quantity. At times, assumptions are made that cannot be avoided, for example, it was noted that drywall tape and compound was applied to every input containing gypsum board, when in reality, exterior gypsum sheathing, and primary layers of a double layered gypsum wall do not have these materials. While the impacts of the added material are likely small it demonstrates that the program does not have the capability to generate very specific models.

Uncertainty due to choices arises in all stages in the generation of this model. In the goal and scope it was decided that the system boundary will include footings, columns and beams, floors, interior walls, exterior walls and roofs. The impacts of earthworks, landscaping, mechanical, electrical, and interior finishes are not included and the significance of the impacts associated with these categories is not known. At the material take-off phase, the choices in how to conduct the estimate and to what degree of accuracy will influence the final result. For example, we decided to estimate interior wall heights from top of slab to top of slab to increase the efficiency of the take-off phase; however this results in higher estimates and the extend of the impact is not known without further investigation. In the modeling phase, assumptions were made when deciding on surrogate materials. While every effort was made to choose materials similar in properties it is unknown if the associated summary measures across all life cycle stages were similar as well.

Uncertainty due to mistakes also arises in all stages in the generation of this model. During the take-off phase it is possible to miss identify material specifications and material dimensions. It is also possible that materials were overlooked entirely. In addition, since the quantities are digitized from digital drawings the accuracy of the "tracing" will contribute a component of error to the results. When working with the Athena Impact Estimator, it becomes difficult to track the large quantity of assemblies and their associated values and the sheer volume of data entry required lends itself to human error. While measures were taken to minimize human error, such as the creation of a nomenclature system to track assemblies from OST to the IE, and careful review of the model and bill of material results the potential for errors still exists.

4.2.3 Sensitivity Analysis

A sensitivity analysis was carried out on the five building materials identified in section 4.0 Results and Interpretation (Concrete 30 MPa (flyash 35%), 5/8" Fire-Rated Type X Gypsum Board, Ballast (aggregate stone), Modified Bitumen Membrane and Rebar, Rod, Light Sections, to provide clearer understanding of the impacts due to errors in measurement and more importantly the impacts associated with specific building materials in the context of a whole building.

Additionally, a sixth case was completed in order to look at the impacts of choosing a high flyash (35%) concrete for this building compared to the impact that would have occurred if an average flyash content (9%) was used.

The analysis was conducted with the use of the "extra basic material" input of the Impact Estimator. An additional ten percent of the material in question was added to the baseline model and the change in impact was analysed. Since the analysis was primarily conducted to compare the impacts of various materials, it was decided to exclude the impacts associated with operational energy from both the baseline and 10% added material models as they would dilute the results significantly.

The relative sensitivity comparison was completed for each of the following impact categories presented in section 4.2.1

4.2.3.1 Sensitivity Analysis – Acidification Potential

While concrete dominates this sensitivity category as seen in (Figure 17), it is noted that the rebar and bitumen membrane have a significant impact relative to their quantities in the building compared to concrete. It is possible that PVC in a modified bitumen membrane could attribute to the creation of hydrogen ions and thus create a higher sensitivity





4.2.3.2 Sensitivity Analysis – Fossil Fuel Consumption

Sensitivity to impacts on the Fossil Fuel Consumption showed in Figure 18 highlights a significant impact of cementations products and modified bitumen roofing membrane and moderate impact of rebar.

The low impact of a variable quantity of gypsum and ballast show that any significant change of this product or error in their measurement will result in very little impact to the fossil fuel consumption.

With the building utilizing a high fly ash substitution for cement in the concrete mix, the sensitivity shows a 2.68% savings in additional energy consumption by substituting regular concrete with one that has a 35% cement reduction.





4.2.3.3 Sensitivity Analysis – Eutrophication Potential

As seen in Figure 19 concrete and rebar have the most significant impact to the eutrophication potential and thus a substitution of these materials, or an error in their take-off quantity will the most significant impact on this category.



Figure 19: Sensitivity Analysis - Eutrophication Potential

4.2.3.4 Sensitivity Analysis – Global Warming Potential

Figure 20 highlights the implications of the use of concrete and the resultant CO_2 emissions. The production of cement includes a significant release of carbon dioxide through the calcining process of conveyor limestone into lime (CaCO₃ \Box CaO +CO₂), through this process, approximately 44% of the limestone weight is lost as carbon dioxide, thus having a significant impact to the global warming potential.

In comparing Case 2 to Case 6, it can be concluded that in order to achieve the same global warming savings potential as using a high cement reduction concrete mix, the designers need to use nearly 20% less regular concrete. The primary drawback to this choice could be in areas where high strength is required from the concrete at an early age since fly ash concrete comes up to strength at a slower rate than regular concrete.



Figure 20: Sensitivity Analysis - Global Warming Potential

4.2.3.5 Sensitivity Analysis – HH Respiratory Effects

Figure 21 highlights the relationship of ballast or other aggregates to human health respiratory effects. Other sensitivities of this product on the other impact categories showed an overall impact of less than 0.02%, however in this impact category, the impact is 0.63% or over thirty times the relative impact of this product on the other impact categories. The production of dust, especially silica, in the crushing and handling of aggregate can result in significant impacts to the HH respiratory effects as this figure has shown.



Figure 21: Sensitivity Analysis - HH Respiratory Effects potential

4.2.3.6 Sensitivity Analysis – Ozone Depletion Potential

As seen in Figure 22, of the products included in the sensitivity analysis, cement usage in connection with the measured concrete consumption has significant impacts to the overall results of ozone depletion.



Figure 22: Sensitivity Analysis - Ozone Depletion Potential

4.2.3.7 Sensitivity Analysis – Smog Potential

As seen in figure 23, cement usage in connection with the measured concrete consumption has significant impacts to the overall results of smog potential.





4.2.4 Functions and Impacts

In order to put the calculates data in context, and make comparisons to similar structures, an assessment of the buildings function needs to be completed and functional units need to be defined.

4.2.4.1 Building Functions

The purpose of New SUB Project was intended to provide a building that combines four main functions:

- Provide central social and recreational areas
- Provide central space with bookable rooms for student use
- Provide an area for the AMS offices and clubs
- Provide central food and retail services

As seen from our functional area take-off (Table 6) the primary spaces provided are atriums/ hallways / lounges, office/ club rooms, study/ bookable rooms and food services space which directly reflect the goals defined set out by the AMS. In addition the New Sub provides auditoriums, a ball room, commercial retail units, storage rooms, washrooms and storage space. It should be noted that the measured functional area is less than the measured gross square foot (GSF) area because unlike the standard GSF measurement, functional area does not include inaccessible space such as mechanical shafts, elevator shafts, wall footprints, etc.

| Eunctional Lico | Floor Area | | | | |
|---|------------|-----------------|------|--|--|
| Functional Ose | m² | ft ² | % | | |
| Atriums/ Hallways/ Lounges | 6,175 | 66,474 | 34% | | |
| Auditoriums/ Lecture halls | 358 | 3,854 | 2% | | |
| Ballroom | 815 | 8,773 | 5% | | |
| Commercial Retail Units | 875 | 9,419 | 5% | | |
| Food Prep/ Food Services/ Kitchens/ Restaurants | 1,989 | 21,412 | 11% | | |
| Mechanical Rooms | 1,753 | 18,871 | 10% | | |
| Office/ Club Rooms | 3,386 | 36,450 | 19% | | |
| Stairwells | 715 | 7,697 | 4% | | |
| Storage Rooms | 370 | 3,983 | 2% | | |
| Studio Space | 252 | 2,713 | 1% | | |
| Study/Bookable Rooms | 951 | 10,237 | 5% | | |
| Washrooms/Locker Rooms | 402 | 4,328 | 2% | | |
| Total | 18,041 | 194,211 | 100% | | |

Table 6: Functional Areas

The atriums, hallways, and lounges all contain seating, desks, and study space, which along with the open nature of the walkways and the location of surrounding areas provide a functional corridor between areas, utilising the available space efficiently. This open floor plan also allows for the reassignment of space as the needs of the stakeholders change over the projected 50 year lifespan of the building. The amount of food services and retail space also allows for revenue within the building, allowing for the majority of students, faculty, and campus guests, to find what they require in one central building.

4.2.4.2 Functional Unit

In Life Cycle Assessments, a "functional unit" is used to quantify the performance of a product system for use as a reference base unit. Using appropriate functional units, comparisons can be made across a wide selection of product systems. In the context of our report, the functional units can be compared to those of similar buildings for comparative analysis.

The functional units for this study are, category indicator:

- 1. per general building square foot constructed
- 2. per specific building square foot constructed
- 3. per generic cubic foot constructed

The first method evaluates the environmental impact over the gross square foot (GSF) area of the entire facility. The second is used to gain insight into the concentrated impact for specific functional areas within the building. The third method looks at the total volume of the structure, this measurement can help to put in the context of the environmental impact when used in conjunction to method 1 since it helps to understand buildings that may have large open spaces such as atriums or stadiums.

Table 7 and Table 8 summarize the resulting functional units, as described above, for the New Sub Project.

Table 7: Functional Units - Per Building Size

| | | Per GSF | Per Volume | |
|--------------------------|------------|-------------|---------------------|--|
| | | Constructed | Constructed | |
| | | (/ GSF) | (/ft ³) | |
| | Building | 222.206 | 4 295 295 | |
| | Total | 222,290 | 4,203,203 | |
| Acidification Potential | 7.04E+06 | 3 17E+01 | 1.645+00 | |
| (moles of H+ eq) | 7.046400 | 5.172+01 | 1.042+00 | |
| Eutrophication Potential | 3.845+03 | 1 735-02 | 8 07E-04 | |
| (kg N eq) | 3.846403 | 1.750-02 | 0.571-04 | |
| Fossil Fuel Consumption | 2 565+08 | 1 155+03 | 5 08E+01 | |
| (MJ) | 2.301400 | 1.150+05 | 5.962+01 | |
| Global Warming Potential | 1 705+07 | 7.665+01 | 3 085+00 | |
| (kg CO2 eq) | 1.701407 | 7.001401 | 3.98E+00 | |
| Human Health Respiratory | | | | |
| Effects | 7.26E+04 | 3.27E-01 | 1.69E-02 | |
| (kg PM10 eq) | | | | |
| Ozone Layer Depletion | 4 19F 02 | 1.995-07 | 0 78E-00 | |
| (kg CFC-11 eq) | 4.192-02 | 1.000-07 | 9.762-09 | |
| Smog Potential | 8 COE . OE | 2 975,00 | 2.015.01 | |
| (kg 03 eq) | 0.00E+05 | 5.67E+00 | 2.012-01 | |

Table 8: Functional Units - Per Specific Floor Area

| | | Acidification Potential (moles of H+ eq) | Eutrophication Potential (kg N eq) | Fossil Fuel Consumption (MJ) | Global Warming Potential (kg CO2 eq) | Human Health Respiratory Effects (kg PM10 eq) | Ozone Layer Depletion (kg CFC-11 eq) | Smog Potential (kg 03 eq) |
|--|-------------------|--|--|------------------------------------|--|---|--|------------------------------|
| | Building Total | 7.04E+06 | 3.84E+03 | 2.56E+08 | 1.70E+07 | 7.26E+04 | 4.19E-02 | 8.60E+05 |
| Atriums/ Hallways/ Lounges (ft ²) | 66,474 | 1.06E+02 | 5.78E-02 | 3.85E+03 | 2.56E+02 | 1.09E+00 | 6.30E-07 | 1.29E+01 |
| Auditoriums/ Lecture halls (ft ²) | 3,854 | 1.83E+03 | 9.97E-01 | 6.65E+04 | 4.42E+03 | 1.88E+01 | 1.09E-05 | 2.23E+02 |
| Ballroom (ft ²) | 8,773 | 8.03E+02 | 4.38E-01 | 2.92E+04 | 1.94E+03 | 8.28E+00 | 4.78E-06 | 9.81E+01 |
| Commertial Retail Units (ft ²) | 9,419 | 7.48E+02 | 4.08E-01 | 2.72E+04 | 1.81E+03 | 7.71E+00 | 4.45E-06 | 9.13E+01 |
| Food Prep/ Food Services/ Kitchens/ Restaurants (ft ²) | 21,412 | 3.29E+02 | 1.80E-01 | 1.20E+04 | 7.96E+02 | 3.39E+00 | 1.96E-06 | 4.02E+01 |
| Mechanical Rooms (ft ²) | 18,871 | 3.73E+02 | 2.04E-01 | 1.36E+04 | 9.03E+02 | 3.85E+00 | 2.22E-06 | 4.56E+01 |
| Office/ Club Rooms (ft ²) | 36,450 | 1.93E+02 | 1.05E-01 | 7.03E+03 | 4.67E+02 | 1.99E+00 | 1.15E-06 | 2.36E+01 |
| Stairwells (ft ²) | 7,697 | 9.15E+02 | 4.99E-01 | 3.33E+04 | 2.21E+03 | 9.44E+00 | 5.44E-06 | 1.12E+02 |
| Storage Rooms (ft ²) | 3,983 | 1.77E+03 | 9.65E-01 | 6.43E+04 | 4.28E+03 | 1.82E+01 | 1.05E-05 | 2.16E+02 |
| Studio Space (ft ²) | 2,713 | 2.60E+03 | 1.42E+00 | 9.44E+04 | 6.28E+03 | 2.68E+01 | 1.54E-05 | 3.17E+02 |
| Study/ Bookable Rooms (ft ²) | 10,237 | 6.88E+02 | 3.75E-01 | 2.50E+04 | 1.66E+03 | 7.09E+00 | 4.09E-06 | 8.40E+01 |
| Washrooms/ Locker Rooms (ft ²) | 4,328 | 1.63E+03 | 8.88E-01 | 5.92E+04 | 3.94E+03 | 1.68E+01 | 9.68E-06 | 1.99E+02 |

5.0 Conclusions

Through the Life Cycle Assessment process the environmental impacts of The NEW Sub Project were critically analyzed and quantified. The system boundary consisted of foundations, columns and beams, floors, interior walls, exterior walls and roofs in addition to the operating energy consumption of the building. The environmental impacts were presented as category indicators across the following impact categories: acidification potential, eutrophication potential, fossil fuel consumption, global warming potential, human health and respiratory effects, ozone layer depletion potential and smog potential. The resulting category indicators for each impact category were transposed into functional units which serve as a basis of comparison across similar product systems. Since the New SUB Project is unique in its function compared to existing buildings in the UBC LCA project database impact comparisons were not developed and the presented results serve as a baseline of comparison for studies.

A sensitivity analysis was conducted on the five materials present in the greatest quantity for two reasons. First, to determine the magnitude of error associated with any uncertainties in the materialtakeoffs and building model and second, to determine which materials present the greatest environmental impact in the context of a whole building. The latter being a significant use of LCA in the design phase to aid in the selection of the most environmentally sustainable materials.

The materials evaluated in the sensitivity analysis were Concrete 30MPa (flyash 35%), 1/2" Fire-Rated Type X Gypsum Board, Ballast (aggregate stone), Modified Bitumen Membrane and Rebar and Concrete 30MPa (flyash 35%) was discovered to have the most significant impact across all assembly measures by several orders of magnitude.

The sensitivity analysis continued with a comparison of the impacts associated with the use of normal concrete, containing 9% cement reduction by use of flyash, to the concrete specified for the New SUB Project, containing a 35% cement reduction. The category indicators associated with the use of normal concrete was substantially greater across all impact categories. For Global Warming Potential, the primary impact category of interest, the average concrete resulted in a 7.4% increase in kg CO2 eq over the baseline case of 35% cement reduced concrete. Considering 9% cement reduced concrete was the minimum we could evaluate, the reduction value comes close to the anticipated 10% difference between a 0% cement reduction and 35% cement reduction provided by the structural consultants.

Energy use data was provided in an energy simulation report from Halsall constants and input directly into the Impact Estimator. It was noted that the category indicators due to energy use are significant

over the design life of a structure, and for many impact categories, are greater than those associated with material manufacturing, construction, maintenance and decommissioning combined. This observation highlights the importance of innovative and sustainable design of mechanical and electrical systems.

Uncertainly in this assessment is primarily attributed to the nature of the Impact Estimator. Some assemblies require minimal input leaving the built in metrics to calculate the resulting material quantity. The assemblies which utilize the most built in calculations are those associated with the structure and as shown by the sensitivity analysis any inaccuracies in concrete volume will have the greatest effect on the overall results.

We feel that the modelling uncertainties warrant a critical review of the bill of materials to further refine the accuracy of the model. It is recommended that a conventional structural take-off be complete and material volumes compared to those generated by the Impact Estimator to verify the accuracy of the results. Refinement can be made as necessary using the conventional structural assembly inputs or the total volume could be placed directly into the extra basic materials input. The sensitivity analysis should be expanded to include all materials present in the structure to identify other significant materials which may require a quantity comparison.

Furthermore, we feel that the system boundary is quite restrictive and a model containing all associated earthwork, landscape, mechanical, electrical and interior finishes would be an asset to evaluate the relative significance of these assembly groups and comment on the validity of our chosen system boundary in regards to total environmental impacts of The New SUB Project. Appendix A – IE Inputs

| Assambly Group | Accombly Type | Assombly Namo | Input Fields | | Input Values |
|----------------|----------------------|--|--|--------------------|--------------------|
| Assembly Group | Assembly Type | Assembly Name | input i ielus | Known/Measured | IE Inputs |
| 1.0 Foundation | | | • | | |
| | 1.1 Concrete Footing | A 4 4 Operate Fasting 54 | | 1 | |
| | | 1.1.1 Concrete Footing_F1 | Quantity (ea) | 15.00 | 1.00 |
| | | | Length (m) Width (m) | 2.50 | 37.50 2.50 |
| | | | Thickness (mm) | 400.00 | 400.00 |
| | | | Total Volume (m ³) Concrete (MPa) | 37.50 | 37.50 |
| | | | Concrete Flyash (%) | 35.00 | 35.00 |
| | | 1.1.2 Concrete Footing _ F2 | Rebar (M) | 15.00 | 15.00 |
| | | | Quantity (ea) | 29.00 | 1.00 |
| | | | Width (m) | 4.00 | 4.00 |
| | | | Thickness (mm) Total Volume (m ³) | 1,100.00 | 500.00 510.40 |
| | | | Concrete (MPa) | 30.00 | 30.00 |
| | | | Concrete Flyash (%) Rebar (M) | 0.35 25.00 | 20.00 |
| | | 1.1.3 Concrete Footing _ F3 | Quantity (ea) | 8.00 | 1.00 |
| | | | Length (m) | 4.20 | 100.80 |
| | | | Width (m) Thickness (mm) | 4.20 1,200.00 | 4.20 400.00 |
| | | | Total Volume (m3) | 169.34 | 169.34 |
| | | | Concrete (MPa) Concrete Flyash (%) | 30.00 | 4,000.00 35.00 |
| | | 1.1.4 Concrete Ecoting E4 | Rebar (M) | 30.00 | 20.00 |
| | | | Quantity (ea) | 7.00 | 1.00 |
| | | | ∟engm (m) Width (m) | 4.90 4.90 | 89.18 4.90 |
| | | | Thickness (mm) | 1,300.00 | 500.00 |
| | | | Concrete (MPa) | 218.49 30.00 | 218.49 4,000.00 |
| | | | Concrete Flyash (%) Rebar (M) | 35.00 | 35.00 |
| | | 1.1.5 Concrete Footing _ Misc 700d | 1 | 30.00 | 20.00 |
| | | | Length (m) Width (m) | 8.00 3.00 | 8.00 6.00 |
| | | | Thickness (mm) | 700.00 | 350.00 |
| | | | Concrete (MPa) | 16.80 30.00 | 16.80 30.00 |
| | | | Concrete Flyash (%) Rebar (M) | 35.00 | 35.00 |
| | | 1.1.6 Concrete Footing _ Misc 875d | | 23.00 | 20.00 |
| | | | Length (m) Width (m) | 3.00 5.67 | 4.25 7.00 |
| | | | Thickness (mm) | 875.00 | 500.00 |
| | | | Concrete (MPa) | 14.87 30.00 | 14.88 30.00 |
| | | | Concrete Flyash (%) Rebar (M) | 35.00 | 35.00 |
| | | 1.1.7 Concrete Footing _ Misc 1200d | | 23.00 | 20.00 |
| | | | Length (m) Width (m) | 8.33 3.00 | 20.00 3.00 |
| | | | Thickness (mm) | 1,200.00 | 500.00 |
| | | | Total Volume (m") Concrete (MPa) | 30.00 | 30.00 30.00 |
| | | | Concrete Flyash (%) Rebar (M) | 35.00 | 35.00 |
| | | 1.1.8 Concrete Footing _ Misc 2500d | I cobar (iii) | 20.00 | 20.00 |
| | | | Length (m) Width (m) | 10.00 | 50.00 3.90 |
| | | | Thickness (mm) | 2,500.00 | 500.00 |
| | | | Concrete (MPa) | 97.50 30.00 | 97.50 30.00 |
| | | | Concrete Flyash (%) Rebar (M) | 35.00 25.00 | 35.00 20.00 |
| | | 1.1.9 Concrete Footing _ SF1 | Longth (m) | 242.00 | 242.00 |
| | | | Width (m) | 0.60 | 0.60 |
| | | | Thickness (mm) Total Volume (m ³) | 350.00 | 350.00 |
| | | | Concrete (MPa) | 30.00 | 30.00 |
| | | | Concrete Flyash (%) Rebar (M) | 35.00 15.00 | 35.00 15.00 |
| | | 1.1.10 Concrete Footing _ Stair Core 1 | Length (m) | 10.00 | 40.00 |
| | | | Width (m) | 16.00 | 16.00 |
| | | | Total Volume (m ³) | 2,000.00 | 500.00 320.00 |
| | | | Concrete (MPa) | 30.00 | 30.00 |
| | | | Rebar (M) | 35.00 | 35.00 20.00 |
| | | 1.1.11 Concrete Footing _ Stair Core 2 | Length (m) | 19.10 | 95.50 |
| | | | Width (m) Thickness (mm) | 20.10 | 20.10 |
| | | | Total Volume (m ³) | 2,500.00 959.78 | 500.00 959.78 |
| | | | Concrete (MPa) Concrete Elvash (%) | 30.00 | 30.00 |
| | | 1112 Concepto Easting Othin Conce | Rebar (M) | 30.00 | 20.00 |
| | | 1.1.12 Concrete Pooling _ Stair Core 3 | Length (m) | 13.95 | 13.95 |
| | | | Width (m) Thickness (mm) | 20.00 | 80.00 |
| | | | Total Volume (m ³) | 558.00 | 558.00 |
| | | | Concrete (MPa) Concrete Flyash (%) | 30.00 35.00 | 30.00 35.00 |
| | | 1113 Concrete Easting Stair Care 4 | Rebar (M) | 30.00 | 20.00 |
| | | 1.1.13 Concrete Pooling _ Stair Core 4 | Length (m) | 10.85 | 10.85 |
| | | | Width (m) Thickness (mm) | 20.00 | 100.00 500.00 |
| | | | Total Volume (m ³) | 542.50 | 542.50 |
| | | | Concrete (MPa) Concrete Flyash (%) | 30.00 35.00 | 30.00 35.00 |
| l | 1 | | Rebar (M) | 30.00 | 20.00 |

| | | | | | Input Values |
|---------------------|----------------------------|--|---|-------------------------------|-------------------------------|
| Assembly Group | Assembly Type | Assembly Name | Input Fields | Known/Measured | IE Inputs |
| | | | | | P |
| | 1.2 Concrete Slab on Grade | 1.2.1 Concrete Slab on Grade Lower Level 125mm | 1 | | |
| | | | Length (m) | Varies | 56.40 |
| | | | Area (m ²) | 4,516.00 | 5,640.00 |
| | | | Thickness (mm) | 125.00 | 100.00 |
| | | | Concrete (MPa) | 564.50 30.00 | 564.00 30.00 |
| | | Envelope | Concrete Flyash (%) | 35.00 | 35.00 |
| | | Liveope | Material | Extruded Polystyrene | Polystyrene Extruded |
| | | | Thickness (mm) Category | 100.00 Air/ Vapour Barrier | 25.38 Vapour & Air Barrier |
| | | | Material | Polyethylene Sheet | Polyethylene |
| | | 1.2.2 Concrete Slab on Grade _ Lower Level _ 225mm | Thickness (mil) | 6.00 | 8.00 |
| | | | Length (m) | Varies | 8.30 |
| | | | Area (m ²) | 83.00 | 83.00 |
| | | | Thickness (mm) Total Valuma (m ³) | 100.00 | 100.00 |
| | | | Concrete (MPa) | 30.00 | 30.00 |
| | | 1.2.3 Concrete Slab on Grade Level 1 125mm | Concrete Flyash (%) | 35.00 | 35.00 |
| | | | Length (m) | Varies | 7.80 |
| | | | Vildtn (m) Area (m ²) | vanes 78.00 | 12.50 97.50 |
| | | | Thickness (mm) | 125.00 | 100.00 |
| | | | Total Volume (m ³) Concrete (MPa) | 9.75 30.00 | 9.75 30.00 |
| | | | Concrete Flyash (%) | 35.00 | 35.00 |
| o columns and Beams | 2.1 Concrete | | | | |
| | | 2.1.1 Columns and Beams _ Concrete _ Lower Level | Number of Beams | None | None |
| | | | Number of Columns | 53.00 | 53.00 |
| | | | Column Height (m) Supported Area (m ²) | 4.26 | 4.26 4.647.00 |
| | | | Bay Sizes (m) | 9.36 | 9.36 |
| | | | Live Load (kPa) | 9.36 | 9.36 4.80 |
| | | | Column Type Beam Type | Concrete | Concrete |
| | | 2.1.2 Columns and Beams _ Concrete _ Level 1 | Beam Type | 104 | 104 |
| | | | Number of Beams Number of Columns | None 43.00 | None 43.00 |
| | | | Column Height (m) | 6.60 | 6.60 |
| | | | Supported Area (m ²) Bay Sizes (m) | 3,579.00 | 3,579.00 |
| | | | Supported Span (m) | 9.12 | 9.12 |
| | | | Live Load (kPa) Column Type | 4.80 Concrete | 4.80 Concrete |
| | | 2.1.3 Columns and Beams Concrete Level 2 | Beam Type | n/a | n/a |
| | | | Number of Beams | None | None |
| | | | Number of Columns Column Height (m) | 42.00 | 42.00 4.30 |
| | | | Supported Area (m ²) | 3,522.00 | 3,522.00 |
| | | | Bay Sizes (m) Supported Span (m) | 9.16 9.16 | 9.16 9.16 |
| | | | Live Load (kPa) | 4.80 | 4.80 |
| | | | Column Type Beam Type | Concrete n/a | Concrete n/a |
| | | 2.1.4 Columns and Beams _ Concrete _ Level 3 | Number of Beams | None | None |
| | | | Number of Columns | 42.00 | 42.00 |
| | | | Column Height (m) Supported Area (m ²) | 4.30 | 4.30 3.579.00 |
| | | | Bay Sizes (m) | 9.23 | 9.23 |
| | | | Supported Span (m) Live Load (kPa) | 9.23 4.80 | 9.23 4.80 |
| | | | Column Type | Concrete | Concrete |
| | | 2.1.5 Columns and Beams _ Concrete _ Level 4 | Locall Type | n/a | h/a |
| | | | Number of Beams Number of Columns | None 33.00 | None 33.00 |
| | | | Column Height (m) | 4.30 | 4.30 |
| | | | Supported Area (m ²) Bay Sizes (m) | 1,591.00 | 1,591.00 6.94 |
| | | | Supported Span (m) | 6.94 | 6.94 |
| | | | Column Type | 4.80 Concrete | 4.80 Concrete |
| | 2.2 Glulam | | Beam Type | n/a | n/a |
| | | 2.2.1 Columns_Beams_Glulam_Lower Level | | | |
| | | | Number of Beams Number of Columns | 3.00 | None 3.00 |
| | | | Column Height (m) | Varies | 4.26 |
| | | | Bay Sizes (m) | 644.50 4.50 | 644.50 4.50 |
| | | | Supported Span (m) | 12.50 | 12.50 |
| | | | Column Type | Glulam | Glulam |
| | | 2.2.2 Columns and Beams _ Glulam _ Level 1 | Beam Type | n/a | n/a |
| | | | Number of Beams | None | None |
| | | | Column Height (m) | Varies | 6.60 |
| | | | Supported Area (m ²) | 486.00 | 486.00 |
| | | | Supported Span (m) | 4.50 9.00 | 4.50 9.00 |
| | | | Live Load (kPa) Column Type | 1.82 Chilom | 2.40 Chilom |
| | | | Beam Type | n/a | n/a |
| | | 2.2.3 Columns and Beams _ Glulam _ Level 2 | Number of Beams | None | None |
| | | | Number of Columns | 27.00 | 27.00 |
| | | | Supported Area (m ²) | 4.30 | 4.30 1.093.50 |
| | | | Bay Sizes (m) Supported Span (m) | Varies | 4.50 |
| | | | Live Load (kPa) | 1.82 | 9.00 2.40 |
| | | | Column Type Beam Type | Glulam n/a | Glulam n/a |

| | | | | | Input Values |
|----------------|---------------------|--|---|--------------------------|------------------|
| Assembly Group | Assembly Type | Assembly Name | Input Fields | Known/Measured | IE Inputs |
| | 1 | | | | • |
| | | 2.2.4 Columns and Beams_ Glulam _Level 2 - 4 _ Gr | eat Hall Foyer Number of Beams | 9.00 | 9.00 |
| | | | Number of Columns | 9.00 | 9.00 |
| | | | Column Height (m) Supported Area (m ²) | 8.60 | 8.60 |
| | | | Bay Sizes (m) | 3.25 | 3.25 |
| | | | Supported Span (m) | Varies | 5.60 |
| | | | Column Type | Glulam | Glulam |
| | | 2.2.5 Columns and Beams Glulam Level 3 | Beam Type | Glulam | Glulam |
| | | | Number of Beams | None | None |
| | | | Number of Columns Column Height (m) | 25.00 4.30 | 25.00 |
| | | | Supported Area (m ²) | 1,012.50 | 1,012.50 |
| | | | Bay Sizes (m) | Varies | 4.50 |
| | | | Live Load (kPa) | 1.82 | 2.40 |
| | | | Column Type Beam Type | Glulam | Glulam |
| | | 2.2.6 Columns and Beams _ Glulam _ Level 4 | Boain Type | 100 | 104 |
| | | | Number of Beams | None 30.00 | None 30.00 |
| | | | Column Height (m) | 4.30 | 4.30 |
| | | | Supported Area (m ²) | 1,215.00 | 1,215.00 |
| | | | Bay Sizes (m) Supported Span (m) | Varies | 4.50 |
| | | | Live Load (kPa) | 1.82 | 2.40 |
| | | | Column Type Beam Type | Glulam | Glulam |
| | | 2.2.7 Columns and Beams _ Glulam _ Level 5 _ Root | fWall | | 104 |
| | | | Number of Beams Number of Columns | 30.00 | 30.00 |
| | | | Column Height (m) | 2.80 | 2.80 |
| | | | Supported Area (m ²) | 518.00 | 518.00 |
| | | | Bay Sizes (m) Supported Span (m) | 3.25 Varies | 3.25 |
| | | | Live Load (kPa) | 1.82 | 1.82 |
| | | | Column Type Beam Type | Glulam | Glulam Glulam |
| | | 2.2.8 Columns and Beams _ Glulam _ L5 _ Sawtooth | Roof | | |
| | | | Number of Beams Number of Columns | None 12.00 | None 12.00 |
| | | | Column Height (m) | 1.00 | 1.00 |
| | | | Supported Area (m ²) | 644.50 | 644.50 |
| | | | Bay Sizes (m) Supported Span (m) | 4.50 | 4.50 |
| | | | Live Load (kPa) | 1.82 | 2.40 |
| | | | Column Type Beam Type | Glulam n/a | Glulam n/a |
| | 2.3 Steel | | | | |
| | | 2.3.1 Columns and Beams_ Steel _Level 2 - 4 _ Grea | Number of Beams | 13.00 | 13.00 |
| | | | Number of Columns | 26.00 | 26.00 |
| | | | Column Height (m) Supported Area (m ²) | 8.60 | 8.60 |
| | | | Bay Sizes (m) | 2.47 | 4.93 |
| | | | Supported Span (m) | 21.30 | 10.65 |
| | | | Column Type | 4.80 Structural Steel | 4.00 WF |
| | | 2.2.2 Columno and Roomo Steel Lough F. Mache | Beam Type | Structural Steel | WF |
| | | 2.3.2 Columns and Beams _ Steel _ Level 5 _ Mecha | Number of Beams | 7.00 | 7.00 |
| | | | Number of Columns | 21.00 | 21.00 |
| | | | Column Height (m) Supported Area (m ²) | 978.00 | 6.00 978.00 |
| | | | Bay Sizes (m) | 9.00 | 9.00 |
| | | | Supported Span (m) | 16.25 | 16.25 |
| | | | Column Type | Structural Steel | WF |
| 2.0 Eleor | | | Beam Type | Structural Steel | WF |
| | 3.1 Composite Metal | | | | |
| | | 3.1.1 Floor _ Composite Metal _ Level 2 _ Great Hall | Eloor Area (m ²) | 1.056.00 | 1 056 00 |
| | | | Number of Bays per Row | 1.00 | 3.00 |
| | | | Number of Rows | 13.00 | 13.00 |
| | | | Span (m) | 3.00 | 3.00 |
| | | | Concrete (MPa) | 35.00 | 30.00 |
| | | | Live Load (kPa) | 4.80 | 35.00 |
| | | 3.1.2 Floor _ Composite Metal _ Level 2 _ Nest and | Bridge Lounge | | |
| | | | Hoor Area (m ⁻) Number of Bays per Row | 321.00 Varies | 321.00 |
| | | | Number of Rows | Varies | 12.00 |
| | | | Bay Size (m) Span (m) | Varies | 3.57 |
| | | | Concrete (MPa) | 35.00 | 30.00 |
| | | | Concrete Flyash (%) | 35.00 | 35.00 |
| | | 3.1.3 Floor _ Composite Metal _ Level 3 _ Nest, Bridge | ge Lounge and Pocket Lounge | 4.80 | 4.00 |
| | | | Floor Area (m ²) | 380.00 | 380.00 |
| | | | Number of Bays per Row | 1.00 | 1.00 |
| | | | Bay Size (m) | Varies | 11.18 |
| | | | Span (m) Concrete (MPa) | 2.00 | 2.00 |
| | | | Concrete Flyash (%) | 35.00 | 35.00 |
| | | 2.1.4 Elear Composite Matrix Lawel 4. Of 2014 | Live Load (kPa) | 4.80 | 4.80 |
| | | 5.1.4 Floor _ Composite Metal _ Level 4 _ Child Mind | Floor Area (m ²) | 74 00 | 74.00 |
| | | | Number of Bays per Row | 1.00 | 1.00 |
| | | | Number of Rows Bay Size (m) | 5.00 | 5.00 |
| | | | Span (m) | 2.00 | 2.00 |
| | | | Concrete (MPa) | 35.00 | 30.00 |
| | | | Live Load (kPa) | 4.80 | 35.00 |

