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Rethinking Aged Care Construction - Consider Timber

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Introduction

Timber's sustainability credentials are attracting world-wide interest and advances in timber engineering have made timber an increasingly cost-competitive proposition.

Encouraging the construction industry to adopt innovative approaches needs information and evidence. Attention to technical design, construction costs and site processes is critical to show the value proposition of timber construction to customers and optimise its use.

This Guide aims to help those involved in the decision chain (such as cost managers, estimators, design professionals, building developers and project managers) gain a better understanding of the value that timber construction systems offer aged care projects.

The Guide is based on a research project that developed a model aged care building and a corresponding lightweight timber-framed solution, and compared it with a corresponding lightweight steel-framed solution. Both solutions were designed to optimise functional performance, constructability and cost-effectiveness and provide guidance for compliance under the National Construction Code (NCC). The Guide provides an explanatory understanding of decision-making issues when developing timber solutions.

2

What Drives Decisions When Choosing a Construction System for Aged Care Projects

A central objective of the project was to provide an understanding of the decision drivers along the customer/supply chain in the selection of construction systems for aged care projects.

Key areas of exploration included:

- Gathering information about customer needs and how construction systems affect decision making.
- Benchmarking against existing construction systems typically used in aged care projects, especially lightweight steel framing as used in brick veneer construction. The steel-framed solution for the model building is provided for comparative purposes in Appendix A.
- Understanding the nature of the overall delivery supply chain and related workflows, especially construction scheduling, productivity and prefabrication issues.
- Optimising the regulatory framework where it affects the viability of timber solutions.

3

Project Development

The research project was developed by a series of expert/stakeholder meetings, interviews, concept development sessions, design charrettes, cost planning studies, construction programming studies and detailed design studies aimed at developing the model building and a cost-effective timber solution for it.

A team of experts worked together to provide input to the development process. Core collaborators included:

- **The Timber Development Association:** A market development association for the timber industry and the project leader for this work.
- **The University of Technology Sydney**: A technology-driven university with an integrated understanding of the building industry and specific expertise in timber construction. The university co-developed the research method and mediated the strategic direction of the timber solutions in terms of detailed design, cost and site productivity issues.
- **BCIS**: A global subsidiary of the Royal Institute of Chartered Surveyors that specialises in gathering building cost data used for reporting on cost trends for a variety of building forms. BCIS provided quantity surveying and cost planning input for both the timber solution and the corresponding steel solution.
- **Engineered timber manufacturers, suppliers and industry associations** (including Tilling Timber, Hyne Timber, Meyer Timber, Nelson Pine Industries, Carter Holt Harvey Wood Products, MiTek): Their input helped ensure the practical viability, design properties and availability of appropriate timber componentry.
- **Plan Source:** A building designer with good knowledge of framed construction systems. A concept design was developed to represent a typical aged care project, including the development of the timber and steel-framed solutions for the model.

4

A Model Aged Care Building - the Basis for Comparison and Solution Development

The model aged care building (Figure 1) demonstrates a prototypical situation for modelling spatial, loading, fire and noise resistance conditions, providing a neutral base for creating both the timber and competing steel solutions. The full design drawings are in Appendix B. The model's basic spatial characteristics are provided in Table 1.

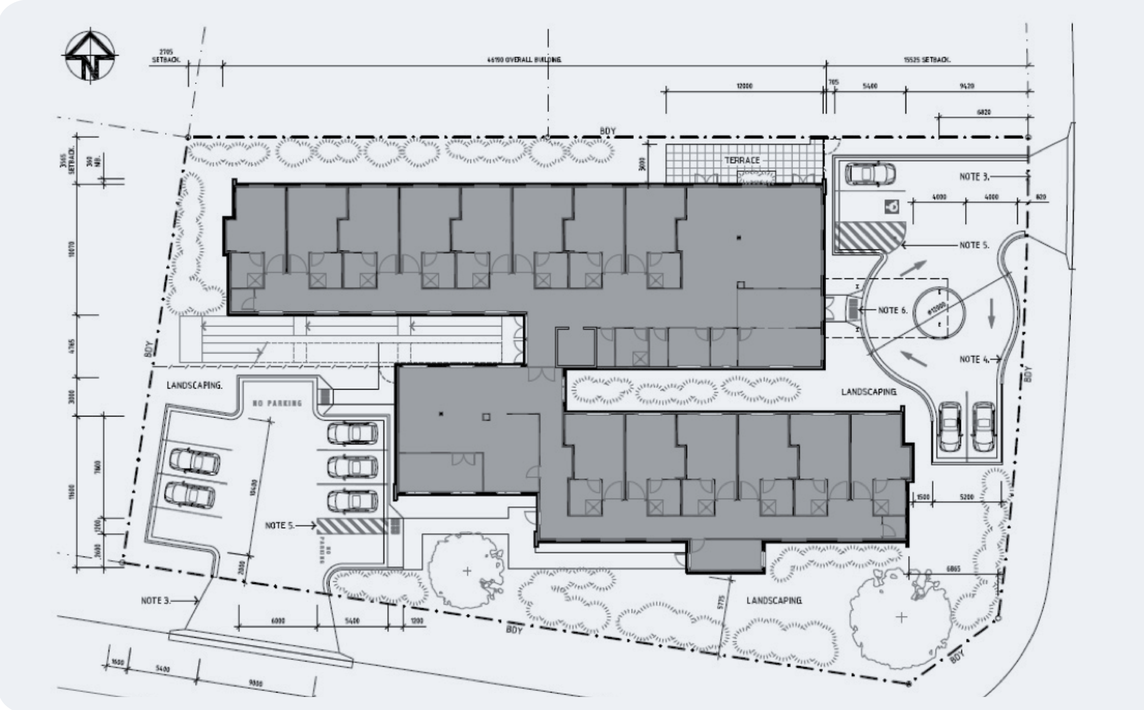


Figure 1: Site plan of two-storey aged care building.

Item	What was used in the model	Relevance and reasons
Height	• Two-storey construction • 6.85 m overall height • 6.0 m to underside of eaves	• This represents a typical height for buildings of this style
Area	• Gross Floor Area - 1,681 m^2 • Floor Space Ratio - 0.67:1	• The area and floor-to-space ratio aim to be indicative of common aged care building situations
Setbacks	• External wall distances are at least 3.0 m from property boundaries	• The location of the building relative to other buildings/properties affects façade fire-resistance requirements
NCC Building classification	• Class 9c building, i.e. aged care buildings	• The classification influences performance and compliance requirements

Table 1: Key spatial characteristics of the aged care building.

4.1 Core Differences between the Timber and Steel Solutions

The only difference between the timber solution and steel-framed solution concerns the wall and floor structure throughout the residential levels of the building (i.e. the levels above the ground floor slab). Parameters pertaining to fire, acoustic and building services requirements (that affect both the timber and steel solutions) are provided under dedicated headings below. Other aspects of the two competing solutions are essentially the same and provide relative neutrality for comparisons.

Discussions of the solutions that are identical have been excluded. Examples of this are the roof coverings, window and doors, services, finishes and fire penetrations.

4.2 Structural Themes

Parameters applied to the model:

- Deemed-to-Satisfy loading was taken from AS 1170, e.g. applied imposed wind loads.
- Wind speed: N2 (AS 4055).
- Load paths are managed in the apartment levels via load-bearing walls and beams.
- Weathered shale soil conditions have been applied in the structural design.

Reasons:

- The selected wind speed reflects typical conditions the model building would likely face in real-world conditions.
- The selected foundation is common in large parts of the greater Sydney basin and other parts of Australia where these buildings would often be found.

4.3 Building Acoustics

Parameters applied to the model:

Class 9c Residential Care Buildings have different acoustic requirements than for residential buildings that are classified as Class 2 or 3, i.e. apartments and hotels. In general, the acoustic rating is lower, and there is no ctr adjustment factor, except for the covering of services.

- Walls between bed-sitters, between bed-sitters and neighbouring bathrooms, and between bed-sitters and kitchen, laundry and plant or utility rooms are required to have an Rw of not less than 45, as per NCC Clause F5.5.
- Floors between bed-sitters must have an Rw of not less than 45.
- Ducts, soil, waste, water supply pipes or stormwater, including a duct or pipe that is located in a wall or floor cavity, must be separated from any sole-occupancy unit by construction with an Rw + Ctr (airborne) not less than –
  - Adjacent room is a habitable room (other than a kitchen) - 40
  - Adjacent room is a kitchen or non-habitable room - 25

4.4 Fire Resistance (based on NCC Requirements)

Parameters applied to the model:

- Type C construction was used, as allowed by the BCA Provision C1.5 for a building with a Rise of Storey of two if it has sprinkler (BCA Specification E1.5 only) throughout and the maximum compartment size is no larger than 3,000 m2 or 18,000 m3. Therefore, the building's Deemed-to-Satisfy (DTS) fire resistance requirements are:
  - external walls: no fire resistance requirements as they are more than 3.0 m from the boundary unless supporting the fire-rated floor where they will be required to be 60/60/60
  - external columns: not applicable
  - common or firewall: not applicable
  - internal wall: no fire resistance required unless supporting the fire-rated floor and must have fire-resistance of 60/60/60
  - floor: BCA's Provision C2.5 (b) (ii) requires all floors to be 60/60/60
  - beams and columns: no fire resistance required unless supporting the fire-rated floor and must have fire-resistance of 60/60/60
  - roof: no fire resistance required.
- Additional NSW-based requirements:
  - sprinklers are installed
  - internal walls to be covered in 13 mm standard grade plasterboard, unless required to be fire-rated
  - where insulation is used, the insulation must be non-combustible
  - internal walls must be smoke-sealed at any construction joint, space between the top of the wall and the floor, ceiling or roof.

Reasons:

- The building is assumed to be in NSW, and therefore the NCC BCA's variation for NSW applies.
- The building is two storeys in height, has a sprinkler and meets the NCC BCA's Provision Clause C1.5 that allows 9c buildings to be defined as Type C fire-resistant construction.
- Type C construction has fire resistance requirements for:
  - floor – 60/60/60
  - walls that support the floor – 60/60/60
  - beam and columns that support the floor – 60/60/60
  - walls surround the lift – 60/60/60.
- Type C construction does not have any fire resistance requirements for:
  - external walls (except loadbearing) or columns (as they are more than 3.0 m from a fire source)
  - internal non-loadbearing walls bounding corridors, between bed-sitters and stairs
  - stairs (not required to be 'fire isolated' under NCC BCA's Clause D1.3)
  - roof.

5

The Timber Solution

This section presents core design information for the timber solutions.

5.1 Internal and External Walls

Wall systems used in the timber solution (see Table 2):

- For all walls separating bed-sitter bathroom and corridor or storeroom:
  - SY1 – ground floor
  - SY1 – first floor.
- For all walls separating bed-sitter bathroom and neighbouring bed-sitter bathrooms:
  - SY2 – ground floor
  - SY2 – first floor.
- For all walls separating bed-sitter and neighbouring bed-sitter, corridors or common rooms:
  - SY3 – ground floor
  - SY3 – first floor.
- SY4 for walls surround the lift shaft and other loadbearing walls, ground and first floor.
- SY5 for walls surrounding the office, kitchen, store and public toilet, and not abutting a bed-sitter, ground and first floor.
- SY6 for smoke-proof, ground and first floor.
- External walls system:
  - external wall – ground floor – brick veneer
  - external wall – first floor – lightweight timber cladding.

