

## DRAWING INDEX.

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## WORKING DRAWINGS.

PROPOSED WAREHOUSE AND OFFICE BUILDING

### GENERAL NOTES:

#### SUBJECT SITE:

AUTHORITIES/CONSULTANTS:

MUNICIPALITY:  
SEWERAGE AUTHORITY:  
RELEVANT BUILDING SURVEYOR:  
CONSULTING STRUCTURAL ENGINEER:  
CONSULTING CIVIL ENGINEER:  
GEOTECHNICAL ENGINEER:  
PLANNING PERMIT:  
FIRE ENGINEER REPORT:  
LANDSCAPE PLAN:  
ENERGY REPORT:

BUILDING CLASS: 5, 7B

CONSTRUCTION TYPE: C

PLANNING ZONE: COMMERCIAL 2 ZONE (C2Z)

PLANNING OVERLAY: DEVELOPMENT CONTRIBUTIONS PLAN OVERLAY - SCHEDULE 1 (DCP01)

THESE PLANS HAVE BEEN PREPARED FOR THE EXCLUSIVE USE BY THE CLIENT OF FOR THE PURPOSE EXPRESSLY NOTIFIED TO THE DESIGNER. ANY OTHER PERSON WHO USES OR RELIES ON THESE PLANS WITHOUT THE DESIGNER'S WRITTEN CONSENT DOES SO AT THEIR OWN RISK AND NO RESPONSIBILITY IS ACCEPTED BY THE DESIGNER FOR SUCH USE AND/OR RELIANCE.

ALL MATERIALS AND WORK PRACTICES SHALL COMPLY WITH, BUT NOT LIMITED TO THE BUILDING REGULATIONS 2019, THE NATIONAL CONSTRUCTION CODE SERIES 2019 BUILDING CODE OF AUSTRALIA VOLUME 1 AND ALL RELEVANT CURRENT AUSTRALIAN STANDARDS (AS AMENDED) REFERRED TO THEREIN.

UNLESS OTHERWISE SPECIFIED, THE TERM BCA SHALL REFER TO NATIONAL CONSTRUCTION CODE SERIES 2019 BUILDING CODE OF AUSTRALIA VOLUME 1.

ALL BUILDING AND CONSTRUCTION PRACTICE SHALL MEET THE PERFORMANCE REQUIREMENTS OF THE BUILDING CODE OF AUSTRALIA, WHERE AN ALTERNATIVE SOLUTION IS PROPOSED THEN PRIOR TO IMPLEMENTATION OR INSTALLATION IT FIRST MUST BE ASSESSED AND APPROVED BY THE RELEVANT BUILDING SURVEYOR AS MEETING THE PERFORMANCE REQUIREMENTS OF THE BUILDING CODE OF AUSTRALIA.

STEP SIZES (OTHER THAN FOR SPIRAL STAIRS) TO BE:  
- RISERS (R) 190MM MAXIMUM AND 115MM MINIMUM  
- GOING (G) 355MM MAXIMUM AND 250MM MINIMUM FOR PUBLIC STAIRWAYS AND 355MM MAXIMUM AND 240MM MINIMUM FOR PRIVATE STAIRWAYS  
- 2R + 1G = 700MM MAXIMUM AND 550MM MINIMUM  
- CONSTRUCTED WITH A LESS THAN 125MM GAP TO OPEN TREADS

ALL TREADS, LANDINGS AND THE LIKE TO HAVE A SLIP-RESISTANCE CLASSIFICATION OF P3 OR R10 FOR DRY SURFACE CONDITIONS AND P4 OR R11 FOR WET SURFACE CONDITIONS, OR A NOSING STRIP WITH A SLIP-RESISTANCE CLASSIFICATION OF P3 FOR DRY SURFACE CONDITIONS AND P4 FOR WET SURFACE CONDITIONS.