| | | | | | Input Values |
|-------------------|-----------------------------|--|---|--------------------------------|-----------------------------|
| Assembly Group | Assembly Type | Assembly Name | Input Fields | Known/Measured | IF Inputs |
| | | | | Thomasurou | 12 IIIputo |
| | 3.2 Concrete Suspended Slab | 3.2.1 Floor _ Concrete Suspended Slab _ Level 1 | | | |
| | | | Floor Width (m) Soan (m) | Varies 9.00 | 380.00 |
| | | | Floor Area (m ²) | 3,420.00 | 3,420.00 |
| | | | Concrete (MPa) Concrete Flvash (%) | 35.00 35.00 | 30.00 35.00 |
| | | 2.2.2 Electr. Constate Supported Slob. Lovel 2 | Live Load (kPa) | 4.80 | 4.80 |
| | | 3.2.2 FIOU _ CUILIERE Suspended Sido _ Lever 2 | Floor Width (m) | Varies | 397.67 |
| | | | Span (m) Eloor Area (m ²) | 9.00 | 9.00 3.579.00 |
| | | | Concrete (MPa) | 35.00 | 30.00 |
| | | | Live Load (kPa) | 4.80 | 4.80 |
| | | 3.2.3 Floor _ Concrete Suspended Slab _ Level 3 | Floor Width (m) | Varies | 391.33 |
| | | | Span (m) | 9.00 | 9.00 |
| | | | Concrete (MPa) | 3.522.00 | 3,522.00 30.00 |
| | | | Concrete Flyash (%) Live Load (kPa) | 35.00 4.80 | 35.00 4.80 |
| | | 3.2.4 Floor _ Concrete Suspended Slab _ Level 4 | Eloor Width (m) | Varies | 279.89 |
| | | | Span (m) | 9.00 | 9.00 |
| | | | Floor Area (m ²) Concrete (MPa) | 2,519.00 35.00 | 2,519.00 30.00 |
| | | | Concrete Flyash (%) | 35.00 | 35.00 |
| | | 3.2.5 Floor _ Concrete Suspended Slab _ Level 5 | Erec Math (m) | 4.80 | 4.80 |
| | | | Span (m) | Varies 9.00 | 119.44 9.00 |
| | | | Floor Area (m ²) | 1,075.00 | 1,075.00 |
| | | | Concrete Flyash (%) | 35.00 | 30.00 |
| 4.0 Interior Wall | | ļ | Live Load (kPa) | 4.80 | 4.80 |
| | 4.1 Cast In Place | 4.1.1 Interior Wall Cast In Place C1 250w 30M | IPa Metal Door | | |
| | | | Length (m) | 50.00 Varies | 32.21 |
| | | | Area (m ²) | 170.45 | 142.05 |
| | | Concrete | Strength (MPa) Thickness (mm) | 30.00 | 30.00 |
| | | | Reinforcement (M) | 15M Vert./ 10M Horiz. | 15.00 |
| | | Openings | Number of Windows | None | None |
| | | | Total Window Area (m ²) Frame Type | None | None |
| | | | Glazing Type | None | None |
| | | | Door Type | Hollow Metal | Steel Interior Door |
| | | 4.1.2 Interior Wall Cast In Place C1 300W 30M | Pa Length (m) | 15.00 | 15.00 |
| | | | Height (m) Area (m ²) | 3.90 | 3.90 |
| | | Concrete | Strength (MPa) | 30.00 | 30.00 |
| | | | Reinforcement (M) | 15M Vert./ 10M Horiz. | 15.00 |
| | | Openings | Concrete Flyash (%) Number of Windows | 35.00 None | 35.00 None |
| | | | Total Window Area (m ²) | None | None |
| | | | Glazing Type | None | None |
| | | | Number of Doors (ea) Door Type | None | None |
| | | 4.1.3 Interior Wall Cast In Place C1 450w 45M | Pa_Metal Door | 198.00 | 297.00 |
| | | | Height (m) | Varies | 4.69 |
| | | Concrete | Area (m ⁻) Strength (MPa) | 928.62 45.00 | 1,392.93 30.00 |
| | | | Thickness (mm) Reinforcement (M) | 450.00 15M Vert / 20M Horiz | 300.00 15.00 |
| | | 0 | Concrete Flyash (%) | 35.00 | 35.00 |
| | | Openings | Total Window Area (m ²) | None | None |
| | | | Frame Type Glazing Type | None | None |
| | | | Number of Doors (ea) | 6.00 Hollow Metal | 6.00 Steel Interior Deer |
| | | 4.1.4 Interior Wall _ Cast In Place _ C1 _ 600w _ 45M | Pa_Metal Door | rioliow Metal | Steel Interior Door |
| | | | Length (m) Height (m) | 498.00 Varies | 498.00 4.71 |
| | | Constato | Area (m ²) Strength (MRo) | 2,345.26 | 2,345.26 |
| | | Conciete | Thickness (mm) | 43.00 | 30.00 |
| | | | Reinforcement (M) Concrete Flyash (%) | 15M Vert./ 20M Horiz. 35.00 | 20.00 35.00 |
| | | | Strength (MPa) Thickness (mm) | n/a n/a | 60.00 300.00 |
| | | | Reinforcement (M) | n/a | 20.00 |
| | | Openings | Number of Windows (ea) | N/a None | 35.00 None |
| | | | Total Window Area (m ²) Frame Type | None | None |
| | | | Glazing Type | None | None |
| | 4.2 Conoroto Plasti | | Door Type | 5.00 Hollow Metal | 5.00 Steel Interior Door |
| | 4.∠ Concrete Block | 4.2.1 Interior Wall _ Concrete Block _ M1 _ Concrete I | Block Wall _ 190mm Block _ Metal | Door | |
| | | | Height (m) | 168.00 Varies | 168.00 4.24 |
| | | Concrete Block | Area (m ²) Thickness (mm) | 711.90 | 711.90 n/a |
| | | Ononingen | Rebar (M) Number of Windows (ea) | 10.00 None | 10.00 |
| | | Openings | Total Window Area (m ²) | None | None |
| | | | Frame Type Glazing Type | None | None None |
| | | | Number of Doors (ea) Door Type | 4.00 Hollow Metal | 4.00 Steel Interior Door |
| | • | | | | |

| | | | | Input Values | | |
|----------------|------------------|--|--|---|--|--|
| Assembly Group | Assembly Type | Assembly Name | Input Fields | Known/Measured | IF Inputs | |
| | | | | i ili cini și li cu cu | -=puto | |
| | | 4.2.2 Interior Wall _ Concrete Block _ M1-A _ Acoustie | c Concrete Block Wall _ 190mm Blo | ck _ Metal Door | 40.00 | |
| | | | Height (m) | 40.00 | 40.00 | |
| | | Converte Disate | Area (m ²) | 197.80 | 197.80 | |
| | | Concrete Block | Rebar (M) | 10.00 | 10.00 | |
| | | Openings | Number of Windows (ea) | None | None | |
| | | | Frame Type | None | None | |
| | | | Glazing Type | None | None | |
| | | | Door Type | Hollow Metal | Steel Interior Door | |
| | | Envelope | Category | Block Filler | Paint Latev Water Based | |
| | | | Thickness (mm) | n/a | Later Water Dased n/a | |
| | | | Category Material | Block Filler | Paint Latex Water Based | |
| | | | Thickness (mm) | n/a | | |
| | | 4.2.3 Interior Wall _ Concrete Block _ M1-A _ Acoustic | c Concrete Block Wall _ 190mm Blo Length (m) | ck _ Wood Door 46.00 | 46.00 | |
| | | | Height (m) | 4.30 | 4.30 | |
| | | Concrete Block | Area (m ²) Thickness (mm) | 197.80 | 197.80 p/a | |
| | | | Rebar (M) | 10.00 | 10.00 | |
| | | Openings | Number of Windows (ea) | None | None | |
| | | | Frame Type | None | None | |
| | | | Glazing Type | None | None | |
| | | | Number of Doors (ea) Door Type | 3.00 Solid Core Wood | 3.00 Solid Wood Door | |
| | | Envelope | Category | Block Filler | Paint | |
| | | | Material Thickness (mm) | Latex n/a | Latex Water Based n/a | |
| | | | Category | Block Filler | Paint | |
| | | | Thickness (mm) | n/a | Latex water based n/a | |
| | 4.3 Curtain Wall | 4.2.1 Interior Wall Curtain Wall CL1R from Tom | pored | | | |
| | | 4.5. Finterior Wall_Cuitain Wall_GETB_Onth Ten | Length (m) | 147.00 | 147.00 | |
| | | | Height (m) | Varies | 5.02 | |
| | | Curtain Wall | Area (m ⁻) Percent Viewable Glazing (%) | 738.10 | /38.10 | |
| | | | Percent Spandrel Panel (%) | None | None | |
| | | | Spandrel Type | n/a n/a | n/a n/a | |
| | | Door Opening | Number of Doors (ea) | 22.00 Aluminum Fully Clozed | 60.00 | |
| | 4.4 Steel Stud | | Door Type | Aluminum, Pully Glazeu | Aluminum Exterior Door, 80% glazing | |
| | | 4.4.1 Interior Wall _ Steel Stud _ RS1 _ Rated Shaft V | Vall 1 HR FRR _ 100mm C-H Stud | 28.00 | 28.00 | |
| | | | Height (m) | 4.30 | 4.30 | |
| | | Steel Stud | Area (m ²) | 120.40 | 120.40 | |
| | | Steel Stud | Stud Spacing (mm) | 400.00 | 400.00 | |
| | | | Stud Weight (Ga) | 25.00 | 25.00 | |
| | | | Load Bearing | No | 92.00 No | |
| | | Openings | Number of Windows (ea) | None | None | |
| | | | Frame Type | None | None | |
| | | | Glazing Type | None | None | |
| | | | Door Type | None | None | |
| | | Envelope | Category | Shaft Wall | Gypsum Board | |
| | | | Thickness (mm) | 19.00 | Gypsum Fire Rated Type X 16.00 | |
| | | | Category | Shaft Wall | Gypsum Board | |
| | | | Thickness (mm) | 16.00 | 16.00 | |
| | | | Category Material | Fire Resistant Insulation Mineral Fiber batt | Insulation Rockwool Batt | |
| | | | Thickness (mm) | 92.00 | 92.00 | |
| | | 4.4.2 Interior Wall _ Steel Stud _ KS2 _ Rated Shaft V | Length (m) | 103.00 | 103.00 | |
| | | | Height (m) | Varies | 4.39 | |
| | | Steel Stud | Area (m ²) Sheathing Type | 451.90 None | 451.90 None | |
| | | | Stud Spacing (mm) | 400.00 | 400.00 | |
| | | | Stud Weight (Ga) Stud Thickness (mm) | 25.00 100.00 | 25.00 92.00 | |
| | | | Load Bearing | No | No | |
| | | Openings | Total Window Area (m ²) | None | None | |
| | | | Frame Type | None | None | |
| | | | Glazing Type Number of Doors (ea) | None | None | |
| | | | Door Type | None | None | |
| | | Envelope | Category Material | Shaft Wall Shaftliner | Gypsum Board Gypsum Fire Rated Type X | |
| | | | Thickness (mm) | 19.00 | 16.00 | |
| | | | Category Material | Shaft Wall Fireboard | Gypsum Board Gypsum Fire Rated Type X | |
| | | | Thickness (mm) | 16.00 | 16.00 | |
| | | | Material | Gypsum Board Regular | Gypsum Board Gypsum Regular | |
| | | | Thickness (mm) Category | 16.00 Fire Resistant Insulation | 16.00 | |
| | | | Material | Mineral Fiber batt | Rockwool Batt | |
| | | | Thickness (mm) | 92.00 | 92.00 | |

| Assombly Group | Accombly Type | Assambly Name | Innut Fieldo | | Input Values |
|----------------|---------------|--|---|---|--|
| Assembly Group | Assembly Type | Assembly Name | liiput rielus | Known/Measured | IE Inputs |
| | | 4.4.3 Interior Wall Steel Stud RS3 Rated Shaft V | Vall 1 HR FRR w/ Additional GWB | 152mm C-H Stud | |
| | | | Length (m) | 25.00 | 25.00 |
| | | | Height (m) Area (m ²) | Varies 161 70 | 6.47 161.70 |
| | | Steel Stud | Sheathing Type | None | None |
| | | | Stud Spacing (mm) Stud Weight (Ga) | 400.00 | 400.00 25.00 |
| | | | Stud Thickness (mm) | 152.00 | 152.00 |
| | | Openings | Load Bearing Number of Windows (ea) | No | No |
| | | Opernings | Total Window Area (m ²) | None | None |
| | | | Frame Type | None | None |
| | | | Glazing Type Number of Doors (ea) | None | None |
| | | | Door Type | None | None |
| | | Envelope | Category Material | Shaft Wall Shaftliner | Gypsum Board Gypsum Fire Rated Type X |
| | | | Thickness (mm) | 19.00 | 16.00 |
| | | | Category Material | Shaft Wall Fireboard | Gypsum Board Gypsum Fire Rated Type X |
| | | | Thickness (mm) | 16.00 | 16.00 |
| | | | Category Material | Gypsum Board Regular | Gypsum Board Gypsum Regular |
| | | | Thickness (mm) | 16.00 | 16.00 |
| | | | Category Material | Fire Resistant Insulation Mineral Fiber batt | Insulation Rockwool Batt |
| | | | Thickness (mm) | 150.00 | 150.00 |
| | | 4.4.4 Interior Wall _ Steel Stud _ W1 _ Wall Furring _ | 22mm Channel | 36.00 | 36.00 |
| | | | Height (m) | Varies | 4.01 |
| | | e1 e1 | Area (m ²) Sheathing Type | 144.30 | 144.30 |
| | | Steel Stud | Stud Spacing (mm) | 400.00 | 400.00 |
| | | | Stud Weight (Ga) | 25.00 | 25.00 |
| | | | Load Bearing | 22.00 No | 92.00 No |
| | | Openings | Number of Windows (ea) | None | None |
| | | | Total Window Area (m ²) Frame Type | None | None |
| | | | Glazing Type | None | None |
| | | | Number of Doors (ea) | None | None |
| | | Envelope | Category | Gypsum Board | Gypsum Board |
| | | | Material | Regular 16.00 | Gypsum Regular |
| | | | Category | Interior Finish | Paint |
| | | | Material | Laytex Paint | Latex Water Based |
| | | 4.4.5 Interior Wall _ Steel Stud _ W1-T _ Tile Clad Wa | all Furring _ 22mm Channel | Illa | liva |
| | | | Length (m) | 19.00 | 19.00 |
| | | | Area (m ²) | 81.70 | 81.70 |
| | | Steel Stud | Sheathing Type | None | None |
| | | | Stud Spacing (mm) Stud Weight (Ga) | 400.00 25.00 | 400.00 25.00 |
| | | | Stud Thickness (mm) | 22.00 | 92.00 |
| | | Openings | Load Bearing Number of Windows (ea) | No | No |
| | | | Total Window Area (m ²) | None | None |
| | | | Frame Type Glazing Type | None | None |
| | | | Number of Doors (ea) | None | None |
| | | Envelope | Door Type Category | None Backer Board | None Gyosum Board |
| | | Liveope | Material | Coated Glass Mat Gypsum | Moisture Resistant Gypsum Board |
| | | 4.4.6 Interior Woll Steel Stud. W/2. Woll Eurrige | Thickness (mm) 41mm Stud Matel Deer | 16.00 | 16.00 |
| | | | Length (m) | 137.00 | 137.00 |
| | | | Height (m) | Varies | 4.26 |
| | | Steel Stud | Sheathing Type | 583.10 None | 583.10 None |
| | | | Stud Spacing (mm) | 400.00 | 400.00 |
| | | | Stud vvergnt (Ga) Stud Thickness (mm) | 25.00 41.00 | 25.00 92.00 |
| | | | Load Bearing | No | No |
| | | Openings | Total Window Area (m ²) | None | None |
| | | | Frame Type | None | None |
| | | | Glazing Type Number of Doors (ea) | None 3.00 | None 3.00 |
| | | | Door Type | Hollow Metal | Steel Interior Door |
| | | Envelope | Category Material | Gypsum Board Regular | Gypsum Board Gypsum Regular |
| | | | Thickness (mm) | 16.00 | 16.00 |
| | | | Category Material | Interior Finish Lavtex Paint | Paint Latex Water Based |
| | | | Thickness (mm) | | n/a |
| | | 4.4.7 Interior Wall _ Steel Stud _ W3 _ Wall Furring _ | 92mm Stud _ Metal Door | 35.00 | 35.00 |
| | | | Height (m) | 4.30 | 4.30 |
| | | Quark Plant | Area (m ²) Sheathing Type | 150.50 | 150.50 |
| | | | Stud Spacing (mm) | 400.00 | 400.00 |
| | | | Stud Weight (Ga) Stud Thickness (mm) | 25.00 | 25.00 |
| | | | Load Bearing | 92.00 No | 92.00 No |
| | | Openings | Number of Windows (ea) | None | None |
| | | | Frame Type | None | None |
| | | | Glazing Type | None | None |
| | | | Number of Doors (ea) Door Type | 3.00 Hollow Metal | 3.00 Steel Interior Door |
| | | Envelope | Category | Gypsum Board | Gypsum Board |
| | | | material Thickness (mm) | Regular 16 00 | Gypsum Regular 16.00 |
| | | | Category | Interior Finish | Paint |
| | | | material Thickness (mm) | Laytex Paint | Latex Water Based |
| , i | | μ | | liva liva | 1i/a |

| | | | | Input Values | | |
|----------------|---------------|--|---|---|---|--|
| Assembly Group | Assembly Type | Assembly Name | Input Fields | Known/Measured | IE Inputs | |
| | | 4.4.8 Interior Wall Steel Stud W3 Wall Furrior | 92mm Stud Wood Door | • | | |
| | | +.+.o intend wair_steer stud_ws_wair uning_ | Length (m) | 35.00 | 35.00 | |
| | | | Height (m) Area (m ²) | 4.30 | 4.30 | |
| | | Steel Stud | Sheathing Type | None | None | |
| | | | Stud Spacing (mm) Stud Weight (Ga) | 400.00 25.00 | 400.00 25.00 | |
| | | | Stud Thickness (mm) | 92.00 | 92.00 | |
| | | Openings | Number of Windows (ea) | No | No | |
| | | | Total Window Area (m ²) | None | None | |
| | | | Glazing Type | None | None | |
| | | | Number of Doors (ea) | 1.00 Solid Core Wood | 1.00 Solid Wood Door | |
| | | Envelope | Category | Gypsum Board | Gypsum Board | |
| | | | Material Thickness (mm) | Regular 16.00 | Gypsum Regular 16.00 | |
| | | | Category | Interior Finish | Paint Latev Water Based | |
| | | | Thickness (mm) | n/a | n/a | |
| | | 4.4.9 Interior Wall _ Steel Stud _ W3-T _ Tile Clad Wa | all Furring _ 92mm Stud Length (m) | 49.00 | 49.00 | |
| | | | Height (m) | Varies | 4.56 | |
| | | Steel Stud | Area (m²) Sheathing Type | 223.30 None | 223.30 None | |
| | | | Stud Spacing (mm) | 400.00 | 400.00 | |
| | | | Stud Weight (Ga) Stud Thickness (mm) | 92.00 | 25.00 92.00 | |
| | | Ononinan | Load Bearing | No | No | |
| | | Openings | Total Window Area (m ²) | None | None | |
| | | | Frame Type Glazing Type | None | None | |
| | | | Number of Doors (ea) | None | None | |
| | | Envelope | Door Type Category | None Backer Board | None Gypsum Board | |
| | | | Material | Coated Glass Mat Gypsum | Moisture Resistant Gypsum Board | |
| | | 4.4.10 Interior Wall _ Steel Stud _ W4 _ Wall Furring | 152mm Stud | 16.00 | 18.00 | |
| | | | Length (m) Height (m) | 82.00 Varies | 82.00 | |
| | | | Area (m ²) | 377.80 | 377.80 | |
| | | Steel Stud | Sheathing Type Stud Spacing (mm) | None 400.00 | None 400.00 | |
| | | | Stud Weight (Ga) | 25.00 | 25.00 | |
| | | | Stud Thickness (mm) Load Bearing | 152.00 No | 152.00 No | |
| | | Openings | Number of Windows (ea) | None | None | |
| | | | Frame Type | None | None | |
| | | | Glazing Type | None | None | |
| | | | Door Type | None | None | |
| | | Envelope | Category Material | Gypsum Board Regular | Gypsum Board Gypsum Regular | |
| | | | Thickness (mm) | 16.00 | 16.00 | |
| | | | Material | Laytex Paint | Latex Water Based | |
| | | 4.4.11 Interior Wall Steel Stud W4-T Wall Furrin | Thickness (mm) a 152mm Stud | n/a | n/a | |
| | | | Length (m) | 5.00 | 5.00 | |
| | | | Area (m ²) | 4.30 | 4.30 21.50 | |
| | | Steel Stud | Sheathing Type | None 400.00 | None 400.00 | |
| | | | Stud Weight (Ga) | 25.00 | 400.00 25.00 | |
| | | | Stud Thickness (mm) Load Bearing | 152.00 No | 152.00 No | |
| | | Openings | Number of Windows (ea) | None | None | |
| | | | Total Window Area (m ²) Frame Type | None | None | |
| | | | Glazing Type | None | None | |
| | | | Door Type | None | None | |
| | | Envelope | Category Material | Backer Board Coated Glass Mat Gypsum | Gypsum Board Moisture Resistant Gypsum Board | |
| | | 4.4.40 Interior Well, Cheel Churt, W.C., Desile Destries | Thickness (mm) | 16.00 | 16.00 | |
| | | 4.4.12 Intenor Wall_Steel Stud_WS_Basic Faltitio | Length (m) | 186.00 | 186.00 | |
| | | | Height (m) | Varies | 4.31 | |
| | | Steed Stud | Sheathing Type | None | None | |
| | | | Stud Spacing (mm) Stud Weight (Ga) | 400.00 25.00 | 400.00 25.00 | |
| | | | Stud Thickness (mm) | 92.00 | 92.00 | |
| | | Openings | Load Bearing Number of Windows (ea) | 3.00 | 3.00 | |
| | | | Total Window Area (m ²) | 23.50 | 23.50 | |
| | | | Frame Type Glazing Type | Aluminum 6mm Laminated | Aluminum Frame Standard Glazing | |
| | | | Number of Doors (ea) Door Type | 10.00 Solid Core Wood | 10.00 Solid Wood Door | |
| | | Envelope: | Category | Interior Finish | Paint | |
| | | | material Thickness (mm) | Laytex Paint n/a | Latex Water Based None | |
| | | | Category Material | Gypsum Board | Gypsum Board | |
| | | | Thickness (mm) | 16.00 | Gypsuff Regular 16.00 | |
| | | | Category Material | Gypsum Board Regular | Gypsum Board Gypsum Regular | |
| | | | Thickness (mm) | 16.00 | | |
| | | | Category Material | Interior Finish Laytex Paint | Paint Latex Water Based | |
| | | | Thickness (mm) | n/a | None | |

| | A | Accomption Name | 1 | | Input Values |
|----------------|---------------|--|---|---|--|
| Assembly Group | Assembly Type | Assembly Name | input Fields | Known/Measured | IE Inputs |
| , | | 4.4.13 Interior Wall Steel Stud W5 Basic Partitio | n 92mm Stud Wood Door GL | 1 | |
| | | | Length (m) | 186.00 | 186.00 |
| | | | Height (m) | Varies | 4.31 |
| | | Steel Stud | Area (m) Sheathing Type | 802.50 None | 802.50 None |
| | | | Stud Spacing (mm) | 400.00 | 400.00 |
| | | | Stud Weight (Ga) | 25.00 | 25.00 |
| | | | Load Bearing | 92.00 No | 92.00 No |
| | | Openings | Number of Windows (ea) | 3.00 | 3.00 |
| | | | Total Window Area (m ⁺) Frame Type | 23.50 Aluminum | 23.50 Aluminum Frame |
| | | | Glazing Type | 6mm Laminated | Standard Glazing |
| | | | Number of Doors (ea) Door Type | 50.00 Hollow Metal | 50.00 Solid Wood Door |
| | | Envelope | Category | Interior Finish | Paint |
| | | | Thickness (mm) | Laytex Paint n/a | Latex Water Based None |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Material Thickness (mm) | Kegular 16.00 | Gypsum Regular 16.00 |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Material Thickness (mm) | Regular 16.00 | Gypsum Regular 16.00 |
| | | | Category | Interior Finish | Paint |
| | | | Material Thickness (mm) | Laytex Paint | Latex Water Based |
| | | 4.4.14 Interior Wall _ Steel Stud _ W5-2 _ Acoustic Pa | artition w/ 2 Layers One Side _ 92m | m Stud _ Metal Door _ GL1 | Nono |
| | | | Length (m) Height (m) | 195.50 | 195.50 |
| | | | Area (m ²) | 840.65 | 840.65 |
| | | Steel Stud | Sheathing Type | None | None |
| | | | Stud Weight (Ga) | 25.00 | 400.00 25.00 |
| | | | Stud Thickness (mm) | 92.00 | 92.00 |
| | | Openings | Load Bearing Number of Windows (ea) | No 35.00 | No 35.00 |
| | | | Total Window Area (m ²) | 78.50 | 78.50 |
| | | | Frame Type Clozing Type | Aluminum | Aluminum Frame Standard Clazing |
| | | | Number of Doors (ea) | 9.00 | 9.00 |
| | | Envelope | Door Type | Hollow Metal | Steel Interior Door |
| | | Envelope | Material | Laytex Paint | Latex Water Based |
| | | | Thickness (mm) Category | n/a Gvpsum Board | n/a Gypsum Board |
| | | | Material | Type X | Gypsum Fire Rated Type X |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Material | Type X | Gypsum Fire Rated Type X |
| | | | Category | R-12 Acoustic Insulation | Insulation |
| | | | Material Thickness (mm) | Fiberglass Batt 92.00 | Fiberglass Batt 92.00 |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Material Thickness (mm) | Type X 16.00 | Gypsum Fire Rated Type X 16.00 |
| | | | Category | Interior Finish | Paint |
| | | | Thickness (mm) | Laytex Paint n/a | Latex water Based n/a |
| | | 4.4.15 Interior Wall _ Steel Stud _ W5-2 _ Acoustic Pa | artition w/ 2 Layers One Side _ 92m | m Stud _ Wood Door _ GL1 | 105 50 |
| | | | Height (m) | 4.30 | 4.30 |
| | | | Area (m ²) | 840.65 | 840.65 |
| | | Steel Stud | Stud Spacing (mm) | None 400.00 | None 400.00 |
| | | | Stud Weight (Ga) | 25.00 | 25.00 |
| | | | Stud Thickness (mm) | 92.00 No | 92.00 No |
| | | Openings | Number of Windows (ea) | 35.00 | 35.00 |
| | | | Total Window Area (m ²) | 78.50 | 78.50 |
| | | | Glazing Type | 6mm Laminated | Standard Glazing |
| | | | Number of Doors (ea) | 25.00 Solid Core Wood | 25.00 Solid Wood Door |
| | | Envelope | Category | Interior Finish | Paint |
| | | | Material Thickness (mm) | Laytex Paint n/a | Latex Water Based |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Thickness (mm) | 16.00 | Gypsum Fire Rated Type X 16.00 |
| | | | Category Material | Gypsum Board | Gypsum Board Gypsum Fire Rated Type Y |
| | | | Thickness (mm) | 16.00 | 16.00 |
| | | | Category Material | R-12 Acoustic Insulation Fiberolass Batt | Insulation Fiberolass Batt |
| | | | Thickness (mm) | 92.00 | 92.00 |
| | | | Material | Gypsum Board Type X | Gypsum Board Gypsum Fire Rated Type X |
| | | | Thickness (mm) Category | 16.00 Interior Einish | 16.00 Paint |
| | | | Material | Laytex Paint | Latex Water Based |
| I | I | L | Thickness (mm) | n/a | n/a |

| | | | Input Values | Input Values | |
|----------------|---------------|--|---|--------------------------------------|--|
| Assembly Group | Assembly Type | Assembly Name | Input Fields | Known/Measured | IE Inputs |
| | | | | | • |
| | | 4.4.16 Interior Wall _ Steel Stud _ W5-22 _ Acoustic F | artition w/ 2 Layers Both Sides _ 92 | mm Stud _ Metal Door _ GL1 678.50 | 678.50 |
| | | | Height (m) | Varies | 4.26 |
| | | Steel Stud | Area (m ²) Sheathing Type | 2,892.20 | 2,892.20 |
| | | Steel Stud | Stud Spacing (mm) | 400.00 | 400.00 |
| | | | Stud Weight (Ga) | 25.00 | 25.00 |
| | | | Load Bearing | 92.00 No | 92.00 No |
| | | Openings | Number of Windows (ea) | 247.00 | 247.00 |
| | | | Total Window Area (m ⁴) | 750.00 Aluminum | 750.00 Aluminum |
| | | | Glazing Type | 6mm Laminated | Standard Glazing |
| | | | Number of Doors | 9.00 Hollow Metal | 9.00 Steel Interior Door |
| | | Envelope | Category | Interior Finish | Paint |
| | | | Material Thickness (mm) | Laytex Paint | Latex Water Based |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Material Thickness (mm) | Type X 16.00 | Gypsum Fire Rated Type X 16.00 |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Material Thickness (mm) | Type X 16.00 | Gypsum Fire Rated Type X 16.00 |
| | | | Category | R-12 Acoustic Insulation | Insulation |
| | | | Material Thickness (mm) | Fiberglass Batt | Fiberglass Batt |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Material Thickness (mm) | Type X 16.00 | Gypsum Fire Rated Type X 16.00 |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Material Thickness (mm) | Type X 16 00 | Gypsum Fire Rated Type X 16.00 |
| | | | Category | Interior Finish | Paint |
| | | | Material | Laytex Paint | Latex Water Based |
| | | 4.4.17 Interior Wall _ Steel Stud _ W5-22 _ Acoustic F | Partition w/ 2 Layers Both Sides _ 92 | mm Stud _ Wood Door _ GL1A | 1i/d |
| | | | Length (m) | 678.50 Vicios | 678.50 |
| | | | Area (m ²) | 2.892.20 | 4.20 2.892.20 |
| | | Steel Stud | Sheathing Type | None | None |
| | | | Stud Spacing (mm) Stud Weight (Ga) | 400.00 25.00 | 400.00 25.00 |
| | | | Stud Thickness (mm) | 92.00 | 92.00 |
| | | Openings | Load Bearing Number of Windows (ea) | No 18.00 | No 18.00 |
| | | | Total Window Area (m ²) | 59.00 | 59.00 |
| | | | Frame Type Clazing Type | Insulated Aluminum | Aluminum Standard Glazing |
| | | | Number of Doors | 137.00 | 137.00 |
| | | Envelope | Door Type Category | Solid Core Wood | Solid Wood Door |
| | | Envelope | Material | Laytex Paint | Latex Water Based |
| | | | Thickness (mm) | n/a Gypgum Board | n/a Gynsym Board |
| | | | Material | Type X | Gypsum Fire Rated Type X |
| | | | Thickness (mm) Category | 16.00 Gypsum Board | 16.00 Gypsym Board |
| | | | Material | Type X | Gypsum Fire Rated Type X |
| | | | Thickness (mm) | 16.00 P-12 Acoustic Insulation | 16.00 |
| | | | Material | Fiberglass Batt | Fiberglass Batt |
| | | | Thickness (mm) | 92.00 Gypgym Board | 92.00 Gyngym Board |
| | | | Material | Type X | Gypsum Fire Rated Type X |
| | | | Thickness (mm) Category | 16.00 Gypsum Board | 16.00 Gypsym Board |
| | | | Material | Type X | Gypsum Fire Rated Type X |
| | | | Thickness (mm) Category | 16.00 Interior Einish | 16.00 Paint |
| | | | Material | Laytex Paint | Latex Water Based |
| | | 4.4.18 Interior Wall Steel Stud W5-R Rated Parti | Thickness (mm) tion 92mm Stud Metal Door | n/a | n/a |
| | | | Length (m) | 11.00 | 11.00 |
| | | | Height (m) | 4.30 | 4.30 |
| | | Steel Stud | Sheathing Type | 47.30 None | 47.30 None |
| | | | Stud Spacing (mm) | 400.00 | 400.00 |
| | | | Stud Thickness (mm) | 92.00 | 92.00 |
| | | Openings | Load Bearing | No | No |
| | | Openings | Total Window Area (m ²) | None | None |
| | | | Frame Type | None | None |
| | | | Giazing Type Number of Doors (ea) | None 3.00 | None 3.00 |
| | | | Door Type | Hollow Metal | Steel Interior Door |
| | | Envelope | Material | Interior Finish Laytex Paint | Paint Latex Water Based |
| | | | Thickness (mm) | n/a | n/a |
| | | | Category Material | Gypsum Board Type X | Gypsum Board Gypsum Fire Rated Type X |
| | | | Thickness (mm) | 16.00 | 16.00 |
| | | | Material | Gypsum Board Tvpe X | Gypsum Board Gypsum Fire Rated Type X |
| | | | Thickness (mm) | 16.00 | 16.00 |
| | | | Material | Interior Finish Laytex Paint | Paint Latex Water Based |
| | | | Thickness (mm) | n/a | n/a |