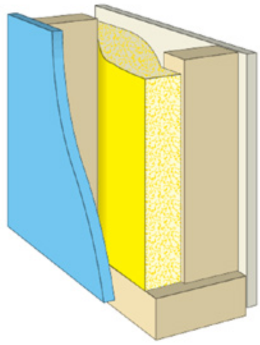
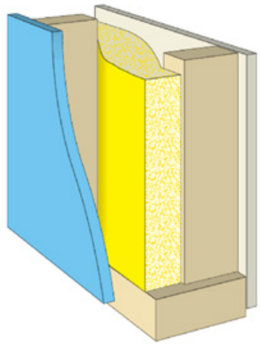
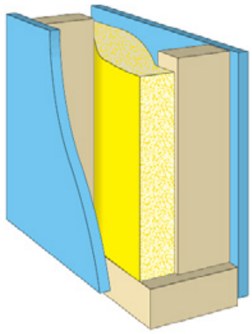
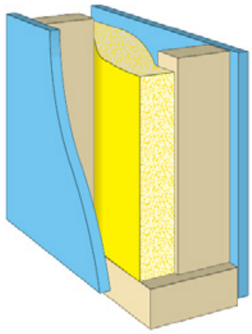
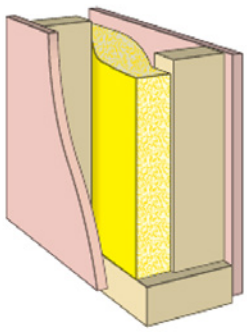
Wall Type	Diagram of Wall System	Description		Acoustic Rw	Fire rating
		Structural	**Linings & Insulation**		
SY1 – Ground Floor		Staggered stud walls consisting of 90 x 35 mm top and bottom plates and 70 x 45 mm studs at 300 mm centres.	11 x 13 mm moisture resistant grade plasterboard bathroom side and 1 x 13 mm impact-grade plasterboard for the first 1,200 mm from floor level with 13 mm standard grade plasterboard above this height, and 75 mm non-combustible glass wool batts.	46 CSR 2226	Nil
SY1 – First Floor		Staggered stud walls consisting of 90 x 35 mm top and bottom plates and 70 x 35 mm studs at 300 mm centres	1 x 13 mm moisture resistant grade plasterboard bathroom side and 1 x 13 mm impact-grade plasterboard for the first 1,200 mm from floor level with 13 mm standard grade plasterboard above this height, and 75 mm non-combustible glass wool batts.	46 CSR 2226	Nil
SY2 – Ground Floor		Staggered stud walls consisting of 90 x 35 mm top and bottom plates and 70 x 45 mm studs at 300 mm centres	1 x 16 mm fire-protective and moisture resistant grade plasterboard, both sides, and 75 mm non-combustible glass wool batts	47 CSR 2257	60/60/60
SY2 – First Floor		Staggered stud walls consisting of 90 x 35 mm top and bottom plates and 70 x 35 mm studs at 300 mm centres	1 x 13 mm moisture resistant grade plasterboard, both sides, and 75 mm non-combustible glass wool batts	47 CSR 2227	Nil
SY3 - Ground Floor		Staggered stud walls consisting of 90 x 35 mm, top and bottom plates and 70 x 45 mm studs at 300 mm centres	1 x 16 mm fire-protective grade plasterboard, both sides, and 75 mm non-combustible glass wool batts	46 CSR 2225	60/60/60

Table 2: Wall systems.

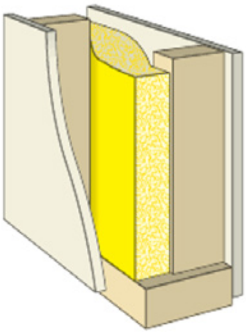
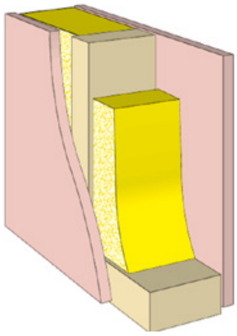
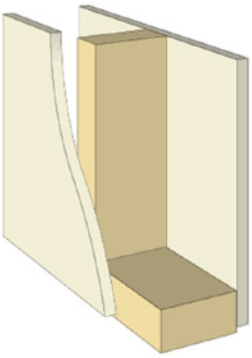
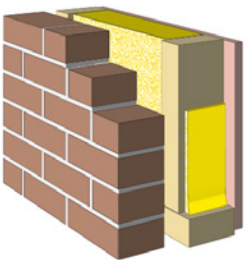
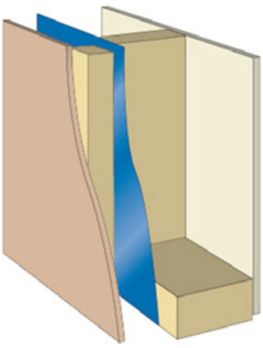
Wall Type	Diagram of Wall System	Description		Acoustic Rw	Fire rating
		Structural	**Linings & Insulation**		
SY3 - First Floor		Staggered stud walls consisting of 90 x 35 mm top and bottom plates and 70 x 35 mm studs at 300 mm centres	1 x 13 mm impact grade plasterboard for the first 1,200 mm from floor level with 13 mm standard grade plasterboard above this height, both sides, and 75 mm non-combustible glass wool batts	46 CSR 2225	Nil
SY4 Walls around the lift shaft and other loadbearing ground floor walls		Single stud walls consisting of 90 x 35 mm top and bottom plates and 90 x 35 mm studs at 600 mm centres	1 x 16 mm fire-protective grade plasterboard, both sides, and 75 mm non-combustible glass wool batts	No rating required	60/60/60 CSR 2060
SY5 and Smoke-Proof Wall – Ground and First Floor Walls		Single stud walls consisting of 90 x 35 mm top and bottom plates and 90 x 35 mm studs at 300 mm centres	1 x 13 mm impact grade plasterboard for the first 1,200 mm from floor level with 13 mm standard grade plasterboard above this height, both sides.	No rating required	No rating required
External Wall – Ground Floor		Single stud walls consisting of 90 x 35 mm top and bottom plates and 90 x 35 mm studs at 600 mm centres	Inside face: 1 x 16 mm fire-protective grade plasterboard. External face: 90 mm brick veneer, and 75 mm non-combustible glass wool batts	No rating required	60/60/60 CSR 920
External Wall – First Floor		Single stud walls consisting of 90 x 35 mm top and bottom plates and 90 x 35 mm studs at 600 mm centres	Inside face: 1 x 13 mm impact grade plasterboard for the first 1,200 mm from floor level with 13 mm standard grade plasterboard above this height. External face: lightweight timber cladding, and 75 mm non-combustible glass wool batts	No rating required	No rating required

Table 2: Wall systems (continued).

5.2 Floor Structure

Floor systems used in the timber solution (see Table 3):

- Floors
  - Internal floor general areas (excluding wet areas) – Type 1
  - Internal floor wet areas and external balcony floor – Type 2

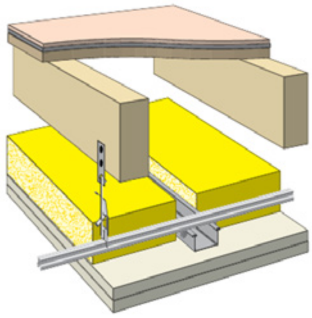
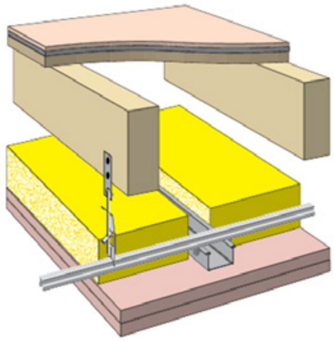
Type	Diagram of Floor System	Description	Acoustic		Fire rating
			Rw	Ln,w	
1		• 240 mm deep I-joists at 450 crs • 19 mm particleboard flooring to all interior areas • Suspension system and furring channel at 600 crs • 2 x 13 mm fire-protective plasterboard ceilings	57	NA	60/60/60 CSR 6267
2		• 240 mm deep I-joists at 450 crs • 18 mm fibre cement to all wet areas and balcony • Suspension system and furring channel at 600 crs • 2 x 13 mm fire-protective plasterboard ceilings	57	NA	60/60/60 CSR 6267

Table 3: Floors Systems used in the timber building.

5.3 Beams

Beams were used over openings in walls or rooms to break up the floor joist spans. They were incorporated into fire-rating of the ceiling and therefore required no additional fire-resistance protection.

5.4 Columns

Columns were used to support the floor beams on the ground level. These columns were placed into ground floor walls that had no fire rating and therefore required to be fire-rated to 60/60/60. Their fire resistance was provided by 45 mm effective depth of char, calculated from AS/NZS 1720.4.

[1] CSR Red Book System Number 821

5.5 Roof/Ceiling Space to Top-Most Storey

Applied to the model

- 75 mm non-combustible glass wool batts are used 1,200 mm either side of the acoustic-rated wall (Figure 2).

Reasons:

- All systems used meet NCC minimum requirements and therefore require acoustic treatment to this zone.
- Systems configuration between steel and timber are effectively the same.

Comparison to steel design:

- The system configuration is effectively the same.

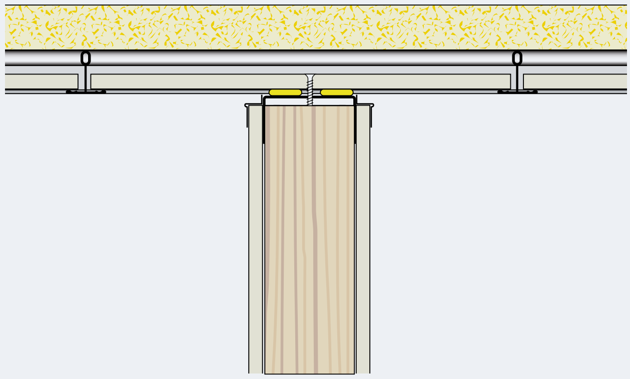


Figure 2: Sound-rated insulation above top-most ceiling.

6

Cost Plan Results – Comparing the Timber and Concrete Solutions

Cost comparison of the two competing solutions involved developing a cost plan for both the timber frame and steel frame solutions. A Bill of Quantities was developed, and the Australian Institute of Quantity Surveyors Building Cost Index was used to determine the rates to be applied.

The Building Cost Index contained rates for most items. Where no cost information was available. a price from the market was used.

6.1 Cost Plan Conclusions

Table 4 compares major items considered in the cost plan. Detailed cost information is contained in Appendix C.

Element	Timber	Steel	Variance
Columns	$1,430	$4,050	-$2,620
Upper Floor	$53,898	$85,400	-$31,502
Roof	$87,351	$87,515	-$164
Ceiling	$158,663	$158,663	0
External Walls	$271,878	$266,680	$5,198
Interior Walls	$332,454	$325,390	$7,064
	$905,674	**$927,698**	**$22,024**

Table 4: Cost comparison between each building considered.

The timber solution shows costs that are $22,024 (2.4%) lower than the steel frame solution.

Reduced costs for the timber solution were mainly in the upper floor framing, i.e. $31,502 or 37% lower than steel solution. Additional timber costs were in the wall framing, i.e. $12,291, or a 0.4% increase.

7

Conclusion

The timber solution was found to be cheaper – $22,024 (2.4%) – than the steel framing solution in the cost planning exercise.

All aspects of the model, aged care building, were the same, except for the competing framing systems used. Of note, the timber solution used stud walls, roof trusses and I-joists; the steel solution used studs, trusses and C-section joists. These elements became the basis of the cost plan, and other equivalent items that were the same cost were not considered.

The deep floor joists for the upper floor construction was the main differentiating feature between the two options, where the timber option was much less expensive than steel joists. Of less impact, timber wall frames were slightly more expensive than steel wall framing.

The Australian Institute of Quantity Surveyors, Building Cost Index was used to determine the rates for both the timber and steel frame solution. Where costs were not available, they were estimated by obtaining a market price and adding labour, delivery and other installation costs. The missing Building Cost Index data occurred for the same elements, and accordingly, the steel and timber systems were treated in the same way.

Further saving may be possible from the timber solutions as the Building Cost Index did not estimate timber systems well. Comparisons of cost from the market and the Building Cost Index varied considerably, even when labour, delivery and other install costs were considered.

Using timber for aged care building construction should be considered a viable alternative to steel frame construction, and it is recommended that market prices should be used instead of a cost index.