PROVIDE BARRIERS WHERE CHANGE IN LEVEL EXCEEDS 1000MM ABOVE THE SURFACE BENEATH LANDINGS, RAMP AND/OR TREADS. BARRIERS (OTHER THAN TENSIONED WIRE BARRIERS) TO BE:  
- 1000MM MINIMUM ABOVE FINISHED SURFACE LEVEL OF BALCONIES, LANDINGS OR THE LIKE, AND  
- 865MM MINIMUM ABOVE FINISHED SURFACE LEVEL OF STAIR NOSING OR RAMP, AND  
- VERTICAL WITH A LESS THAN 125MM GAP BETWEEN, AND  
- ANY HORIZONTAL ELEMENT WITHIN THE BARRIER BETWEEN 150MM AND 760MM ABOVE THE FLOOR MUST NOT FACILITATE CLIMBING WHERE CHANGES IN LEVEL EXCEEDS 4000MM ABOVE THE SURFACE BENEATH LANDINGS, RAMP AND/OR TREADS.

TOP OF HAND RAILS TO BE MINIMUM 865MM VERTICALLY ABOVE STAIR NOSING AND FLOOR SURFACE OF RAMP.

WINDOW SIZES NOMINATED ARE NOMINAL ONLY. ACTUAL SIZE MAY VARY ACCORDING TO MANUFACTURER. WINDOWS TO BE FLASHED ALL AROUND.

WATERPROOFING OF WET AREAS TO COMPLY WITH BCA PART F1.7

BUILDINGS IN MARINE OR OTHER EXPOSURE ENVIRONMENTS SHALL HAVE MASONRY UNITS, MORTAR AND ALL BUILT IN COMPONENTS AND THE LIKE COMPLYING WITH THE DURABILITY REQUIREMENTS OF AS3700-2011 MASONRY STRUCTURES.

ALL STORM WATER TO BE TAKEN TO THE LEGAL POINT OF DISCHARGE TO THE RELEVANT AUTHORITIES' APPROVAL.

THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL SPECIFICATIONS, RELEVANT STRUCTURAL AND ALL OTHER CONSULTANTS' DRAWINGS/DETAILS AND SPECIFICATIONS AND WITH ANY OTHER WRITTEN INSTRUCTIONS ISSUED IN THE COURSE OF THE CONTRACT.

ALL MEASUREMENTS AND LEVELS IN MILLIMETRES UNLESS NOTED OTHERWISE.

FIGURED DIMENSIONS TAKE PRECEDENCE OVER SCALED DIMENSIONS.

THE BUILDER SHALL TAKE ALL STEPS NECESSARY TO ENSURE THE STABILITY AND GENERAL WATER TIGHTNESS OF ALL NEW AND/OR EXISTING STRUCTURES AND ALL ESSENTIAL SERVICES TO BE MAINTAINED DURING ALL WORKS.

THE BUILDER AND SUBCONTRACTORS SHALL CHECK AND VERIFY ALL DIMENSIONS, SETBACKS, LEVELS AND SPECIFICATIONS AND ALL OTHER RELEVANT DOCUMENTATION PRIOR TO THE COMMENCEMENT OF ANY WORKS. REPORT ALL DISCREPANCIES TO THIS OFFICE FOR CLARIFICATION.

INSTALLATION OF ALL SERVICES SHALL COMPLY WITH THE RESPECTIVE SUPPLY AUTHORITY REQUIREMENTS.

THE BUILDER AND SUBCONTRACTOR SHALL ENSURE THAT ALL STORM WATER DRAINS, SEWER PIPES AND THE LIKE ARE LOCATED AT A SUFFICIENT DISTANCE FROM ANY BUILDINGS FOOTING AND/OR SLAB EDGE BEAMS SO AS TO PREVENT GENERAL MOISTURE PENETRATION, DAMPNESS, WEAKENING AND UNDERMINING OF ANY BUILDING AND ITS FOOTING SYSTEM.