| Aukeining (comp) Aukeining (comp) Aukeining (comp) Response Response Response | | | | | | Input Values |
|--|----------------|---------------|--|---|---|---|
| | Assembly Group | Assembly Type | Assembly Name | input Fields | Known/Measured | IE Inputs |
| | | | 4 4 19 Interior Wall Steel Stud W5-RA Rated Acc | oustic Partition 92mm Stud | | |
| Norm Norm <t< th=""><th></th><th></th><th></th><th>Length (m)</th><th>14.00</th><th>14.00</th></t<> | | | | Length (m) | 14.00 | 14.00 |
| | | | | Height (m) Area (m ²) | 4.30 60.20 | 4.30 60.20 |
| | | | Steel Stud | Sheathing Type | None 400.00 | None 400.00 |
| hall max man | | | | Stud Weight (Ga) | 25.00 | 25.00 |
| | | | | Stud Thickness (mm) | 92.00 No | 92.00 No |
| Image: State of the state o | | | Openings | Number of Windows (ea) | None | None |
| Image in the set of t | | | | Total Window Area (m ⁻) Frame Type | None | None |
| Image: Special problem Image: Special problem< | | | | Glazing Type | None | None |
| | | | | Door Type | None | None |
| Thinks (m) Thinks (m) <ththinks (m)<="" th=""> Thinks (m) Thinks (</ththinks> | | | Envelope | Category Material | Interior Finish Lavtex Paint | Paint Latex Water Based |
| A Decemperation of the second o | | | | Thickness (mm) | | |
| Nome Pic Database | | | | Material | Gypsum Board Type X | Gypsum Board Gypsum Fire Rated Type X |
| Nome Nome <th< th=""><th></th><th></th><th></th><th>Thickness (mm)</th><th>16.00 R-12 Acoustical Insulation</th><th>16.00 Insulation</th></th<> | | | | Thickness (mm) | 16.00 R-12 Acoustical Insulation | 16.00 Insulation |
| | | | | Material | Mineral Fiber batt | Rockwool Batt |
| Marg Table Protocol Table Protocol <th></th> <th></th> <th></th> <th>Category</th> <th>92.00 Gypsum Board</th> <th>92mm Gypsum Board</th> | | | | Category | 92.00 Gypsum Board | 92mm Gypsum Board |
| Image: mining intermediate interme | | | | Material Thickness (mm) | Type X 16.00 | Gypsum Fire Rated Type X 16.00 |
| Integer < | | | | Category | Interior Finish | Paint |
| 44.20 Yearce Vall _ Sold Start, Wo.7 Tit Cata Protein 0 < | | | | Material Thickness (mm) | Laytex Paint n/a | Latex water Based |
| inspin (m) inspin | | | 4.4.20 Interior Wall _ Steel Stud _ W5-T _ Tile Clad Pa | artition Both Sides _ 92mm Stud _ \ | Wood Door 25.00 | 25.00 |
| baseling baseling 1110 1110 baseling 4110 1110 1110 baseling 4100 4200 4200 baseling 420 200 4200 baseling 800 200 200 baseling 800 800 800 baseling 800 800 800 baseling 800 800 800 baseling 800 800 800 baseling 800 6000 800 800 baseling 6000 6000 6000 800 900 baseling 6000 6000 6000 900 800 baseling 6000 6000 900 800 900 800 baseling 110000 11000 11000 11000 11000 11000 11000 11000 11000 11000 11000 11000 11000 11000 11000 110000 110000 110000 </th <th></th> <th></th> <th></th> <th>Height (m)</th> <th>25.00 Varies</th> <th>25.00</th> | | | | Height (m) | 25.00 Varies | 25.00 |
| Lacis Back right (Damp) 420.00 420.00 Back Vest (Damp) 420.00 420.00 Lacis Back (Damp) 400 400 Lacis Back (Damp) 1200 400 < | | | Steal Stud | Area (m ²) Sheathing Type | 111.10 None | 111.10 None |
| bid Wedr (G) 3.00 3.00 3.00 Decemp Karber 4Workse (a) Nove Nove Comm Karber 4Workse (a) Nove Nove Comm Karber 4Workse (a) Nove Nove Comm Barber 4Workse (a) Barber 4Workse (a) Nove Comm Comm Barber 4Workse (a) Nove Nove Comm Comm Comm Same form Nove Nove Comm Marker 4Workse (a) Nove Nove Nove Nove Laboration Nove Nove Nove Nove Nove Laboration Same form Laboration Nove Nove Nove Laboration Same form Laboration Nove Nove Nove <th></th> <th></th> <th>Steel Stud</th> <th>Stud Spacing (mm)</th> <th>400.00</th> <th>400.00</th> | | | Steel Stud | Stud Spacing (mm) | 400.00 | 400.00 |
| Lad Boorg Print Windows (ma) Nova Nova And Boorg Print Types (m) Nova Nova Control France Types (m) Static Control France Types (m) Nova Control France Types (m) Control France Types (m) Nova Nova Control France Types (m) Control France Types (m) Nova Nova Nova Control France Types (m) Control France Types (m) Nova Nova Nova Nova Add Tobaca (m) Nova (m) Nova Nova Nova Nova Nova Add Tobaca (m) Control France Types (m) Nova Nova <td< th=""><th></th><th></th><th></th><th>Stud Weight (Ga) Stud Thickness (mm)</th><th>25.00 92.00</th><th>25.00 92.00</th></td<> | | | | Stud Weight (Ga) Stud Thickness (mm) | 25.00 92.00 | 25.00 92.00 |
| Image: Section (Section (| | | Openings | Load Bearing | No | No |
| Prime Type None None Entertion Type Construction 2.20 2.21 Entertion Type Construction 2.20 2.21 Entertion Type Construction 2.20 2.21 Entertion Type Construction 2.20 3.21 Entertion Type Construction 3.21 3.21 3.21 Entertion Type Construction 4.21 Maxim Planutry Type 4.22 Maxim Planutry Type </th <th></th> <th></th> <th>Openings</th> <th>Total Window Area (m²)</th> <th>None</th> <th>None</th> | | | Openings | Total Window Area (m ²) | None | None |
| Harder of Doos (w) 2.0 2.0 2.0 Environ Good Yano | | | | Frame Type Glazing Type | None | None |
| Envelop Solito Marcos Solito Marcos Solito Marcos 1 Solito Marcos Canado Solito Marcos Matchine Restain Consume Baset Indexion (mon) Canado Solito Marcos October Marcos 1 4 21 Instruct Wall_Solito Marcos Canado Solito Marcos Solito Marcos Matchine Restain Consume Baset Indexion (mon) Solito Marcos Matchine Restain Consume Baset Matchine (mon) Solito Marcos 1 4 21 Instruct Wall_Solito Marcos Solito Marcos Solito Marcos Solito Marcos Solito Marcos 1 4 21 Instruct Wall_Solito Marcos Solito Marcos Solito Marcos Solito Marcos Solito Marcos 1 4 20 Instruct Wall_Solito Marcos Solito Marcos Solito Marcos Solito Marcos Solito Marcos 1 4 20 Instruct Wall_Solito Marcos Solito Marcos Solito Marcos Solito Marcos Solito Marcos 1 4 20 Instruct Wall_Solito Marcos Solito Marcos Solito Marcos Solito Marcos Solito Marcos Solito Marcos 1 4 20 Instruct Wall_Solito Marcos Solito Marcos Solito Marcos Solito Marcos Solito Marcos Solito Marcos 1 4 20 Instruct Wall_Solito Marcos Solito Marcos Solito Marcos | | | | Number of Doors (ea) | 2.00 | 2.00 |
| Material roman Control Glass Ma Concurs Material roman < | | | Envelope | Category | Backer Board | Gypsum Board |
| Category Bible Board Marcial Cynum Board Category Common Category Common C | | | | Material Thickness (mm) | Coated Glass Mat Gypsum 16.00 | Moisture Resistant Gypsum Board 16.00 |
| Image: space of the s | | | | Category | Backer Board Coated Glass Mat Gursum | Gypsum Board Mojeture Resistant Gypsum Board |
| 4.4.21 menor Wall_State Stud_ Will Base Petition 253.00 253.00 Heads (m) 243.00 1.219.00 Area (m) 1.219.00 1.219.00 Area (m) 1.219.00 1.219.00 Steel Elasti Statuming Type in 0.000 0.000 Bud Wright (Ga) 3.000 0.000 Bud Wright (Ga) 3.000 0.000 Bud Thomas (mon) 1.000 0.000 Common (Ga) 0.000 0.000 Bud Thomas (mon) 1.000 0.000 Common (Ga) 0.000 0.000 0.000 Bud Thomas (mon) 1.0000 0.000 0.000 Mateal (mon) 1.0000 0.000 0.000 Mateal (mon) | | | | Thickness (mm) | 16.00 | 16.00 |
| Head rm Values 4.42 Ana (1) (1) (1) (1) Basel Source (rm) 00000 00000 0000 | | | 4.4.21 Interior Wall _ Steel Stud _ W6 _ Basic Partition | Length (m) | 253.00 | 253.00 |
| Searching Type 1. Kone 1. Kone Sub Stand Searching Type 400.00 400.00 Sub Weyt (Ga) 25.00 25.00 Sub Type 1. Kone 1. Stand Opening Munther of Windows (a) None None Cypering Munther of Windows (a) None None Tasil Window Area (ar) None None None Copering Lipse (a) None None Envelopic Cetacry None None None Material Lipse (ann) Generating (a) Gen | | | | Height (m) Area (m ²) | Varies | 4.82 |
| Sub Stacking (mm) 40.00 40.00 Sub Stacking (mm) 120.0 125.00 Load Bearing No No Teal Vindow Ang (m²) None None Castigery 10.000 10.000 10.000 Dor Type Holdow Media 0.0000 10.000 Category Grypun Board Grypun Board Grypun Board Category Grypun Board Grypun Board Grypun Board Category Grypun Board Grypun Board Grypun Board Ad.22 Interior Wall Statel Stud Wold Door 10.000 40.200 12.190.000 State Stud Statel (m2) None None None Ad.22 Interior Wall Statel Stud Wold Door 20.000 20.000 20.000 State Statel (m2) None | | | Steel Stud | Sheathing Type | None | None |
| Sud Thioheas (m) 152.00 152.00 Opening Balang Non Non Nontbor of Windows (ea) None None Nontbor of Windows (ea) None None Nontbor of Windows (ea) None None Nontbor of Doors (ea) 129.00 35.00 Door Type Indoor Marked None Balang Control (ea) 129.00 Door Type Indoor Marked None Callegry Oppening Control (ea) 20.00 Door Type Oppening None None Callegry Oppening Control (ea) 20.00 Door Type Oppening None None Callegry Oppening Oppening Control (ea) Oppening Callegry Oppening Oppening Control (ea) Oppening Callegry Oppening Oppening Control (ea) Oppening Callegry Oppening None None None Callegry <t< th=""><th></th><th></th><th></th><th>Stud Spacing (mm) Stud Weight (Ga)</th><th>400.00 25.00</th><th>400.00 25.00</th></t<> | | | | Stud Spacing (mm) Stud Weight (Ga) | 400.00 25.00 | 400.00 25.00 |
| Opening Number of Window Ana (m) None None Tatal Window Ana (m) None Anae None Fame Type None None None Rang Type None None None Number of Doors (eb) Hadros Fish Peners (high Peners) None Envicos Calagory Gradual (high Peners) Latex Wale Baad Tatal Calagory Gradual (high Peners) Calagory Gradual (high Peners) Tatal Calagory Gradual (high Peners) Calagory Gradual (high Peners) Calagory Gradual (high Peners) Calagory Gradual (high Peners) Calagory Calagory Graduary Graduary Graduary Graduary Calagory Calagory Graduary Graduary Graduary Calagory Calagory Calagory None Calagory Base Pantion Tokones (mn) Calagory Cal | | | | Stud Thickness (mm) | 152.00 No | 152.00 No |
| Image: Stand | | | Openings | Number of Windows (ea) | None | None |
| Glazina Tippe Nome Nome Number of Doors (an) 20.00 20.00 Door Type Heldow Meal Steel Interior Doors Enrekoz Canagory Heldow Meal Cate Steel Interior Doors Tackosse (mn) Laster Wein Cate Steel Interior Doors Cate Steel Interior Doors Cate Steel Interior Doors Cate Steel Interior Doors Cate Steel Interior Doors Cate Steel Interior Doors Tackosse (mn) Cate Steel Interior Doors Cate Steel Interior Steel Inter | | | | Total Window Area (m ⁻) Frame Type | None | none |
| Indication Hole | | | | Glazing Type | None | None |
| Image: Second | | | | Door Type | Hollow Metal | 29.00 Steel Interior Door |
| Index space Index space None None Category Grypsum Board Gypsum Board Gypsum Board Gypsum Board Material Regular Gypsum Board Gypsu | | | Envelope | Category Material | Interior Finish Lavtex Paint | Paint Latex Water Based |
| Image: Comparison of the second sec | | | | Thickness (mm) | n/a | None |
| Image: stand | | | | Material | Gypsum Board Regular | Gypsum Board Gypsum Regular |
| Material Regular Grynam Regular Category Interior Finish Participant A 4.22 Interior Wall_Steel Stud_W6 Basic Partition 152m A 4.22 Interior Wall_Steel Stud_W6 Basic Partition 152m A 4.22 Interior Wall_Steel Stud_W6 Basic Partition 152m A 4.22 Interior Wall_Steel Stud_W6 Basic Partition 253.00 Length (m) Varies 4.42 Height (m) 1219.00 1219.00 Stud Spacing (rmn) 400.00 400.00 Stud Spacing (rmn) 400.00 400.00 Stud Spacing (rmn) 152.00 25.00 Stud Spacing (rmn) 152.00 152.00 Stud Thickness (rmn) 152.00 152.00 Load Bearing None None Number of Windows (rea) None None Number of Dors (rea) 31.00 31.00 Dor Type Solid Care Wood Solid Wood Dor Tickness (rmn) niterior Pinish Partition Hearing Tickness (rmn) 16.00 60.90 <th></th> <th></th> <th></th> <th>LINICKNESS (MM) Category</th> <th>16.00 Gypsum Board</th> <th>16.00 Gypsum Board</th> | | | | LINICKNESS (MM) Category | 16.00 Gypsum Board | 16.00 Gypsum Board |
| Conservation Interior Trace Description Additional Lates Lates Lates Mater 4.4.22 Interior Wall_Steel Stud_W6_Basic Partition 152mm Statu Wood Door 253.00 253.00 4.4.22 Interior Wall_Steel Stud_W6_Basic Partition 152mm Statu Wood Door 253.00 253.00 4.4.22 Interior Wall_Steel Stud_W6_Basic Partition Length (m) Varian 263.00 1219.00 1219.00 Steel Stud Steel Stud Steel Stud Steel Stud None A00.00 400.00 Stud Spacini (rm) 152.00 25.00 25.00 25.00 25.00 Stud Thickness (rm) 152.00 152.00 152.00 152.00 Copenigs Number of Workows (ei) None None None Number of Workow (eigh (Ga) 25.00 31.00 31.00 31.00 31.00 Door Type Solid Corew Wood Solid Wood Nore None None Raterial Lates Regular Gypsum Board Gypsum Regular | | | | Material Thickness (mm) | Regular 16.00 | Gypsum Regular |
| Image: main brackers Layter Hant black Late Water Based None 4.4.22 Interior Wall_Steel Stud_W6_Basic Partition_152mm Stud_Wood Door 0.253.00 253.00 Height (m) Varies 0.253.00 Height (m) Varies 0.421.00 Area (m ²) 1.219.00 1.219.00 Steel Stud Sheathing Type None None Steel Stud Viely (Ga) 255.00 265.00 Stud Weight (Ga) 255.00 265.00 Stud Weight (Ga) 25.00 265.00 Stud Weight (Ga) 25.00 265.00 Stud Weight (Ga) 25.00 265.00 Lad Bearing Type None None Frame Type None None Frame Type None None Gatzing Type None None Category Solid Core Wood 35.00 Door Type None Solid Wood Door Category Gypsum Board Gypsum Board Category Gypsum Board Gypsum Board Category | | | | Category | Interior Finish | Paint |
| 4.4.22 Interior Wall_Steel Stud_W6_Basic Patition_152m Stud_Wood Door 253.00 253.00 Height (m) Varies 4.4.22 Area (m ²) 1.219.00 1.219.00 Steel Stud Sheathing Type None None Steel Stud Sheathing Type None 0.000 Steel Stud Sheathing Type None None Openings Number of Windows (sin) 25.00 25.00 Stud Weight (Ga) 25.00 25.00 25.00 Stud Weight (Ga) 25.00 25.00 25.00 Stud Weight (Ga) None None None None Fisher of Windows (sin) None None None None Giazing Type None None None None Number of Windows (sin) None None None None Number of Windows (sin) None None None None Number of Vindows (sin) None None None None Number of Vindows (sin) None None None None Regizing Type None | | | | Thickness (mm) | Laytex Paint n/a | Latex vvater Based None |
| Height (m) Varies 4.48e (m) Area (m) 1.219.00 Steel Stat Sheathing Type None Steel Stat Sheathing Type 400.00 Stat Weight (Ga) 25.00 25.00 Stat Weight (Ga) None None Total Basing None None Frame Type None None Frame Type None None Gazang Type None None Basing Type None None Raterial Solid Core Wood Solid Wood Door Raterial Later Water Based Gazagery Reagery Gypsum Board Gypsum Board Material Regular Grypsum Redular Thickness (mn) 16.00 Gypsum Board Category Orgen Board Gypsum Redular Thickness (mn) 16.00 Galgaure Category Intervint Later Water Based Material Regular Grypsum Redular Thickness (mn) 16.00 Parint Material Later Water Based <th></th> <th></th> <th>4.4.22 Interior Wall _ Steel Stud _ W6 _ Basic Partition</th> <th>n _ 152mm Stud _ Wood Door Length (m)</th> <th>253.00</th> <th>253.00</th> | | | 4.4.22 Interior Wall _ Steel Stud _ W6 _ Basic Partition | n _ 152mm Stud _ Wood Door Length (m) | 253.00 | 253.00 |
| International constraints 1.219.00 1.219.00 Steel Stud Sheathing Type None None Stud Sacaina (rmm) 400.00 400.00 Stud Sacaina (rmm) 400.00 25.00 Stud Thickness (rmm) 152.00 152.00 Data Thickness (rmm) 152.00 152.00 Dot Thickness (rmm) None None Openings Number of Windows (ea) None Traine Type None None Galaxing Type None None Number of Window Area (m ²) None None Frame Type None None Material Category None Number of Doors (ea) 31.00 Solid Core Wood Envelope Category Gypeum Board Thickness (rmn) nia Latex Water Baard Material Regular Gypeum Board Thickness (rmn) 16.0 Gypeum Board Category Gypeum Board Gypeum Board Category International Latex Water Baard Material Regular Gypeum Board Category Gypeum Board Gypeum Board Category International Latex Water Baard Material | | | | Height (m) | Varies | 4.82 |
| Stud Saeaina (mm) 400.00 0400.00 Stud Viejht (Ga) 25.00 25.00 Stud Thickness (mm) 152.00 152.00 Laad Bearing No None Openings Number of Windows (ea) None None Total Window Area (m ²) None None Frame Type None None Glazing Type None None Door Type Solid Core Wood Solid Vindow Area Thickness (mm) Category Cytepum Beard Thickness (mm) Na None Thickness (mm) Category Gypsum Require Material Regular Gypsum Require Thickness (mm) 16.00 Gypsum Require Thickness (mm) 16.00 Category Category Gypsum Require Gypsum Require Thickness (mm) 16.00 Category Material Require Gypsum Require Thickness (mm) 16.00 16.00 Category Gypsum Require Gypsum Require Thickness (mm) 16.00 16.00 Category Netorial Gategory Material Require Gypsum Require Thickness (mm) 16.00 | | | Steel Stud | Sheathing Type | 1,219.00 None | 1,219.00 None |
| Stud Thickness (nm) 152.00 152.00 Laad Bearing No No Openings Number of Windows (ea) None Thickness (nm) None None Frame Type None None Glazing Type None None Number of Windows (ea) None None Glazing Type None None Number of Doors (ea) 31.00 3d10.00 Door Type Solid Core Wood Solid Vood Door Envelope Category Interior Finish Patenti Category Gypsum Board Gypsum Regular Thickness (nm) 16.00 10.00 Category Gypsum Regular Gypsum Regular Thickness (nm) 16.00 10.00 Category Gypsum Regular Gypsum Regular Thickness (nm) 16.00 10.00 Category Gypsum Regular Gypsum Regular Thickness (nm) 16.00 10.00 Category Glaegory Gypsum Regular Thickness (nm) 16.00 <th></th> <th></th> <th></th> <th>Stud Spacing (mm) Stud Weight (Ga)</th> <th>400.00 25.00</th> <th>400.00 25.00</th> | | | | Stud Spacing (mm) Stud Weight (Ga) | 400.00 25.00 | 400.00 25.00 |
| Loss Descring Not Not Openings None None Total Window Area (m ²) None None Total Window Area (m ²) None None Farame Type None None Glazing Type None None Number of Doors (ea) 33:10 3010 Door Type Solid Core Wood Solid Wood Point Envelope Category Interior Finish Peter Category Gypsum Board Gypsum Regular Thickness (mm) 16:00 16:00 16:00 Category Gypsum Board Gypsum Regular Thickness (mm) 16:00 16:00 16:00 Category Grageury Gypsum Regular Gypsum Regular Thickness (mm) 16:00 16:00 16:00 Category Grageury Gypsum Regular Material Material Regular Gypsum Regular 16:00 16:00 Category Interior Finish Paint 14:00 16:00 | | | | Stud Thickness (mm) | 152.00 | 152.00 |
| Total Window Area (m ²) None none Farame Type None None Burnher of Doors (ea) 3010 3010 Door Type Soild Core Wood Soild Wood Door Door Type Soild Core Wood Soild Wood Door Envolve Category Interior Finish Part Category Cypsum Board Cypsum Regular Thickness (mm) 16.00 Gypsum Regular Thickness (mm) 16.00 Part Material Regular Gypsum Regular Thickness (mm) 16.00 Part Material Regular Gypsum Regular Material Regular Gypsum Regular Material Regular Gypsum Regular Thickness (mm) 16.00 Part Material Latex Water Based Part Material Latex Water Based Thickness (mm) Material Latex Water Based Thickness (mm) Material Latex Water Based Thickness (mm) | | | Openings | Number of Windows (ea) | None | None |
| Glazing Type None None Number of Doors (ea) 30 0 3100 Door Type Solid Core Wood Solid Wood Door Envelope Category Interior Finish Perint Material Laytex Parint Latex Water Back Category Gypsum Back Gypsum Back Gypsum Back Category Gypsum Back Gypsum Back Gypsum Back Thickness (mm) 10 16.00 16.00 Category Gypsum Back Gypsum Back Gypsum Back Category Gypsum Back Gypsum Back Gypsum Back Thickness (mm) 10.00 16.00 16.00 Category Gypsum Back Gypsum Back Gypsum Back Category Interior Finish Gypsum Back Gypsum Back Category Interior Finish 16.00 16.00 Category Interior Finish Parint 16.00 Category Interior Finish Parint 16.00 Category Interior Finish Latex Water B | | | | Total Window Area (m ²) Frame Type | None | none None |
| Internet of Doors triety) 3 1.00 3 1.00 Door Type Solid Core Wood Solid Wood Door Ervelope Category Interior Finish Paint Material Latex Water Based Category Category Gypeum Board Gypeum Board Thickness (mm) n/a Material Thickness (mm) Gypeum Board Gypeum Board Category Gypeum Board Gypeum Board Category Gypeum Board Gypeum Board Thickness (mm) 16.00 600 cm Category Gypeum Board Gypeum Board Material Regular Gypeum Board Material Regular Gypeum Board Category Interior Finish Paint Material Regular Gypeum Board Category Interior Finish Paint Material Latex Water Based Paint Material Latex Water Based Thickness (mm) Material n'n'n Nater | | | | Glazing Type | None | None |
| Envelop Category Interior Finish Paint Material Latyste Paint Latex Water Baset Thickness (rm) n'a None Category Gypsum Board Gypsum Board Material Regular Gypsum Board Thickness (rm) 16.0 Category Category Gypsum Board Gypsum Regular Thickness (rm) 16.0 Gypsum Regular Material Regular Gypsum Regular Thickness (rm) 16.00 Category Category Gypsum Regular Gypsum Regular Material Regular Gypsum Regular Thickness (rm) 16.00 10.0 Category Interior Finish Paint Material Latex Water Based Thickness (rm) Material Latex Water Based Thickness (rm) | | | | Door Type | 31.00 Solid Core Wood | 31.00 Solid Wood Door |
| Thickness (mm) n/a None Category Gysum Board Grysum Board Material Regular Grysum Regular Thickness (mn) 16.00 16.00 Category Grysum Board Grysum Regular Material Regular Grysum Regular Material Regular Grysum Regular Thickness (mn) 16.00 Grysum Regular Category Grysum Regular Grysum Regular Thickness (mn) 10.00 10.00 Category Interior Finish Paint Material Latex Wate Based Thickness (mm) | | | Envelope | Category Material | Interior Finish Laytex Paint | Paint Latex Water Based |
| Material Regular Gypsum Regular Mickness (mm) 16.00 Category Category Gypsum Regular Gypsum Regular Material Regular Gypsum Regular Thickness (mm) 16.00 Gypsum Regular Category Gypsum Regular Gypsum Regular Thickness (mm) 16.00 1000 Category Interior Finish Paint Material Latex Wate Based Thickness (mm) | | | | Thickness (mm) Category | n/a Gyneum Board | None Gunsum Board |
| Inickness (mm) 16.00 61600 Category Gypsum Board Gypsum Board Gypsum Board Material Regular Gypsum Board Gypsum Board Thickness (mm) 16.00 01000 1600 Category Interior Finish Paint Paint Material Latex Wate Baard None Thickness (mm) n/a None | | | | Material | Regular | Gypsum Regular |
| Material Regular Gypsum Regular Thickness (nm) 16.00 01000 Category Interior Finish Paint Material Latex Wate Based Latex Wate Based Thickness (nm) n/a None | | | | Category | 16.00 Gypsum Board | 16.00 Gypsum Board |
| Category Interior Finish Paint Material Laytex Paint Latex Water Based Thickness (mm) n/a None | | | | Material Thickness (mm) | Regular 16.00 | Gypsum Regular 16.00 |
| Thickness (nm) tai tait Salad Salad No. 1 A Salad Sa | | | | Category | Interior Finish | Paint |
| | | | | Thickness (mm) | Laytex Paint n/a | Latex water based None |

| | | | | | Input Values |
|----------------|---------------|--|---|---|--|
| Assembly Group | Assembly Type | Assembly Name | Input Fields | Known/Measured | IE Inputs |
| | | 4.4.22 Interior Wall Steel Stud. W6.2 Accustic Re | artition w/ 2 Lovern One Sides 152 | mm Ptud | |
| | | | Length (m) | 10.00 | 10.00 |
| | | | Height (m) | Varies | 3.40 |
| | | Steel Stud | Sheathing Type | None | None |
| | | | Stud Spacing (mm) Stud Weight (Ga) | 400.00 | 400.00 |
| | | | Stud Thickness (mm) | 152.00 | 152.00 |
| | | Openings | Load Bearing Number of Windows (ea) | No | No |
| | | oponingo | Total Window Area (m ²) | None | None |
| | | | Frame Type Clazing Type | None | None |
| | | | Number of Doors (ea) | None | None |
| | | Envelope | Door Type Category | None Interior Einish | None |
| | | Liveope | Material | Laytex Paint | Latex Water Based |
| | | | Thickness (mm) Category | n/a Gypsum Board | n/a Gyosum Board |
| | | | Material | Type X | Gypsum Fire Rated Type X |
| | | | Category | 16.00 Gypsum Board | 16.00 Gypsum Board |
| | | | Material | Type X | Gypsum Fire Rated Type X |
| | | | Category | R-12 Acoustic Insulation | Insulation |
| | | | Material | Fiberglass Batt | Fiberglass Batt |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Material Thickness (mm) | Type X 16.00 | Gypsum Fire Rated Type X 16.00 |
| | | | Category | Interior Finish | Paint |
| | | | Material Thickness (mm) | Laytex Paint | Latex Water Based |
| | | 4.4.24 Interior Wall _ Steel Stud _ W6-22 _ Acoustic F | Partition w/ 2 Layers Both Sides _ 15 | 2mm Stud _ Metal Door _ GL1 | 104 |
| | | | Length (m) Height (m) | 43.50 Varies | 43.50 |
| | | | Area (m ²) | 169.35 | 169.35 |
| | | Steel Stud | Sheathing Type Stud Spacing (mm) | None 400.00 | None 400.00 |
| | | | Stud Weight (Ga) | 25.00 | 25.00 |
| | | | Stud Thickness (mm) | 152.00 | 152.00 No |
| | | Openings | Number of Windows (ea) | 2.00 | 2.00 |
| | | | Total Window Area (m ²) | 9.50 | 9.50 |
| | | | Glazing Type | 6mm Laminated Glass | Standard Glazing |
| | | | Number of Doors (ea) | 2.00 Hollow Metal | 2.00 Steel Interior Door |
| | | Envelope | Category | Interior Finish | Paint |
| | | | Material Thickness (mm) | Laytex Paint | Latex Water Based |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Material Thickness (mm) | Type X 16.00 | Gypsum Fire Rated Type X 16.00 |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Material Thickness (mm) | Type X 16.00 | Gypsum Fire Rated Type X 16mm |
| | | | Category | R-12 Acoustic Insulation | 16.00 |
| | | | Material Thickness (mm) | Fiberglass Batt 152.00 | Fiberglass Batt 152.00 |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Material Thickness (mm) | Type X 16.00 | Gypsum Fire Rated Type X 16.00 |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Material Thickness (mm) | 1 ype X 16.00 | Gypsum Fire Rated Type X 16.00 |
| | | | Category | Interior Finish | Paint |
| | | | Thickness (mm) | Laytex Paint n/a | Latex Water Based |
| | | 4.4.25 Interior Wall _ Steel Stud _ W6-22 _ Acoustic F | Partition w/ 2 Layers Both Sides _ 15 | 2mm Stud _ Wood Door _ GL1 | 42.50 |
| | | | Height (m) | Varies | 3.89 |
| | | | Area (m ²) | 169.35 | 169.35 |
| | | Steel Stud | Stud Spacing (mm) | None 400.00 | None 400.00 |
| | | | Stud Weight (Ga) | 25.00 | 25.00 |
| | | | Load Bearing | 152.00 No | 152.00 No |
| | | Openings | Number of Windows (ea) | 2.00 | 2.00 |
| | | | Total Window Area (m ⁺) Frame Type | 9.50 Aluminum | 9.50 Aluminum Frame |
| | | | Glazing Type | 6mm Laminated Glass | Standard Glazing |
| | | | Number of Doors (ea) Door Type | 2.00 Solid Core Wood | 2.00 Solid Wood Door |
| | | Envelope | Category | Interior Finish | Paint |
| | | | Material Thickness (mm) | Laytex Paint n/a | Latex water Based n/a |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Thickness (mm) | 19pe X 16mm | Gypsum Fire Raied Type X 16.00 |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Thickness (mm) | 16mm | Gypsum File Kated Type X 16.00 |
| | | | Category Material | R-12 Acoustic Insulation Fiberolase Batt | Insulation Fiberalass Batt |
| | | | Thickness (mm) | 152.00 | 152.00 |
| | | | Category Material | Gypsum Board Type X | Gypsum Board Gypsum Fire Rated Type X |
| | | | Thickness (mm) | 16mm | 16.00 |
| | | | Category Material | Gypsum Board Tvoe X | Gypsum Board Gypsum Fire Rated Type X |
| | | | Thickness (mm) | 16mm | 16.00 |
| | | | Material | Interior Finish Laytex Paint | Paint Latex Water Based |
| | ļ | | Thickness (mm) | n/a | n/a |

| Assombly Group | | Assombly Namo | Input Fields | | Input Values |
|----------------|---------------|---|--|---|---|
| Assembly Group | Assembly Type | | input ricius | Known/Measured | IE Inputs |
| i i | | 4.4.26 Interior Wall Steel Stud W6-R Rated Parti | ition 152mm Stud Metal Door | | |
| | | | Length (m) | 211.00 | 211.00 |
| | | | Height (m) Area (m ²) | varies 1 144 80 | 5.43 1 144 80 |
| | | Steel Stud | Sheathing Type | None | None |
| | | | Stud Spacing (mm) | 400.00 | 400.00 |
| | | | Stud Thickness (mm) | 152.00 | 152.00 |
| | | | Load Bearing | No | No |
| | | Openings | Total Window Area (m ²) | None | Nohe |
| | | | Frame Type | None | None |
| | | | Glazing Type | None 15.00 | None 15.00 |
| | | | Door Type | Hollow Metal | Steel Interior Door |
| | | Envelope | Category | Interior Finish | Paint |
| | | | Thickness (mm) | Laytex Paint n/a | Latex water Based |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Material Thickness (mm) | l ype X 16mm | Gypsum Fire Rated Type X 16.00 |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Material Thickness (mm) | Type X 16mm | Gypsum Fire Rated Type X 16.00 |
| | | | Category | Interior Finish | Paint |
| | | | Material | Laytex Paint | Latex Water Based |
| | | 4.4.27 Interior Wall _ Steel Stud _ W6-RA _ Rated Ac | oustic Partition _ 152mm Stud | IVa | li/d |
| | | | Length (m) | 19.00 | 19.00 |
| | | | Area (m ²) | 7.10 | 7.10 134.90 |
| | | Steel Stud | Sheathing Type | None | None |
| | | | Stud Spacing (mm) Stud Weight (Ga) | 400.00 25.00 | 400.00 25.00 |
| | | | Stud Thickness (mm) | 152.00 | 152.00 |
| | | Openings | Load Bearing Number of Windows (ea) | No | No |
| | | oporango | Total Window Area (m ²) | None | None |
| | | | Frame Type | None | None |
| | | | Glazing Type Number of Doors (ea) | None | None |
| | | | Door Type | None | None |
| | | Envelope | Category Material | Interior Finish | Paint Latex Water Based |
| | | | Thickness (mm) | n/a | n/a |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Thickness (mm) | 16mm | Gypsun File Kated Type X 166.00 |
| | | | Category | R-12 Acoustical Insulation | Insulation |
| | | | Thickness (mm) | 152.00 | 152.00 |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Material Thickness (mm) | l ype X 16mm | Gypsum Fire Rated Type X 16.00 |
| | | | Category | Interior Finish | Paint |
| | | | Material Thickness (mm) | Laytex Paint n/a | Latex Water Based |
| | | 4.4.28 Interior Wall _ Steel Stud _ W6-T _ Tile Clad Pa | artition Both Sides _ 152mm Stud _ | Wood Door | |
| | | | Length (m) Height (m) | 60.00 Varies | 60.00 4.66 |
| | | | Area (m ²) | 279.60 | 279.60 |
| | | Steel Stud | Sheathing Type | None | None |
| | | | Stud Spacing (mm) Stud Weight (Ga) | 25.00 | 400.00 25.00 |
| | | | Stud Thickness (mm) | 152.00 | 152.00 |
| | | Openings | Load Bearing Number of Windows (ea) | No | No |
| | | | Total Window Area (m ²) | None | None |
| | | | Frame Type Clazing Type | None | None |
| | | | Number of Doors (ea) | 4.00 | 4.00 |
| | | F | Door Type | Solid Core Wood | Solid Wood Door |
| | | Envelope | Material | Coated Glass Mat Gypsum | Moisture Resistant Gypsum Board |
| | | | Thickness (mm) | 16.00 | 16.00 |
| | | | Material | Backer Board Coated Glass Mat Gypsum | Gypsum Board Moisture Resistant Gypsum Board |
| | | | Thickness (mm) | 16.00 | 16.00 |
| | | 4.4.29 Interior Wall Steel Stud W6-11 Tile Clad F | Length (m) | 101.00 | 101.00 |
| | | | Height (m) | Varies | 5.17 |
| | | Steel Stud | Area (m ²) Sheathing Type | 522.50 None | 522.50 |
| | | 0.0010.000 | Stud Spacing (mm) | 400.00 | 400.00 |
| | | | Stud Weight (Ga) | 25.00 | 25.00 |
| | | | Load Bearing | 152.00 No | 152.00 No |
| | | Openings | Number of Windows (ea) | None | None |
| | | | i otal vvindow Area (m^) Frame Type | None | None |
| | | | Glazing Type | None | None |
| | | | Number of Doors (ea) Door Type | 4.00 Solid Core Wood | 4.00 Solid Wood Door |
| | | Envelope | Category | Backer Board | Gypsum Board |
| | | | Material Thickness (mm) | Coated Glass Mat Gypsum | Moisture Resistant Gypsum Board |
| | | | Category | 16.00 Gypsum Board | 16.00 Gypsum Board |
| | | | Material Thickness (mm) | Regular | Gypsum Regular |
| | | | Category | 16.00 Interior Finish | Paint |
| | | | Material | Laytex Paint | Latex Water Based |
| | | <u></u> | i nickness (mm) | n/a | None |