A

Appendix A: Comparison Design: The Steel-Framed Solution

A1 Internal and External Walls

Wall systems used in the timber solution (see Table A1):

- For all walls separating bed-sitter bathroom and corridor or storeroom:
  - SY1 – Ground and first floor
- For all walls separating bed-sitter bathroom and neighbouring bed-sitter bathrooms:
  - SY2 – Ground floor
  - SY2 – First floor
- For all walls separating bed-sitter and neighbouring bed-sitter, corridors or common rooms:
  - SY3 – Ground
  - SY3 – First floor
- SY4 for walls surround the lift shaft and other loadbearing walls – ground and first floor
- SY5 for walls surrounding the office, kitchen, store and public toilet, and not abutting a bed-sitter – ground and first floor
- SY6 for Smoke-proof – ground and first floor
- External walls system:
  - External wall – lower for fire-rated brick veneer
  - External wall – upper for lightweight timber cladding

[1] CSR system 110

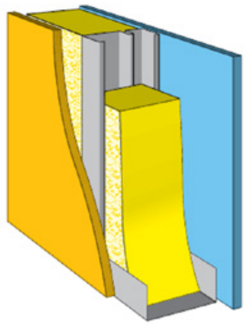
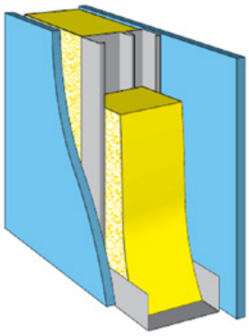
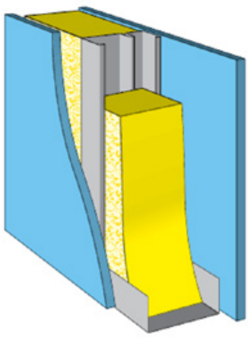
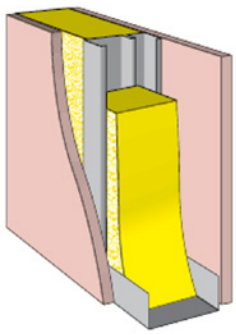
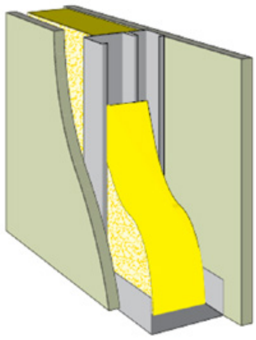
Wall Type	Diagram of Wall System	Description		Acoustic Rw	Fire rating
		Structural	Linings & Insulation		
SY1 – Ground and Floor		CSR's 92 mm Quiet Stud at 600 mm centres and track	1 x 13 mm moisture resistant grade plasterboard bathroom side and 1 x 13 mm impact grade plasterboard for the first 1,200 mm from floor level with 13 mm standard grade plasterboard above this height. 75 mm non-combustible glass wool batts.	51 CSR 1108	Nil
SY2 – Ground Floor		CSR's 92 mm Quiet Stud at 600 mm centres and track	1 x 16 mm fire-protective and moisture resistant grade plasterboard, both sides, and 75 mm non-combustible glass wool batts.	50 CSR 1127	60/60/60
SY2 – First Floor		CSR's 92 mm Quiet Stud at 600 mm centres and track	1 x 13 mm moisture resistant grade plasterboard, both sides, and 75 mm non-combustible glass wool batts.	49 CSR 1105	Nil
SY3 – Ground Floor		CSR's 92 mm Quiet Stud at 600 mm centres and track	1 x 16 mm fire-protective and moisture resistant grade plasterboard, both sides, and 75 mm non-combustible glass wool batts.	50 CSR 1133	60/60/60
SY3 – First Floor		CSR's 92 mm Quiet Stud at 600 mm centres and track	1 x 13 mm impact grade plasterboard for the first 1,200 mm from floor level with 13 mm standard grade plasterboard above this height, both sides, and 75 mm non-combustible glass wool batts.	49 CSR 1105	Nil

Table A1: Walls systems used in the timber building.

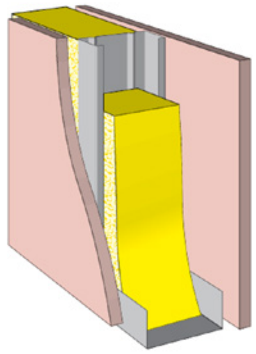
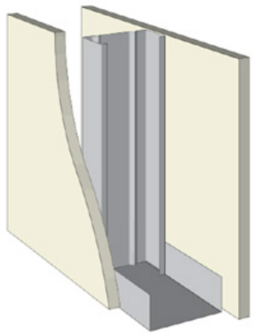
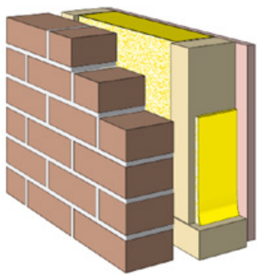
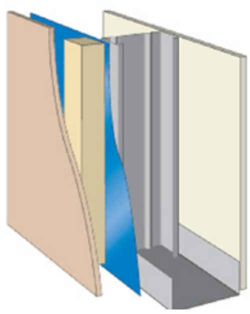
Wall Type	Diagram of Wall System	Description		Acoustic Rw	Fire rating
		Structural	Linings & Insulation		
SY4 Walls around the lift shaft and other loadbearing ground floor walls		92 mm metal stud walls 600 mm centres and track	1 x 16 mm fire-protective grade plasterboard, both sides, and 75 mm non-combustible glass wool batts	No rating required	60/60/60 CSR 2070
SY5 and Smoke-Proof Wall – Ground and First Floor Walls		92 mm metal stud walls 600 mm centres and track	1 x 13 mm impact grade plasterboard for the first 1,200 mm from floor level with 13 mm standard grade plasterboard above this height, both sides.	No rating required	No rating required
External Wall – Ground Floor		92 mm metal stud walls 600 mm centres and track	Inside face: 1 x 16 mm fire-protective grade plasterboard. External face: 90 mm brick veneer external face, and 75 mm non-combustible glass wool batts.	No rating required	60/60/60 CSR 5891
External Wall – First Floor		92 mm metal stud walls 600 mm centres and track	Inside face: 1 x 13 mm impact grade plasterboard for the first 1,200 mm from floor level with 13 mm standard grade plasterboard above this height. External face: lightweight timber cladding, and 75 mm non-combustible glass wool batts.	No rating required	No rating required

Table A1: Walls systems used in the timber building (continued).

A2 Floor Structure

Floor systems used in the timber solution (see Table A2):

- Floors
  - Internal floor general areas (excluding wet areas) – Type 1
  - Internal floor wet areas and external balcony floor – Type 2

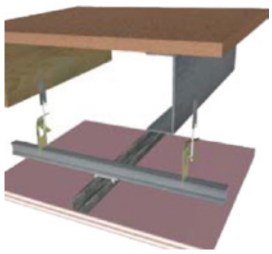
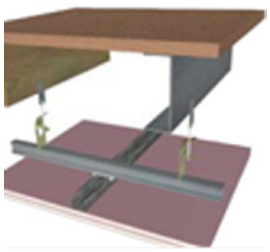
Type	Diagram of Floor System	Description	Acoustic		Fire rating
			Rw	Ln,w	
1		• 283 x 64 mm deep C-section at 450 crs • 19 mm particleboard flooring to all interior areas • Suspension system and furring channel at 600 crs • 2 x 13 mm fire-protective plasterboard ceilings	57	NA	60/60/60 CSR 6267
2		• 283 x 64 mm deep C-section at 450 crs • 18 mm fibre cement to all wet areas and balcony • Suspension system and furring channel at 600 crs • 2 x 13 mm fire-protective plasterboard ceilings	57	NA	60/60/60 CSR 6267

Table A2: Floor systems.

A3 Beams

Beams were used over openings in walls or rooms to break up the floor joist spans. They were incorporated into fire-rating of the ceiling and therefore required no additional fire-resistance protection.

A4 Columns

Columns were used to support the floor beams on the ground level. These columns are required to be fire-rated to 60/60/60 and their fire resistance was provided by 2 x 13 mm fire-protective grade plasterboard.

A5 Roof/Ceiling Space to Top-Most Storey

What was applied to the model:

- Floors
  - 75 mm non-combustible glass wool batts are used 1,200 mm either side of the acoustic rated wall, refer Figure A1.

Reasons:

- All system used meets NCC minimum requirements
- Systems configuration between steel and timber are effectively the same.

How does this compare with the timber design?

- The system configuration is effectively the same for both materials considered in the cost comparison.
- All other cost has been assumed to be the same although there maybe variations, they were too insignificant to consider.

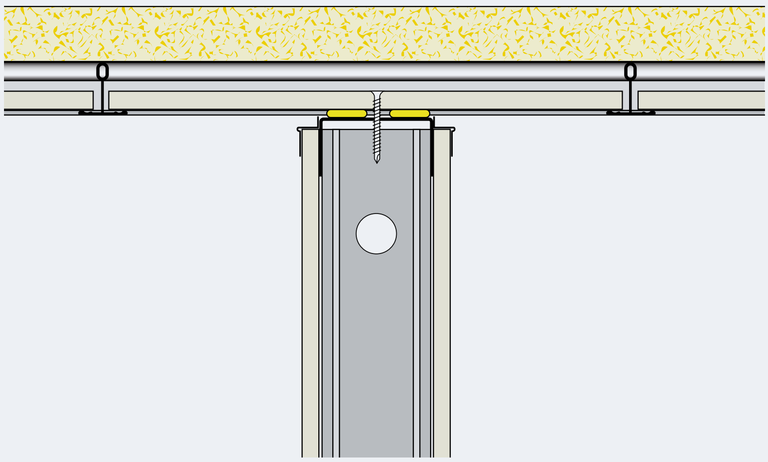
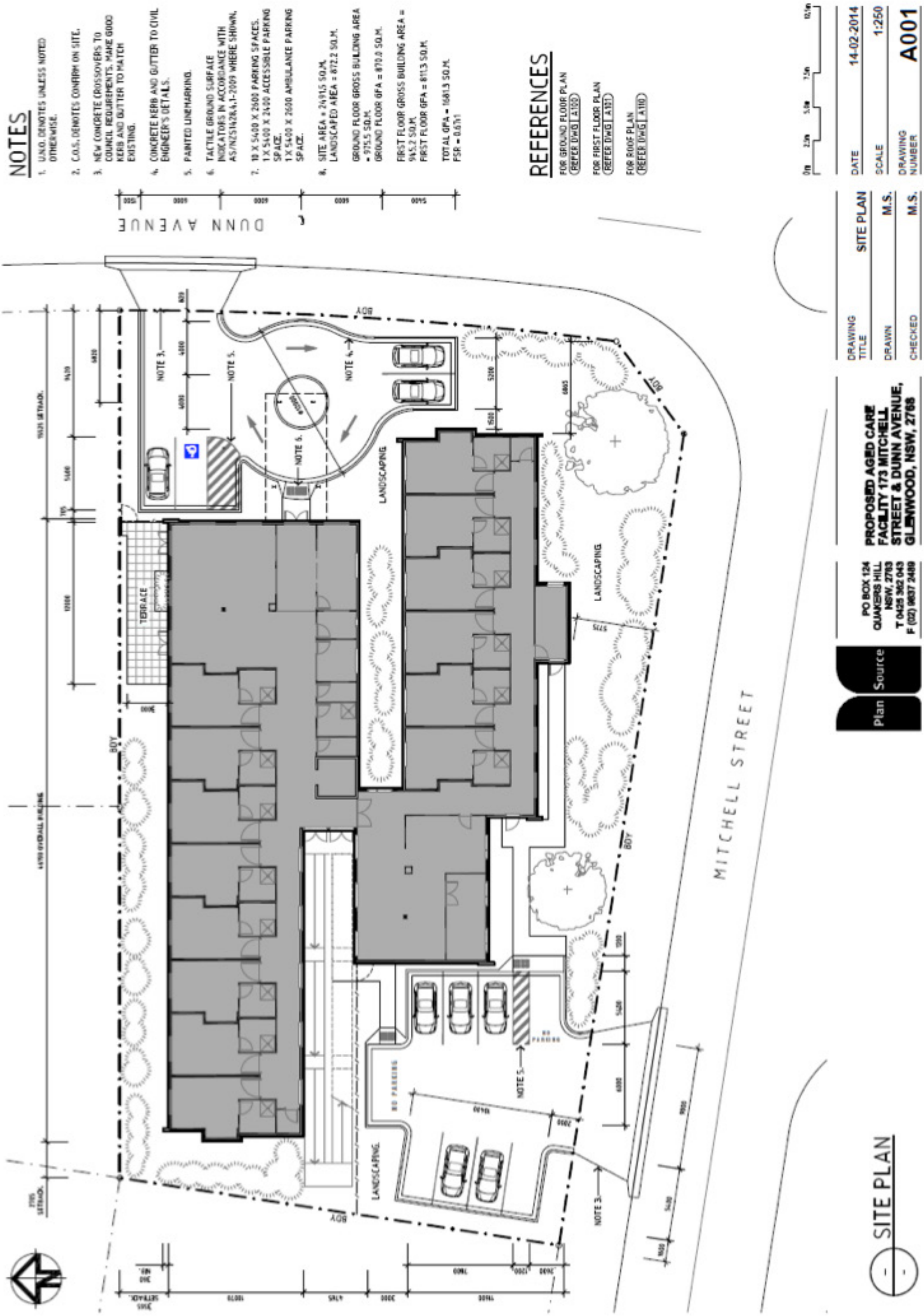
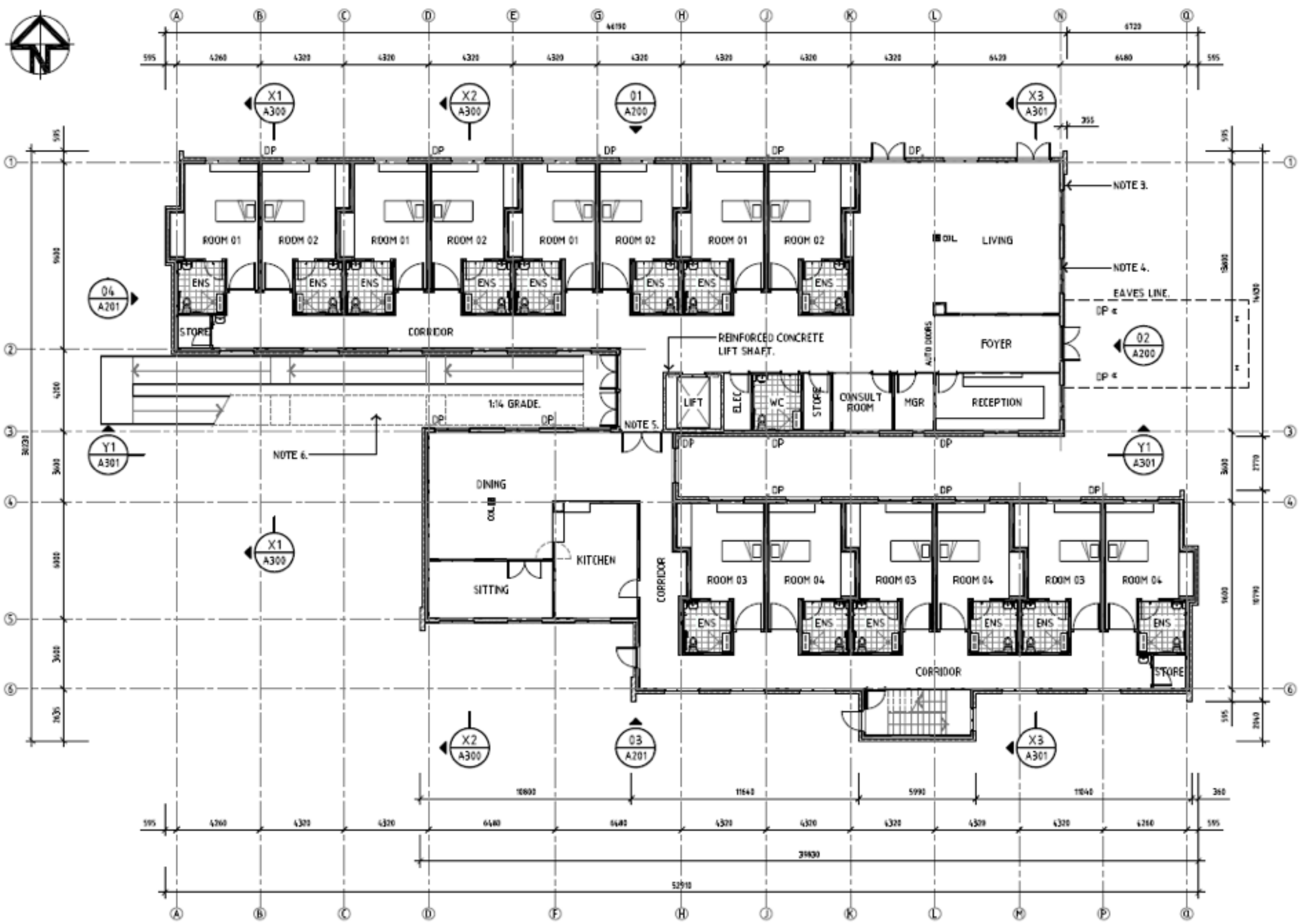