| | | | | Input Values | | |
|----------------|---------------|--|--|---------------------------------|------------------------------------|--|
| Assembly Group | Assembly Type | Assembly Name | Input Fields | Known/Measured | IE Inputs | |
| I. | | 4.4.30 Interior Wall Steel Stud W7 Double Stud | Acoustic/ Mechanical Partition 92 | mm Stud Metal Door GL1 | | |
| | | | Length (m) | 209.00 | 209.00 | |
| | | | Height (m) | 4.30 | 5.30 | |
| | | | Area (m ²) | 898.70 | 1,107.70 | |
| | | Steel Stud | Sheathing Type | None | None | |
| | | | Stud Spacing (mm) | 400.00 | 400.00 | |
| | | | Stud Thickness (mm) | 92.00 | 23.00 | |
| | | | Load Bearing | No | No | |
| | | | Sheathing Type | None | None | |
| | | | Stud Spacing (mm) | 400.00 | 400.00 | |
| | | | Stud Weight (Ga) | 25.00 | 25.00 | |
| | | | Load Bearing | 92.00 No | 92.00 No | |
| | | Openings | Number of Windows (ea) | 36.00 | 36.00 | |
| | | | Total Window Area (m ²) | 113.00 | 150.00 | |
| | | | Frame Type | Aluminum | Aluminum Frame | |
| | | | Glazing Type | 6mm Laminated Glass | Standard Glazing | |
| | | | Number of Doors (ea) | 2.00 Steel Door | 2.00 Steel Interior Door | |
| | | | Category | Interior Finish | Paint | |
| | | | Material | Laytex Paint | Latex Water Based | |
| | | | Thickness (mm) | n/a | n/a | |
| | | | Material | Gypsum Board Type X | Gypsum Eire Rated Type X | |
| | | | Thickness (mm) | 16.00 | 16.00 | |
| | | Envelope | Category | R-12 Acoustical Insulation | Insulation | |
| | | | Material | Fiberglass Batt | Fiberglass Batt | |
| | | | Category | 8-12 Acoustical Insulation | 92.00 Insulation | |
| | | | Material | Fiberglass Batt | Fiberglass Batt | |
| | | | Thickness (mm) | 92.00 | 92.00 | |
| | | | Category | Gypsum Board | Gypsum Board | |
| | | | Thickness (mm) | 16mm | 16.00 | |
| | | | Category | Interior Finish | Paint | |
| | | | Material | Laytex Paint | Latex Water Based | |
| | | 4.4.31 Interior Wall Steel Stud W7 Double Stud | I NICKNESS (MM) Acoustic/ Mechanical Partition 92 | n/a mm Stud, Wood Door, GL1A | h/a | |
| | | | Length (m) | 209.00 | 209.00 | |
| | | | Height (m) | 4.30 | 5.30 | |
| | | | Area (m ²) | 898.70 | 1,107.70 | |
| | | Steel Stud | Sheathing Type | None | None | |
| | | | Stud Spacing (mm) Stud Weight (Ga) | 400.00 | 400.00 | |
| | | | Stud Thickness (mm) | 92.00 | 92.00 | |
| | | | Load Bearing | No | No | |
| | | | Sheathing Type | None | None | |
| | | | Stud Spacing (mm) | 400.00 | 400.00 | |
| | | | Stud Thickness (mm) | 92.00 | 92.00 | |
| | | | Load Bearing | No | No | |
| | | Openings | Number of Windows (ea) | 22.00 | 22.00 | |
| | | | Total Window Area (m ²) | 55.00 | 78.00 | |
| | | | Clazing Type | 13mm Laminated Glass | Aluminum Frame Standard Glazing | |
| | | | Number of Doors (ea) | 26.00 | 26.00 | |
| | | | Door Type | Solid Core Wood | Solid Wood Door | |
| | | | Category | Interior Finish | Paint Later Water Based | |
| | | | Thickness (mm) | Laytex Faint n/a | Latex water based | |
| | | | Category | Gypsum Board | Gypsum Board | |
| | | | Material | Type X | Gypsum Fire Rated Type X | |
| | | Envelope | Category | R-12 Acoustical Insulation | 16.00 | |
| | | Envelope | Material | Fiberglass Batt | Fiberglass Batt | |
| | | | Thickness (mm) | 92.00 | 92.00 | |
| | | | Category | R-12 Acoustical Insulation | Insulation | |
| | | | Thickness (mm) | Fiberglass Batt 92.00 | Pibergiass Batt 92.00 | |
| | | | Category | Gypsum Board | Gypsum Board | |
| | | | Material | Type X | Gypsum Fire Rated Type X | |
| | | | Category | 16.00 Interior Finish | 16.00 Paint | |
| | | | Material | Laytex Paint | Latex Water Based | |
| 1 | | | Thickness (mm) | n/a | n/a | |

| Assembly Group | Assembly Type | Asser | nbly Na | mo | | Innut Fields | Input Values | | Input Values |
|----------------|---------------|----------------------------|------------|-------|-------------|---|------------------------|--|--|
| Assembly Group | Assembly Type | ASSE | noiy Na | ine | | input rielus | Known/M | leasured | IE Inputs |
| | | 4.4.32 Interior Wall _ Ste | eel Stud _ | W7-22 | _ Double St | ud Acoustic/ Mechanical Partition w | 2 Layers Both Sides | 92mm Stud _ Wood | Door _ 10mm Glass |
| | | | | | | Length (m) Height (m) | | 60.00 4.30 | 60.00 4.30 |
| | | | | | Steel Stud | Area (m ²) Sheathing Type | | 258.00 None | 258.00 None |
| | | | | | | Stud Spacing (mm) | | 400.00 | 400.00 |
| | | | | | | Stud Thickness (mm) | | 92.00 | 92.00 |
| | | | | | | Load Bearing Sheathing Type | | No None | No |
| | | | | | | Stud Spacing (mm) Stud Weight (Ga) | | 400.00 25.00 | 400.00 25.00 |
| | | | | | | Stud Thickness (mm) | | 92.00 No | 92.00 No |
| | | | | | Openings | Number of Windows (ea) | | 8.00 | 8.00 |
| | | | | | | Total Window Area (m ⁺) Frame Type | | 14.00 Wood Frame | 14.00 Wood Frame |
| | | | | | | Glazing Type Number of Doors (ea) | | 10mm Glass 4.00 | Standard Glazing 4.00 |
| | | | | | Envelope | Door Type | | Wood Door | Wood Door Baint |
| | | | | | LINGOPO | Material | | Laytex Paint | Latex Water Based |
| | | | | | | Category | | n/a Gypsum Board | n/a Gypsum Board |
| | | | | | | Material Thickness (mm) | | Type X 16.00 | Gypsum Fire Rated Type X 16.00 |
| | | | | | | Category Material | | Gypsum Board Type X | Gypsum Board Gypsum Fire Rated Type X |
| | | | | | | Thickness (mm) | D.40 | 16.00 | 196.00 |
| | | | | | | Material | R-12 | Fiberglass Batt | Fiberglass Batt |
| | | | | | | Linickness (mm) Category | R-12 | 92.00 Acoustical Insulation | 92.00 Insulation |
| | | | | | | Material Thickness (mm) | | Fiberglass Batt 92.00 | Fiberglass Batt 92.00 |
| | | | | | | Category | | Gypsum Board | Gypsum Board |
| | | | | | | Thickness (mm) | | 16.00 | 160 |
| | | | | | | Material | | Gypsum Board Type X | Gypsum Board Gypsum Fire Rated Type X |
| | | | | | | Thickness (mm) Category | | 16.00 Interior Finish | 16.00 Paint |
| | | | | | | Material Thickness | | Laytex Paint | Latex Water Based |
| | | 4.4.33 Interior Wall _ Ste | eel Stud_ | W7-T_ | Double Stu | d Acoustic/ Mechanical Partition Tile | e Clad Both Sides _ 92 | mm Stud | 40.00 |
| | | | | | | Height (m) | | Varies | 40.00 |
| | | | | | Steel Stud | Area (m ²) Sheathing Type | | 182.80 None | 182.80 None |
| | | | | | | Stud Spacing (mm) Stud Weight (Ga) | | 400.00 | 400.00 |
| | | | | | | Stud Thickness (mm) | | 92.00 | 92.00 |
| | | | | | | Sheathing Type | | None | No |
| | | | | | | Stud Spacing (mm) Stud Weight (Ga) | | 400.00 25.00 | 400.00 25.00 |
| | | | | | | Stud Thickness (mm) Load Bearing | | 92.00 No | 92.00 No |
| | | | | | Openings | Number of Windows (ea) | | None | None |
| | | | | | | Frame Type | | None | None |
| | | | | | | Glazing Type Number of Doors (ea) | | None | None |
| | | | | | Envelope | Door Type Category | | None Backer Board | None Gypsum Board |
| | | | | | | Material Thickness (mm) | Coate | d Glass Mat Gypsum 16.00 | Moisture Resistant Gypsum Board 16.00 |
| | | | | | | Category | R-12 | Acoustical Insulation | Insulation |
| | | | | | | Thickness (mm) | | Pibergiass Batt 92.00 | 92.00 |
| | | | | | | Category Material | R-12 | Fiberglass Batt | Insulation Fiberglass Batt |
| | | | | | | Thickness (mm) Category | | 92.00 Backer Board | 92.00 Gypsum Board |
| | | | | | | Material Thickness (mm) | Coate | d Glass Mat Gypsum | Moisture Resistant Gypsum Board |
| | | 4.4.34 Interior Wall _ Ste | eel Stud _ | W7-T1 | _ Double St | ud Acoustic/ Mechanical Partition T | ile Clad One Side _ 92 | mm Stud | 7.00 |
| | | | | | | Height (m) | | 4.30 | 4.30 |
| | | | | | Steel Stud | Area (m ⁻) Sheathing Type | | 30.10 None | 30.10 None |
| | | | | | | Stud Spacing (mm) Stud Weight (Ga) | | 400.00 25.00 | 400.00 25.00 |
| | | | | | | Stud Thickness (mm) | | 92.00 | 92.00 No |
| | | | | | | Sheathing Type | | None | None |
| | | | | | | Stud Spacing (mm) Stud Weight (Ga) | | 25.00 | 25.00 |
| | | | | | | Stud Thickness (mm) Load Bearing | | 92.00 No | 92.00 No |
| | | | | | Openings | Number of Windows (ea) Total Window Area (m ²) | | None | None |
| | | | | | | Frame Type | | None | None |
| | | | | | | Number of Doors (ea) | | None | None |
| | | | | | | Category | | None Backer Board | None Gypsum Board |
| | | | | | | Material Thickness (mm) | Coate | d Glass Mat Gypsum 16.00 | Moisture Resistant Gypsum Board 16.00 |
| | | | | | | Category Material | R-12 | Acoustical Insulation Fiberolass Batt | Insulation Fibernlass Batt |
| | | | | | Envolor - | Thickness (mm) | D 40 | 92.00 | 92.00 |
| | | | | | L IVel0pe | Material | K-12 | Fiberglass Batt | Insulation Fiberglass Batt |
| | | | | | | Linickness (mm) Category | | 92.00 Gypsum Board | 92.00 Gypsum Board |
| | | | | | | Material Thickness (mm) | | Regular 16.00 | Gypsum Regular 16.00 |
| | | | | | | Category Material | | Interior Finish Lavter Paint | Paint Later Water Based |
| | | | | | | Thickness (mm) | | n/a | None |

| Accombly Crown | Accombly Type | Accombly Name | Input Fields | Input Values | | | |
|----------------|-------------------------------|--|---|---|--|--|--|
| Assembly Group | Assembly Type | Assembly Name | input Fields | Known/Measured | IE Inputs | | |
| , | • | 4.4.35 Interior Wall Steel Stud W9 Double Stud | Partition 152mm Stud | • | | | |
| | | 4.4.35 Intenor Wall_Steel Stud_W9_Double Stud | Length (m) | 17.00 | 17.00 | | |
| | | | Height (m) | Varies | 6.34 | | |
| | | Steel Stud | Sheathing Type | None | None | | |
| | | | Stud Spacing (mm) | 400.00 | 400.00 | | |
| | | | Stud Weight (Ga) Stud Thickness (mm) | 25.00 | 152.00 | | |
| | | | Load Bearing | No | No | | |
| | | | Stud Spacing (mm) | 400.00 | 400.00 | | |
| | | | Stud Weight (Ga) | 25.00 | 25.00 | | |
| | | | Load Bearing | 152.00 No | 152.00 No | | |
| | | Openings | Number of Windows (ea) | None | None | | |
| | | | Frame Type | None | None | | |
| | | | Glazing Type | None | none | | |
| | | | Door Type | None | None | | |
| | | Envelope | Category | Interior Finish | Paint | | |
| | | | Thickness (mm) | n/a | Latex water Based | | |
| | | | Category | Gypsum Board | Gypsum Board | | |
| | | | Thickness (mm) | 16.00 | Gypsum Fire Rated Type X 16.00 | | |
| | | | Category | Air/ Vapour Barrier | Vapour & Air Barrier | | |
| | | | Thickness (mil) | Folyethylene Sneet 6.00 | Polyethylene 6.00 | | |
| | | | Category | R-12 Acoustical Insulation | Insulation | | |
| | | | Thickness (mm) | 92.00 | 92.00 | | |
| | | | Category | R-12 Acoustical Insulation | Insulation | | |
| | | | Thickness (mm) | 92.00 | Rockwool Batt 92.00 | | |
| | | | Category | Gypsum Board | Gypsum Board | | |
| | | | Thickness (mm) | 16.00 | Gypsum File Rated Type X 16.00 | | |
| | | | Category | Interior Finish | Paint | | |
| | | | Thickness (mm) | n/a | None | | |
| | 4.5 Wood Stud | 4.5.4 Interior Well, Wood Stud, WR, Double Stud | Accuratio Dostition 140/184mm Stu | ud Wood Door 10mm Class | | | |
| | | 4.5.1 Interior Wall _ Wood Stud _ W8 _ Double Stud / | Length (m) | 69.00 | 69.00 | | |
| | | | Height (m) | 4.30 | 4.30 | | |
| | | Wood Stud | Area (m ⁺) Sheathing Type | 296.70 10mm Plywood | 296.70 Photocol | | |
| | | W000 5100 | Stud Spacing (mm) | 400.00 | 400.00 | | |
| | | | Stud Type | Kiln-dried | Kiln-dried | | |
| | | | Stud Thickness (mm) | 140.00 | 140.00 | | |
| | | | Load Bearing Sheathing Type | No 10mm Plywood | No | | |
| | | | Stud Spacing (mm) | 400.00 | 400.00 | | |
| | | | Stud Type Stud Thickness (mm) | Kiln-dried 184.00 | Kiln-dried | | |
| | | | Load Bearing | No | No | | |
| | | Openings | Number of Windows (ea) Total Window Area (m ²) | 2.00 | 2.00 | | |
| | | | Frame Type | Wood Frame | Wood Frame | | |
| | | | Glazing Type | 10mm Laminated | Standard Glazing | | |
| | | | Door Type | Solid Core Wood | 4.00 Solid Wood Door | | |
| | | Envelope | Category Material | Gypsum Board Type X | Gypsum Board Gypsum Fire Rated Type X | | |
| | | | Thickness (mm) | 13.00 | 13.00 | | |
| | | | Category Material | Gypsum Board Type X | Gypsum Board Gypsum Fire Rated Type X | | |
| | | | Thickness (mm) | 13.00 | 13.00 | | |
| | | | Category Material | Acoustic Insulation Black Mat Acoustical Blanket | Insulation Rockwool Batt | | |
| | | | Thickness (mm) | - | 50.00 | | |
| | | | Category Material | R-12 Acoustic Insulation Fiberalass Batt | Insulation Fiberalass Batt | | |
| | | | Thickness (mm) | 92.00 | 92.00 | | |
| | | | Category Material | Gypsum Board | Gypsum Board Gypsum Fire Rated Type Y | | |
| | | | Thickness (mm) | 13.00 | 13.00 | | |
| | | | Category Material | Gypsum Board Type X | Gypsum Board Gypsum Fire Rated Type X | | |
| | | | Thickness (mm) | 13.00 | 13.00 | | |
| | 4.6 Concrete Block/Steel Stud | 4.6.1 Interior Wall _ Concrete Block/Steel Stud _ M2 _ | Concrete Block Wall w/ Furring Bo | th Sides _ 190mm Block/ 25mm Channel _ V | /ood Door | | |
| | | | Length (m) | 26.00 | 26.00 | | |
| | | | Height (m) Area (m ²) | Varies 105.80 | 4.07 | | |
| | | Concrete Block | Thickness (mm) | 190.00 | N/A | | |
| | | Steel Stud | Rebar (M) Sheathing Type | 10.00 None | 10.00 None | | |
| | | | Stud Spacing (mm) | 400.00 | 400.00 | | |
| | | | Stud Weight (Ga) Stud Thickness (mm) | 25.00 | 25.00 | | |
| | | | Load Bearing | No | 92.00 No | | |
| | | Openings | Number of Windows (ea) | None | None | | |
| | | | Frame Type | None | None | | |
| | | | Glazing Type | None | None | | |
| | | | Door Type | 3.00 Solid Core Wood | 3.00 Solid Wood Door | | |
| | | Envelope | Category Material | Interior Finish | Paint | | |
| | | | Thickness (mm) | LayteX Paint n/a | n/a | | |
| | | | Category | Gypsum Board | Gypsum Board | | |
| | | | Thickness (mm) | regular 16.00 | Gypsum Regular 16.00 | | |
| | | | Category | Gypsum Board | Gypsum Board | | |
| | | | Thickness (mm) | 16.00 | Gypsum Regular 16.00 | | |
| | | | Category | Interior Finish | Paint | | |
| | | | Thickness (mm) | Laytex Paint n/a | Latex vvaller Based | | |

| Assembly Grown | Assembly True | Assembly Name | Innut Fields | | Input Values |
|---|-------------------|---|---|---|--|
| Assembly Group | Assembly Type | Assembly Name | Input Fields | Known/Measured | IE Inputs |
| | | | | Į | |
| 5.0 Exterior Walls & Parapets | 5.1 Cast In Place | | | | |
| | | 5.1.1 Exterior Wall _ Cast In Place _ EW2 sim (No Ins | ulation, No Finish) _ Below Grade \ | Vall_250w_30MPa 11.00 | 11.00 |
| | | | Height (m) | 4.00 | 4.00 |
| | | Concrete | Area (m ²) Strength (MPa) | 44.00 | 44.00 |
| | | Conside | Thickness (mm) | 250.00 | 300.00 |
| | | | Reinforcement (M) Concrete Flyash (%) | 15M Vert./ 10M Horiz. 35.00 | 15.00 35.00 |
| | | Openings | Number of Windows | None | None |
| | | | Total Window Area (m ⁻) Frame Type | None | None |
| | | | Glazing Type | None | None |
| | | | Door Type | None | None |
| | | Envelope | Category Material | Protection Board Extruded Polystyrene | Insulation Polystyrene Extruded |
| | | | Thickness (mm) | 25.00 | 25.38 |
| | | | Material | HDPE Panel | Vapour & All Ballier Vapour Barrier |
| | | | Thickness (mil) Category | - Waterproofing | 6.00 Roof Envelopes |
| | | | Material | Torch-On Sheet | Standard Modified Bitumen Membrane 2 ply |
| | | 5.1.2 Exterior Wall _ Cast In Place _ EW3 _ Below Gr | ade Wall _ 250w _ 30MPa | - | n/a |
| | | | Length (m) Height (m) | 83.00 Varies | 83.00 |
| | | | Area (m ²) | 320.55 | 320.55 |
| | | Concrete | Strength (MPa) Thickness (mm) | 30.00 | 30.00 |
| | | | Reinforcement (M) | 20M Vert./ 10M Horiz. | 20.00 |
| | | Openings | Concrete Flyash (%) Number of Windows | 35.00 None | 35.00 None |
| | | | Total Window Area (m ²) | None | None |
| | | | Frame Type Glazing Type | None | None |
| | | | Number of Doors (ea) | None | None |
| | | Envelope | Category | Protection Board | Insulation |
| | | | Material Thickness (mm) | Extruded Polystyrene 25.00 | Polystyrene Extruded 25.38 |
| | | | Category | Drainage Mat | Vapour & Air Barrier |
| | | | Thickness (mil) | HDFE Failer | 6.00 |
| | | | Category Material | R-15 Board Insulation Extruded Polystyrene | Insulation Polystyrene Extruded |
| | | | Thickness (mm) | 75.00 | 75.00 |
| | | | Material | Torch-On Sheet | Standard Modified Bitumen Membrane 2 ply |
| | | 5.1.3 Exterior Wall Cast In Place EW3 Below Gr | Thickness (mm) ade Wall 300w 30MPa | - | n/a |
| | | | Length (m) | 66.00 | 66.00 |
| | | | Height (m) Area (m ²) | 274.95 | 4.17 274.95 |
| | | Concrete | Strength (MPa) | 30.00 | 30.00 |
| | | | Reinforcement (M) | 20M Vert./ 10M Horiz. | 20.00 |
| | | Openings | Concrete Flyash (%) Number of Windows | 35.00 None | 35.00 None |
| | | | Total Window Area (m ²) | None | None |
| | | | Frame Type Glazing Type | None | None |
| | | | Number of Doors (ea) | None | None |
| | | Envelope | Category | Protection Board | Insulation |
| | | | Material Thickness (mm) | Extruded Polystyrene 25.00 | Polystyrene Extruded 25.38 |
| | | | Category | Drainage Mat | Vapour & Air Barrier |
| | | | Material Thickness (mil) | HDPE Panel | vapour Barrier 6.00 |
| | | | Category | R-15 Board Insulation | Insulation Polystyrapa Extruded |
| | | | Thickness (mm) | 75.00 | 75.00 |
| | | | Category Material | Waterproofing Torch-On Sheet | Root Envelopes Standard Modified Bitumen Membrane 2 ply |
| | | 5.1.4 Exterior Wall Cast In Place EW3 Below Gr | Thickness (mm) | | n/a |
| | | | Length (m) | 8.00 | 8.00 |
| | | | Height (m) Area (m ²) | 3.90 | 3.90 |
| | | Concrete | Strength (MPa) | 45.00 | 30.00 |
| | | | Reinforcement (M) | 15M Vert./ 20M Horiz. | 20M |
| | | | Concrete Flyash (%) Strength (MPa) | 35.00 p/a | 35.00 60MPa |
| | | | Thickness (mm) | n/a | 300mm |
| | | | Concrete Flyash (%) | n/a n/a | 20M Average |
| | | Openings | Number of Windows | None | None |
| | | | Frame Type | None | None |
| | | | Glazing Type Number of Doors (ea) | None | None |
| | | | Door Type | None | None |
| | | Envelope | Category Material | Protection Board Extruded Polystyrene | Insulation Polystyrene Extruded |
| | | | Thickness (mm) | 25.00 Drainage Met | 25.38 Varour & Air Barrier |
| | | | Material | HDPE Panel | Vapour & Alf Barrier Vapour Barrier |
| | | | Thickness (mil) Category | - R-15 Board Insulation | 6.00 Insulation |
| | | | Material Thickness (mm) | Extruded Polystyrene | Polystyrene Extruded |
| | | | Category | Waterproofing | Roof Envelopes |
| | | | Material Thickness (mm) | Torch-On Sheet | Standard Modified Bitumen Membrane 2 ply n/a |
| I. Contraction of the second se | 1 | L | | | 108 |
| | | | | | Input Values |
|----------------|------------------|---|--|--|--|
| Assembly Group | Assembly Type | Assembly Name | input Fields | Known/Measured | IE Inputs |
| | | | | | |
| | | 5.1.5 Parapet _ Cast In Place _ EW1 _ GFRC Clad W | all _ 200w _ 30MPa _ Detail 4-A6 | 24.00 | 24.00 |
| | | | Height (m) | 0.58 | 0.58 |
| | | Concrete | Area | 13.92 30MPa | 13.92 30MPa |
| | | | Thickness | 200mm | 200mm |
| | | | Reinforcement | 35.00 | 15M 35.00 |
| | | Openings | Number of Windows | None | None |
| | | | Total Window Area (m2) | None | None |
| | | | Glazing Type | None | None |
| | | | Number of Doors | None | None |
| | | Envelope | Door Type Category | None | None |
| | | Liveope | Material | Cladding w/ Suspension Rail and Steel Girt | Fiber Cement Siding |
| | | | Thickness (mm) | 13.00 Droipage Blanc Membrane | n/a Vopour & Ais Portion |
| | | | Material | Spun-Bonded Poly-Olefin Sheet | Air Barrier |
| | | | Thickness (mm) | | n/a |
| | | | Category Material | Cavity Wall Insulation Mineral Fibre Board | Insulation Rockwool Batt |
| | | | Thickness (mm) | 150.00 | 150.00 |
| | | | Category | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Thickness (mil) | 6.00 | 6.00 |
| | | | Category | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Material Thickness (mil) | Polyethylene Sheet 6.00 | Polyethylene 6.00 |
| | | | Category | Waterproof Membrane | Roof Envelopes |
| | | | Material | 2-Ply SBS Membrane | Standard Modified Bitumen Membrane 2 ply |
| | | | Category | Board Insulation | Insulation |
| | | | Material | Polyisocyanurate Foam w/ Glass Reinforced | Wall Polyiso Foam Board Foil Facer |
| | | | Category | Exterior Sheathing | 100.00 Gypsum Board |
| | | | Material | tant, Fiberglass Mat Facing Gypsum Board | Gypsum Moisture Resistant |
| | | 5.1.6 Paranet Cast In Place FW1 GERC Clad W | Thickness (mm) all 200w 30MPa Detail 5-465 | 13.00 | 13.00 |
| | | | Length (m) | 134.00 | 134.00 |
| | | | Height (m) | 1.10 | 1.10 |
| | | Concrete | Area (m ⁺) Strength (MPa) | 147.40 | 147.40 |
| | | Controlo | Thickness (mm) | 200.00 | 200.00 |
| | | | Reinforcement (M) | | 15.00 |
| | | Openings | Number of Windows | 35.00 None | 35.00 None |
| | | | Total Window Area (m ²) | None | None |
| | | | Frame Type | None | None |
| | | | Number of Doors (ea) | None | None |
| | | | Door Type | None | None |
| | | Envelope | Category Material | Cladding Cladding w/ Suspension Rail and Steel Girt | Cladding Fiber Cement Siding |
| | | | Thickness (mm) | 13.00 | n/a |
| | | | Category | Drainage Plane Membrane | Vapour & Air Barrier |
| | | | Thickness (mm) | | n/a |
| | | | Category | Cavity Wall Insulation | Insulation |
| | | | Thickness (mm) | 150.00 | 150.00 |
| | | | Category | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Material Thickness (mil) | Polyethylene Sheet | Polyethylene |
| | | | Category | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Material Thickness (mil) | Polyethylene Sheet | Polyethylene |
| | | | Category | 6.00 Cavity Wall Insulation | 6.00 Insulation |
| | | | Material | Mineral Fibre Board | Rockwool Batt |
| | | | LINICKNESS (MM) Category | 150.00 Drainage Plane Membrane | 150.00 Vapour & Air Barrier |
| | | | Material | Spun-Bonded Poly-Olefin Sheet | Air Barrier |
| | | | Thickness (mm) Category | - Cladding | n/a Cladding |
| | | | Material | Cladding w/ Suspension Rail and Steel Girt | Fiber Cement Siding |
| | 5.0 Quateia Mall | | Thickness (mm) | 13.00 | n/a |
| | 5.2 Curtain Wall | 5.2.1 Exterior Wall Curtain Wall GL1 Triple Glaze | ed | | |
| | | | Length (m) | 249.00 | 249.00 |
| | | | Height (m) | Varies | 3.80 |
| | | Curtain Wall | Percent Viewable Glazing (%) | 946.45 86.00 | 946.45 86.00 |
| | | | Percent Spandrel Panel (%) | 14.00 | 14.00 |
| | | | I NICKNESS OF INSULATION (MM) | 100.00 Clazed | 100.00 Onarue Glass |
| | | Door Opening | Number of Doors (ea) | 11.00 | 11.00 |
| | | 5.2.2 Exterior Wall Curtain Wall CL.2. Device Of- | Door Type | Aluminum, Fully Glazed | Aluminum Exterior Door, 80% glazing |
| | | OLL CARRIE OURAIL VIAIL OLL DOUDIE GIA | Length (m) | 556.00 | 556.00 |
| | | | Height (m) | Varies | 4.08 |
| | | Curtain Wall | Area (m ²) Percent Viewable Glazing (%) | 2,266.84 | 2,266.84 |
| | | Cultain wai | Percent Spandrel Panel (%) | 4.00 | 4.00 |
| | | | Thickness of Insulation (mm) | 100.00 | 100.00 |
| | | Door Opening | Spandrel Type Number of Doors (ea) | Glazed 60.00 | Opaque Glass 60.00 |
| | | 2 cc. oponing | Door Type | Aluminum, Fully Glazed | Aluminum Exterior Door, 80% glazing |

| | | | | | Input Values |
|----------------|----------------|--|---|--|---|
| Assembly Group | Assembly Type | Assembly Name | Input Fields | Known/Measured | IE Inputs |
| | | Į | | | • |
| | 5.3 Steel Stud | 5.3.1 Exterior Wall _ Steel Stud _ Curtainwall Head at | Soffit _ Detail 2-A657 | | |
| | | | Length (m) | 261.00 Varies | 261.00 |
| | | | Area (m ²) | 363.21 | 363.21 |
| | | Steel Stud | Sheathing Type Stud Spacing (mm) | None 400.00 | None 400.00 |
| | | | Stud Weight (Ga) | 25.00 | 20.00 |
| | | | Stud Thickness (mm) Load Bearing | 152.00 Yes | 152.00 Yes |
| | | Openings | Number of Windows (ea) | None | None |
| | | | Total Window Area (m ²) Frame Type | None | None |
| | | | Glazing Type | None | None |
| | | | Number of Doors (ea) Door Type | None | None |
| | | Envelope | Category | Cavity Wall Insulation | Insulation |
| | | | Material Thickness (mm) | Mineral Fibre Board 150.00 | Rockwool Batt 150.00 |
| | | | Category | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Thickness (mil) | 6.00 | 6.00 |
| | | | Category Material | Exterior Sheathing tant Eiberglass Mat Facing Gypsum Board | Gypsum Board Gypsum Moisture Resistant |
| | | | Thickness (mm) | 13.00 | 13.00 |
| | | | Category Material | Spray Foam Insulation Polyisocyanurate Foam | Insulation Polyisocyanurate Foam |
| | | | Thickness (mil) | 100.00 | 100.00 |
| | | | Category Material | Gypsum Board Regular | Gypsum Board Gypsum Regular |
| | | | Thickness (mm) | 16mm | 16mm |
| | | | Material | Latex Paint | Paint Latex Water Based |
| | | 5.3.2 Exterior Wall Steel Stud EW1 GEPC Clad | Thickness Wall | n/a | n/a |
| | | | Length (m) | 539.00 | 539.00 |
| | | | Height (m) | Varies 2 198 50 | 4.08 |
| | | Steel Stud | Sheathing Type | None | None |
| | | | Stud Spacing (mm) Stud Weight (Ga) | 400.00 25.00 | 400.00 25.00 |
| | | | Stud Thickness (mm) | 152.00 | 152.00 |
| | | Openings | Load Bearing Number of Windows (ea) | No 177.00 | No 177.00 |
| | | | Total Window Area (m ²) | 484.00 | 484.00 |
| | | | Frame Type Glazing Type | Aluminum Triple Glazed, Argon Filled | Aluminum Standard |
| | | | Number of Doors (ea) | None | None |
| | | Envelope | Category | Cladding | Cladding |
| | | | Material | Cladding w/ Suspension Rail and Steel Girt | Fiber Cement Siding |
| | | | Category | Drainage Plane Membrane | Vapour & Air Barrier |
| | | | Material Thickness (mm) | Spun-Bonded Poly-Olefin Sheet | Air Barrier n/a |
| | | | Category | Cavity Wall Insulation | Insulation |
| | | | Material Thickness (mm) | Mineral Fibre Board 150.00 | Rockwool Batt 150.00 |
| | | | Category Material | Air/ Vapour Barrier Polyethylene Sheet | Vapour & Air Barrier Polyethylene |
| | | | Thickness (mil) | 6.00 | 6.00 |
| | | | Category Material | Exterior Sheathing tant. Fiberglass Mat Facing Gypsum Board | Gypsum Board Gypsum Moisture Resistant |
| | | | Thickness (mm) | 13.00 | 13.00 |
| | | | Material | Polyisocyanurate Foam | Insulation Polyisocyanurate Foam |
| | | | Thickness (mm) | 100.00 Gyrosym Board | 100.00 Gyogeum Board |
| | | | Material | Regular | Gypsum Regular |
| | | | Thickness (mm) Category | 16mm Interior Finish | 16mm Paint |
| | | | Material | Latex Paint | Latex Water Based |
| | | 5.3.3 Exterior Wall _ Steel Stud _ EW7 _ Louvered W | all | nva | n/a |
| | | | Length (m) Height (m) | 223.00 Varies | 223.00 3.94 |
| | | | Area (m ²) | 879.20 | 879.20 |
| | | Steel Stud | Sheathing Type Stud Spacing (mm) | None 400.00 | None 400.00 |
| | | | Stud Weight (Ga) | 25.00 | 25.00 |
| | | | Stud Thickness (mm) Load Bearing | 92.00 No | 92.00 No |
| | | Openings | Number of Windows (ea) | None | None |
| | | | Total Window Area (m [*]) Frame Type | None | None |
| | | | Glazing Type | None | None |
| | | | Door Type | None | None |
| | | Envelope | Category | Cladding | Cladding Steel Cladding Commercial (26 as) |
| | | | Thickness (mm) | ried Aldmindin Eddver supported on 2-onto | n/a |
| | | | Category Material | Cavity Wall Insulation Mineral Fibre Board | Cavity Wall Insulation Rockwool Batt |
| | | | Thickness (mm) | 75.00 | 75.00 |
| | | | Category Material | Air/ Vapour Barrier Polyethylene Sheet | Vapour & Air Barrier Polyethylene |
| | | | Thickness (mil) | 6.00 | 6.00 |
| | | | Material | Exterior Sneathing tant, Fiberglass Mat Facing Gypsum Board | Gypsum Board Gypsum Moisture Resistant |
| | | | Thickness (mm) Category | R-10 Spray Foam Inculation | 13.00 |
| | | | Material | Polyisocyanurate Foam | Polyisocyanurate Foam |
| | | | Category | 50.00 Gypsum Board | 50.00 Gypsum Board |
| | | | Material Thickness (mm) | Regular | Gypsum Regular |
| | | | Category | Interior Finish | Paint |
| | | | Material Thickness (mm) | Latex Paint n/a | Latex Water Based |
| 1 | | k | | iva | 104 |