Figure A1: Sound-rated insulation above top-most ceiling.

[3] CSR system 110

Appendix B: Complete Architectural Drawings





NOTES

1. U.N.O. DENOTES UNLESS NOTED OTHERWISE.
2. C.O.S. DENOTES CONFIRM ON SITE.
3. BRICK VENEER WALL CONSTRUCTION TO GROUND FLOOR PERIMETER WALLS.
4. RYLOCK AA SERIES DOUBLE GLAZED WINDOWS & DOORS TYPICAL. BREEZEWAY LOUVRE WINDOW GALLERY INSERTS WHERE SHOWN.
5. SMOKE-PROOF WALLS AND SELF-CLOSING OR AUTOMATIC CLOSING -/60/30 FIRE DOORS IN THIS LOCATION TO BCA REQUIREMENTS.
6. REINFORCED CONCRETE ACCESS RAMP TO STRUCTURAL ENGINEERS DETAIL.

LEGEND

DP - DOWNPIPE.

REFERENCES

FOR EXTERNAL FINISHES SCHEDULE (REFER DWG | A200)

FOR EXTERNAL DOOR & WINDOW SCHEDULE (REFER DWG | A300)

DESIGN CRITERIA

A. BUILDING CLASSIFICATION: 9C AGED CARE BUILDING.

B. THE BUILDING SHALL BE CONSTRUCTED TO MEET THE REQUIREMENTS FOR TYPE C CONSTRUCTION IN ACCORDANCE WITH BCA CLAUSE E1.5 (B).

C. THE BUILDING SHALL BE PROTECTED THROUGHOUT WITH A SPRINKLER SYSTEM COMPLYING WITH BCA SPECIFICATION E1.5.

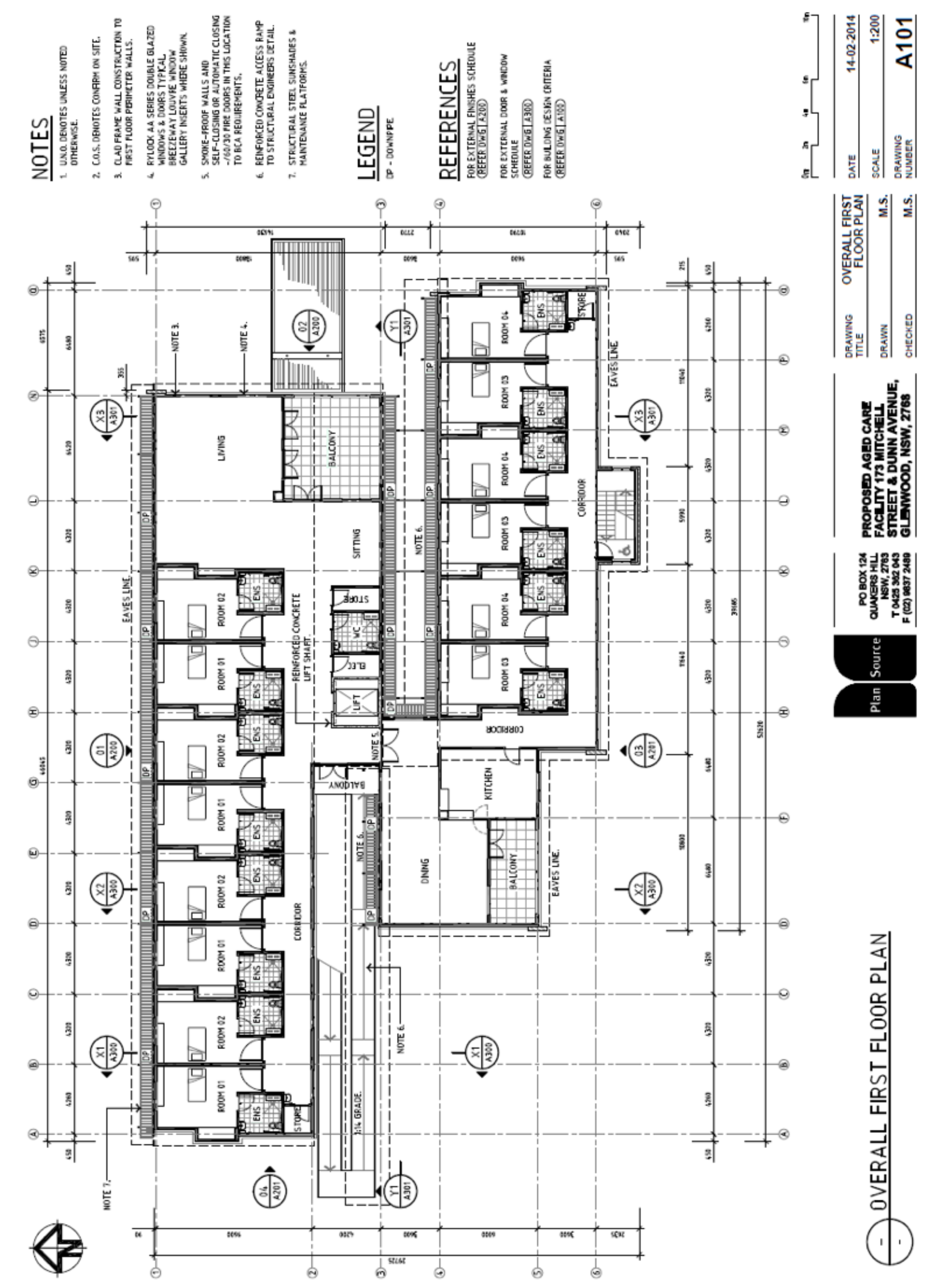
OVERALL GROUND FLOOR PLAN

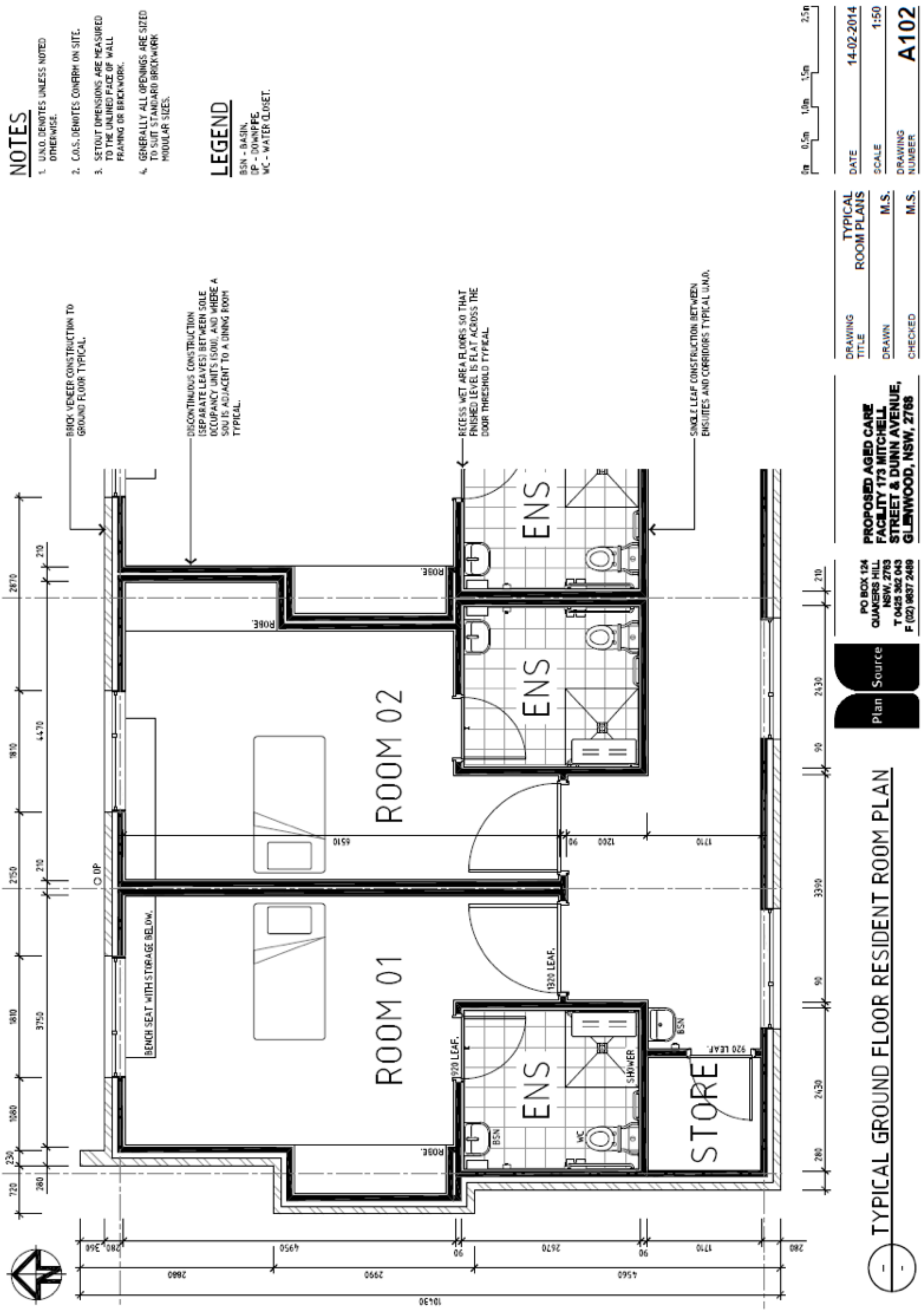
Plan Source

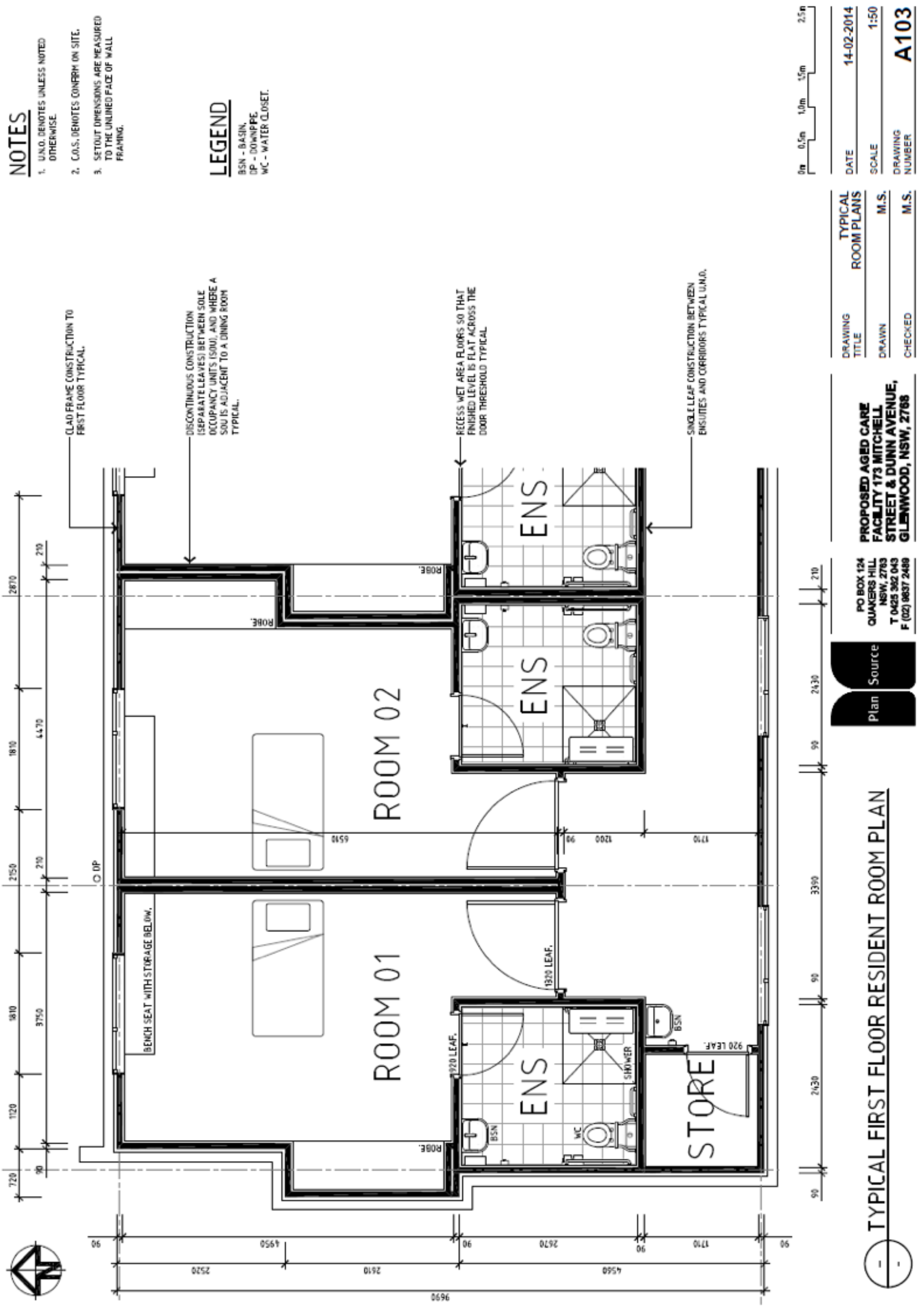
PO BOX 124
QUAKERS HILL
NSW, 2763
T 0425 362 043
F (02) 9837 2489

PROPOSED AGED CARE FACILITY 173 MITCHELL STREET & DUNN AVENUE, GLENWOOD, NSW, 2768

DRAWING TITLE	OVERALL GROUND FLOOR PLAN
DRAWN	M.S.
CHECKED	M.S.
DATE	14-02-2014
SCALE	1:200
DRAWING NUMBER	A100


NOTES
1. U.N.O. DENOTES UNLESS NOTED OTHERWISE.
2. C.O.S. DENOTES CONFIRM ON SITE.
3. CLAD FRAME WALL CONSTRUCTION TO FIRST FLOOR PERIMETER WALLS.
4. RYLOCK AA SERIES DOUBLE GLAZED WINDOWS & DOORS TYPICAL. BREEZEWAY LOUVRE WINDOW GALLERY INSERTS WHERE SHOWN.
5. SMOKE-PROOF WALLS AND SELF-CLOSING OR AUTOMATIC CLOSING -/60/30 FIRE DOORS IN THIS LOCATION TO BCA REQUIREMENTS.
6. REINFORCED CONCRETE ACCESS RAMP TO STRUCTURAL ENGINEERS DETAIL.
7. STRUCTURAL STEEL SUNSHADES & MAINTENANCE PLATFORMS.
LEGEND
DP - DOWNPIPE
REFERENCES
FOR EXTERNAL FINISHES SCHEDULE REFER DWG A200
FOR EXTERNAL DOOR & WINDOW SCHEDULE REFER DWG A300
FOR BUILDING DESIGN CRITERIA REFER DWG A100
DATE 14-02-2014
SCALE 1:200
DRAWING NUMBER A101
DRAWING TITLE OVERALL FIRST FLOOR PLAN
DRAWN M.S.
CHECKED M.S.
PROPOSED AGED CARE FACILITY 173 MITCHELL STREET & DUNN AVENUE, GLENWOOD, NSW, 2768
PO BOX 124 QUAKERS HILL NSW, 2763
T 0425 362 043
F (02) 9837 2489
Plan Source
OVERALL FIRST FLOOR PLAN
LIVING
BALCONY
SITTING
DINING
KITCHEN
CORRIDOR
ROOM 01
ROOM 02
ROOM 03
ROOM 04
ENS
STORE
WC
ELEC
LIFT
REINFORCED CONCRETE LIFT SHAFT.
EAVES LINE
1:14 GRADE.


NOTES
1. U.N.O. DENOTES UNLESS NOTED OTHERWISE.
2. C.O.S. DENOTES CONFIRM ON SITE.
3. SETOUT DIMENSIONS ARE MEASURED TO THE UNLINED FACE OF WALL FRAMING OR BRICKWORK.
4. GENERALLY ALL OPENINGS ARE SIZED TO SUIT STANDARD BRICKWORK MODULAR SIZES.
LEGEND
BSN - BASIN,
DP - DOWNPIPE,
WC - WATER CLOSET.
BRICK VENEER CONSTRUCTION TO GROUND FLOOR TYPICAL.
DISCONTINUOUS CONSTRUCTION (SEPARATE LEAVES) BETWEEN SOLE OCCUPANCY UNITS (SOU), AND WHERE A SOU IS ADJACENT TO A DINING ROOM TYPICAL.
RECESS WET AREA FLOORS SO THAT FINISHED LEVEL IS FLAT ACROSS THE DOOR THRESHOLD TYPICAL.
SINGLE LEAF CONSTRUCTION BETWEEN ENSUITES AND CORRIDORS TYPICAL U.N.O.
ROOM 02
ROOM 01
ENS
ENS
ENS
STORE
ROBE.
ROBE.
ROBE.
BENCH SEAT WITH STORAGE BELOW.
DP
1320 LEAF.
920 LEAF.
920 LEAF.
SHOWER
BSN
WC
BSN
TYPICAL GROUND FLOOR RESIDENT ROOM PLAN
Plan Source
PO BOX 124
QUAKERS HILL
NSW, 2763
T 0425 362 043
F (02) 9837 2489
PROPOSED AGED CARE FACILITY 173 MITCHELL STREET & DUNN AVENUE, GLENWOOD, NSW, 2768
DRAWING TITLE
TYPICAL ROOM PLANS
DRAWN
M.S.
CHECKED
M.S.
DATE
14-02-2014
SCALE
1:50
DRAWING NUMBER
A102
0m 0.5m 1.0m 1.5m 2.5m