| | | | | Input Values | |
|----------------|---------------|---|---|--|--|
| Assembly Group | Assembly Type | Assembly Name | Input Fields | Known/Measured | IE Inputs |
| I | 1 | | | | |
| | | 5.3.4 Exterior Wall Steel Stud EW8 EIFS | Length (m) | 196.00 | 196.00 |
| | | | Height (m) | Varies | 1.39 |
| | | Steel Stud | Area (m [*]) Sheathing Type | 271.70 None | 271.70 None |
| | | | Stud Spacing | 400.00 | 400.00 |
| | | | Stud Weight Stud Thickness (mm) | 25.00 152mm | 20.00 152mm |
| | | | Load Bearing | Yes | Yes |
| | | Openings | Number of Windows | None | None |
| | | | Frame Type | None | None |
| | | | Glazing Type | None 2.00 | None |
| | | | Door Type | Hollow Metal | Steel Exterior |
| | | Envelope | Category | Cladding | Cladding Stucco, Quor matel mash |
| | | | Thickness (mm) | tern including Kentorcing and Stater Wesh | n/a |
| | | | Category | R-25 Board Insulation | Insulation |
| | | | Thickness (mm) | Expanded Polystyrene 150.00 | Polystyrene Expanded 150.00 |
| | | | Category | Drainage Track | Vapour & Air Barrier |
| | | | Thickness (mm, mil) | Corrugated Plastic Sheet | Polyethylene 6.00 |
| | | | Category | Transition Membrane | Roof Envelopes |
| | | | Material Thickness (mil) | Spray Applied Rubber Barrier 40.00 | EPDM Membrane 60.00 |
| | | | Category | Water Penetration Membrane | Vapour & Air Barrier |
| | | | Thickness (mm) | Spunbonded Polyolerin | Air Bartier n/a |
| | | | Category | Cavity Wall Insulation | Insulation |
| | | | Thickness (mm) | 100.00 | 100.00 |
| | | | Category | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Thickness (mil) | Polyethylene Sneet 6.00 | 6.00 |
| | | | Category | Exterior Sheathing | Gypsum Board |
| | | | Thickness (mm) | 13.00 | Gypsum Molsture Resistant 13.00 |
| | | | Category Material | Gypsum Board Regular | Gypsum Board Gypsum Regular |
| | | | Thickness (mm) | 16mm | 16mm |
| | | | Category Material | Interior Finish | Paint Latex Water Based |
| | | | Thickness (mm) | n/a | n/a |
| | | 5.3.5 Exterior Wall _ Steel Stud _ EW9 _ Aluminum C | ladding | 100.00 | 100.00 |
| | | | Height (m) | Varies | 2.92 |
| | | Stool Stud | Area (m ²) | 291.94 None | 291.94 |
| | | | Stud Spacing (mm) | 400.00 | 400.00 |
| | | | Stud Weight (Ga) | 25.00 | 25.00 |
| | | | Load Bearing | 152.00 No | 152.00 No |
| | | Openings | Number of Windows (ea) | None | None |
| | | | Total Window Area (m ⁻) Frame Type | None | None |
| | | | Glazing Type | None | None |
| | | | Number of Doors (ea) Door Type | 6.00 Hollow Metal | 6.00 Steel Exterior |
| | | Envelope | Category | Cladding | Cladding |
| | | | Material Thickness (mm) | ital Suspensions Rail and Vertical Steel Girt 13.00 | Steel Cladding - Commercial (26 ga) n/a |
| | | | Category | Drainage Plane Membrane | Vapour & Air Barrier |
| | | | Material Thickness (mm) | Spun-Bonded Poly-Olefin Sneet | Air Barrier n/a |
| | | | Category | Cavity Wall Insulation | Insulation Registreed Batt |
| | | | Thickness (mm) | 150.00 | 150.00 |
| | | | Category Material | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Thickness (mil) | - Oryeutyiene Sheet 6.00 | Polyethylene 6.00 |
| | | | Category Material | Exterior Sheathing tant, Eiberglass Mat Facing Gypsum Board | Gypsum Board Gypsum Moisture Resistant |
| | | | Thickness (mm) | 13.00 | 13.00 |
| | | | Category Material | Spray Foam Insulation Polvisocvanurate Foam | Insulation Polvisocvanurate Foam |
| | | | Thickness (mm) | 100.00 | 100.00 |
| | | | Material | Gypsum Board Recular | Gypsum Board Gypsum Regular |
| | | | Thickness (mm) | 16mm | 16mm |
| | | | Category Material | Interior Finish Latex Paint | Paint Latex Water Based |
| | | | Thickness (mm) | n/a | n/a |

| Assembly Crown | Assembly True | Assembly Name | Innut Fields | | Input Values |
|----------------|---------------|---|-----------------------------|---|--|
| Assembly Group | Assembly Type | Assembly Name | Input Fields | Known/Measured | IE Inputs |
| i. | i. | 5.3.6 Exterior Wall Steel Stud DW Standing Sea | m Zine Roof Wall | | |
| | | 5.5.0 Extends Wall_Steel Stud_NW_Standing Sea | Length (m) | 264.00 | 264.00 |
| | | | Height (m) | Varies | 4.30 |
| | | | Area | 1,134.48 | 1,134.48 |
| | | Steel Stud | Sheathing Type | None | None 600.00 |
| | | | Stud Spacing Stud Weight | None | 25.00 |
| | | | Stud Thickness (mm) | None | 92.00 |
| | | | Load Bearing | No | No |
| | | Openings | Number of Windows | 75.00 | 75.00 |
| | | | Fromo Tuno | 156.00 Aluminum Framo | 156.00 Aluminum Framo |
| | | | Glazing Type | Triple Glazed, Argon Filled | Standard |
| | | | Number of Doors | None | None |
| | | | Door Type | None | None |
| | | Envelope | Category | Cladding | Cladding |
| | | | Thickness | Standing Seam Zinc | Steel Cladding - Commercial (26 ga) |
| | | | Category | Drainage Plane Membrane | Vapour & Air Barrier |
| | | | Material | Spun-Bonded Poly-Olefin Sheet | Air Barrier |
| | | | Thickness | | n/a |
| | | | Category | R-25 Cavity Wall Insulation Minorel Eibre Board | Insulation Received Ret |
| | | | Thickness | 150.00 | 150.00 |
| | | | Category | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Material | Polyethylene Sheet | Polyethylene |
| | | | Thickness (mil) | 6.00 Exterior Sheething | 6.00 Curpum Roard |
| | | | Material | extenor Sneathing arolass Mat Facing Gypsum Board (Type X) | Gypsum Board Gypsum Fire Rated Type X |
| | | | Thickness (mm) | 16.00 | 16.00 |
| | | | Category | Acoustic Insulation | Insulation |
| | | | Material | Fiberglass Batt | Fiberglass Batt |
| | | | Category | - Metal Deck | 92.00 Steel Roof System |
| | | | Material | Acoustical Metal Deck | 26 Ga. Galvanized Sheet (Commercial) |
| | | | Thickness | 92.00 | n/a |
| | | | Category | Interior Finish | Included in |
| | | | Thickness | Paint | 26 Ga. Gaivanized Sneet (Commercial) |
| | | 5.3.7 Parapet _ Steel Stud _ EW1 _ GFRC Clad Wall | _ Detail 3-A657 | | |
| | | | Length (m) | 35.00 | 35.00 |
| | | | Height (m) | 1.10 | 1.10 |
| | | Otrail Otrai | Area (m [*]) | 38.50 | 38.50 |
| | | Steel Stud | Stud Spacing | 400.00 | 400.00 |
| | | | Stud Weight | 20.00 | 20.00 |
| | | | Stud Thickness (mm) | 152.00 | 152.00 |
| | | | Load Bearing | Yes | Yes |
| | | Openings | Total Window Area (m2) | None | None |
| | | | Frame Type | None | None |
| | | | Glazing Type | None | None |
| | | | Number of Doors (ea) | None | None |
| | | Envelope | Category | Cladding | Cladding |
| | | 21100000 | Material | Cladding w/ Suspension Rail and Steel Girt | Fiber Cement Siding |
| | | | Thickness (mm) | 13.00 | n/a |
| | | | Category | Drainage Plane Membrane | Vapour & Air Barrier |
| 1 | | | Thickness (mm) | Spun-Bonded Poly-Olefin Sheet | Air Barner |
| 1 | | | Category | Cavity Wall Insulation | Insulation |
| | | | Material | Mineral Fibre Board | Rockwool Batt |
| | | | Thickness (mm) | 150.00 | 150.00 |
| 1 | | | Material | Polyethylene Sheet | v aputit & Air Barrier Polvethvlene |
| | | | Thickness (mil) | 6.00 | 6.00 |
| | | | Category | Exterior Sheathing | Gypsum Board |
| 1 | | | Material | tant, Fiberglass Mat Facing Gypsum Board | Gypsum Moisture Resistant |
| | | | Category | 13.00 Spray Foam Insulation | 13.00 Insulation |
| 1 | | | Material | Polyisocyanurate Foam | Polyisocyanurate Foam |
| 1 | 1 | | Thickness (mm) | 50.00 | 50.00 |

| Accombly Crown | Assambly Type Assambly Name | Innut Fielde | Input Values | | |
|----------------|-----------------------------|--|-----------------------------|--|--|
| Assembly Group | Assembly Type | Assembly Name | input rielus | Known/Measured | IE Inputs |
| | | 5.3.8 Parapet Steel Stud EW1 GERC Clad Wall | Detail 4-4655 | | |
| | | | Length (m) | 105.00 | 105.00 |
| | | | Height (m) | 1.10 | 1.10 |
| | | Steel Stud | Sheathing Type | None | None |
| | | | Stud Spacing | 400.00 | 400.00 |
| | | | Stud Weight | 25.00 | 20.00 |
| | | | Load Bearing | Yes | Yes |
| | | Openings | Number of Windows | None | None |
| | | | Frame Type | None | None |
| | | | Glazing Type | None | None |
| | | | Number of Doors | None | None |
| | | Envelope | Category | Cladding | Cladding |
| | | | Material | Cladding w/ Suspension Rail and Steel Girt | Fiber Cement Siding |
| | | | Category | Drainage Plane Membrane | Na Vapour & Air Barrier |
| | | | Material | Spun-Bonded Poly-Olefin Sheet | Air Barrier |
| | | | Thickness (mm) | - Cavity Wall Insulation | n/a Insulation |
| | | | Material | Mineral Fibre Board | Rockwool Batt |
| | | | Thickness (mm) | 150.00 | 150.00 |
| | | | Category Material | Air/ Vapour Barrier Polvethylene Sheet | Vapour & Air Barrier Polvethylene |
| | | | Thickness (mil) | 6.00 | 6.00 |
| | | | Category | Exterior Sheathing | Gypsum Board Gypsum Mojeture Resistant |
| | | | Thickness (mm) | 13.00 | 33.00 |
| | | | Category | Insulation | Insulation |
| | | | Material Thickness (mm) | Mineral Wool 150.00 | Rockwool Bat 150.00 |
| | | | Category | Exterior Sheathing | Gypsum Board |
| | | | Material | tant, Fiberglass Mat Facing Gypsum Board | Gypsum Moisture Resistant |
| | | | Category | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Material | Polyethylene Sheet | Polyethylene |
| | | | Thickness (mil) Category | 6.00 Board Insulation | 6.00 Insulation |
| | | | Material | Polyisocyanurate Foam w/ Glass Reinforced | Wall Polyiso Foam Board Foil Facer |
| | | | Thickness (mm) | 100.00 | 100.00 |
| | | | Material | tant, Fiberglass Mat Facing Gypsum Board | Gypsum Board Gypsum Moisture Resistant |
| | | | Thickness (mm) | 13.00 | 13.00 |
| | | | Category Material | 2-Ply SBS Membrane | Root Envelopes Standard Modified Bitumen Membrane 2 plv |
| | | | Thickness (mm) | | n/a |
| | | 5.3.9 Parapet _ Steel Stud _ EW7 _ Louvered Wall _ I | Detail 6-A654/3-A653/5-A659 | 181.00 | 181.00 |
| | | | Height (m) | 0.85 | 0.85 |
| | | Steel Stud | Area Sheathing Type | 153.85 None | 153.85 |
| | | Steel Stad | Stud Spacing | 400.00 | 400.00 |
| | | | Stud Weight | 25.00 | 20.00 |
| | | | Load Bearing | 152.00 Yes | 152.00 Yes |
| | | Openings | Number of Windows | None | None |
| | | | Total Window Area (m2) | None | None |
| | | | Glazing Type | None | None |
| | | | Number of Doors | None | None |
| | | Envelope | Category | Cladding | Cladding |
| | | | Material | hed Aluminum Louver supported on Z-Girts | Steel Cladding - Commercial (26 ga) |
| | | | Category | - Cavity Wall Insulation | n/a Insulation |
| | | | Material | Mineral Fibre Board | Rockwool Batt |
| | | | Thickness (mm) Category | 75.00 Air/Vapour Barrier | 75.00 Vapour & Air Barrier |
| | | | Material | Polyethylene Sheet | Polyethylene |
| | | | Thickness (mil) | 6.00 Exterior Sheething | 6.00 Cuppum Poord |
| | | | Material | tant, Fiberglass Mat Facing Gypsum Board | Gypsum Moisture Resistant |
| | | | Thickness (mm) | 13.00 | 13.00 |
| | | | Category Material | Insulation Mineral Wool | Insulation Rockwool Bat |
| | | | Thickness (mm) | 150.00 | 150.00 |
| | | | Category Material | Exterior Sheathing | Gypsum Board Gypsum Mojeture Registrant |
| | | | Thickness (mm) | 13.00 | 33.00 |
| | | | Category | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Thickness (mil) | Polyetnyiene Sheet 6.00 | Polyethylene 6.00 |
| | | | Category | Board Insulation | Insulation |
| | | | Material Thickness (mm) | Polyisocyanurate Foam w/ Glass Reinforced | Wall Polyiso Foam Board Foil Facer 100.00 |
| | | | Category | Exterior Sheathing | Gypsum Board |
| | | | Material Thickness (mm) | tant, Fiberglass Mat Facing Gypsum Board | Gypsum Moisture Resistant |
| | | | Category | Waterproof Membrane | Roof Envelopes |
| | | | Material | 2-Ply SBS Membrane | Standard Modified Bitumen Membrane 2 ply |
| 1 | I | L | I NICKNESS (MM) | - | n/a |

| | | | | | Input Values |
|----------------|---------------------------------|--|---|---|--|
| Assembly Group | Assembly Type | Assembly Name | input Fields | Known/Measured | IE Inputs |
| l | i - | 5.3.10 Paranet Steel Stud EW/9 Aluminum Cladd | ling Detail 5-4659 sim | | |
| | | | Length (m) | 8.00 | 8.00 |
| | | | Height (m) Area | 0.85 | 0.85 |
| | | Steel Stud | Sheathing Type | None | None |
| | | | Stud Spacing (mm) | 400.00 | 400.00 |
| | | | Stud Thickness (mm) | 152.00 | 152.00 |
| | | Oracian | Load Bearing | Yes | Yes |
| | | Openings | Total Window Area (m2) | None | None |
| | | | Frame Type | None | None |
| | | | Glazing Type Number of Doors | None | None |
| | | | Door Type | None | None |
| | | Envelope | Category Material | Cladding Ital Suspensions Rail and Vertical Steel Girt | Cladding Steel Cladding - Commercial (26 ga) |
| | | | Thickness (mm) | 13.00 | n/a |
| | | | Category Material | Drainage Plane Membrane Spun-Bonded Poly-Olefin Sheet | Vapour & Air Barrier Air Barrier |
| | | | Thickness (mm) | | n/a |
| | | | Category Material | Cavity Wall Insulation Mineral Fibre Board | Insulation Rockwool Batt |
| | | | Thickness (mm) | 75.00 | 75.00 |
| | | | Category | Air/ Vapour Barrier Polyethylene Sheet | Vapour & Air Barrier Polyethylene |
| | | | Thickness (mil) | 6.00 | 6.00 |
| | | | Category Material | Exterior Sheathing tant Fiberglass Mat Facing Gypsum Board | Gypsum Board Gypsum Moisture Resistant |
| | | | Thickness (mm) | 13.00 | 13.00 |
| | | | Category Material | Insulation | Insulation Reduced Bat |
| | | | Thickness (mm) | 150.00 | 150.00 |
| | | | Category Material | Exterior Sheathing | Gypsum Board |
| | | | Thickness (mm) | 13.00 | Gypsun woisture Resistant 13.00 |
| | | | Category Material | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Thickness (mil) | Polyethylene Sheet 6.00 | 6.00 |
| | | | Category | Board Insulation | Insulation |
| | | | Thickness (mm) | 100.00 | 100.00 |
| | | | Category | Exterior Sheathing | Gypsum Board |
| | | | Thickness (mm) | 13.00 | 13.00 |
| | | | Category Material | Waterproof Membrane 2-Ply SBS Membrane | Roof Envelopes Standard Modified Bitumen Membrane 2 nlv |
| | | | Thickness (mm) | 2 Hij Obo Membraio | n/a |
| | 5.4 Cast In Place/ Curtain Wall | 5.4.1 Parapet Cast In Place/Curtain Wall 200w 3 | 0MPa G1 Detail 2-A656 | | |
| | | | Length (m) | 28.00 | 28.00 |
| | | | Height (m) Area | 0.98 27.30 | 0.98 27.30 |
| | | Concrete | Strength | 30.00 | 30.00 |
| | | | Thickness Reinforcement | 200.00 | 200.00 |
| | | | Concrete Flyash % | 35.00 | 35.00 |
| | | Curtain Wall | Percent Viewable Glazing Percent Spandrel Panel | 69.00 | 31.00 |
| | | | Thickness of Insulation (mm) | 50mm | 50mm |
| | | Openings | Number of Windows | Glazed | Opaque Glass None |
| | | | Total Window Area (m2) | None | None |
| | | | Glazing Type | None | None |
| | | | Number of Doors | None | None |
| | | Envelope | Category | Drainage Plane Membrane | Vapour & Air Barrier |
| | | | Material | Spun-Bonded Poly-Olefin Sheet | Air Barrier |
| | | | Category | Exterior Sheathing | Gypsum Board |
| | | | Material | tant, Fiberglass Mat Facing Gypsum Board | Gypsum Moisture Resistant |
| | | | Category | 13.00 Board Insulation | 13.00 Insulation |
| | | | Material | Polyisocyanurate Foam w/ Glass Reinforce | Wall Polyiso Foam Board Foil Facer |
| | | | Category | 100.00 Waterproof Membrane | 100.00 Roof Envelopes |
| | | | Material | 2-Ply SBS Membrane | Standard Modified Bitumen Membrane 2 ply |
| | | | Category | - Air/ Vapour Barrier | n/a Vapour & Air Barrier |
| | | | Material Thickness (mil) | Polyethylene Sheet | Polyethylene |
| | | 5.4.2 Parapet _ Cast In Place/Curtain Wall _ G1 _ Trip | e Glazed _ 200w _ 30MPa _ Deta | il 4-A653 | 0.00 |
| | | | Length (m) Height (m) | 42.00 | 42.00 0.47 |
| | | | Area (m ²) | 19.74 | 19.74 |
| | | Concrete | Strength (MPa) | 30.00 | 30.00 |
| | | | Reinforcement (M) | | 15.00 |
| | | Cuttain Wall | Concrete Flyash (%) Percent Viewable Glazing (%) | 35.00 | 35.00 |
| | | Outern Pres | Percent Spandrel Panel (%) | 64.00 | 64.00 |
| | | | Thickness of Insulation (mm) Spandrel Type | 50.00 Glazed | 50.00 Onaque Glass |
| | | Openings | Number of Windows | None | None |
| | | | Total Window Area (m2) Frame Type | None | None |
| | | | Glazing Type | None | None |
| | | | Number of Doors (ea) Door Type | None | None |
| | | Envelope | Category | Waterproof Membrane | Roof Envelopes |
| | | | material Thickness (mm) | 2-Ply SBS Membrane | Standard Modified Bitumen Membrane 2 ply n/a |
| | | | Category | Exterior Sheathing | Gypsum Board |
| | | | material Thickness (mm) | tant, Fiberglass Mat Facing Gypsum Board 13.00 | Gypsum Moisture Resistant 13.00 |
| | | | Category | Board Insulation | Insulation |
| | | | Thickness (mm) | 100.00 | vv an Polyiso Poarn Board Poll Pacer 100.00 |
| | | | Category Material | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Thickness (mil) | 6.00 | 6.00 |
| | | | | | |

| | | | | | Input Values |
|----------------|------------------------------|--|--|--|--|
| Assembly Group | Assembly Type | Assembly Name | input Fields | Known/Measured | IE Inputs |
| | | 5.4.3 Paranet Cast In Place/Curtain Wall G2 Do | uble Glazed 200w 30MPa Det | ail 2-4656 cim | |
| | | | Length (m) | 8.00 | 8.00 |
| | | | Height (m) | 0.98 | 0.98 |
| | | Constato | Area (m ²) Strongth (MBo) | 7.80 | 7.80 |
| | | Concrete | Thickness (mm) | 200.00 | 200.00 |
| | | | Reinforcement (M) | - | 15.00 |
| | | Cuttoin Wall | Concrete Flyash (%) | 35.00 | 35.00 |
| | | Curtain waii | Percent Viewable Glazing (%) Percent Spandrel Panel (%) | 31.00 | 31.00 |
| | | | Thickness of Insulation (mm) | 50.00 | 50.00 |
| | | | Spandrel Type | Glazed | Opaque Glass |
| | | Openings | Total Window Area (m2) | None | None |
| | | | Frame Type | None | None |
| | | | Glazing Type | None | None |
| | | | Number of Doors (ea) | None | None |
| | | Envelope | Category | Drainage Plane Membrane | Vapour & Air Barrier |
| | | | Material | Spun-Bonded Poly-Olefin Sheet | Air Barrier |
| | | | Thickness (mm) | - Exterior Sheathing | n/a Gypeym Board |
| | | | Material | tant, Fiberglass Mat Facing Gypsum Board | Gypsum Moisture Resistant |
| | | | Thickness (mm) | 13.00 | 13.00 |
| | | | Category | Board Insulation | Insulation |
| | | | Thickness (mm) | 100.00 100.00 | vv an Polytso Poarn Board Foll Facer 100.00 |
| | | | Category | Waterproof Membrane | Roof Envelopes |
| | | | Material | 2-Ply SBS Membrane | Standard Modified Bitumen Membrane 2 ply |
| | | | Category | - Air/ Vanour Barrier | n/a Vanour & Air Rarrier |
| | | | Material | Polyethylene Sheet | Polyethylene |
| | | | Thickness (mil) | 6.00 | 6.00 |
| | | 5.4.4 Parapet _ Cast in Place/Curtain Wall _ G2 _ Do | uble Glazed _ 200w _ 30MPa _ Det | 200A-0 2 | 4.00 |
| | | | Height (m) | 0.58 | 4.00 |
| | | | Area (m ²) | 2.32 | 2.32 |
| | | Concrete | Strength (MPa) | 30.00 | 30.00 |
| | | | Reinforcement (M) | 200.00 | 200.00 |
| | | | Concrete Flyash (%) | 35.00 | 35.00 |
| | | Curtain Wall | Percent Viewable Glazing (%) | 48.00 | 48.00 |
| | | | Percent Spandrel Panel (%) Thickness of Insulation (mm) | 52.00 | 52.00 |
| | | | Spandrel Type | Glazed | Opaque Glass |
| | | Openings | Number of Windows | None | None |
| | | | Frame Type | None | None |
| | | | Glazing Type | None | None |
| | | | Number of Doors (ea) | None | None |
| | | Envelope | Door Type Catagony | None Exterior Sheething | None Cuppum Roard |
| | | Envelope | Material | tant, Fiberglass Mat Facing Gypsum Board | Gypsum Moisture Resistant |
| | | | Thickness (mm) | 13.00 | 13.00 |
| | | | Category | Board Insulation | Insulation Well Delvice Form Reard Feil Forer |
| | | | Thickness (mm) | 100.00 | 100.00 |
| | | | Category | Waterproof Membrane | Roof Envelopes |
| | | | Material Thickness (mm) | 2-Ply SBS Membrane | Standard Modified Bitumen Membrane 2 ply |
| | | | Category | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Material | Polyethylene Sheet | Polyethylene |
| | E E Cont In Dinos/Stool Stud | | Thickness (mil) | 6.00 | 6.00 |
| | 5.5 GASLIN FIACE/SIEE SIUG | 5.5.1 Exterior Wall _ Cast In Place/Steel Stud EW2 | Below Grade Wall _ 250w _ 30M | Pa | |
| | | | Length (m) | 65.00 | 65.00 |
| | | | Height (m) | Varies | 3.62 |
| | | Concrete | Area (M ⁻) Strength (MPa) | 235.30 | 235.30 |
| | | Conciete | Thickness (mm) | 250.00 | 300.00 |
| | | | Reinforcement (M) | 15M Vert./ 10M Horiz. | 15.00 |
| | | Steel Stud | Concrete Flyash (%) Sheathing Type | 35.00 None | 35.00 None |
| | | | Stud Spacing (mm) | 400.00 | 400.00 |
| | | | Stud Weight (Ga) | 25.00 | 25.00 |
| | | | Stud Thickness (mm) | 41.00 No | 92mm |
| | | Openings | Number of Windows | None | None |
| | | | Total Window Area (m2) | None | None |
| | | | Frame Type Glazing Type | None | None |
| | | | Number of Doors | None | None |
| | | | Door Type | None | None |
| | | Envelope | Category Material | Protection Board Extruded Polystyrepe | Insulation Polystyrene Extraded |
| | | | Thickness (mm) | 25.00 | 25.38 |
| | | | Category | Drainage Mat | Vapour & Air Barrier |
| | | | material Thickness (mil) | HDPE Panel | Vapour Barrier |
| | | | Category | R-15 Board Insulation | 5.00 Insulation |
| | | | Material | Extruded Polystyrene | Polystyrene Extruded |
| | | | Thickness (mm) Category | 75.00 Waterproofing | 75.00 Roof Envelopee |
| | | | Material | Torch-On Sheet | Standard Modified Bitumen Membrane 2 plv |
| | | | Thickness (mm) | - | n/a |
| | | | Category Material | Gypsum Board | Gypsum Board |
| | | | Thickness (mm) | 16mm | Sypsort Regular 16mm |
| | | | Category | Interior Finish | Paint |
| | | | material Thickness (mm) | Latex Paint | Latex Water Based |
| | | | | iva iva | 104 |

| | | Accombly Type Accombly Name | | Input Values | |
|----------------|-----------------------------|--|---------------------------------------|--|--|
| Assembly Group | Assembly Type | Assembly Name | input Fields | Known/Measured | IE Inputs |
| | • 1 | 5.5.0 Exterior Mich. Cont.la Disco Concl. Churd. EMild | · | 0 | L |
| | | 5.5.2 Exterior Wall _ Cast in Place/Steel Stud _ EW10 | Exterior Exposed Concrete _ 25 | 0w_30MPa 5.00 | 5.00 |
| | | | Height (m) | 3.55 | 3.55 |
| | | | Area (m ²) | 17.75 | 17.75 |
| | | Concrete | Strength (MPa) | 20.00 | 30.00 |
| | | | Reinforcement (M) | 15M Vert./ 10M Horiz. | 300.00 15M |
| | | | Concrete Flyash (%) | 35.00 | 35.00 |
| | | Steel Stud | Sheathing Type | None 400.00 | None 400.00 |
| | | | Stud Spacing (mm) Stud Weight (Ga) | 25.00 | 400.00 25.00 |
| | | | Stud Thickness (mm) | 152.00 | 152.00 |
| | | 0 | Load Bearing | No | No |
| | | Openings | Total Window Area (m2) | None | None |
| | | | Frame Type | None | None |
| | | | Glazing Type | None | None |
| | | | Number of Doors (ea) Door Type | None | None |
| | | Envelope | Category | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Material | Polyethylene Sheet | Polyethylene |
| | | | Thickness (mil) | 6.00 P-25 Spray Ecom Insulation | 6.00 |
| | | | Material | Polyisocyanurate Foam | Polyisocyanurate Foam |
| | | | Thickness (mm) | 75.00 | 75.00 |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Thickness (mm) | Kegular 16mm | Gypsum Regular 16mm |
| | | | Category | Interior Finish | Paint |
| | | | Material | Latex Paint | Latex Water Based |
| | | 5.5.3 Exterior Wall Cast In Place/Steel Stud Conce | rete Upstand 200w 30MPa De | n/a n/a | n/a |
| | | | Length (m) | 73.00 | 73.00 |
| | | | Height (m) | 1.10 | 1.10 |
| | | | Area (m²) | 80.30 | 80.30 |
| | | Concrete | Strength (MPa) Thickness (mm) | 200.00 | 200.00 |
| | | | Reinforcement (M) | | 15.00 |
| | | 0 | Concrete Flyash (%) | 35.00 | 35.00 |
| | | Steel Stud | Sheatning Type Stud Spacing (mm) | None 400.00 | None 400.00 |
| | | | Stud Weight (Ga) | 25.00 | 25.00 |
| | | | Stud Thickness (mm) | 41.00 | 92.00 |
| | | Ononingo | Load Bearing | No | No |
| | | Opernings | Total Window Area (m2) | None | None |
| | | | Frame Type | None | None |
| | | | Glazing Type | None | None |
| | | | Door Type | None | None |
| | | Envelope | Category | Drainage Plane Membrane | Vapour & Air Barrier |
| | | | Material | Spun-Bonded Poly-Olefin Sheet | Air Barrier |
| | | | Category | Cavity Wall Insulation | Insulation |
| | | | Material | Mineral Fibre Board | Rockwool Batt |
| | | | Thickness (mm) | 150.00 | 150.00 |
| | | | Material | Polyethylene Sheet | Polvethylene |
| | | | Thickness (mil) | 6.00 | 6.00 |
| | | | Category | Gypsum Board | Gypsum Board |
| | | | Material Thickness (mm) | Regular 16mm | Gypsum Regular 16mm |
| | | | Category | Interior Finish | Paint |
| | | | Material | Latex Paint | Latex Water Based |
| | 5.6 Curtain Wall/Steel Stud | | Thickness (mm) | n/a | ha |
| | | 5.6.1 Parapet _ Curtain Wall/Steel Stud _ G1 _ Triple | Glazed _ Detail 5-A655/2-A662 | | |
| | | | Length (m) | 36.00 | 36.00 |
| | | | Area (m ²) | 0.60 | 0.60 |
| | | Curtain Wall | Percent Viewable Glazing (%) | 13.00 | 13.00 |
| | | | Percent Spandrel Panel (%) | 87.00 | 87.00 |
| | | | Thickness of Insulation (mm) | 50.00 | 50.00 Onogrue Close |
| | | Steel Stud | Sheathing Type | 13mm Exterior Sheathing | None |
| | | | Stud Spacing (mm) | 400.00 | 400.00 |
| | | | Stud Weight (Ga) | 25.00 | 20.00 |
| | | | Load Bearing | 152.00 Yes | 152.00 Yes |
| | | Openings | Number of Windows | None | None |
| | | | Total Window Area (m2) | None | None |
| | | | Frame Type Glazing Type | None | None |
| | | | Number of Doors | None | None |
| | | | Door Type | None | None |
| | | Envelope | Category Material | 2-Ply SRS Membrane | Root Envelopes Standard Modified Ritumen Membrane 2 plu |
| | | | Thickness (mm) | 2-Fiy 3b3 wentbrane | n/a |
| | | | Category | Exterior Sheathing | Gypsum Board |
| | | | material Thickness (mm) | tant, Fiberglass Mat Facing Gypsum Board | Gypsum Moisture Resistant |
| | | | Category | Insulation | Insulation |
| | | | Material | Mineral Wool | Rockwool Bat |
| | | | Thickness (mm) | 150.00 | 150.00 Vapur & Air Parrier |
| | | | Material | Polvethylene Sheet | vapour & Aif Barrier Polvethvlene |
| | | | Thickness (mil) | 6.00 | 6.00 |

| | | | | | Input Values |
|-----------------------|-----------------------------|---|--|--|--|
| Assembly Group | Assembly Type | Assembly Name | Input Fields | Known/Measured | IE Inputs |
| | | | | | |
| | | 5.6.2 Parapet _ Curtain Wall/Steel Stud _ G1 _ Triple (| Glazed _ Detail 6-A652 | 26.00 | 26.00 |
| | | | Height (m) | 0.60 | 0.60 |
| | | Outrain Mart | Area (m ²) | 15.60 | 15.60 |
| | | Curtain Wali | Percent Viewable Glazing (%) Percent Spandrel Panel (%) | 13.00 | 13.00 |
| | | | Thickness of Insulation (mm) | 50.00 | 50.00 |
| | | Steel Stud | Spandrel Type Sheathing Type | Glazed | Opaque Glass None |
| | | | Stud Spacing (mm) | 400.00 | 400.00 |
| | | | Stud Weight (Ga) Stud Thickness (mm) | 25.00 | 20.00 |
| | | | Load Bearing | Yes | Yes |
| | | Openings | Number of Windows | None | None |
| | | | Frame Type | None | None |
| | | | Glazing Type | None | None |
| | | | Number of Doors Door Type | None | None |
| | | Envelope | Category | Waterproof Membrane | Roof Envelopes |
| | | | Material Thickness (mm) | 2-Ply SBS Membrane | Standard Modified Bitumen Membrane 2 ply |
| | | | Category | Exterior Sheathing | Gypsum Board |
| | | | Material | tant, Fiberglass Mat Facing Gypsum Board | Gypsum Moisture Resistant |
| | | | Category | Board Insulation | Insulation |
| | | | Material | Polyisocyanurate Foam w/ Glass Reinforce | Wall Polyiso Foam Board Foil Facer |
| | | | LINICKNESS (MM) | 100.00 Air/ Vapour Barrier | 100.00 Vanur & Air Barrier |
| | | | Material | Polyethylene Sheet | Polyethylene |
| | | | Thickness (mil) | 6.00 | 6.00 |
| | | | Material | Exterior Sneathing tant, Fiberglass Mat Facing Gypsum Board | Gypsum Board Gypsum Moisture Resistant |
| | | | Thickness (mm) | 13.00 | 13.00 |
| | | | Category | Insulation Mineral Wool | Insulation Rectwool Bat |
| | | | Thickness (mm) | 150.00 | 150.00 |
| 6.0 Roofs and Soffits | C.4. Companying Materia | | · | | |
| | 6.1 Composite Metal | 6.1.1 Roof _ Composite Metal _ R1 _ Exposed Membr | ane Roof _ Roof Level | | |
| | | | Bay Size (m) | 9.00 | 9.00 |
| | | | Span (m) | 1.72 | 1.72 |
| | | Composite Metal Roof | Number of Bays per Row (ea) | 1.00 | 1.00 |
| | | | Number of Rows (ea) | 4.00 | 4.00 |
| | | | Concrete Strength (Mpa) Concrete Flyash (%) | 25.00 | 30.00 |
| | | | Live Load (kPa) | 1.40 | 2.40 |
| | | Envelope | Category | SBS Membrane | Modified Bitumen Membrane Roofing System |
| | | | Thickness (mm) | 2°F lý 363 Metholalie | 150.00 |
| | | | Category | Protection Board | Included in |
| | | | Material Thickness (mm) | Asphalt Impregnated Fiberglass Felt 6 00 | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum |
| | | | Category | R-30 Board Insulation | Included in |
| | | | Material | Polyisocyanurate Foam w/ Glass Reinforced | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum |
| | | | Category | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Material | Polyethylene Sheet | Polyethylene |
| | | | Category | 6.00 Roof Sheathing | 6.00 Included in |
| | | | Material | stant, Fiberglass Mat Facing Gypsum Board | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum |
| | | 6.1.2 Roof Composite Metal R8 Play Area Lev | Thickness (mm) el 4 | 13.00 | n/a |
| | | | Bay Size (m) | 12.39 | 12.10 |
| | | | Span (m) | 3.00 | 3.07 |
| | | Composite Metal Roof | Area (m) Number of Bays per Row (ea) | 223.00 | 223.00 |
| | | | Number of Rows (ea) | 3.00 | 3.00 |
| | | | Concrete Strength (Mpa) Concrete Flyash (%) | 25.00 | 30.00 |
| | | | Live Load (kPa) | 2.40 | 2.40 |
| | | Envelope | Category | Protection Board | Included in Mod. Rit Rolvice Foort Provid Close Force - C |
| | | | Thickness (mm) | Asphan impregnated FibergiaSS Felt 6.00 | wou. bit Foigiso Foarn Board Glass Facer + Gypsum n/a |
| | | | Category | SBS Membrane | Modified Bitumen Membrane Roofing System |
| | | | material Thickness (mm) | 2-Ply SBS Membrane | wood. Bit Polyiso Foam Board Glass Facer + Gypsum 150.00 |
| | | | Category | Roof Sheathing | Included in |
| | | | Material Thickness (mm) | stant, Fiberglass Mat Facing Gypsum Board | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum |
| | | | Category | R-30 Board Insulation | Included in |
| | | | Material | Polyisocyanurate Foam w/ Glass Reinforced | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum |
| | | | Category | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Material | Polyethylene Sheet | Polyethylene |
| | 6.2 Concrete Suspended Slab | <u> </u> | Thickness (mil) | 6.00 | 6.00 |
| | | 6.2.1 Roof _ Concrete Suspended Slab _ R2 _ Expose | ed Membrane _ Level 5 | | |
| | | | Roof Width (m) Roof Snan (m) | Varies 9.00 | 50.67 |
| | | | Area (m ²) | 456.00 | 456.00 |
| | | Concrete Suspended Slab | Strength (MPa) | 35.00 | 30.00 |
| | | | Live Load (kPa) Concrete Flyash % | 2.40 | 2.40 |
| | | Envelope | Category | SBS Membrane | Modified Bitumen Membrane Roofing System |
| | | | Material | 2-Ply SBS Membrane | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum |
| | | | Category | Protection Roard | 150.00 Included in |
| | | | Material | Asphalt Impregnated Fiberglass Felt | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum |
| | | | Thickness (mm) | 6.00 R-30 Roard Insulation | n/a Isobudod is |
| | | | Material | Polyisocyanurate Foam w/ Glass Reinforced | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum |
| | | | Thickness (mm) | 150.00 | n/a |
| | | | Category Material | Air/ Vapour Barrier Polvethylene Sheet | Vapour & Air Barrier Polvethylene |
| | 1 | 1 | Thickness (mil) | 6.00 | 6mil |

| Assombly Group | Assombly Type | Assombly Namo | Input Fields | | Input Values |
|----------------|----------------------------|--|--|---|---|
| Assembly Gloup | Assembly Type | Assembly Name | input rielus | Known/Measured | IE Inputs |
| | 1 | 6.2.2 Roof _ Concrete Suspended Slab _ R4 _ Crop A | rea_Level 4 | | |
| | | | Roof Width (m) Roof Span (m) | Varies 9.00 | 39.22 9.00 |
| | | | Area (m ²) | 353.00 | 353.00 |
| | | Concrete Suspended Slab | Live Load (kPa) | 35.00 | 2.40 |
| | | Envelope | Concrete Flyash % | 35.00 SBS Membrane | 35.00 Modified Bitumen Membrane Roofing System |
| | | Livelope | Material | 2-Ply SBS Membrane | Mod. Bit Polyiso Foam Board Glass Facer + Gystern |
| | | | Category | - Roof Sheathing | Included in |
| | | | Material Thickness (mm) | tant, Fiberglass Mat Facing Gypsum Board 6.00 | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum |
| | | | Category | R-30 Board Insulation | Included in |
| | | | Material Thickness (mm) | Polyisocyanurate Foam w/ Glass Reinforce 150.00 | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum n/a |
| | | | Category | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Thickness (mil) | 6.00 | 6mil |
| | | 6.2.3 Roof _ Concrete Suspended Slab _ R5 _ Pavers | on Concrete _ Level 4 Roof Width (m) | Varies | 81.78 |
| | | | Roof Span (m) | 9.00 | 9.00 |
| | | Concrete Suspended Slab | Area (m ⁻) Strength (MPa) | 736.00 | 736.00 30.00 |
| | | | Live Load (kPa) | 4.80 | 4.80 |
| | | Envelope | Category | Pavers | Cladding |
| | | | Material Thickness (mm) | Concrete | Brick - Concrete |
| | | | Category | Fill | Roof Envelopes |
| | | | Material Thickness (mm) | 75.00 | Ballast |
| | | | Category Material | SBS Membrane | Modified Bitumen Membrane Roofing System |
| | | | Thickness (mm) | 2-PTY SBS Wernbrane | wou. bit Forviso Foarn Board Glass Facer + Gypsum 150.00 |
| | | | Category Material | Protection Board Asphalt Impregnated Fiberolass Felt | Included in Mod. Bit Polviso Foam Board Glass Facer + Gvosum |
| | | | Thickness (mm) | 6.00 | n/a |
| | | | Category Material | R-30 Board Insulation Polyisocyanurate Foam w/ Glass Reinforce | Included in Mod. Bit Polyiso Foam Board Glass Facer + Gypsum |
| | | | Thickness (mm) | 150.00 | n/a |
| | | | Material | Polyethylene Sheet | Polyethylene |
| | | 6.2.4 Roof Concrete Suspended Slab R7 Landsc | Thickness (mil) ape on Concrete Level 1 | 6.00 | 6mil |
| | | | Roof Width (m) | Varies | 18.78 |
| | | | Area (m ²) | 9.00 | 9.00 |
| | | Concrete Suspended Slab | Strength (MPa) | 35.00 | 30.00 |
| | | | Concrete Flyash % | 4.80 | 35.00 |
| | | Envelope | Category Material | Filter Fabric Polyethylene | Included in Mod. Bit. (Inv.) - Extruded Polystyrene |
| | | | Thickness (mm) | | n/a |
| | | | Category Material | Fill Gravel | Included in Mod. Bit. (Inv.) - Extruded Polystyrene |
| | | | Thickness (mm) | 75.00 | n/a |
| | | | Material | HDPE Panel | Vapour & Air Barrier Vapour Barrier |
| | | | Thickness (mm, mil) | 25.00 Drainage Plane Membrane | 6.00 Vapour & Air Barrier |
| | | | Material | Spun-Bonded Poly-Olefin Sheet | Air Barrier |
| | | | Category | - R-30 Board Insulation | n/a Included in |
| | | | Material Thickness (mm) | Extruded Polystyrene | Mod. Bit. (Inv.) - Extruded Polystyrene |
| | | | Category | SBS Membrane | Modified Bitumen Membrane Roofing System - Inverted |
| | | | Material Thickness (mm) | 2-Ply SBS Membrane | Mod. Bit. (Inv.) - Extruded Polystyrene 150.00 |
| | | 6.2.5 Roof _ Concrete Suspended Slab _ R10 _ Paver | s on Concrete _ Level 1 | Madaa | 447.00 |
| | | | Roof Span (m) | 9.00 | 9.00 |
| | | Conomia Russon-1-1 Ol-1 | Area (m ²) Strength (MPa) | 1,058.00 | 1,058.00 |
| | | Concrete Suspended SIab | Live Load (kPa) | 35.00 4.80 | 30.00 4.80 |
| | | Favalana | Concrete Flyash % Category | 35.00 Pavore | 35.00 Cladding |
| | | 211/400/8 | Material | Concrete | Brick - Concrete |
| | | | LINICKNESS (MM) Category | - Fill | n/a Included in |
| | | | Material Thickness (mm) | Gravel | Mod. Bit. (Inv.) - Extruded Polystyrene |
| | | | Category | 75.00 Filter Fabric | n/a Included in |
| | | | Material Thickness (mm) | Polyethylene - | Mod. Bit. (Inv.) - Extruded Polystyrene n/a |
| | | | Category | Drainage Board | Vapour & Air Barrier |
| | | | material Thickness (mm, mil) | HDPE Panel 25.00 | Vapour Barrier 6.00 |
| | | | Category | R-30 Board Insulation | Included in Mod. Bit. (Inv.) - Extruded Polystyrene |
| | | | Thickness (mm) | 150.00 | n/a |
| | | | Category | SBS Membrane | Modified Bitumen Membrane Roofing System - Inverted Mod. Bit. (Inv.) - Extruded Polystyrene |
| | | | Material | Z*FIV 3D3 Wellibrarie | |
| | 6.3 Light Frame Wood Truss | | Material Thickness (mm) | 2*Fly 3B3 Membrane | 150.00 |
| | 6.3 Light Frame Wood Truss | 6.3.1 Roof _ Light Frame Wood Truss _ R6 _ Cross La | Material Thickness (mm) aminated Timber Panel _ Level 5 | 2°F iy 353 menuzare - | 150.00 |
| | 6.3 Light Frame Wood Truss | 6.3.1 Roof _ Light Frame Wood Truss _ R6 _ Cross La | Material Thickness (mm) minated Timber Panel _ Level 5 Roof Width (m) Roof Span (m) | 2-r ly 353 Mellibraire - 69.00 | 150.00 103.69 14.64 |
| | 6.3 Light Frame Wood Truss | 6.3.1 Roof _Light Frame Wood Truss _ R6 _ Cross La | Material Thickness (mm) minated Timber Panel _ Level 5 Roof Width (m) Roof Span (m) Area (m ²) | 2-riy 353 memorane | 103.69 14.64 1,518.00 |
| | 6.3 Light Frame Wood Truss | 6.3.1 Roof _ Light Frame Wood Truss _ R6 _ Cross La Light Frame Wood Truss | Material Thickness (mm) iminated Timber Panel _ Level 5 Roof Width (m) Roof Span (m) Area (m ²) Truss Type Decking Type | 69.00 (51.60 (51.60) (51.60) (70) (70) (70) (70) (70) (70) (70) (7 | 150.00 103.69 1.464 1.518.00 Paralel Phaneot |
| | 6.3 Light Frame Wood Truss | 6.3.1 Roof _ Light Frame Wood Truss _ R6 _ Cross La | Material Thickness (mm) uminated Timber Panel _ Level 5 Roof Width (m) Roof Span (m) Area (m ²) Truss Type Decking Type Decking Thickness (mm) | 2-r y 363 menita ale 89.00 22.00 1.518.00 Glulam Timber Truss (Parallel) Cross Laminated Timber Panel 102.00 | 150.00 103.69 1454 1,518.00 Parallel Plywood 19.00 |
| | 6.3 Light Frame Wood Truss | 6.3.1 Roof _Light Frame Wood Truss _ R6 _ Cross Ls Light Frame Wood Truss Light Frame Wood Truss Envelope | Material minated Timber Panel Level 5 Roof Widht (m) Roof Span (m) Area (m ²) Truss Type Decking Tiple Decking Tiple. Decking Tiple. Decking Tiple. Zetagory | 2-r y 363 menita and 69.00 22.00 Giulam Timber Truss (Paralle) Cross Laminated Timber Paral 102.00 SBS Membrane | 150.00 103.69 14.64 1.518.00 Parallel Plywood 19.00 2.40 Modified Bitumen Membrane Rocho Svstem |
| | 6.3 Light Frame Wood Truss | 6.3.1 Roof _ Light Frame Wood Truss _ R6 _ Cross Lz Light Frame Wood Truss Envelope | Material Thickness (mm) miniated Timber Panel_Level 5 Roof Width (m) Roof Span (m) Area (m ³) Truse Type Decking Thickness (mm) Live Load (kPa) Category Material Material | 2-P y SBS Meniticane 69.00 22.00 Giulam Timber Trusk Cross Laminated Timber Panel Cross Laminated Timber Panel 0.0 9.50 SBS Membrane 2-Ply SBS Membrane | 150.00 103.69 14.64 1.518.00 Parallel Plywood 19.00 2.40 Modified Bitumen Membrane Roding System Mod. Bit Polyiso Foam Board Glass Facer + Gypsum |
| | 6.3 Light Frame Wood Truss | 6.3.1 Roof _Light Frame Wood Truss _ R6 _ Cross La Light Frame Wood Truss Envelope | Material Thickness (mm) miniated Timber Panel_Level 5 Roof Width (m) Roof Span (m) Area (m ²) Truss Type Decking Type Decking Type Decking Type Decking Type Decking Type Category Material Thickness (mm) Category Category | 2-Pry SBS Menita and 69.00 22.00 Glutam Timber Truss (Paralle) Cross Laminated Timber Panel 102.00 0.50 SBS Membrane 2-Pty SBS Membrane 2-Pty Concertion Band | 150.00 103.69 14.64 1.518.00 Paralel Plywood 19.00 Modified Bitumen Membrane Roofing System Mod. Bit Polyiso Foam Board Glass Face + Cynsum Mod. Bit Polyiso Foam Board Glass Face + Cynsum 150.00 Included in |
| | 6.3 Light Frame Wood Truss | 6.3.1 Roof _ Light Frame Wood Truss _ R6 _ Cross La Light Frame Wood Truss Envelope | Material Thickness (mm) miniated Timber Panel _ Level 5 Roof Width (m) Roof Span (m) Area (m ²) Truss Type Decking Type Decking Type Decking Type Decking Thickness (mm) Live Load (kPa) Category Material Thickness (mm) Category Material Thickness (mm) | 2-Pry SBS MenitZahe 89.00 22.00 Giulam Timber Truss (Parallel) Cross Laminated Timber Panel 02.00 SBS Mentzane 2-Ply SBS Mentzane Protection Board Asphalt Impregnated Fiberglass Feld | 150.00 103.69 14,64 1,518.00 Paralel Phywood 19,00 Modified Bitumen Membrane Roofing System Mod. Bit Polyiso Foam Board Glass Facer + Gypsum Included in Mod. Bit Polyiso Foam Board Glass Facer + Gypsum |
| | 6.3 Light Frame Wood Truss | 6.3.1 Roof _Light Frame Wood Truss _ R6 _ Cross Ls Light Frame Wood Truss Envelope | Material Thickness (mm) mininated Timber Panel _ Level 5 Roof Width (m) Roof Span (m) Area (m ²) Truss Type Decking Thickness (mm) Live Load (kPa) Category Material Thickness (mm) Category Material Thickness (mm) | 2-Pry 363 Methica de 89.00 22.00 1.518.00 Glulam Timber Trasel Cross Laminated Timber Panel Cross Laminated Timber Panel 102.00 0.50 SBS Membrane 2-Pty SBS Membrane 2-Pty SBS Membrane Protection Board Protection Board 6.00 R-30 Goard Insulation R-30 Goard Insulation | 150.00 103.69 14.64 1.518.00 Parallel Plywood 19.00 20.00 Modified Bitumen Membrane Roofing System Mod. Bit Polyiso Foam Board Glass Facer + Cypsum Included in Mod. Bit Polyiso Foam Board Glass Facer + Cypsum Included in Mod. Bit Polyiso Foam Board Glass Facer + Cypsum Included in Nod. Bit Polyiso Foam Board Glass Facer + Cypsum Included in |
| | 6.3 Light Frame Wood Truss | 6.3.1 Roof _ Light Frame Wood Truss _ R6 _ Cross Lz Light Frame Wood Truss Envelope | Material Thickness (mm) miniated Timber Panel _ Level 5 Roof Width (m) Roof Span (m) Area (m ²) Truss Tyre Decking Tyre Decking Tyre Decking Tyre Decking Tyre Decking Thickness (mm) Category Material | 2-Pry 365 Methica are 69.00 22.00 1.518.00 Giulam Timber Thasel Cross Laminated Timber Panel Cross Laminated Timber Panel Cross Laminated Timber Panel 0.50 SBS Membrane 2-Ply SBS Membrane 2-Ply SBS Membrane Protection Baard Asphalt Impregnated Fibergiass Felt 6.00 R-30 Board Insulation Polyisocyanurate Foam wi Glass Reinforce | 150.00 103.69 14.64 1,518.00 Parallel Plywood 19.00 2.40 Modified Bitumen Membrane Roofing System Mod. Bit Polyiso Foam Board Glass Facer + Cypsum Included in Mod. Bit Polyiso Foam Board Glass Facer + Cypsum Included in Mod. Bit Polyiso Foam Board Glass Facer + Cypsum |
| | 6.3 Light Frame Wood Truss | 6.3.1 Roof _ Light Frame Wood Truss _ R6 _ Cross La Light Frame Wood Truss Envelope | Material Thickness (mm) miniated Timber Panel_Level 5 Roof Width (m) Roof Span (m) Area (m ²) Trust Type Decking Type Decking Type Decking Type Decking Type Decking Thickness (mm) Category Material Thickness (mm) Category Material Thickness (mm) Category Material Thickness (mm) Category Material | 2-Pry 363 Menita and 69.00 22.00 Giulam Timber Truss (Parallel) Cross Laminated Timber Panel Cross Laminated Timber Panel Cross Laminated Timber Panel Cross Laminated Timber Panel SBS Membrane 2-Ply SBS Membrane Protection Board Asphalt Impregnated Fiberglass Felt 6.00 R-30 Board Insuliation Polyisocyanurate Foarm wi Glass Reinforce 150.00 Airt Vapour Barrier | 150.00 103.69 1.64 1.518.00 Parallel Phywood 19.00 Modified Bitumen Membrane Roofing System Mod. Bit Polyiso Foam Board Glass Facer + Oypsum 150.00 Mod. Bit Polyiso Foam Board Glass Facer + Oypsum ng Included in Mod. Bit Polyiso Foam Board Glass Facer + Oypsum Nod. Bit Polyiso Foam Board Glass Facer + Oypsum Nod. Bit Polyiso Foam Board Glass Facer + Oypsum Nature - Oysum Nature - Oysum - Oysum |

| Accombly Crown | Assembly Type Assembly Name | Innut Fielde | Input Values | | |
|----------------|----------------------------------|--|---|--|--|
| Assembly Group | Assembly Type | Assembly Name | input rielus | Known/Measured | IE Inputs |
| | 6.4 Pre-Engineered Metal Roof St | retern | | • | |
| | 0.4 TTe-Engineered Metal Roor By | 6.4.1 Roof _ Pre-Engineered Metal Roof System _ R1 | _ Exposed Membrane _ Roof Leve | 1 | |
| | | | Roof Width (m) Roof Length (m) | Varies Varies | 30.58 30.58 |
| | | | Area (m ²) | 935.00 | 935.00 |
| | | Pre-Engineered Metal Roof System Envelope | Live Load (kPa) Category | 1.82 SBS Membrane | 2.40 Modified Bitumen Membrane Roofing System |
| | | | Material | 2-Ply SBS Membrane | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum |
| | | | Category | Protection Board | 150.00 Included in |
| | | | Material Thickness (mm) | Asphalt Impregnated Fiberglass Felt | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum |
| | | | Category | R-30 Board Insulation | Included in |
| | | | Material Thickness (mm) | Polyisocyanurate Foam w/ Glass Reinforced 150.00 | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum n/a |
| | | | Category | Air/ Vapour Barrier | Vapour & Air Barrier |
| | | | Material Thickness (mil) | Polyethylene Sheet 6.00 | Polyethylene 6.00 |
| | | | Category | Roof Sheathing | Included in Mod. Bit. Balvice Fear Reard Class Fear - Cursum |
| | | | Thickness (mm) | tant, Fibergiass Mat Facing Gypsum Board 13.00 | n/a |
| | | 6.4.2 Roof Pre-Engineered Metal Roof System R3 | _ Exposed Membrane _ Acoustic I Roof Width (m) | nsulation _ Level 4 Varies | 27 37 |
| | | | Roof Length (m) | Varies | 27.37 |
| | | Pre-Engineered Metal Poof System | Area (m ²) | 749.00 | 749.00 |
| | | Envelope | Category | SBS Membrane | Modified Bitumen Membrane Roofing System |
| | | | Material Thickness (mm) | 2-Ply SBS Membrane | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum 150.00 |
| | | | Category | Protection Board | Included in |
| | | | Material Thickness (mm) | Asphalt Impregnated Fiberglass Felt 6.00 | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum n/a |
| | | | Category | R-30 Board Insulation | Included in Mad Dity, Dataing Form Board Class Form & Crassing |
| | | | Thickness (mm) | Polyisocyanurate Poam w Glass Reinforced 150.00 | Mod. Bit Polyiso Poam Board Glass Pacer + Gypsum n/a |
| | | | Category Material | Air/ Vapour Barrier Polyethylene Sheet | Vapour & Air Barrier |
| | | | Thickness (mil) | 6.00 | 6mil |
| | | | Category Material | Roof Sheathing tant. Fiberglass Mat Facing Gypsum Board | Included in Mod. Bit Polviso Foam Board Glass Facer + Gypsum |
| | | | Thickness (mm) | 13.00 | n/a |
| | | | Material | Fiberglass Batt | Fiberglass Batt |
| | | 6.4.3 Poof Pre-Engineered Metal Poof System P3 | Thickness (mm) Exposed Membrane Acoustic I | | 92.00 |
| | | | Roof Width (m) | Varies | 7.07 |
| | | | Roof Length (m) Area (m ²) | Varies 50.00 | 7.07 |
| | | Pre-Engineered Metal Roof System | Live Load (kPa) | 1.82 | 2.40 |
| | | Envelope | Category Material | SBS Membrane 2-Ply SBS Membrane | Modified Bitumen Membrane Roofing System Mod. Bit Polviso Foam Board Glass Facer + Gvosum |
| | | | Thickness (mm) | - | 150.00 |
| | | | Material | Asphalt Impregnated Fiberglass Felt | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum |
| | | | Thickness (mm) Category | 6.00 R-30 Board Insulation | n/a Included in |
| | | | Material | Polyisocyanurate Foam w/ Glass Reinforced | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum |
| | | | Thickness (mm) Category | 150.00 Air/ Vapour Barrier | n/a Vapour & Air Barrier |
| | | | Material | Polyethylene Sheet | Polyethylene |
| | | | Category | Roof Sheathing | Included in |
| | | | Material Thickness (mm) | stant, Fiberglass Mat Facing Gypsum Board | Mod. Bit Polyiso Foam Board Glass Facer + Gypsum |
| | | | Category | Acoustic Insulation | Insulation |
| | | | Material Thickness (mm) | Fiberglass Batt | Fiberglass Batt 92.00 |
| | | 6.4.4 Roof _ Pre-Engineered Metal Roof System _ RW | /2 Standing Seam Zinc Roof Wal | I_Acoustical Insulation Level 5 | 02.00 |
| | | | Roof Length (m) | Varies Varies | 22.47 22.47 |
| | | | Area (m ²) | 505.00 | 505.00 |
| | | Pre-Engineered Metal Roof System Envelope | Category | 1.82 Cladding | 2.40 Cladding |
| | | | Material Thickness (mm) | Standing Seam Zinc | Steel Cladding - Commercial (26 ga) |
| | | | Category | Drainage Mat | Vapour & Air Barrier |
| | | | Material Thickness (mm) | Entangled Nylon Fibre Mat 19.00 | Air Barrier n/a |
| | | | Category | R25 Board Insulation | Insulation |
| | | | Thickness (mm) | Mineral Wool Board 175.00 | Rockwool Bat 175.00 |
| | | | Category | SBS Membrane | Roof Envelopes Standard Modified Bitumen Mamhrons 2 alu |
| | | | Thickness (mm) | 2-Ply SBS Wertibrane | Standard woollied bitumen wempfahe 2 ply n/a |
| | | | Category Material | Roof Sheathing arolass Mat Facing Gynsum Board (Tyne X) | Gypsum Board Gypsum Fire Rated Type X |
| | | | Thickness (mm) | 16.00 | 16.00 |
| | | | Category Material | Acoustic Insulation Fiberglass Batt | Insulation Fiberglass Batt |
| | | | Thickness (mm) | Interior Einich | 92.00 Doint |
| | | | Material | Paint | Paint Alkyd Solvent Based |
| | L | | Thickness (mm) | n/a | n/a |

| | Assembly Type | ssembly Type Assembly Name | | | Input Values |
|----------------|----------------|---|-------------------------------------|-----------------------|---------------------------------|
| Assembly Group | | | Input Fields | Known/Measured | IE Inputs |
| | - | | | + | |
| | 6.5 Steel Stud | 1 | | | |
| | | 6.4.5 Soffit _ Steel Stud _ ES1/ES2 _ GFRC CI | ad Wall Level 1 | 1 | 1 |
| | | | Length (m) | Varies | 46.07 |
| | | | Height (m) | Varies | 46.07 |
| | | | Area | 2,122.00 | 2,122.00 |
| | | | Sheathing Type | None | None |
| | | | Stud Spacing (mm) | 400.00 | 400.00 |
| | | | Stud Weight (Ga) | 25.00 | 25.00 |
| | | | Stud Thickness (mm) | 152.00 | 152.00 |
| | | Onesian | Load Bearing | NO | NO |
| | | Openings | Number of Windows (ea) | None | None |
| | | | Total Window Area (m ⁺) | None | None |
| | | | Frame Type | None | None |
| | | | Glazing Type | None | None |
| | | | Number of Doors (ea) | None | None |
| | | | Door Type | None | None |
| | | Envelope | Category | Cladding | Cladding Elber Compat Sidian |
| | | | Thickness (mm) | GFRC 12.00 | Fiber Cement Siding |
| | | | Cotogoni | 13.00 Eiroproofing | Cuppum Board |
| | | | Material | Spray Eireproofing | Gypsum Eire Rated Type X |
| | | | Thickness (mm) | opray r neprooning | Cypadin ne Nated Type X |
| | | | Category | Spray Ecom Insulation | 10.00 |
| | | | Material | Polyisocyanurate Ecom | Polyisocyanurate Ecom |
| | | | Thickness (mm) | 100.00 | 100.00 |
| 1 | | | Category | Air/ Vapour Barrier | Vapour & Air Barrier |
| 1 | | | Material | Polyethylene Sheet | Polyethylene |
| 1 | | | Thickness (mil) | 6.00 | 6.00 |

Appendix B – IE Assumptions

IE Input Assumptions Document - New SUB Project

| Assembly Group | Assembly Type | Assembly Name | Specific Assumptions | | | | | | |
|----------------|--|--|---|--|--|--|--|--|--|
| 1.0 Foundation | The IE SOG inputs are limited to being either 100mm or 200mm. Since the actual SOG thicknesses for the New SUB Project are not exactly 100mm or 200mm thick, the measured areas required adjustments to equalize the total volume of the SOG. The IE limits the thickness of footings to be between 190mm and 500mm thick. As there are a number of cases where footing thicknesses exceed 500mm, their widths were increased accordingly to maintain the same volume of footing while accommodating this limitation. The specified concrete uses Limestone to reduce a minimum of 35% of the cement within the mix design. Because of this cement reduction, the concrete flyash was modelled to be 35% for all IE foundation inputs. | | | | | | | | |
| | 1.1 Concrete Footing | The length of this footing was adjusted to accommodate the the quantity of footings. The measured width was maintained, thicknesses was set at 400mm and the length | | | | | | | |
| | | | was increased using the following calculations; = [(Cited Width) x (Cited Thickness)] Cited Length * 15 units = [(2.5m) x (400mm)] * 2.5m * 15 units = 37.5m ³ | | | | | | |
| | | 1.1.2 Concrete Footing _ F2 | The length of this footing was adjusted to accommodate the the quantity of footings and the IE limitation of footing thicknesses to be under 500mm. The measured width was maintained, thicknesses was set at 500mm and the lengths were increased using the following calculations; | | | | | | |
| | | | = [(Cited Width) x (Cited Thickness)/500mm]* Cited Length * 29 units = [(4.0m) x (1100mm)/500mm] *4.0m * 29 units = 510.4m^3 | | | | | | |
| | | 1.1.3 Concrete Footing F3 | The length of this footing was adjusted to accommodate the the quantity of footings and the IE limitation of footing thicknesses to be under 500mm. The measured width was maintained, thicknesses was set at 400mm and the lengths were increased using the following calculations; | | | | | | |
| | | | = [(Cited Width) x (Cited Thickness)/400mm]* Cited Length * 8 units = [(4.2m) x (1200mm)/400mm] *4.2m * 8 units = 169.34m^3 | | | | | | |
| | | 1.1.4 Concrete Footing F4 | The length of this footing was adjusted to accommodate the the quantity of footings and the IE limitation of footing thicknesses to be under 500mm. The measured width was maintained, thicknesses was set at 500mm and the lengths were increased using the following calculations; | | | | | | |
| | | | = [(Cited Width) x (Cited Thickness)/500mm]* Cited Length * 7 units = [(4.9m) x (1300mm)/500mm] *4.9m * 7 units = 218.491m^3 | | | | | | |
| | | 1.1.5 Concrete Footing Misc. 700d | The length of this footing was adjusted to accommodate the the quantity of footings and the IE limitation of footing thicknesses to be under 500mm. The measured width was maintained, thicknesses was set at 350mm and the lengths were increased using the following calculations; | | | | | | |
| | | | = [(Cited Width) x (Cited Thickness)/2]* Cited Length * 2 = [(8m) x (350mm] *3m * 2 = 16.8m^3 | | | | | | |
| | | 1.1.6 Concrete Footing _ Misc 875d | The length of this footing was adjusted to accommodate the the quantity of footings and the IE limitation of footing thicknesses to be under 500mm. The measured width was maintained, thicknesses was set at 500mm and the lengths were increased using the following calculations; | | | | | | |
| | | | = [(Factored Width) x (Factored Thickness)]* Cited Length * 2 = [(4.25m) x (500mm] *7m = 14.875m*3 | | | | | | |
| | | 1.1.7 Concrete Footing _ Misc 1200d | The length of this footing was adjusted to accommodate the IE limitation of footing thicknesses to be under 500mm. The measured width was maintained, thicknesses was set at 500mm and the lengths were increased using the following calculations; | | | | | | |
| | | | = [(Cited Width) x (Cited Thickness)/500mm]* Cited Length * adj. thickness = [(3m) x (1200mm)/500mm] *8.333m * 500mm = 30m^3 | | | | | | |
| | | 1.1.8 Concrete Footing _ Misc 2500d | The length of this footing was adjusted to accommodate the Impact Estimator limitation of footing thicknesses to be under 500mm. The measured width was maintained, thicknesses was set at 500mm and the lengths were increased using the following calculations; | | | | | | |
| | | | = [(Cited Width) x (Cited Thickness)/500mm]* Cited Length * adj. thickness = [(3.9m) x (2500mm)/500mm] *10m * 500mm = 97.5m^3 | | | | | | |
| | | 1.1.9 Concrete Footing SF1 1.1.10 Concrete Footing Stair Core 1 | The length of this spread footing was totaled and inputted directly. The area of this footing was measured and multiplied by the cited 1/4 of the actual thickness to get the volume, the length was then factored by four since the thickness of 2000mm can't be input directly. This was done using the following calculations; | | | | | | |
| | | | = [[(Measured Area) x (500mm)] *4 = [[(10m) x (16m) x 500mm] *4 = 320m^3 | | | | | | |
| | | 1.1.11 Concrete Footing _ Stair Core 2 | The area of this footing was measured and multiplied by the cited 1/5 of the actual thickness to get the volume, the length was then factored by four since the thickness of 2500nm can't be input directly. This was done using the following calculations; | | | | | | |
| | | | = [[(Measured Area) x (500mm)] *5 = [[(19.1m) x (20.1m) x 500mm] *5 = 959.775m^3 | | | | | | |

| Assembly Group | Assembly Type | Assembly Name | Specific Assumptions |
|-----------------------|---|--|---|
| | i. | | |
| | | 1.1.12 Concrete Footing _ Stair Core 3 | The area of this footing was measured and multiplied by the cited 1/4 of the actual thickness to get the volume, the length was then factored by four since the thickness of 2000mm can't be input directly. This was done using the following calculations; |
| | | | = [[(Measured Area) x (500mm)] *4 = [[(13.95m) x (20m) x 500mm] *4 = 558m^3 |
| | | 1.1.13 Concrete Footing _ Stair Core 4 | The area of this footing was measured and multiplied by the cited 1/5 of the actual thickness to get the volume, the length was then factored by four since the thickness of 2500mm can't be input directly. This was done using the following calculations; |
| | | | = [[(Measured Area) x (500mm)] *5 = [[(10.85m) x (20m) x 500mm] *5 = 542.5m^3 |
| | 1.2 Concrete Slab on Grade | 1.2.1 Concrete Slob on Grade Lower Lovel 125mm | The area of this slab had to be adjusted so that the thickness fit into the 100mm |
| | | | This data of this data in the to be applied of the interfaced and the formal the formal thickness specified in the IE. The area was factored up 25% to make up the difference between the 100mm inputted slab and the actual slab thickness of 125mm. - Because the SOG area was modified the insulation thickness should be reduced to 8mm to maintain the same material volume. The lowest IE input of 25.381mm was used. |
| | | 1.2.2 Concrete Slab on Grade ower Level 225mm | - The base area of 125mm was already included in the previous input and so this |
| | | | input included just the additional 100mm thickness. The difference between the 225mm and 125mm slab. - The below grade insulation and vapour barrier was omitted for this portion of SOG due to the over estimate of the previous input. |
| | | 1.2.3 Concrete Slab on Grade _ Level 1 _ 125mm | Similar to the SOG on the lower level, this SOG area was increased 25% to account for the additional thickness from 100mm to 125mm. The below grade insulation and vapour barrier was omitted for this portion of SOG due to the over estimate at the lower level. |
| 2.0 Columns and Beams | The method used to measure or inputs; number of beams, number floor's area was measured, there assumption details below for each The IE does not allow the input of | blumn sizing was completely depended upon the metrics built into the IE. Ti of columns, floor to floor height, bay size, supported span and live load. T were no traditional beams utilized in the structure. An average bay and spa input. of concrete flyash percent in the columns and beams assemblies and an av | hat is, the IE calculates the sizing of beams and columns based on the following his being the case, concrete columns were counted for on each floor, while each an size were calculated in order to cover the measured area, as seen in the erage value of 9% is used by default. |
| | 2.1 Concrete | 2.1.1 Columns and Beams _ Concrete _ Lower Level | - Because of the variability of actual bay and span sizes, they were approximated |
| | | | for the IE input using the following calculation; = sqrt[(Measured Supported Floor Area) / (Counted Number of Columns)] = sqrtf(/4647 m/2) / (53)] |
| | | | 9.36m Since the floor to floor height of the lower level varies, and average height was used. Average(4.0, 49, 3.9) = 4.23m |
| | | 2.1.2 Columns and Beams _ Concrete _ Level 1 | - Because of the variability of actual bay and span sizes, they were approximated |
| | | | For the tile input using the following calculation; = sqrt[(Measured Supported Floor Area) / (Counted Number of Columns)] = sqrt[(4647 m^2) / (53)] |
| | | | Since the floor to floor height on level one varies, an average height was used. Average(6.1, 7.1) = 6.6m |
| | | 2.1.3 Columns and Beams _ Concrete _ Level 2 | Because of the variability of bay and span sizes, they were calculated using the following calculation; |
| | | | = sqrt[(Measured Supported Floor Area) / (Counted Number of Columns)] = sqrt[(3522 m^2) / (42)] = 9.16m |
| | | 2.1.4 Columns and Beams _ Concrete _ Level 3 | Because of the variability of actual bay and span sizes, they were approximated for the IE input using the following calculation; |
| | | | = sqrt[(Measured Supported Floor Area) / (Counted Number of Columns)] = sqrt[(3579 m^2) / (42)] = 9.23m |
| | | 2.1.5 Columns and Beams _ Concrete _ Level 4 | Because of the variability of actual bay and span sizes, they were approximated for the IE input using the following calculation; |
| | 2.2 Chilom | | = sqrt[(Measured Supported Floor Area) / (Counted Number of Columns)] = sqrt[(1591 m^2) / (33)] = 6.94m |
| | | 2.2.1 Columns and Beams _ Glulam _ Lower Level Level | Since the floor to floor height of the lower level varies, and average height was used. Average(4.0, 4.9, 3.9) = 4.23m The specified live load of 1.28kPa could not be modelled I the IE and so the lowest allowable input of 2.4kPa was selected. |
| | | 2.2.2 Columns and Beams _ Glulam _ Level 1 | Since the floor to floor height on level one varies, an average height was used. Average(6.1, 7.1) = 6.6m The specified live load of 1.82kPa could not be modelled I the IE and so the lowest allowable input of 2.4kPa was selected. |
| | | 2.2.3 Columns and Beams _ Glulam _ Level 2 | Since the column spacing and span varies, the average values of 4.5m and 9.0m respectively were used for the IE. The specified live load of 1.82kPa could not be modelled I the IE and so the lowest allowable input of 2.4kPa was selected. |
| | | 2.2.4 Columns and Beams_ Glulam _Level 2 - 4 _ Great Hall Foyer | Since the span varied over the length of the roof an average value of 5.6m was selected for the IE input. The column height of L2 and L3 were both included as the columns span over the two floors. |