NOTES
1. U.N.O. DENOTES UNLESS NOTED OTHERWISE.
2. C.O.S. DENOTES CONFIRM ON SITE.
3. SETOUT DIMENSIONS ARE MEASURED TO THE UNLINED FACE OF WALL FRAMING.
LEGEND
BSN - BASIN.
DP - DOWNPIPE.
WC - WATER CLOSET.
CLAD FRAME CONSTRUCTION TO FIRST FLOOR TYPICAL.
DISCONTINUOUS CONSTRUCTION (SEPARATE LEAVES) BETWEEN SOLE OCCUPANCY UNITS (SOU), AND WHERE A SOU IS ADJACENT TO A DINING ROOM TYPICAL.
RECESS WET AREA FLOORS SO THAT FINISHED LEVEL IS FLAT ACROSS THE DOOR THRESHOLD TYPICAL.
SINGLE LEAF CONSTRUCTION BETWEEN ENSUITES AND CORRIDORS TYPICAL U.N.O.
DP
BENCH SEAT WITH STORAGE BELOW.
ROOM 01
ROOM 02
ROBE.
ENS
BSN
WC
SHOWER
STORE
920 LEAF.
1320 LEAF.
TYPICAL FIRST FLOOR RESIDENT ROOM PLAN
Plan Source
PO BOX 124
QUAKERS HILL
NSW, 2763
T 0425 362 043
F (02) 9837 2489
PROPOSED AGED CARE FACILITY 173 MITCHELL STREET & DUNN AVENUE, GLENWOOD, NSW, 2768
DRAWING TITLE TYPICAL ROOM PLANS
DRAWN M.S.
CHECKED M.S.
DATE 14-02-2014
SCALE 1:50
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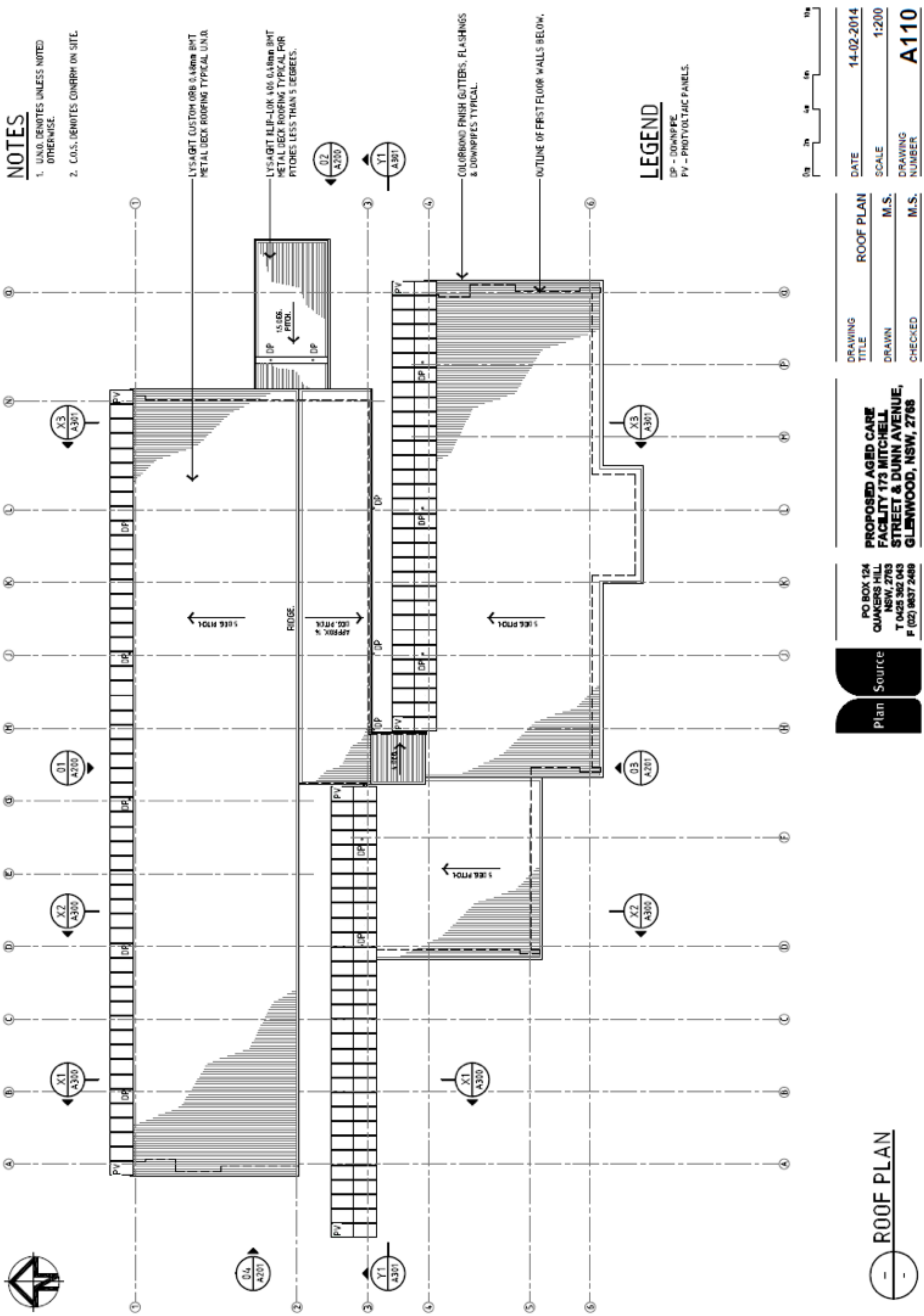
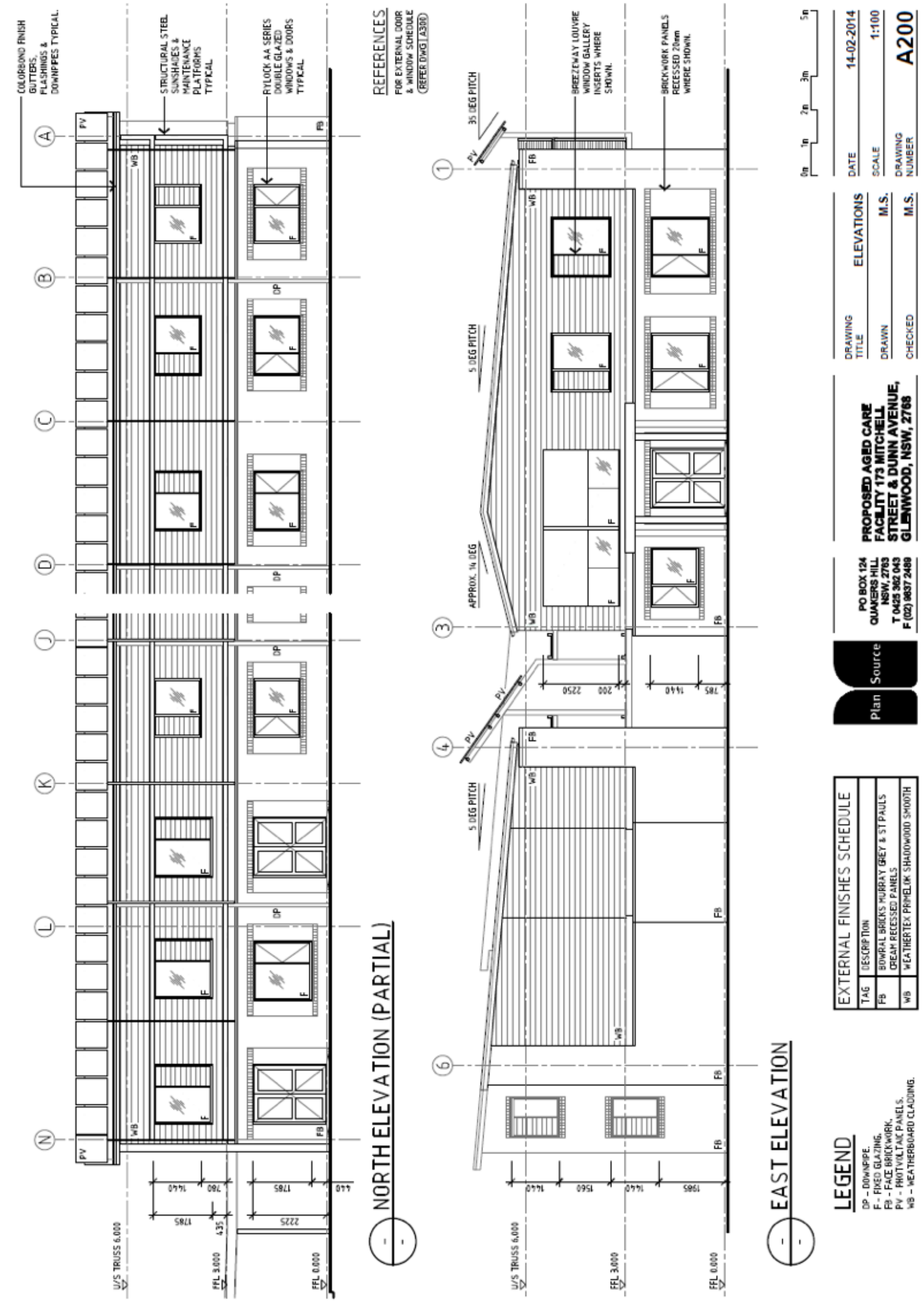
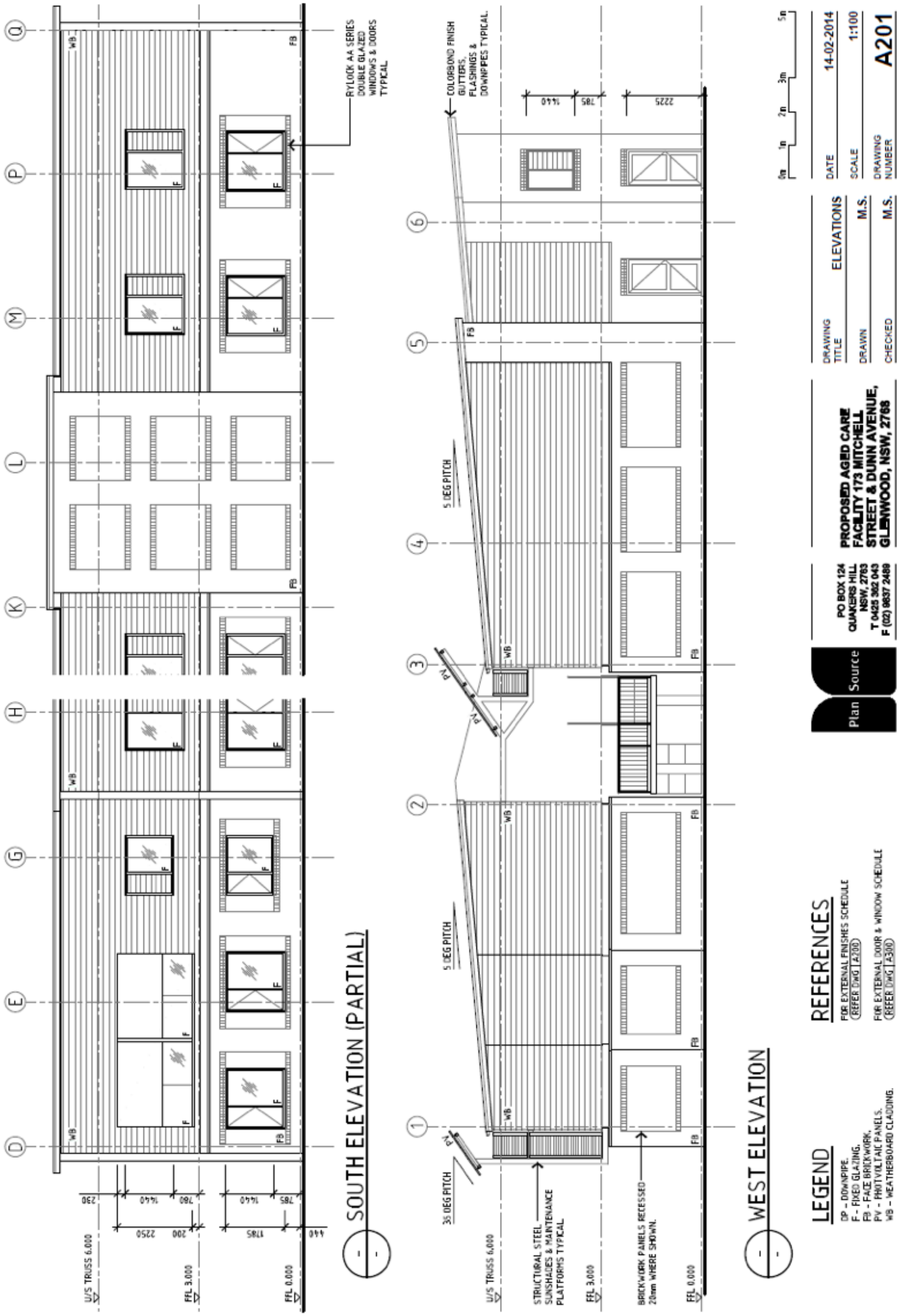
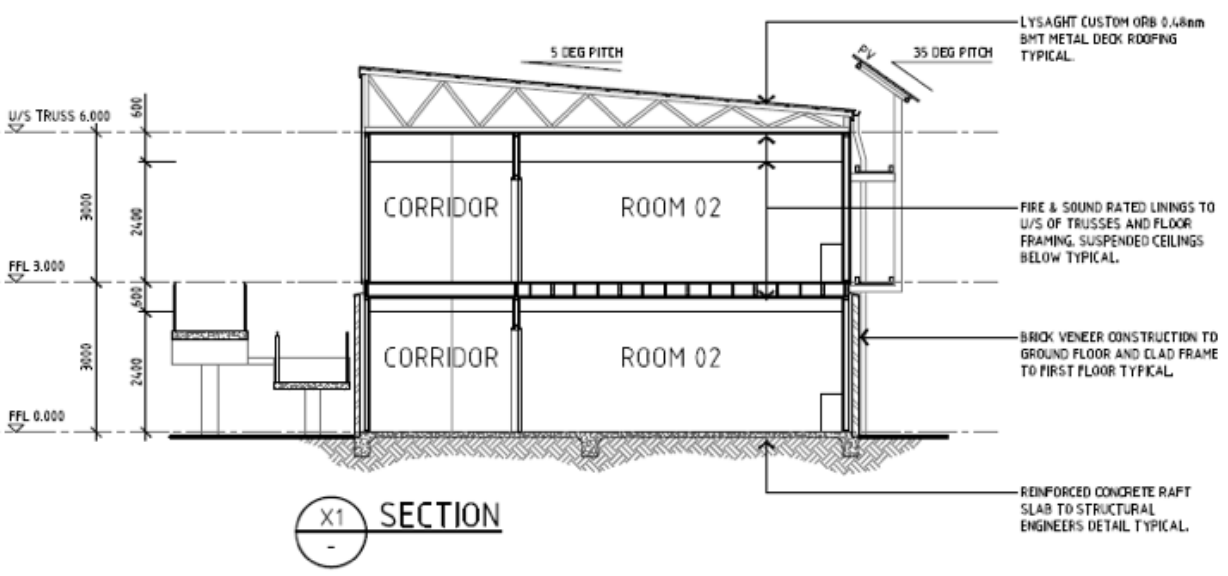

NOTES
1. U.N.O. DENOTES UNLESS NOTED OTHERWISE.
2. C.O.S. DENOTES CONFIRM ON SITE.
LYSAGHT CUSTOM ORB 0.48mm BMT METAL DECK ROOFING TYPICAL U.N.O.
LYSAGHT KLIP-LOK 406 0.48mm BMT METAL DECK ROOFING TYPICAL FOR PITCHES LESS THAN 5 DEGREES.
COLORBOND FINISH GUTTERS, FLASHINGS & DOWNPIPES TYPICAL.
OUTLINE OF FIRST FLOOR WALLS BELOW.
LEGEND
DP - DOWNPIPE
PV - PHOTVOLTAIC PANELS.
RIDGE.
5 DEG. PITCH.
1.5 DEG. PITCH.
ROOF PLAN
Plan Source
PO BOX 124 QUAKERS HILL NSW, 2763 T 0425 362 043 F (02) 9837 2489
PROPOSED AGED CARE FACILITY 173 MITCHELL STREET & DUNN AVENUE, GLENWOOD, NSW, 2768
DRAWING TITLE ROOF PLAN
DRAWN M.S.
CHECKED M.S.
DATE 14-02-2014
SCALE 1:200
DRAWING NUMBER A110


COLORBOND FINISH GUTTERS, FLASHINGS & DOWNPIPES TYPICAL.
STRUCTURAL STEEL SUNSHADES & MAINTENANCE PLATFORMS TYPICAL
RYLOCK AA SERIES DOUBLE GLAZED WINDOWS & DOORS TYPICAL
REFERENCES
FOR EXTERNAL DOOR & WINDOW SCHEDULE (REFER DWG | A300)
NORTH ELEVATION (PARTIAL)
35 DEG PITCH
5 DEG PITCH
APPROX. 14 DEG
BREEZEWAY LOUVRE WINDOW GALLERY INSERTS WHERE SHOWN.
BRICKWORK PANELS RECESSED 20mm WHERE SHOWN.
EAST ELEVATION
U/S TRUSS 6.000
FFL 3.000
FFL 0.000
LEGEND
DP - DOWNPIPE.
F - FIXED GLAZING.
FB - FACE BRICKWORK.
PV - PHOTOVOLTAIC PANELS.
WB - WEATHERBOARD CLADDING.
EXTERNAL FINISHES SCHEDULE
TAG DESCRIPTION
FB BOWRAL BRICKS MURRAY GREY & ST PAULS CREAM RECESSED PANELS
WB WEATHERTEX PRIMELOK SHADOWOOD SMOOTH
Plan Source
PO BOX 124 QUAKERS HILL NSW, 2763
T 0425 362 043
F (02) 9837 2489
PROPOSED AGED CARE FACILITY 173 MITCHELL STREET & DUNN AVENUE, GLENWOOD, NSW, 2768
DRAWING TITLE ELEVATIONS
DRAWN M.S.
CHECKED M.S.
DATE 14-02-2014
SCALE 1:100
DRAWING NUMBER A200



SOUTH ELEVATION (PARTIAL)
RYLOCK AA SERIES DOUBLE GLAZED WINDOWS & DOORS TYPICAL
U/S TRUSS 6.000
FFL 3.000
FFL 0.000
WEST ELEVATION
COLORBOND FINISH GUTTERS, FLASHINGS & DOWNPIPES TYPICAL.
5 DEG PITCH
35 DEG PITCH
STRUCTURAL STEEL SUNSHADES & MAINTENANCE PLATFORMS TYPICAL.
BRICKWORK PANELS RECESSED 20mm WHERE SHOWN.
LEGEND
DP - DOWNPIPE.
F - FIXED GLAZING.
FB - FACE BRICKWORK.
PV - PHOTOVOLTAIC PANELS.
WB - WEATHERBOARD CLADDING.
REFERENCES
FOR EXTERNAL FINISHES SCHEDULE REFER DWG A200
FOR EXTERNAL DOOR & WINDOW SCHEDULE REFER DWG A300
Plan Source
PO BOX 124
QUAKERS HILL
NSW, 2763
T 0425 352 043
F (02) 9837 2489
PROPOSED AGED CARE FACILITY 173 MITCHELL STREET & DUNN AVENUE, GLENWOOD, NSW, 2768
DRAWING TITLE ELEVATIONS
DRAWN M.S.
CHECKED M.S.
DATE 14-02-2014
SCALE 1:100
DRAWING NUMBER A201



X1 SECTION

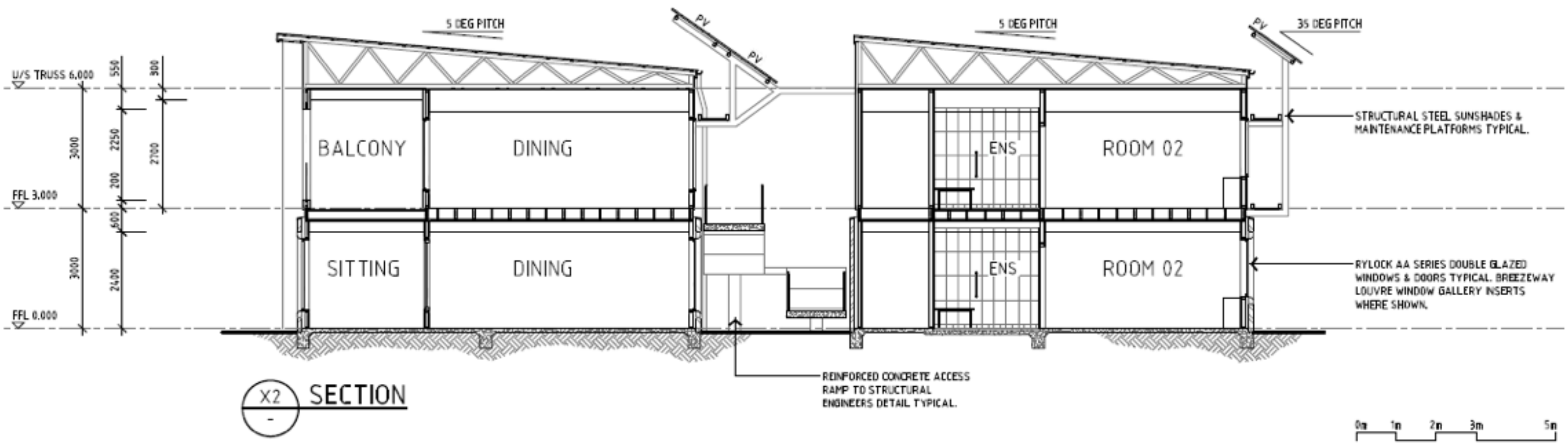
EXTERNAL DOOR & WINDOW SCHEDULE			
DESCRIPTION	QTY.	FRAME OPENING HEIGHT	FRAME OPENING WIDTH
FRENCH DOORS: LIVING, FOYER, CORRIDOR TO ACCESS RAMP, FIRST FLOOR BALCONIES	10	2240	1810
DOORS: SOUTHERN WING CORRIDOR & STAIRWELL	2	2240	1090
WINDOWS: RESIDENT ROOMS, RECEPTION, CORRIDOR OPPOSITE DINING ROOM, KITCHEN	34	1465	1810
WINDOWS: CORRIDOR, LIVING, DINING, CONSULT ROOM, SITTING ROOM, BALCONIES	41	1810	1810
MANAGER	1	1810	610
SOUTHERN WING STAIRWELL	3	1810	1210

LEGEND

DP – DOWNPIPE.
F – FIXED GLAZING.
FB – FACE BRICKWORK.
PV – PHOTVOLTAIC PANELS.
WB – WEATHERBOARD CLADDING.

REFERENCES

FOR EXTERNAL FINISHES SCHEDULE (REFER DWG | A200)



X2 SECTION

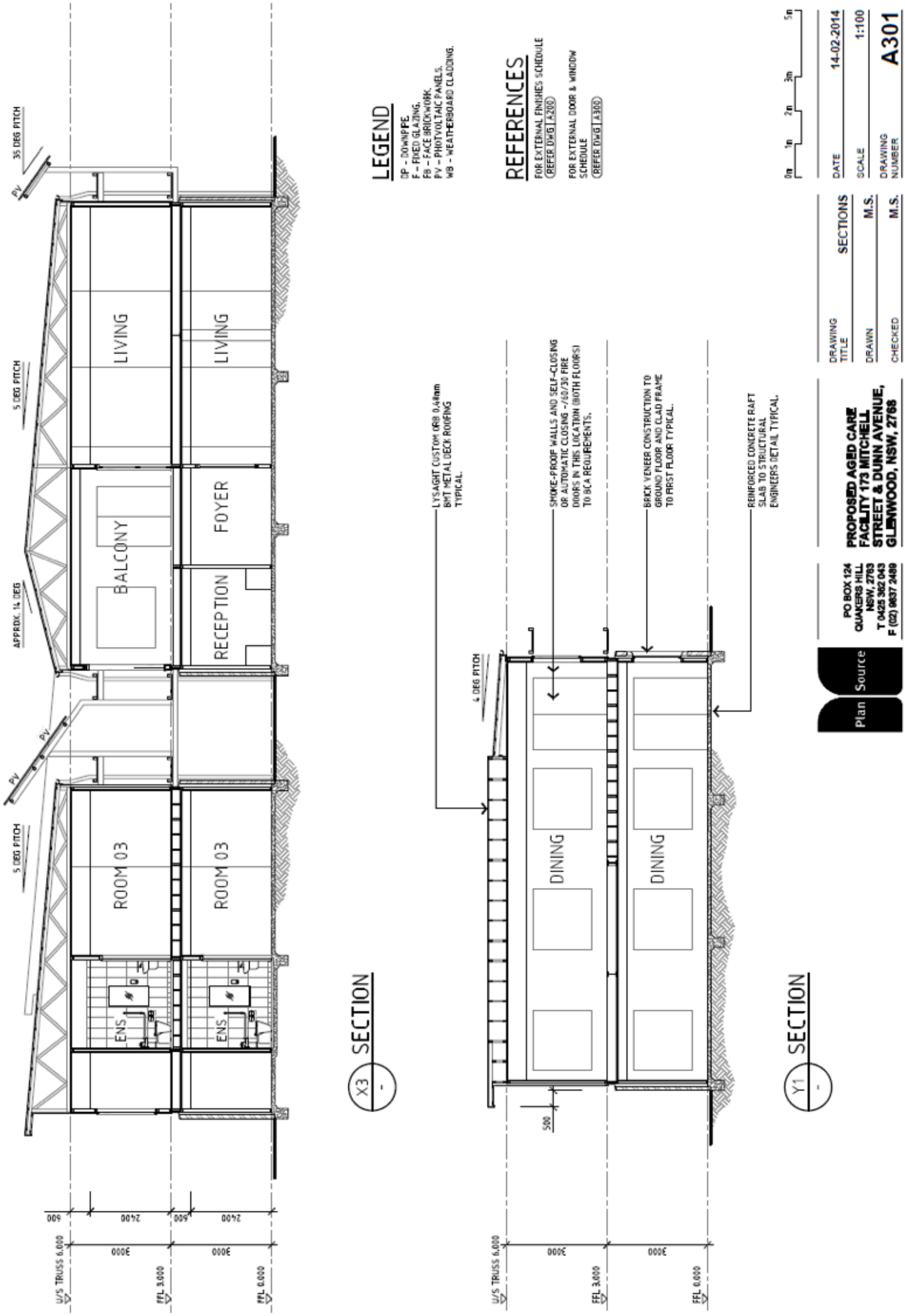
0m 1m 2m 3m 5m

Plan Source

PO BOX 124
QUAKERS HILL
NSW, 2763
T 0425 362 043
F (02) 9837 2489

PROPOSED AGED CARE FACILITY 173 MITCHELL STREET & DUNN AVENUE, GLENWOOD, NSW, 2768

DRAWING TITLE	SECTIONS	DATE	14-02-2014
DRAWN	M.S.	SCALE	1:100
CHECKED	M.S.	DRAWING NUMBER	A300


LEGEND
DP - DOWNPIPE.
F - FIXED GLAZING.
FB - FACE BRICKWORK.
PV - PHOTOVOLTAIC PANELS.
WB - WEATHERBOARD CLADDING.
REFERENCES
FOR EXTERNAL FINISHES SCHEDULE
REFER DWG A200
FOR EXTERNAL DOOR & WINDOW SCHEDULE
REFER DWG A300
LIVING
BALCONY
FOYER
RECEPTION
ROOM 03
ENS
DINING
35 DEG PITCH
5 DEG PITCH
APPROX. 14 DEG
4 DEG PITCH
PV
U/S TRUSS 6.000
FFL 3.000
FFL 0.000
3000
2400
600
500
LYSAGHT CUSTOM ORB 0.48mm BMT METAL DECK ROOFING TYPICAL.
SMOKE-PROOF WALLS AND SELF-CLOSING OR AUTOMATIC CLOSING -/60/30 FIRE DOORS IN THIS LOCATION (BOTH FLOORS) TO BCA REQUIREMENTS.
BRICK VENEER CONSTRUCTION TO GROUND FLOOR AND CLAD FRAME TO FIRST FLOOR TYPICAL.
REINFORCED CONCRETE RAFT SLAB TO STRUCTURAL ENGINEERS DETAIL TYPICAL.
X3 SECTION
Y1 SECTION
Plan Source
PO BOX 124
QUAKERS HILL
NSW, 2763
T 0425 362 043
F (02) 9837 2489
PROPOSED AGED CARE FACILITY 173 MITCHELL STREET & DUNN AVENUE, GLENWOOD, NSW, 2768
DRAWING TITLE
SECTIONS
DRAWN
M.S.
CHECKED
M.S.
DATE
14-02-2014
SCALE
1:100
DRAWING NUMBER
A301
0m
1m
2m
3m
5m

Appendix C: Detailed Cost Information

Project Name: **Aged Care Building - Timber Framed**

Client Name: Timber Development Association for Forest and Wood Products Australia