| Assembly Group | Assembly Type | Assembly Name | Specific Assumptions |
|--------------------|--|--|--|
| | | | |
| | | 2.2.5 Columns and Beams _ Glulam _ Level 3 | Since the column spacing and span varies, the average values of 4.5m and 9.0m respectively were used for the IE. The specified live load of 1.82kPa could not be modelled I the IE and so the lowest allowable input of 2.4kPa was selected. |
| | | 2.2.6 Columns and Beams _ Glulam _ Level 4 | Since the column spacing and span varies, the average values of 4.5m and 9.0m respectively were used for the IE. The specified live load of 1.82kPa could not be modelled I the IE and so the lowest allowable input of 2.4kPa was selected. |
| | | 2.2.7 Columns and Beams _ Glulam _ Level 5 _ Roof Wall | Since the span varies, the average value of 10.0m was used for the IE. The specified live load of 1.82kPa could not be modelled I the IE and so the lowest allowable input of 2.4kPa was selected. There was a small portion of HSS in an area of this roof which was not considered significant enough to count separately. |
| | | 2.2.8 Columns and Beams _ Glulam _ L5 _ Sawtooth Roof | The specified live load of 1.82kPa could not be modelled I the IE and so the lowest allowable input of 2.4kPa was selected. |
| | 2.3 Steel | 2.3.1 Columns and Beams Steel evel 2 - 4 Great Hall | -The actual hav size of the beams is 2 47m however the IE limits the minimum hav |
| | | | Size to 3.05, the number of the beams was kept the same but the bay size was doubled, to make the equivalent support area the beam span was reduced by half. - The column height of L2 and L3 were both included as the columns span over the two floors. |
| | | 2.3.2 Columns and Beams _ Steel _ Level 5 _ Mechanical Room | The specified live load of 1.82kPa could not be modelled I the IE and so the lowest allowable input of 2.4kPa was selected. |
| 3.0 Floor | The IE calculated the thickness of The specified concrete strength The specified concrete uses Lim IE floor inputs. Composite metal roofs are incluo Concrete suspended roof slabs a Soffit finishes to concrete susper | If the suspended slabs based on floor width, span, concrete strength, concr for suspended however the IE limits inputs to 20MPa 30MPa, or 60MPa str estone to reduce a minimum of 35% of the cement within the mix design. B ded in section 6.1 Roofs and Soffits _ Composite Metal are included in section 6.2 Roofs and Soffits _ Concrete Suspended Slab rded slabs are included in section 6.5 Roofs and Soffits _ Steel Stud | ete flyash content and live load. engths. 30MPa was used for the modelling. lecause of this cement reduction, the concrete flyash was modelled to be 35% for all |
| | 3.1 Composite Metal | | |
| | | 3.1.1 Floor _ Composite Metal _ Level 2 _ Great Hall | - Since the bay size varied, it was approximated using the following equation; Floor Area (# of Row's Bay Size) /# of Bays; This resulted in a bay size of 27.8m. The maximum allowable bay size in the IE is 12.1m and so the number of bays was increased to 3 reducing the span to 9.03m while maintaining the same floor area. |
| | | 3.1.2 Floor _ Composite Metal _ Level 2 _ Nest and Bridge Lounge | Composite Deck area of the Nest (214 m^2) and Bridge Lounge (78+29m^2). An average span of 1.5m, approximate row count of 12 and approximate bay count of swere determined and the bay size was then approximated using; Floor Area / (# of Rows * Bay Size) / # of Bays |
| | | 3.1.3 Floor _ Composite Metal _ Level 3 _ Nest, Bridge Lounge and Pocket Lounge | Composite Deck area of the Nest (203 m^2), Bridge Lounge (78+3m^2) and Pocket lounge (96m^2). Bay size was approximated using, Floor Area / (# of Rows * Bay Size) / # of Bays |
| | | 3.1.4 Floor _ Composite Metal _ Level 4 _ Child Minding | Composite Deck area of the Indoor child minding area (74m^2). Bay size was approximated using; Floor Area / (# of Rows * Bay Size) / # of Bays |
| | 3.2 Concrete Suspended Slab | | · |
| | | 3.2.1 Floor _ Concrete Suspended Slab _ Level 1 | Floor span was taken from the typical bayline spacing. The floor width was calculated by the floor area divided by the span as follows: 3420m² / 9.0m = 380m Floor Width |
| | | 3.2.2 Floor _ Concrete Suspended Slab _ Level 2 | Floor span was taken from the typical bayline spacing. The floor width was calculated by the floor area divided by the span as follows 3579m^2 / 9.0m = 397.7m Floor Width |
| | | 3.2.3 Floor _ Concrete Suspended Slab _ Level 3 | - Floor span was taken from the typical bayline spacing. The floor width was calculated by the floor area divided by the span as follows $3522m^2/9.0m = 391.3m$ Floor Width |
| | | 3.2.4 Floor _ Concrete Suspended Slab _ Level 4 | Floor span was taken from the typical bayline spacing. The floor width was calculated by the floor area divided by the span as follows 2519m^2 / 9.0m = 379.8m Floor Width. Suspended roof slabs included in roofing systems |
| | | 3.2.5 Floor _ Concrete Suspended Slab _ Level 5 | Floor span was taken from the typical bayline spacing. The floor width was calculated by the floor area divided by the span as follows 1075m/2 /9.0m = 119.4m Floor Width Suspended roof slabs included in roofing systems |
| 4.0 Interior Walls | All interior walls were assumed to The specified concrete uses Lim concrete wall IE inputs. The specifications call for abuse envelope and so the abuse resiste Due to limitations of the IE all do | o be the full top of slab to top of slab height. No reduction in wall height was estone to reduce a minimum of 35% of the cement within the mix design. B resistant gypsum board in corridors to a height of 1200mm above finished I ent gypsum board was ignored. ors were assumed to be a standard (812mm x 2133). Double doors were | s made to accommodate slab thickenings or slab bands. lecause of this cement reduction, the concrete flyash was modelled to be 35% for all floor. The IE is unable to model a combination of finishes on a given layer of e counted as two standard sized doors. |
| | | | |
| | | 4.1.1 Interior Wall _ Cast In Place _ C1 _ 250w _ 30MPa _ Metal Door | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. Since the IE only accepts 200mm and 300mm wall thicknesses, the length of the wall was adjusted to maintain the same overall volume. |
| | | 4.1.2 Interior Wall_Cast In Place_C1_300w_30MPa 4.1.3 Interior Wall_Cast In Place_C1_450w_45MPa_Metal Door | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. Since the IE only accepts 200 and 300 wall thicknesses, the length of the wall was adjusted to maintain the same overall volume, as that is the functional unit of concrete. Since the IE does not model 45MPa it was rounded to the nearest strength value of 30MPa. |
| I | I | L | 1 |

| Assembly Group | Assembly Type | Assembly Name | Specific Assumptions |
|----------------|--------------------|--|--|
| | | 4.1.4 Interior Wall _ Cast In Place _ C1 _ 600w _ 45MPa _ Metal Door | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. The specified 600mm concrete wall was modelled in the IE using two layers of 300mm concrete wall since 300mm is the maximum allowable thickness. The specified 45MPa strength is not an available IE input and was modelled with one 300mm wall at 30MPa strength and the other at 60MPa strength. (A more than average flyash % was not available for 60MPa concrete). |
| | 4.2 Concrete Block | 4.2.1 Interior Wall _ Concrete Block _ M1 _ Concrete Block Wall _ 190mm Block _ Metal Door | -Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. |
| | | 4.2.2 Interior Wall _ Concrete Block _ M1-A _ Acoustic Concrete Block Wall _ 190mm Block _ Metal Door | Since the IE can not model two types of doors in a single assembly, the total quantity was divided in two and input as two assemblies, one with wood doors and one with metal doors. |
| | | 4.2.3 Interior Wall _ Concrete Block _ M1-A _ Acoustic Concrete Block Wall _ 190mm Block _ Wood Door | Since the IE can not model two types of doors in a single assembly, the total quantity was divided in two and input as two assemblies, one with wood doors and one with metal doors. |
| | 4.3 Curtain Wali | 4.3.1 Interior Wall _ Curtain Wall _ GL1B _ 6mm Tempered | Since there are various heights of this wall assembly The total area was calculated and divided by The total length to determine The weighted average of height. The assembly specifications includes single pane 6mm laminated glass. The IE is unable to model this configuration of glazing and utilizes a standard double glazed system. |
| | 4.4 Steel Stud | | |
| | | 4.4.1 Interior Wall _ Steel Stud _ RS1 _ Rated Shaft Wall 1 HR FRR _ 100mm C-H Stud | The IE does not contain 100mm C-H studs in its material database and so 92mm regular studs were used as a surrogate due to similar material properties. The IE does not contain 19mm Shaftliner or 16mm Fireboard in its material database. 16mm Type X Gypsum board was used as a surrogate due to similar material properties. |
| | | 4.4.2 Interior Wall _ Steel Stud _ RS2 _ Rated Shaft Wall 1 HR FRR w/ Additional GWB_ 100mm C-H Stud | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. The IE does not contain 100mm C-H studs in its material database and so 92mm regular studs were used as a surrogate due to similar material properties. The IE does not contain 19mm Shaftiner or 16mm Fireboard in its material database. 16mm Type X Gypsum board was used as a surrogate due to similar material properties. |
| | | 4.4.3 Interior Wall _ Steel Stud _ RS3 _ Rated Shaft Wall 1 HR FRR w/ Additional GWB _ 152mm C-H Stud | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. The IE does not contain 152mm C-H studs in its material database and so 152mm regular studs were used as a surrogate due to similar material properties. The IE does not contain 19mm Shaftliner or 16mm Fireboard in its material database. Hom Type X Gypsum board was used as a surrogate due to similar material properties. |
| | | 4.4.4 Interior Wall _ Steel Stud _ W1 _ Wall Furring _ 22mm Channel | - The IE does not contain 22mm furring channel in its material database and so the smallest available steel stud thickness of 92mm was used as a surrogate due to |
| | | 4.4.5 interior wall_steer Stud_wi-1_tie Clad wall Furring_22mm Channel 4.4.6 Interior Wall_Steel Stud_W2_Wall Furring_41mm Stud_ Metal Door | The is does not contain Z2mm turning channel in its material database and so the smallest available steel stud thickness of 92mm was used as a surrogate due to Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. The IE does not contain 22mm furring channel in its material database and so the smallest available steel stud thickness of 92mm was used as a surrogate due to similar material properties. |
| | | 4.4.7 Interior Wall _ Steel Stud _ W3 _ Wall Furring _ 92mm Stud _ Metal Door | Since The IE can not model two types of doors in a single assembly. The total quantity was divided in two and input as two assemblies, one with wood doors and one with metal doors. |
| | | 4.4.8 Interior Wall _ Steel Stud _ W3 _ Wall Furring _ 92mm Stud _ Wood Door | Since the IE can not model two types of doors in a single assembly, the total quantity was divided in two and input as two assemblies, one with wood doors and one with metal doors. |
| | | 4.4.9 Interior Wall _ Steel Stud _ W3-T _ Tile Clad Wall Furring _ 92mm Stud | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. The IE does not contain 16mm Coated Glass Map Backer Board so 16mm Moisture Resistant Gypsum board was used as a surrogate due to similar material properties. This wall assembly contains a tile finish which was excluded from the IE due to an absence of accentable surrogate. |
| | | 4.4.10 Interior Wall _ Steel Stud _ W4 _ Wall Furring _ 152mm Stud | Since there are various heights of this wall assembly The total area was calculated and divided by The total length to determine The weighted average of height. |
| | | 4.4.11 Interior Wall _ Steel Stud _ W4-T _ Wall Furring _ 152mm Stud | The IE does not contain 16mm Coated Glass Map Backer Board so 16mm Moisture Resistant Gypsum board was used as a surrogate due to similar material properties. This wall assembly contains a tile finish which was excluded from the IE due to an |
| | | 4.4.12 Interior Wall _ Steel Stud _ W5 _ Basic Partition _ 92mm Stud _ Metal Door _ GL1 | absence of acceptable surrogate. - Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. - Since the IE can not model two types of doors in a single assembly, the total quantity was divided in two and input as two assemblies, one with wood doors and one with metal doors. |
| | | 4.4.13 Interior Wall _ Steel Stud _ W5 _ Basic Partition _ 92mm Stud _ Wood Door _ GL1 | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. Since the IE can not model two types of doors in a single assembly, the total quantity was divided in two and input as two assemblies, one with wood doors and one with metal doors. |
| | | 4.4.14 Interior Wall _ Steel Stud _ W5-2 _ Acoustic Partition w/ 2 Layers One Side _ 92mm Stud _ Metal Door _ GL1 | Since the IE can not model two types of doors in a single assembly, the total quantity was divided in two and input as two assemblies, one with wood doors and one with metal doors. This wall assembly contains an acoustic sealant which was excluded from the IE due to an absence of acceptable surrogate. |

| Assembly Group | Assembly Type | Assembly Name | Specific Assumptions | | | |
|----------------|---------------|--|--|--|--|--|
| | | | | | | |
| | | 4.4.15 Interior Wall _ Steel Stud _ W5-2 _ Acoustic Partition w/ 2 Layers One Side _ 92mm Stud _ Wood Door _ GL1 | Since the IE can not model two types of doors in a single assembly, the total quantity was divided in two and input as two assemblies, one with wood doors and one with metal doors. This wall assembly contains an acoustic sealant which was excluded from the IE due to an absence of acceptable surrogate. | | | |
| | | [4.4.16 interior Wall _ Steel Stud _ W5-22 _ Acoustic Partition w/ 2 Layers Both Sides _ 92mm Stud _ Metal Door _ GL1 | - since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height Since the IE can not model two types of doors in a single assembly, the total quantity was divided in two and input as two assemblies, one with wood doors and one with metal doors. This assembly also contains two types of glazing and so it was separated similarly to the doors This wall assembly contains two types of glazing and so it was separated similarly to the doors. | | | |
| | | 4.4.17 Interior Wall _ Steel Stud _ W5-22 _ Acoustic Partition w/ 2 Layers Both Sides _ 92mm Stud _ Wood Door _ GL1A | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. Since the IE can not model two types of doors in a single assembly, the total quantity was divided in two and input as two assemblies, one with wood doors and one with metal doors. This assembly also contains two types of glazing and so it was separated similarly to the doors. This wall assembly contains an acoustic sealant which was excluded from the IE due to an absence of acceptable surrogate. | | | |
| | | 4.4.18 Interior Wall _ Steel Stud _ W5-R _ Rated Partition _ 92mm Stud | | | | |
| | | 4.4.19 Interior Wall _ Steel Stud _ W5-RA _ Rated Acoustic Partition _ | - This wall assembly contains an acoustic sealant which was excluded from the IE | | | |
| | | 4.4.20 Interior Wall Steel Stud W5-T Tile Clad Partition Both Sides | Since there are various heights of this wall assembly the total area was calculated | | | |
| | | _ 92mm Stud _ Wood Door | and divided by the total length to determine the weighted average of height. - The IE does not contain 16mm Coated Glass Map Backer Board so 16mm Moisture Resistant Gypsum board was used as a surrogate due to similar material properties. - This wall assembly contains a tile finish which was excluded from the IE due to an absence of acceptable surrogate. | | | |
| | | 4.4.21 Interior Wall _ Steel Stud _ W6 _ Basic Partition _ 152mm Stud _ Metal Door | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. Since the IE can not model two types of doors in a single assembly, the total quantity was divided in two and input as two assemblies, one with wood doors and one with metal doors. | | | |
| | | 4.4.22 Interior Wall _ Steel Stud _ W6 _ Basic Partition _ 152mm Stud _ Wood Door | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. Since the IE can not model two types of doors in a single assembly, the total quantity was divided in two and input as two assemblies, one with wood doors and one with metal doors. | | | |
| | | 4.4.23 Interior Wall _ Steel Stud _ W6-2 _ Acoustic Partition w/ 2 Layers One Sides _ 152mm Stud | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. This wall assembly contains an acoustic sealant which was excluded from the IE due to an absence of acceptable surrogate. | | | |
| | | 4.4.24 Interior Wall _ Steel Stud _ W6-22 _ Acoustic Partition w/ 2 Layers Both Sides _ 152mm Stud _ Metal Door _ GL1 | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. Since the IE can not model two types of doors in a single assembly, the total quantity was divided in two and input as two assemblies, one with wood doors and one with metal doors. This wall assembly contains an acoustic sealant which was excluded from the IE due to an absence of acceptable surrogate. | | | |
| | | 4.4.25 Interior Wall _ Steel Stud _ W6-22 _ Acoustic Partition w/ 2 Layers Both Sides _ 152mm Stud _ Wood Door _ GL1 | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. Since the IE can not model two types of doors in a single assembly, the total quantity was divided in two and input as two assemblies, one with wood doors and one with metal doors. This wall assembly contains an acoustic sealant which was excluded from the IE due to an absence of acceptable surrogate. | | | |
| | | 4.4.26 Interior Wall _ Steel Stud _ W6-R _ Rated Partition _ 152mm Stud _ Metal Door | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. | | | |
| | | 4.4.27 Interior Wall _ Steel Stud _ W6-RA _ Rated Acoustic Partition _ 152mm Stud | This wall assembly contains an acoustic sealant which was excluded from the IE due to an absence of acceptable surrogate. | | | |
| | | 4.4.28 Interior Wall _ Steel Stud _ W6-T _ Tile Clad Partition Both Sides _ 152mm Stud _ Wood Door | - Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. - The IE does not contain 16mm Coated Glass Map Backer Board so 16mm Moisture Resistant Gypsum board was used as a surrogate due to similar material properties. - This wall assembly contains a tile finish which was excluded from the IE due to an absence of acceptable surrogate. | | | |
| | | 4.4.29 Interior Wall _ Steel Stud _ W6-T1 _ Tile Clad Partition One Side _ 152mm Stud _ Wood Door | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. The IE does not contain 16mm Coated Glass Map Backer Board so 16mm Moisture Resistant Gypsum board was used as a surrogate due to similar material properties. This wall assembly contains a tile finish which was excluded from the IE due to an absence of acceptable surrogate. | | | |
| | | 4.4.30 Interior Wall_Steel Stud_W7_Double Stud Acoustic/ Mechanical Partition_92mm Stud_Metal Door_GL1 | Since the IE can not model two types of doors in a single assembly, the total quantity was divided in two and input as two assemblies, one with wood doors and one with metal doors. This assembly also contains two types of glazing and so it was separated similarly to the doors. | | | |
| | | 14.4.31 Interior Wall _ Steel Stud _ W/ _ Double Stud Acoustic/ Mechanical Partition _ 92mm Stud _ Wood Door _ GL1A | - once use the carn not mouse two types or doors in a single assembly, the total quantity was divided in two and input as two assemblies, one with wood doors and one with metal doors. This assembly also contains two types of glazing and so it was separated similarly to the doors. | | | |

| Assembly Group | Assembly Type | Assembly Name | Specific Assumptions | | |
|-------------------------------|---|--|---|--|--|
| | | 4.4.32 Interior Wall _ Steel Stud _ W7-22 _ Double Stud Acoustic/ Mechanical Partition w/ 2 Layers Both Sides _ 92mm Stud _ Wood Door | | | |
| | | _10mm Glass 4.4.33 Interior Wall _ Steel Stud _ W7-T _ Double Stud Acoustic/ Mechanical Parition Tile Clad Both Sides _ 92mm Stud | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. | | |
| | | 4.4.34 Interior Wall _ Steel Stud _ W7-T1 _ Double Stud Acoustic/ Mechanical Partition Tile Clad One Side _ 92mm Stud 4.4.35 Interior Wall _ Steel Stud _ W9 _ Double Stud Partition _ 152mm Stud | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. | | |
| | 4.5 Wood Stud | 4.5.1 Interior Wall _ Wood Stud _ W8 _ Double Stud Acoustic Partition _ | - This wall assembly contains a veneer plywood finish on one side and fabric | | |
| | | 140/184mm Stud _ Wood Door _ 10mm Glass | wrapped acoustic panel finish on the other. Both materials were excluded from the IE due to an absence of acceptable surrogate. - The IE does not contain IBLack Mat Acoustical Blanket in its database so 50mm Rockwool was used as a surrogate due to similar material properties. - This wall assembly contains an acoustic sealant which was excluded from the IE due to an absence of acceptable surromate. | | |
| | 4.6 Concrete Block/Steel Stud | | | | |
| | | 4.6.1 Interior WallConcrete Block/Steel StudM2Concrete Block Wall w/ Furring Both Sides _ 190mm Block/ 25mm Channel _ Wood Door | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. This wall assembly contains a 25mm furning channel on both sides, a single layer of the smallest available steel stud thickness of 92mm was used as a surrogate due to similar material properties. | | |
| 5.0 Exterior Walls & Parapets | - The specified concrete uses Lime concrete wall assemblies. | estone to reduce a minimum of 35% of the cement within the mix design. B | ecause of this cement reduction, the concrete flyash was modelled to be 35% for all | | |
| | 5.1 Cast In Place | 5.1.1 Exterior Wall _ Cast In Place _ EW2 sim (No Insulation, No Finish) | - The specified wall thickness is 250mm which was rounded up to the nearest | | |
| | | _ Below Grade Wall _ 250w _ 30MPa | allowable input of 300mm in the IE. Note that concrete volume equalization by modification of the wall length was not conducted as it would alter the square foot area and finishes associated with it. - Protection board was modeled for the full height of the wall instead of the specific 0.9m due to limitations of the IE. The minimum IE input of 25.381mm was used instead of the specified 25mm. - The specified drainage mat is a high density polyethylene (HDPE) panel which is not a material in the IE database. A 6mil polyethylene vapour barrier was used as a surrogate due to the similar material properties. - The specified waterproofing is a torch on sheet membrane composed of a polyester reinforced SBS. A standard 2-ply SBS membrane was used as a surrogate due to similar material properties. | | |
| | | 5.1.2 Exterior Wall _ Cast In Place _ EW3 _ Below Grade Wall _ 250w _ 30MPa | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. The specified wall thickness is 250mm which was rounded up to the nearest allowable input of 300mm in the IE. Note that concrete volume equalization by modification of the wall length was not conducted as it would alter the square foot area and finishes associated with it. Protection board was modeled for the full height of the wall instead of the specific O.9m due to limitations of the IE. The minimum IE input of 25.381mm was used instead of the specified 25mm. The specified drainage mat is a high density polyethylene (HDPE) panel which is not a material in the IE database. A 6mil polyethylene (HDPE) panel which is not a material in the IE database. A 6mil polyethylene capour barrier was used as a surrogate due to the similar material properties. | | |
| | | 5.1.3 Exterior Wall _ Cast In Place _ EW3 _ Below Grade Wall _ 300w _ 30MPa | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height Protection board was modeled for the full height of the wall instead of the specified 0.9m due to limitations of the IE. The minimum IE input of 25.381mm was used instead of the specified 25mm. The specified drainage mat is a high density polyethylene (HDPE) panel which is not a material in the IE database. A 6mi polyethylene vapour barrier was used as a surrogate due to the similar material properties. The specified waterproofing is a torch on sheet membrane composed of a polyester reinforced SBS. A standard 2-py SBS membrane was used as a surrogate due to similar material properties. | | |
| | | 5.1.4 Exterior Wall _ Cast In Place _ EW3 _ Below Grade Wall _ 600w _ 45MPa | The specified 600mm 45MPaconcrete wall was modelled using two layers of 300mm concrete wall since 300mm is the maximum allowable thickness in the IE. One layer of wall was modelled at 30MPa and the other 60Mpa to approximate the specified strength. Note that a more than average flyash % was not available for 60MPa concrete. - Protection board was modeled for the full height of the wall instead of the specified 0.9m due to limitations of the IE. The minimum IE input of 25.381mm was used instead of the specified 25mm. - The specified drainage mat is a high density polyethylene (HDPE) panel which is not a material in the IE database. A 6mil polyethylene vapour barrier was used as a surrogate due to the similar material properties. - The specified waterproofing is a torch on sheet membrane composed of a polyester reinforced 58Ds. A standard 2-py SBS membrane was used as a surrogate due to similar material properties. | | |
| | | 5.1.5 Parapet _ Cast In Place _ EW1 _ GFRC Clad Wali _ 200w _ 30MPa _ Detail 4-A660 | Reinforcement was assumed to be 15M, the lightest available choice, as concrete parapets are non structural elements. The specified cladding is a fiber reinforced concrete panel which is not a material in the IE database. Fibre cement siding was selected as a surrogate as it contains similar material properties. The specified exterior sheathing consists of a fiberglass faced water resistant gypsum board which is not a material in the IE database. Moisture resistant gypsum was selected as a surrogate as it contains similar material properties. | | |
| | | 5.1.6 Parapet _ Cast In Place _ EW1 _ GFRC Clad Wali _ 200w _ 30MPa _ Detail 5-A651 | Reinforcement was assumed to be 15M, the lightest available choice, as concrete parapets are non structural elements. The specified cladding is a fiber reinforced concrete panel which is not a material in the IE database. Fibre cement siding was selected as a surrogate as it contains similar material properties. | | |

| Assembly Group | Assembly Type | Assembly Name Specific Assumptions | | | | |
|----------------|------------------|--|--|--|--|--|
| | | | | | | |
| | 5.2 Curtain Wall | 5.2.1 Exterior Wall _ Curtain Wall _ GL1 _ Triple Glazed | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. This assembly includes triple glazed argon filled glass as the glazing component. The IE is unable to model this configuration of glazing and utilizes a standard double glazed system. | | | |
| | | 5.2.2 Exterior Wall _ Curtain Wall _ GL2 _ Double Glazed | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. This assembly includes double glazed low-a grayo filled glass as the glazing component. The IE is unable to model this configuration of glazing and utilizes a standard double glazed system. | | | |
| | 5.3 Steel Stud | 5.2.1 Exterior Wall Steel Stud. Curtainwall Head at Soffit Datail 2. | Since there are various heights of this wall assembly the total area was calculated | | | |
| | | A657 | and divided by the total length to determine the weighted average of height. - The specified assembly incorporates HSS support framing. To model this the steel studs were selected to be load bearing, heavy gauge steel studs. - The specified exterior sheathing consists of a fiberglass faced water resistant gypsum board which is not a material in the IE database. Moisture resistant gypsum was selected as a surrogate as it contains similar material properties. | | | |
| | | 5.3.2 Exterior Wall _ Steel Stud _ EW1 _ GFRC Clad Wall | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. The IE provides an option for low-E argon filled glazing however the specified product is only argon filled. Because of this standard glazing was selected for the | | | |
| | | | model. - The specified cladding is a fiber reinforced concrete panel which is not a material in the IE database. Fibre cement siding was selected as a surrogate as it contains similar material properties. - The specified exterior sheathing consists of a fiberglass faced water resistant gypsum board which is not a material in the IE database. Moisture resistant gypsum was selected as a surrogate as it contains similar material properties. | | | |
| | | 5.3.3 Exterior Wall _ Steel Stud _ EW7 _ Louvered Wall | - Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height The specified cladding is prefinished aluminum lowers which is not a material in the IE database. A commercial grade steel cladding was selected as a surrogate as it contains similar material properties The specified exterior sheating consists of a fiberglass faced water resistant gypsum board which is not a material in the IE database. Moisture resistant gypsum was selected as a surrogate as it contains similar material properties. | | | |
| | | 5.3.4 Exterior Wall _ Steel Stud _ EW8 _ EIFS | - Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height The specified assembly incorportates HSS support framing. To model this the steel studs were selected to be load bearing, heavy gauge steel studs The specified drainage track is a corrugated plastic sheet which is not a material in the IE database. A polyethylene vapor barrier was selected as a surrogate as it contains similar material properties The specified transition membrane is a spray applied rubber which is not a material in the IE database. An PEPM rubber sheet membrane was elected as a surrogate as it contains similar material properties The specified exterior sheatming consists of a fiberglass faced water resistant gypsum board which is not a material in the IE database. Moisture resistant gypsum was selected as a surrogate as it contains similar material properties. | | | |
| | | 5.3.5 Exterior Wall _ Steel Stud _ EW9 _ Aluminum Cladding | - Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height The specified cladding is prefinished aluminum panel which is not a material in the IE database. A commercial grade steel cladding was selected as a surrogate as it contains similar material properties The specified exterior sheathing consists of a fiberglass faced water resistant gypsum board which is not a material in the IE database. Moisture resistant gypsum was selected as a surrogate as it contains similar material properties. | | | |
| | | 5.3.6 Exterior Wall _ Steel Stud _ RW _ Standing Seam Zinc Roof Wall | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height - The Pre-Engineered metal roof system is more appropriate assembly for the roof wall structure however it does not allow openings to be added. Since there are a large quantity of windows in the roof wall steel studs were chosen as the base of the assembly model. The IE provides an option for low-E argon filled glazing however the specified product is only argon filled. Because of this standard glazing was selected for the model. The specified cladding is standing seam Zinc which is not a material in the IE database. A commercial steel cladding was determined to be the most suitable option as a surrogate. The specified exterior sheathing consists of a type X fiberglass faced water resistant gypsum board which is not a material in the IE database. Type X gypsum was selected as a surrogate as it contains similar material properties. A steel roof system was chosen to model the corrugated metal deck component of this assembly. An insulation thickness was not specified and so 92mm was assumed to match the specified deck depth. | | | |
| | | 5.3.7 Parapet _ Steel Stud _ EW1 _ GFRC Clad Wall _ Detail 3-A657 | The specified cladding is a fiber reinforced concrete panel which is not a material in the IE database. Fibre cement siding was selected as a surrogate as it contains similar material properties. The specified exterior sheathing consists of a fiberglass faced water resistant gypsum board which is not a material in the IE database. Moisture resistant gypsum | | | |
| | | 5.3.8 Parapet _ Steel Stud _ EW1 _ GFRC Clad Wall _ Detail 4-A655 | was sericited as a surrogate as it contains similar material properties. The specified assembly incorporates HSS support framing. To model this the steel studs were selected to be load bearing, heavy gauge steel studs. The specified cladding is a fiber reinforced concrete panel which is not a material in the IE database. Fibre cement siding was selected as a surrogate as it contains similar material properties. The specified exterior sheathing consists of a fiberglass faced water resistant gypsum bard which is not a material in the IE database. Moist curve start gypsum bard which is not a material in the IE database. | | | |

| Assembly Group | Assembly Type | Assembly Name | Specific Assumptions |
|----------------|---------------------------------|---|---|
| | | | |
| | | 5.3.9 Parapet _ Steel Stud _ EW7 _ Louvered Wall _ Detail 6-A654/3- A653/5-A659 5.3.10 Parapet _ Steel Stud _ EW9 _ Aluminum Cladding _ Detail 5- A659 sim | The specified assembly incorporates HSS support framing. To model this the steel studs were selected to be load bearing, heavy gauge steel studs. - The specified cladding is prefinished aluminum louvers which is not a material in the IE database. A commercial grade steel cladding was selected as a surrogate as it contains similar material properties. - The specified exterior sheathing consists of a fiberglass faced water resistant gypsum board which is not a material in the IE database. Moisture resistant gypsum was selected as a surrogate as it contains similar material properties. - The specified cladding is prefinished aluminum panel which is not a material in the IE database. A commercial grade steel cladding was selected as a surrogate as it contains similar material properties. - The specified cladding is prefinished aluminum panel which is not a material in the IE database. A commercial grade steel cladding was selected as a surrogate as it contains similar material properties. - The specified exterior sheathing consists of a fiberglass faced water resistant gypsum board which is not a material in the IE database. Moisture resistant gypsum was selected as a surrogate as it contains for an uncertain gypsum hoard which is not a material in the IE database. Moisture resistant gypsum was selected as a surrogate as it contains failer grader for the specified exterior sheathing consists of a fiberglass faced water resistant gypsum board which is not a material in the IE database. Moisture resistant gypsum data shift as a surrogate as it contains failer material properties. |
| | 5.4 Cast In Place/ Curtain Wall | | nde bolotod de a banegate de la containe eininar material proportioe. |
| | | 5.4.1 Parapet _ Cast In Place/Curtain Wall _ 200w _ 30MPa _ G1 _ Detail 2-A656 | Reinforcement was assumed to be 15M, the lightest available choice, as concrete parapets are non structural elements. This assembly includes triple glazed argon filled glass as the glazing component. The Is unable to model this configuration of glazing and utilizes a standard double glazed system. The specified exterior sheathing consists of a fiberglass faced water resistant gypsum board which is not a material in the IE database. Moisture resistant gypsum was selected as a surrogate as it contains similar material properties. |
| | | 5.4.2 Parapet _ Cast In Place/Curtain Wall _ G1 _ Triple Glazed _ 200w _ 30MPa _ Detail 4-A653 | - Reinforcement was assumed to be 15M, the lightest available choice, as concrete parapets are non structural elements This assembly includes triple glazed argon filled glass as the glazing component. The Is unable to model this configuration of glazing and utilizes a standard double glazed system The specified exterior sheathing consists of a fiberglass faced water resistant gypsum board which is not a material in the IE database. Moisture resistant gypsum was selected as a surcogate as it contains similar material properties. |
| | | 5.4.3 Parapet_Cast In Place/Curtain Wall_G2_Double Glazed_ 200w_30MPa_Detail 2-A656 sim | Reinforcement was assumed to be 15M, the lightest available choice, as concrete parapets are non structural elements. This assembly includes double glazed low-E argon filled glass as the glazing component. The IE is unable to model this configuration of glazing and utilizes a standard double glazed system. The specified exterior sheathing consists of a fiberglass faced water resistant gypsum board which is not a material in the IE database. Moisture resistant gypsum |
| | | 5.4.4 Parapet _ Cast In Place/Curtain Wall _ G2 _ Double Glazed _ 200w _ 30MPa _ Detail 6-A662 | Reinforcement was assumed to be 15M, the lightest available choice, as concrete parapets are non structural elements. This assembly includes double glazed low-E argon filled glass as the glazing component. The IE is unable to model this configuration of glazing and utilizes a standard double glazed system. The specified exterior sheathing consists of a fiberglass faced water resistant gypsum board which is not a material in the IE database. Moisture resistant gypsum was selected as a surcogate as it contains similar material properties. |
| | 5.5 Cast In Place/Steel Stud | | |
| | | 5.5.1 Exterior Wall _Cast In Place/Steel Stud _ EW2 _ Below Grade Wall _ 250w _ 30MPa | Since there are various heights of this wall assembly the total area was calculated and divided by the total length to determine the weighted average of height. The specified wall thickness is 250mm which was rounded up to the nearest allowable input of 300mm in the IE. Note that concrete volume equalization by modification of the wall length was not conducted as it would alter the square foot area and finishes associated with it. The specified steel stud thickness is 41mm which is not an available input in the IE so the value was rounded to 92mm, the nearest available input dimension. Protection board was modeled for the full height of the wall instead of the specified 0.9m due to limitations of the IE. The minimum IE input of 25.381mm was used instead of the specified 25mm. The specified drainage mat is a high density polyethylene (HDPE) panel which is not a material in the IE database. A 6mil polyethylene composed of a polyester reinforced SBS. A standard 2-ply SBS membrane was used as a surrogate due to similar material properties. |
| | | 5.5.2 Exterior Wall _ Cast In Place/Steel Stud _ EW10 _ Exterior Exposed Concrete _ 250w _ 30MPa | The specified wall thickness is 250mm which was rounded up to the nearest allowable input of 300mm in the IE. Note that concrete volume equalization by modification of the wall length was not conducted as it would alter the square foot area and finishes associated with it. |
| | | 5.5.3 Exterior Wall _ Cast in Place/Steel Stud _ Concrete Upstand _ 200w _ 30MPa _ Detail 3-A657 | - Reinforcement was assumed to be 15M, the lightest available choice, as concrete parapets are non structural elements. - The specified steel stud thickness is 41mm which is not an available input in the IE so the value was rounded to 92mm, the nearest available input dimension. |
| | 5.6 Curtain Wall/Steel Stud | | This according to the trade of the state of |
| | | o.o. r rarapet _ Curtain vvaivSteel Stud _ G1 _ Inple Glazed _ Detail 5- A655/2-A662 5.6.2 Parapet _ Curtain Wall/Steel Stud _ G1 _ Triple Glazed _ Detail 6- A652 | Imis assembly includes triple glazed argon tilled glass as the glazing component. The IE is unable to model this configuration of glazing and utilizes a standard double glazed system. The specified assembly incorporates HSS support framing. To model this the steel studs were selected to be load bearing, heavy gauge steel studs. The specified exterior sheathing consists of a fiberglass faced water resistant gypsum board which is not a material in the IE database. Noisture resistant gypsum board which is not a material in the IE database. Noisture resistant gypsum board which is not a material in the IE database. Noisture resistant gypsum board subjective the glazed argon filled glass as the glazing component. The IE is unable to model this configuration of glazing and utilizes a standard double glazed system. The specified assembly incorporates HSS support framing. To model this the steel studs were selected to be load bearing, heavy gauge steel studs. |
| | | | The specified exterior sheathing consists of a fiberglass faced water resistant gypsum board which is not a material in the IE database. Moisture resistant gypsum was selected as a surrogate as it contains similar material properties. |