Element		$/m² GFA	Quantity	Unit	Unit Rate ($)	Cost ($)
			1,501	**m²**	**$603.38**	**$905,674**
Columns		**$1.76**				**$2,646**
1	115 x 115 LVL15 column, 3000 long	$0.95	14	No.	$102	$1,430
Upper Floors		**$35.91**				**$53,898**
1	Beam B1; 3/300 x 58 LVL 15, Ref B1, 2000 long	$0.10	1	No.	$174	$150
2	Beam B2; 2/240 x 42 LVL 15, Ref B2, 3000 long	$0.33	4	No.	$123	$492
3	Beam B3; 2/240 x 58 LVL 15, Ref B3, 3000 long	$0.62	6	No.	$156	$938
4	Beam B4; 170 x 58 LVL 15, Ref B4, 2000 long	$0.17	5	No.	$52	$262
5	Beam B5; 2/240 x 42 LVL 15, Ref B5, 3600 long	$0.20	2	No.	$148	$295
6	Beam B6; 240 x 75 LVL 15, Ref B6, 3600 long	$0.27	3	No.	$133	$398
7	Beam B7; 2/240 x 75 LVL 15, Ref B7, 4500 long	$0.38	2	No.	$287	$575
8	I-Joists 360 x 90	$7.97	352	m	$34	$11,968
9	I-Joists 200 x 44	$25.86	1,941	m	$20	$38,820
Roof		**$58.20**				**$87,351**
1	Prefabricated timber truss, 13700 long, unequal pitch 5° and 14°	$11.53	39	No.	$444	$17,308
2	Prefabricated timber truss, 9600 long, pitch 5°, 600 mm overhang at end	$12.98	45	No.	$433	$19,485
3	Prefabricated timber truss, 12100 long, pitch 5°	$5.19	18	No.	$433	$7,794
4	Prefabricated timber truss, 9600 long, pitch 5°	$11.24	39	No.	$433	$16,876
5	Prefabricated timber truss, 3000 long, pitch 4°	$1.34	7	No.	$287	$2,008
6	Timber bracing to trusses	$15.91	597	m	$40	$23,880
Ceilings		**$105.70**				**$158,663**
1	Under Roof, suspension system, 1 x 13 mm flush fixed standard plasterboard and 75 fibreglass insulation	$45.30	735	m²	$92	$67,988
2	Upper Floor: suspension system, 2 x 13 mm fire-protective flush fixed plasterboard, and 75 fibreglass insulation	$60.40	775	m²	$117	$90,675
External Wall		**$181.13**				**$271,878**
1	Lower Floor: 90 x 35 studs at 600 crs, Interior lined with 16 mm fire-protective grade plasterboard, and 75 mm insulation. Exterior cladding 110 mm common clay bricks	$115.33	18	No.	$433	$7,794
2	Upper Floor: 90 x 35 studs at 600 crs, Interior lined with 13 mm impact board and Standard grade plasterboard, and 75 mm insulation. Exterior timber cladding	$65.80	226	m	$437	$98,762

Project Name: Office Building - Timber Framed

Client Name: Timber Development Association for Forest and Wood Products Australia

Element		$/m² GFA	Quantity	Unit	Unit Rate ($)	Cost ($)
Internal Walls		**$221.49**				**$332,454**
1	Lower floor – SY1: Staggered studs 90 x 35 plates & 70 x 45 studs at 300 crs and 75 mm glass insulation. Lined with 13 mm impact board and Standard grade plasterboard, both sides of the wall.	$17.94	3,831	m	$30	$114,930
2	Upper floor – SY1: Staggered studs 90 x 35 plates & 70 x 35 studs at 300 crs and 75 mm glass insulation. Lined with 13 mm impact board and Standard grade plasterboard, both sides of the wall.		47	m	$573	$26,931
3	Lower floor – SY2: Staggered studs 90 x 35 plates & 70 x 45 studs at 300 crs and 75 mm glass insulation. Lined with 1 x 16 mm fire-protective and moisture resistant grade plasterboard, both sides of the wall.	$17.63	47	m	$563	$26,461
4	Upper floor – SY2: Staggered studs 90 x 35 plates & 70 x 35 studs at 300 crs and 75 mm glass insulation. Lined with 1 x 13 mm moisture resistant grade plasterboard, both sides of the wall.	$7.20	17	m	$636	$10,812
5	Lower floor – SY3: Staggered studs 90 x 35 plates & 70 x 45 studs at 300 crs and 75 mm glass insulation. Lined with 1 x 16 mm fire-protective grade plasterboard, both sides of the wall.	$6.16	17	m	$544	$9,248
6	Upper floor – SY3: Staggered studs 90 x 35 plates & 70 x 35 studs at 300 crs and 75 mm glass insulation. Lined with 1 x 16 mm fire-protective grade plasterboard, both sides of the wall.	$42.52	111	m	$575	$63,825
7	Lower floor – SY4: 90 x 35 plates and studs at 600 crs. Lined with 1 x 16 mm fire-protective grade plasterboard, both sides of the wall.	$41.93	111	m	$567	$62,937
8	Upper floor – SY4: 90 x 35 plates and studs at 600 crs. Lined with 13 mm impact board and standard grade plasterboard, both sides of the wall.	$7.72	23	m	$504	$11,592
9	Lower floor – SY5: 90 x 35 plates and studs at 600 crs. Lined with 1 x 16 mm fire-protective grade plasterboard, both sides of the wall.	$2.01	6	m	$504	$3,024
10	Upper floor – SY5: 90 x 35 plates and studs at 600 crs. Lined with 1 x 13 mm impact board and Standard grade plasterboard, both sides of the wall.	$38.51	114	m	$507	$57,798
11	Lower floor – smoke wall: 90 x 35 plates and studs at 600 crs. Lined with 13 mm impact board and standard grade plasterboard, both sides of the wall.	$38.51	114	m	$507	$57,798
12	Upper floor – smoke wall: 90 x 35 plates and studs at 600 crs. Lined with 13 mm impact board and standard grade plasterboard, both sides of the wall.	$0.68	2	m	$507	$1,014
Preliminaries Adjustment		**$0.00**				**$0**
1	Provision of time related preliminaries based on the duration of structure construction time.					
2	Preliminaries based on reduced Construction duration of:	$0.00	0	Weeks		$0
Total Cost						**$905,674**

Notes

1. The cost estimates are priced at April 2020 prices and based on construction in the Sydney region.
2. Timber frame construction will have a marginally faster construction program than steel, but this has been ignored in this comparison.
3. The timber frame rates are based on feedback from the Sydney market.

Project Name: **Aged Care Building - Steel Framed**

Client Name: Timber Development Association for Forest and Wood Products Australia

Element		$/m² GFA	Quantity	Unit	Unit Rate ($)	Cost ($)
			1,501	**m²**	**$618.05**	**$927,698**
Columns		**$2.70**				**$4,050**
1	89 x 89 x 3.5 SHS column, 3000 long; 9.06 kg/m	$1.71	10	No.	$257	$2,570
2	2 x 16 mm fire-protective plasterboard	$0.99	10	No.	$148	$1,480
Upper Floors		**$56.90**				**$85,400**
1	Beam B1; 180UB16.1, Ref B1, 2000 long	$0.17	1	No.	$255	$255
2	Beam B2; RHS 125 x 75 x 3.0; Ref B2, 3000 long; 24 kg/m	$1.63	4	No.	$612	$2,448
3	Beam B3; RHS 125 x 75 x 3.0, Ref B3, 3000 long; 24 kg/m	$2.45	6	No.	$612	$3,672
4	Beam B4; RHS 125 x 75 x 3.0; Ref B4, 2000 long, 24 kg/m	$1.36	5	No.	$408	$2040
5	Beam B5; 150UB14, Ref B5, 3600 long	$0.53	2	No.	$398	$796
6	Beam B6; RHS 125 x 75 x 3.0, Ref B6, 3600 long; 24 kg/m	$1.47	3	No.	$734	$2,202
7	Beam B7; 180UB16.1, Ref B7, 4500 long	$0.76	2	No.	$572	$1,144
8	Joist; Stramit J28324; 283 x 64 @ 450 crs; to Upper Floors, 8.04 kg/m	$8.44	352	m	$36	$12,672
9	Joist; Stramit J28319; 283 x 64 @ 450 crs; to Upper Floors, 6.37 kg/m	$40.09	1,941	m	$31	$60,171
Roof		**$58.20**				**$87,351**
1	Prefabricated timber truss, 13,700 long, unequal pitch 5° and 14°	$11.78	27	No.	$655	$17,685
2	Prefabricated timber truss, 9,600 long, pitch 5°, 600 mm overhang at end	$13.22	31	No.	$640	$19,840
3	Prefabricated timber truss, 12,100 long, pitch 5°	$5.54	13	No.	$640	$8,320
4	Prefabricated timber truss, 9,600 long, pitch 5°	$11.09	26	No.	$640	$16,640
5	Prefabricated timber truss, 3,000 long, pitch 4°	$1.43	5	No.	$430	$2,150
6	Timber bracing to trusses	$15.24	597	m	$40	$22,880
Ceilings		**$105.70**				**$158,663**
1	Under Roof, suspension system, 1 x 13 mm flush fixed standard plasterboard and 75 fibreglass insulation	$45.30	735	m²	$92	$67,988
2	Upper Floor: suspension system, 2 x 13 mm fire-protective flush fixed plasterboard, and 75 fibreglass insulation	$60.40	775	m²	$117	$90,675
External Wall		**$177.67**				**$266,680**
1	Lower Floor: 92 mm studs at 600 crs, Interior lined with 16 mm fire-protective grade plasterboard, and 75 mm insulation. Exterior cladding 110 mm common clay bricks	$113.68	226	m	$755	$170,630
2	Upper Floor: 92 mm studs at 600 crs, Interior lined with 13 mm impact board and Standard grade plasterboard, and 75 mm insulation. Exterior timber cladding	$63.99	226	m	$425	$96,050

Project Name: **Aged Care Building - Steel Framed**

Client Name: Timber Development Association for Forest and Wood Products Australia

Element		$/m² GFA	Quantity	Unit	Unit Rate ($)	Cost ($)
Internal Walls		**$216.78**				**$325,390**
1	Lower floor – SY1: 92 mm Quiet Studs at 600 crs and 75 mm glass insulation.	$17.44	47	m	$557	$26,179
2	Lined with 13 mm impact board and standard grade plasterboard, both sides of the wall.	$17.44	47	m	$557	$26,179
3	Upper floor – SY1: 92 mm Quiet Studs at 600 crs and 75 mm glass insulation.	$7.02	17	m	$620	$10,540
4	Lined with 13 mm impact board and standard grade plasterboard, both sides of the wall.	$6.09	17	m	$538	$9,146
5	Lower floor – SY2: 92 mm Quiet Studs at 600 crs and 75 mm glass insulation. Lined with 1 x 16 mm fire-protective and moisture resistant grade plasterboard, both sides of the wall.	$41.26	111	m	$558	$61,938
6	Upper floor – SY3: 92 mm Quiet Studs at 600 crs and 75 mm glass insulation. Lined with 13 mm impact board and standard grade plasterboard, both sides of the wall.	$41.49	111	m	$561	$62,271
7	Lower floor – SY4: 92 mm studs at 600 crs. Lined with 1 x 16 mm fire-protective grade plasterboard, both sides of the wall.	$7.55	23	m	$493	$11,339
8	Upper floor – SY4: 92 mm studs at 600 crs. Lined with 13 mm impact board and standard grade plasterboard, both sides of wall.	$1.97	6	m	$493	$2,958
9	Lower floor – SY5: 92 mm studs at 600 crs. Lined with 1 x 16 mm fire-protective grade plasterboard, both sides of the wall.	$37.59	114	m	$495	$56,430
10	Upper floor – SY5: 92 mm studs at 600 crs. Lined with 1x 13 mm impact board and standard grade plasterboard, both sides of the wall.	$37.59	114	m	$495	$56,430
11	Lower floor – smoke wall: 92 mm studs at 600 crs. Lined with 13 mm impact board and standard grade plasterboard, both sides of wall.	$0.66	2	m	$495	$990
12	Upper floor – smoke wall: 92 mm studs at 600 crs. Lined with 13 mm impact board and standard grade plasterboard, both sides of wall.	$0.66	2	m	$495	$990
Preliminaries Adjustment		**$0.00**				**$0**
1	Provision of time related preliminaries based on the duration of structure construction time.					
2	Preliminaries based on reduced Construction duration of:	$0.00	0	Weeks		$0
Total Cost						**$927,698**

Notes

1. The cost estimates are priced at April 2020 prices and based on construction in the Sydney Region.
2. The steelwork is assumed to be pre-fabricated and bolted together on site with minimum welding required.
3. The steel roof trusses included above are relatively high cost compared to standard timber trusses.

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