| Assembly Group | Assembly Type | Assembly Name | Specific Assumptions | | | | |
|-----------------------|---|--|---|--|--|--|--|
| | | | | | | | |
| 6.0 Roofs and Soffits | The predefines assembly entitled an isolated system was created an Furthermore, it was noted that the assembly. | "Modified Bitumen Membrane Roofing System" in the IE was used for the d bill of materials generated. As a result it was determined the pre defined insulation quantity is the only one which varied with the input thickness and | majority of the roofing systems. To determine the materials included in this assembly system includes SBS membrane, protection board, insulation, and sheathing. so the roof insulation thickness was used as the governing thickness for the roof | | | | |
| | The specified concrete uses Lime 6.1 Composite Metal | estone to reduce a minimum of %35 of the cement within the mix design. B | ecause of this cement reduction, the concrete flyash was modelled to be %35 for all | | | | |
| | | 6.1.1 Roof _ Composite Metal _ R1 _ Exposed Membrane Roof _ Roof Level | The specified concrete strength is 25MPa which was rounded up to 30MPa, the nearest allowable input in the IE. The specified live load is 1.4kPa which was rounded up to 2.4kPa, the nearest Number list is the UP. | | | | |
| | | 6.1.2 Roof _ Composite Metal _ R8 _ Play Area _ Level 4 | allowable input in the ite. - The measured bay size of 12.39m could not be input into the IE due to its size limitations. The maximum bay size of 12.10m was entered and the span was adjusted to maintain the same total roof area using the following equation; Span = (Roof Area / (Bay Size * Number of Bays)) / Number of Spans - The specified concrete strength is 25MPa which was rounded up to 30MPa, the nearest allowable input in the IE. - The specified roofing system includes a *Play Surface* which was omitted due to the hot back of the strength is 25MPa which was omitted due to | | | | |
| | 6.2 Concrete Suspended Slab | | the absence of an appropriate surrogate. | | | | |
| | | 6.2.1 Roof _ Concrete Suspended Slab _ R2 _ Exposed Membrane _ Level 5 | Since the roof area was irregular with no defined width the measured area was divided by the average span to determine the input width. The specified concrete strength is 25MPa which was rounded to 30MPa, the nearest allowable input in the IE. This assembly does not contain exterior sheathing however it can not be removed from the pre-defined IE roofing assembly and was therefore included in the model. | | | | |
| | | 6.2.2 Roof _ Concrete Suspended Slab _ R4 _ Crop Area _ Level 4 | Since the roof area was irregular with no defined width the measured area was divided by the average span to determine the input width. The specified concrete strength is 25MPa which was rounded to 30MPa, the nearest allowable input in the IE. This assembly does not contain protection board it can not be removed from the pre-defined IE roofing assembly and was therefore included in the model. The specified roofing system includes a "Planting Buildup" and "Leak Detection System" which were omitted due to the absence of an appropriate surrogate. | | | | |
| | | 6.2.3 Roof _ Concrete Suspended Slab _ R5 _ Pavers on Concrete _ Level 4 | Since the roof area was irregular with no defined width the measured area was divided by the average span to determine the input width. The specified concrete strength is 25MPa which was rounded to 30MPa the nearest allowable input in the IE. This assembly does not contain exterior sheathing however it can not be removed from the pre-defined IE roofing assembly and was therefore included in the model. | | | | |
| | | 6.2.4 Roof _ Concrete Suspended Slab _ R7 _ Landscape on Concrete _ Level 1 | - Since the roof area was irregular with no defined width the measured area was divided by the average span to determine the input width The specified concrete strength is 25MPa which was rounded to 30MPa, the nearest allowable input in the IE The specified drainage board is a high density polyethylene (HDPE) panel which is not a material in the IE database. A polyethylene vapour barrier was used as a surrogate due to the similar material properties The specified roofing system includes a "Planting Buildup" and "Leak Detection System" which were omitted due to the absence of an appropriate surrogate. | | | | |
| | C 2 Link Enne Wood Taxe | 6.2.5 Roof _ Concrete Suspended Slab _ R10 _ Pavers on Concrete _ Level 1 | Since the roof area was irregular with no defined width the measured area was divided by the average span to determine the input width. The specified concrete strength is 25MPa which was rounded to 30MPa the nearest allowable input in the IE. The specified drainage board is a high density polyethylene (HDPE) panel which is not a material in the IE database. A polyethylene vapour barrier was used as a surrogate due to the similar material properties. The specified roofing system includes a "Leak Detection System" which was omitted due to the absence of an appropriate surrogate. | | | | |
| 1 | 0.3 LIGHT FRAME WOOD TRUSS | 6.3.1 Roof _ Light Frame Wood Truss _ R6 _ Cross Laminated Timber | - The measured span of 22m could not be input into the IE due to its size limitations. | | | | |
| | | Panel _ Level 5 | The maximum span size of 14.64m was entered and the roof width was adjusted to maintain the same total roof area using the following formula; Roof Width = Total Area / Span. - The specified structural base of this roofing assembly is cross laminated timber (CLT) which is not in the IE database. Plywood was determined to be the closest available surrogate. - The specified live load is 0.5kPa which was rounded up to 2.4kPa, the nearest allowable input in the IE. - This assembly does not contain exterior sheathing however it can not be removed from the pre-defined IE roofing assembly and was therefore included in the model. | | | | |
| 1 | 6.4 Pre-Engineered Metal Roof Sy | stem | Cines the eccembly has no constants it upper and the data and the second state of the | | | | |
| | | io.4.1 KOOT_ Pre-Engineered Metal Roof System _ R1 _ Exposed Membrane _ Roof Level | - since the assembly has no concrete it was not modeled as a composite deck but rather a pre-engineered metal deck. Because of which, the beam and column support structure has been included in the beams and columns section under the input "2.3.2 Columns and Beams _ Steel _ Level 5 . Mechanical Room" - Since the roof area was irregular with no defined length or width, the square root of the total area was used to determine the length and width inputs. - The specified live load is 1.82kPa which was rounded up to 2.4kPa, the nearest allowable input in the IE. | | | | |
| | | 6.4.2 Roof _ Pre-Engineered Metal Roof System _ R3 _ Exposed Membrane _ Acoustic Insulation _ Level 4 | - Since the assembly has no concrete it was not modeled as a composite deck but rather a pre-engineered metal deck. Because of which, the beam and column support structure has been included in the beams and columns section under the input '2.3.1 Columns and Beams_Steel _Level 2 - 4 _ Great Hall' - Since the roof area was irregular with no defined length or width, the square root of the total area was used to determine the length and width inputs. The specified live load is 1.0kPa which was rounded up to 2.4kPa, the nearest allowable input in the IE. | | | | |

| Assembly Group | Assembly Type | Assembly Name | Specific Assumptions |
|----------------|----------------|---|--|
| | | | |
| | | 6.4.3 Roof _ Pre-Engineered Metal Roof System _ R3 _ Exposed Membrane _ Acoustic Insulation _ Level 5 | - Since the assembly has no concrete it was not modeled as a composite deck but rather a pre-engineered metal deck. Because of which, the beam and column support structure has been included in the beams and columns section under the input "2.2.7 Columns and BeamsGluiamLevel GRoot Wall" - Since the root area was inregular with no defined length or width, the square root of the total area was used to determine the length and width inputs The specified live load is 1.82kPa which was rounded up to 2.4kPa the nearest allowable input in the IE Insulation thickness was not provided so 92mm was assumed to match the depth of the deck corrugations. |
| | | 6 4.4 Roof _ Pre-Engineered Metal Roof System _ RW2 _ Standing Seam Zinc Roof Wall _ Acoustical Insulation _ Level 5 | Since the assembly has no concrete it was not modeled as a composite deck but rather a pre-engineered metal deck. Because of which, the beam and column support structure has been included in the beams and columns section under the input "2.2.7 Columns and Beams_Glulam_Level 5_Roof Wall" Since the roof area was inregular with no defined length or width, the square root of the total area was used to determine the length and width inputs. The specified leve load is 1.82kPa which was rounded up to 2.4kPa, the nearest allowable input in the IE. The specified diadding is standing seam Zinc which is not a material in the IE database. A commercial steel cladding was determined to be the most suitable surrogate. The specified frainage plane is an entangles nylon fibre mat which is not a material in the IE database. A conventional drainage plane (air barrier) was determined to be the most suitable surrogate. Insulation thickness was not provided so 92mm was assumed to match the depth of the deck corrugations. |
| | 6.5 Steel Stud | | |
| | | 6.4.5 Soffit _ Steel Stud _ ES1/ES2 _ GFRC Clad Wall Level 1 | The soffits were included with the roofing assemblies as they are horizontal envelope components. Since the soffit super structure (concrete suspended slab and composite metal deck) is included in the flooring assemblies the soffits were modeled as a steel stud wall serving as a surrogate for the galvanized steel suspension system and z-girls. Since the soffit area was irregular with no defined length or width, the square root of the total area was used to determine the length and width inputs. The specified cladding is a fiber reinforced concrete panel which is not a material in the IE database. Fibre cement siding was selected as a surrogate due to similar material properties. Spray fireproofing is not a material available in the IE database. Fire rated gypsum board was selected as a surrogate. |

Appendix C – Bill of Materials

| | | Assembly Group | | | | | | |
|---|--------------|----------------|--------------------|----------|----------------|----------------|------------|----------------|
| Construction Material | Units | Foundation | Columns & Beams | Floors | Interior Walls | Exterior Walls | Roofs | Building Total |
| #15 Organic Felt | m2 | - | - | - | - | 9,841.40 | 37,437.39 | 47,278.79 |
| 1/2" Fire-Rated Type X Gypsum Board | m2 | - | - | - | 1,191.36 | - | - | 1,191.36 |
| 1/2" Moisture Resistant Gypsum Board | m2 | - | - | - | - | 4,946.01 | 5,590.30 | 10,536.31 |
| 24 Ga. Steel Roof (Commercial) | m2 | - | - | - | - | 2,273.92 | - | 2,273.92 |
| 5/8" Fire-Rated Type X Gypsum Board | m2 | - | - | - | 36,443.51 | 1,077.12 | 5,224.77 | 42,745.40 |
| 5/8" Moisture Resistant Gypsum Board | m2 | - | - | - | 2,197.76 | - | - | 2,197.76 |
| 5/8" Regular Gypsum Board | m2 | - | - | - | 11,372.32 | 4,222.58 | - | 15,594.90 |
| 6 mil Polyethylene | m2 | 5,982.91 | - | - | 114.33 | 7,481.94 | 8,944.24 | 22,523.42 |
| Air Barrier | m2 | - | - | - | - | 4,061.01 | 714.90 | 4,775.91 |
| Aluminum | Tonnes | - | - | - | 82.19 | 82.82 | - | 165.01 |
| Ballast (aggregate stone) | kg | - | - | - | - | - | 325,458.00 | 325,458.00 |
| Batt. Fiberglass | m2 (25mm) | - | - | - | 41,470.79 | 5,686.70 | 4,876.11 | 52,033.60 |
| Batt. Rockwool | m2 (25mm) | - | - | - | 5,542.03 | 29,798.92 | 3,591.30 | 38,932.24 |
| Cold Rolled Sheet | Tonnes | - | - | - | - | - | 1.40 | 1.40 |
| Commercial(26 ga.) Steel Cladding | m2 | - | - | - | - | 7,590.21 | 1,110.78 | 8,701.00 |
| Concrete 30 MPa (flyash 35%) | m3 | 4,324.92 | - | 5,021.50 | 1,233.70 | 444.89 | 958.98 | 11,983.99 |
| Concrete 30 MPa (flyash av) | m3 | - | 730.95 | - | - | - | - | 730.95 |
| Concrete 60 MPa (flyash av) | m3 | - | - | - | 736.13 | 100.92 | - | 837.05 |
| Concrete Blocks | Blocks | - | - | - | 15,237.51 | - | - | 15,237.51 |
| Concrete Brick | m2 | - | - | - | - | - | 1,883.76 | 1,883.76 |
| EPDM membrane (black, 60 mil) | kg | - | - | - | 5,435.93 | 6,897.69 | - | 12,333.61 |
| Expanded Polystyrene | m2 (25mm) | - | - | - | - | 1,666.12 | - | 1,666.12 |
| Extruded Polystyrene | m2 (25mm) | 5,865.59 | - | - | - | 4,781.16 | 7,614.52 | 18,261.27 |
| Fiber Cement | m2 | - | - | - | - | 2,395.62 | 2,334.69 | 4,730.31 |
| Foil Facer | m2 | - | - | - | - | 762.32 | - | 762.32 |
| Galvanized Decking | Tonnes | - | - | 23.58 | - | - | 3.67 | 27.24 |

| | | Assembly Group | | | | | | |
|--|--------------|----------------|-----------|--------|---------------------|----------------|------------|----------------|
| Construction Material | Units | Foundation | Columns & | Floors | , Interior Walls | Exterior Walls | Boofs | Building Total |
| | Units | roundation | Beams | 10013 | | | Roois | bunung rotar |
| Galvanized Sheet | Tonnes | - | - | - | 17.40 | 3.56 | 19.85 | 40.81 |
| Galvanized Studs | Tonnes | - | - | - | 58.73 | 23.38 | 6.64 | 88.75 |
| Glass Facer | m2 | - | - | - | - | - | 10,672.39 | 10,672.39 |
| Glazing Panel | Tonnes | - | - | - | 38.19 | 171.58 | - | 209.77 |
| GluLam Sections | m3 | - | 32.28 | - | - | - | - | 32.28 |
| Hollow Structural Steel | Tonnes | - | 0.85 | - | - | - | - | 0.85 |
| Joint Compound | Tonnes | - | - | - | 51.10 | 10.23 | 5.21 | 66.54 |
| Modified Bitumen membrane | kg | - | - | - | - | 53,744.60 | 158,469.76 | 212,214.36 |
| Mortar | m3 | - | - | - | 290.80 | - | 34.98 | 325.78 |
| Nails | Tonnes | 0.35 | - | - | 6.42 | 3.51 | 3.20 | 13.49 |
| Paper Tape | Tonnes | - | - | - | 0.59 | 0.12 | 0.06 | 0.76 |
| Polyethylene Filter Fabric | Tonnes | - | - | - | - | - | 0.21 | 0.21 |
| Polyiso Foam Board (unfaced) | m2 (25mm) | - | - | - | - | 13,213.12 | 40,071.55 | 53,284.67 |
| Rebar, Rod, Light Sections | Tonnes | 8.61 | 345.48 | 286.49 | 90.71 | 14.37 | 53.21 | 798.86 |
| Roofing Asphalt | kg | - | - | - | - | - | 47,012.08 | 47,012.08 |
| Screws Nuts & Bolts | Tonnes | - | 1.26 | 1.47 | 2.48 | 2.48 | 1.09 | 8.78 |
| Small Dimension Softwood Lumber, kiln- dried | m3 | - | - | - | 18.50 | - | 53.62 | 72.13 |
| Softwood Plywood | m2 (9mm) | - | - | - | 378.12 | - | 3,187.85 | 3,565.97 |
| Solvent Based Alkyd Paint | L | - | - | - | 82.83 | 705.80 | 525.30 | 1,313.93 |
| Standard Glazing | m2 | - | - | - | 5,389.49 | 2,801.07 | - | 8,190.55 |
| Stucco over metal mesh | m2 | - | - | - | | 713.91 | - | 713.91 |
| Water Based Latex Paint | L | - | - | - | 39,301.21 | 11,172.06 | 3,359.80 | 53,833.07 |
| Welded Wire Mesh / Ladder Wire | Tonnes | 5.26 | - | - | - | - | - | 5.26 |
| Wide Flange Sections | Tonnes | - | 25.43 | 114.82 | - | - | 25.39 | 165.64 |

Appendix D - Impact Category Tables

| Life Cycle Stage | Process | Acidification Potential | Foundations | Columns & Beams | Floors | Interior Walls | Exterior Walls | Roofs | Building Total |
|------------------|------------------|----------------------------|-------------|-----------------|----------|----------------|----------------|----------|----------------|
| Manufacturing | Material | moles of H+ eq | 3.35E+05 | 1.46E+05 | 4.71E+05 | 5.02E+05 | 5.93E+05 | 2.27E+05 | 2.27E+06 |
| | Transportation | moles of H+ eq | 1.95E+04 | 4.71E+03 | 2.49E+04 | 1.58E+04 | 5.62E+03 | 7.31E+03 | 7.78E+04 |
| | Total | moles of H+ eq | 3.55E+05 | 1.51E+05 | 4.96E+05 | 5.17E+05 | 5.98E+05 | 2.34E+05 | 2.35E+06 |
| Construction | Site Preparation | moles of H+ eq | | | | | | I | |
| | Material | moles of H+ eq | 1.18E+04 | 1.78E+03 | 3.03E+04 | 1.82E+04 | 4.90E+03 | 7.31E+03 | 7.43E+04 |
| | Transportation | moles of H+ eq | 1.69E+04 | 3.96E+03 | 2.27E+04 | 1.66E+04 | 1.04E+04 | 1.20E+04 | 8.26E+04 |
| | Total | moles of H+ eq | 2.87E+04 | 5.74E+03 | 5.31E+04 | 3.47E+04 | 1.53E+04 | 1.93E+04 | 1.57E+05 |
| Maintenance | Material | moles of H+ eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.41E+05 | 3.44E+05 | 6.80E+04 | 7.53E+05 |
| | Transportation | moles of H+ eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.48E+03 | 7.67E+03 | 1.95E+03 | 1.51E+04 |
| | Total | moles of H+ eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.46E+05 | 3.52E+05 | 6.99E+04 | 7.68E+05 |
| End-of-Life | Material | moles of H+ eq | 3.98E+03 | 8.68E+02 | 4.89E+03 | 2.03E+03 | 5.43E+02 | 1.04E+03 | 1.33E+04 |
| | Transportation | moles of H+ eq | 8.22E+03 | 1.69E+03 | 9.82E+03 | 5.75E+03 | 1.84E+03 | 3.42E+03 | 3.07E+04 |
| | Total | moles of H+ eq | 1.22E+04 | 2.56E+03 | 1.47E+04 | 7.78E+03 | 2.38E+03 | 4.46E+03 | 4.41E+04 |
| Operating Energy | Annual | moles of H+ eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.45E+04 |
| | Total | moles of H+ eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.72E+06 |
| | | Total | 3.96E+05 | 1.59E+05 | 5.64E+05 | 9.06E+05 | 9.68E+05 | 3.28E+05 | 7.04E+06 |

| | | | | | Assembly G | roup | | | |
|------------------|------------------|-----------------------------|-------------|-----------------|------------|----------------|----------------|----------|----------------|
| Life Cycle Stage | Process | Eutrophication Potential | Foundations | Columns & Beams | Floors | Interior Walls | Exterior Walls | Roofs | Building Total |
| Manufacturing | Material | kg N eq | 2.45E+02 | 5.56E+02 | 8.27E+02 | 4.88E+02 | 3.59E+02 | 2.67E+02 | 2.74E+03 |
| | Transportation | kg N eq | 2.13E+01 | 5.14E+00 | 2.72E+01 | 1.72E+01 | 6.13E+00 | 7.99E+00 | 8.50E+01 |
| | Total | kg N eq | 2.66E+02 | 5.61E+02 | 8.54E+02 | 5.06E+02 | 3.65E+02 | 2.75E+02 | 2.83E+03 |
| Construction | Site Preparation | kg N eq | | | | | | | |
| | Material | kg N eq | 9.09E+00 | 1.07E+00 | 3.04E+01 | 1.73E+01 | 4.67E+00 | 6.98E+00 | 6.95E+01 |
| | Transportation | kg N eq | 1.84E+01 | 4.31E+00 | 2.48E+01 | 1.80E+01 | 1.13E+01 | 1.30E+01 | 8.99E+01 |
| | Total | kg N eq | 2.75E+01 | 5.38E+00 | 5.51E+01 | 3.53E+01 | 1.60E+01 | 2.00E+01 | 1.59E+02 |
| Maintenance | Material | kg N eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 9.81E+01 | 1.94E+02 | 2.61E+01 | 3.18E+02 |
| | Transportation | kg N eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.96E+00 | 8.36E+00 | 2.12E+00 | 1.64E+01 |
| | Total | kg N eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.04E+02 | 2.02E+02 | 2.83E+01 | 3.35E+02 |
| End-of-Life | Material | kg N eq | 3.98E+00 | 8.70E-01 | 4.90E+00 | 2.03E+00 | 5.45E-01 | 1.04E+00 | 1.34E+01 |
| | Transportation | kg N eq | 7.76E+00 | 1.60E+00 | 9.28E+00 | 5.43E+00 | 1.74E+00 | 3.23E+00 | 2.90E+01 |
| | Total | kg N eq | 1.17E+01 | 2.47E+00 | 1.42E+01 | 7.47E+00 | 2.28E+00 | 4.28E+00 | 4.24E+01 |
| Operating Energy | Annual | kg N eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 9.62E+00 |
| | Total | kg N eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.81E+02 |
| | | Total | 3.05E+02 | 5.69E+02 | 9.24E+02 | 6.53E+02 | 5.86E+02 | 3.27E+02 | 3.84E+03 |

| | | | Assembly Group | | | | | | |
|------------------|------------------|----------------------------|----------------|-----------------|----------|----------------|----------------|----------|----------------|
| Life Cycle Stage | Process | Fossil Fuel Consumption | Foundations | Columns & Beams | Floors | Interior Walls | Exterior Walls | Roofs | Building Total |
| Manufacturing | Material | MJ | 6.45E+06 | 7.20E+06 | 1.38E+07 | 1.19E+07 | 1.08E+07 | 1.35E+07 | 6.36E+07 |
| | Transportation | MJ | 8.84E+05 | 1.97E+05 | 1.12E+06 | 7.04E+05 | 2.52E+05 | 3.31E+05 | 3.49E+06 |
| | Total | MJ | 7.33E+06 | 7.40E+06 | 1.49E+07 | 1.26E+07 | 1.10E+07 | 1.38E+07 | 6.71E+07 |
| Construction | Site Preparation | MJ | | | | | | | |
| | Material | MJ | 3.42E+05 | 2.22E+05 | 1.05E+06 | 4.75E+05 | 1.28E+05 | 2.23E+05 | 2.44E+06 |
| | Transportation | MJ | 7.17E+05 | 1.71E+05 | 9.82E+05 | 7.12E+05 | 4.51E+05 | 5.16E+05 | 3.55E+06 |
| | Total | MJ | 1.06E+06 | 3.94E+05 | 2.03E+06 | 1.19E+06 | 5.79E+05 | 7.39E+05 | 5.99E+06 |
| Maintenance | Material | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.20E+06 | 8.13E+06 | 6.44E+06 | 1.98E+07 |
| | Transportation | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.32E+05 | 3.36E+05 | 8.38E+04 | 6.53E+05 |
| | Total | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.44E+06 | 8.47E+06 | 6.52E+06 | 2.04E+07 |
| End-of-Life | Material | MJ | 1.10E+06 | 2.40E+05 | 1.35E+06 | 5.62E+05 | 1.50E+05 | 2.88E+05 | 3.69E+06 |
| | Transportation | MJ | 3.48E+05 | 7.18E+04 | 4.16E+05 | 2.44E+05 | 7.78E+04 | 1.45E+05 | 1.30E+06 |
| | Total | MJ | 1.45E+06 | 3.12E+05 | 1.77E+06 | 8.05E+05 | 2.28E+05 | 4.33E+05 | 4.99E+06 |
| Operating Energy | Annual | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.15E+06 |
| | Total | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.58E+08 |
| | · | Total | 9.84E+06 | 8.10E+06 | 1.87E+07 | 2.01E+07 | 2.03E+07 | 2.15E+07 | 2.56E+08 |

| | | | | Assembly Group | | | | | | |
|------------------|------------------|-----------------------------|-------------|-----------------|----------|----------------|----------------|----------|----------------|--|
| Life Cycle Stage | Process | Global Warming Potential | Foundations | Columns & Beams | Floors | Interior Walls | Exterior Walls | Roofs | Building Total | |
| Manufacturing | Material | kg CO2 eq | 9.91E+05 | 4.30E+05 | 1.41E+06 | 1.20E+06 | 1.01E+06 | 6.78E+05 | 5.72E+06 | |
| | Transportation | kg CO2 eq | 3.88E+04 | 1.30E+04 | 5.22E+04 | 3.74E+04 | 1.33E+04 | 1.68E+04 | 1.71E+05 | |
| | Total | kg CO2 eq | 1.03E+06 | 4.43E+05 | 1.46E+06 | 1.24E+06 | 1.02E+06 | 6.95E+05 | 5.89E+06 | |
| Construction | Site Preparation | kg CO2 eq | | | | | | | | |
| | Material | kg CO2 eq | 2.31E+04 | 1.63E+04 | 7.09E+04 | 3.45E+04 | 9.29E+03 | 1.62E+04 | 1.70E+05 | |
| | Transportation | kg CO2 eq | 5.48E+04 | 1.16E+04 | 6.72E+04 | 5.01E+04 | 3.04E+04 | 3.58E+04 | 2.50E+05 | |
| | Total | kg CO2 eq | 7.79E+04 | 2.79E+04 | 1.38E+05 | 8.46E+04 | 3.97E+04 | 5.20E+04 | 4.20E+05 | |
| Maintenance | Material | kg CO2 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.36E+05 | 5.98E+05 | 1.40E+05 | 1.17E+06 | |
| | Transportation | kg CO2 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.72E+04 | 2.05E+04 | 5.96E+03 | 4.37E+04 | |
| | Total | kg CO2 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.53E+05 | 6.19E+05 | 1.46E+05 | 1.22E+06 | |
| End-of-Life | Material | kg CO2 eq | 7.39E+04 | 1.61E+04 | 9.09E+04 | 3.77E+04 | 1.01E+04 | 1.94E+04 | 2.48E+05 | |
| | Transportation | kg CO2 eq | 2.68E+04 | 5.52E+03 | 3.20E+04 | 1.87E+04 | 5.99E+03 | 1.11E+04 | 1.00E+05 | |
| | Total | kg CO2 eq | 1.01E+05 | 2.17E+04 | 1.23E+05 | 5.65E+04 | 1.61E+04 | 3.05E+04 | 3.48E+05 | |
| Operating Energy | Annual | kg CO2 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.83E+05 | |
| · - | Total | kg CO2 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 9.16E+06 | |
| | | Total | 1.21E+06 | 4.92E+05 | 1.72E+06 | 1.84E+06 | 1.69E+06 | 9.23E+05 | 1.70E+07 | |

| | | | | | Assembly G | roup | | | |
|------------------|------------------|--------------|-------------|-----------------|------------|----------------|----------------|----------|----------------|
| | | Human Health | | | | | | | |
| Life Cycle Stage | Process | Respiratory | Foundations | Columns & Beams | Floors | Interior Walls | Exterior Walls | Roofs | Building Total |
| | | Effects | | | | | | | |
| Manufacturing | Material | kg PM10 eq | 4.81E+03 | 1.22E+03 | 5.89E+03 | 9.47E+03 | 1.57E+04 | 3.08E+03 | 4.02E+04 |
| | Transportation | kg PM10 eq | 2.56E+01 | 6.15E+00 | 3.27E+01 | 2.07E+01 | 7.37E+00 | 9.60E+00 | 1.02E+02 |
| | Total | kg PM10 eq | 4.84E+03 | 1.23E+03 | 5.92E+03 | 9.49E+03 | 1.57E+04 | 3.09E+03 | 4.03E+04 |
| Construction | Site Preparation | kg PM10 eq | | | | | | | |
| | Material | kg PM10 eq | 5.44E+00 | 1.12E+01 | 2.20E+01 | 1.11E+01 | 2.99E+00 | 5.25E+00 | 5.79E+01 |
| | Transportation | kg PM10 eq | 2.20E+01 | 5.16E+00 | 2.96E+01 | 2.16E+01 | 1.36E+01 | 1.56E+01 | 1.07E+02 |
| | Total | kg PM10 eq | 2.74E+01 | 1.64E+01 | 5.16E+01 | 3.26E+01 | 1.66E+01 | 2.08E+01 | 1.65E+02 |
| Maintenance | Material | kg PM10 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.85E+03 | 8.72E+03 | 1.39E+03 | 1.90E+04 |
| | Transportation | kg PM10 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.12E+00 | 1.00E+01 | 2.54E+00 | 1.97E+01 |
| | Total | kg PM10 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.86E+03 | 8.73E+03 | 1.40E+03 | 1.90E+04 |
| End-of-Life | Material | kg PM10 eq | 5.33E+01 | 1.16E+01 | 6.55E+01 | 2.72E+01 | 7.28E+00 | 1.40E+01 | 1.79E+02 |
| | Transportation | kg PM10 eq | 1.07E+01 | 2.20E+00 | 1.28E+01 | 7.47E+00 | 2.39E+00 | 4.44E+00 | 3.99E+01 |
| | Total | kg PM10 eq | 6.39E+01 | 1.38E+01 | 7.82E+01 | 3.47E+01 | 9.66E+00 | 1.84E+01 | 2.19E+02 |
| Operating Energy | Annual | kg PM10 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.60E+02 |
| | Total | kg PM10 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.30E+04 |
| | | Total | 4.93E+03 | 1.26E+03 | 6.05E+03 | 1.84E+04 | 2.45E+04 | 4.53E+03 | 7.26E+04 |

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|------------------|------------------|------------------------------|-------------|-----------------|----------|----------------|----------------|----------|----------------|
| Life Cycle Stage | Process | Ozone Depletion Potential | Foundations | Columns & Beams | Floors | Interior Walls | Exterior Walls | Roofs | Building Total |
| Manufacturing | Material | kg CFC-11 eq | 5.78E-03 | 1.25E-03 | 6.71E-03 | 5.18E-03 | 8.49E-03 | 6.10E-03 | 3.35E-02 |
| | Transportation | kg CFC-11 eq | 1.61E-06 | 5.25E-07 | 2.15E-06 | 1.53E-06 | 5.42E-07 | 6.87E-07 | 7.04E-06 |
| | Total | kg CFC-11 eq | 5.78E-03 | 1.25E-03 | 6.71E-03 | 5.18E-03 | 8.49E-03 | 6.10E-03 | 3.35E-02 |
| Construction | Site Preparation | kg CFC-11 eq | | | | | | | 1 |
| | Material | kg CFC-11 eq | 0.00E+00 | 6.37E-07 | 2.42E-07 | 1.26E-09 | 1.15E-09 | 4.37E-08 | 9.24E-07 |
| | Transportation | kg CFC-11 eq | 2.18E-06 | 4.63E-07 | 2.68E-06 | 2.00E-06 | 1.21E-06 | 1.43E-06 | 9.97E-06 |
| | Total | kg CFC-11 eq | 2.18E-06 | 1.10E-06 | 2.93E-06 | 2.00E-06 | 1.22E-06 | 1.47E-06 | 1.09E-05 |
| Maintenance | Material | kg CFC-11 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.02E-03 | 5.93E-03 | 4.01E-04 | 8.35E-03 |
| | Transportation | kg CFC-11 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 6.86E-07 | 8.23E-07 | 2.38E-07 | 1.75E-06 |
| | Total | kg CFC-11 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.03E-03 | 5.93E-03 | 4.01E-04 | 8.35E-03 |
| End-of-Life | Material | kg CFC-11 eq | 3.23E-06 | 7.05E-07 | 3.97E-06 | 1.65E-06 | 4.41E-07 | 8.46E-07 | 1.08E-05 |
| | Transportation | kg CFC-11 eq | 1.07E-06 | 2.20E-07 | 1.28E-06 | 7.47E-07 | 2.39E-07 | 4.44E-07 | 3.99E-06 |
| | Total | kg CFC-11 eq | 4.30E-06 | 9.25E-07 | 5.25E-06 | 2.40E-06 | 6.80E-07 | 1.29E-06 | 1.48E-05 |
| Operating Energy | Annual | kg CFC-11 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.45E-07 |
| | Total | kg CFC-11 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.23E-06 |
| | | Total | 5.79E-03 | 1.25E-03 | 6.72E-03 | 7.21E-03 | 1.44E-02 | 6.51E-03 | 4.19E-02 |

| | | | | | Assembly G | roup | | | |
|------------------|------------------|----------------|-------------|-----------------|------------|----------------|----------------|----------|----------------|
| Life Cycle Stage | Process | Smog Potential | Foundations | Columns & Beams | Floors | Interior Walls | Exterior Walls | Roofs | Building Total |
| Manufacturing | Material | kg 03 eq | 1.20E+05 | 3.38E+04 | 1.46E+05 | 1.09E+05 | 1.17E+05 | 4.63E+04 | 5.71E+05 |
| | Transportation | kg 03 eq | 1.10E+04 | 2.57E+03 | 1.40E+04 | 8.75E+03 | 3.12E+03 | 4.08E+03 | 4.35E+04 |
| | Total | kg 03 eq | 1.31E+05 | 3.63E+04 | 1.60E+05 | 1.18E+05 | 1.20E+05 | 5.04E+04 | 6.15E+05 |
| Construction | Site Preparation | kg 03 eq | | | | | | | |
| | Material | kg 03 eq | 5.32E+03 | 2.28E+02 | 1.72E+04 | 9.86E+03 | 2.66E+03 | 3.95E+03 | 3.92E+04 |
| | Transportation | kg 03 eq | 9.00E+03 | 2.14E+03 | 1.23E+04 | 8.90E+03 | 5.63E+03 | 6.45E+03 | 4.44E+04 |
| | Total | kg 03 eq | 1.43E+04 | 2.37E+03 | 2.95E+04 | 1.88E+04 | 8.29E+03 | 1.04E+04 | 8.36E+04 |
| Maintenance | Material | kg 03 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.04E+04 | 4.51E+04 | 6.56E+03 | 9.21E+04 |
| | Transportation | kg 03 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.93E+03 | 4.19E+03 | 1.05E+03 | 8.17E+03 |
| | Total | kg 03 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.34E+04 | 4.93E+04 | 7.61E+03 | 1.00E+05 |
| End-of-Life | Material | kg 03 eq | 3.86E+02 | 8.43E+01 | 4.75E+02 | 1.97E+02 | 5.28E+01 | 1.01E+02 | 1.30E+03 |
| | Transportation | kg 03 eq | 4.37E+03 | 9.00E+02 | 5.22E+03 | 3.06E+03 | 9.76E+02 | 1.82E+03 | 1.63E+04 |
| | Total | kg 03 eq | 4.75E+03 | 9.85E+02 | 5.69E+03 | 3.25E+03 | 1.03E+03 | 1.92E+03 | 1.76E+04 |
| Operating Energy | Annual | kg 03 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.82E+02 |
| | Total | kg 03 eq | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.41E+04 |
| | | Total | 1.50E+05 | 3.97E+04 | 1.95E+05 | 1.83E+05 | 1.79E+05 | 7.03E+04 | 8.60E+05 |