THESE PLANS HAVE BEEN PREPARED FOR THE EXCLUSIVE USE BY FOR THE PURPOSE EXPRESSLY NOTIFIED TO THE DESIGNER. ANY OTHER PERSON WHO USES OR RELIES ON THESE PLANS WITHOUT THE DESIGNER'S WRITTEN CONSENT DOES SO AT THEIR OWN RISK AND NO RESPONSIBILITY IS ACCEPTED BY THE DESIGNER FOR SUCH USE AND/OR RELIANCE.

THE CLIENT AND/OR THE CLIENT'S BUILDER SHALL NOT MODIFY OR AMEND THE PLANS WITHOUT THE KNOWLEDGE AND CONSENT OF EXCEPT WHERE A REGISTERED BUILDING SURVEYOR MAKES MINOR NECESSARY CHANGES TO FACILITATE THE BUILDING PERMIT APPLICATION AND THAT SUCH CHANGES ARE PROMPTLY REPORTED BACK TO

THE APPROVAL BY THIS OFFICE OF A SUBSTITUTE MATERIAL, WORK PRACTICE, VARIATION OR THE LIKE IS NOT AN AUTHORISATION FOR ITS USE OR A CONTRACT VARIATION. ALL VARIATIONS MUST BE ACCEPTED BY ALL PARTIES TO THE AGREEMENT AND WHERE APPLICABLE THE RELEVANT BUILDING SURVEYOR PRIOR TO IMPLEMENTING ANY VARIATION.

REFER TO CIVIL ENGINEERS DESIGN AND DETAILS FOR ALL STORM WATER, CAR PARKING AND DRIVEWAY CONSTRUCTION REQUIREMENTS.

REFER TO FIRE SERVICES DESIGN FOR ALL HYDRANT, HOSE REELS AND EXTINGUISHER DETAILS.

ELECTRICAL SWITCHBOARDS LOCATED IN THE PATH OF TRAVEL TO TN004-2015 GENERAL NOTES FOR COMMERCIAL WORKS - REVISED MAY 2015 PAGE 2 OF 2 PAGES EXITS TO BE ENCLOSED IN A METAL OR OTHER NON COMBUSTIBLE CABINET WITH SMOKE PROOF DOORS. SIGNIFICANT SWITCHBOARDS SHALL BE PROVIDED WITH A 5KG CARBON DIOXIDE EXTINGUISHER OR ANOTHER TYPE OF EXTINGUISHER WITH A MINIMUM CLASSIFICATION OF 1A:2 AND FITTED WITH A HOSE COMPLETE WITH EXTINGUISHER IDENTIFICATION SIGNAGE AND SHALL BE LOCATED BETWEEN 2M AND 20M FROM THE SIGNIFICANT SWITCHBOARD.

FIRE HAZARD PROPERTIES OF MATERIALS AND ASSEMBLIES TO COMPLY WITH BCA SPECIFICATION C1.10.

MECHANICAL VENTILATION OR AIR-CONDITIONING OF ROOMS TO BE PROVIDED WITH A SYSTEM COMPLYING WITH AS1668.2 AND AS/NZS 3866.1 AS AMENDED. EXHAUST OUTLETS TO BE LOCATED NO CLOSER THAN 6.0M TO FRESH AIR INLETS.

SEDIMENT POLLUTION CONTROL:  
- A SITE MANAGEMENT PLAN IS TO BE IMPLEMENTED DURING CONSTRUCTION TO CONTROL SEDIMENT RUN-OFF IN ACCORDANCE WITH EPA VICTORIA PUBLICATION #275 'CONSTRUCTION TECHNIQUES FOR SEDIMENT POLLUTION CONTROL'.  
- PROVIDE 'PROPEX' OR WRITTEN APPROVED EQUIVALENT SILT FENCES TO THE LOW SIDE OF THE ALLOTMENT AND AROUND ALL SOIL STOCKPILES AND STORM WATER INLET PITS / SUMPS AND INSTALL 'SILT STOP' FILTER BAGS OVER ALL STORM WATER ENTRY PITS DURING CONSTRUCTION WORKS.  
- 'SUPERGRO' OR WRITTEN APPROVED EQUIVALENT EROSION CONTROL FABRIC TO BE PLACED OVER GARDEN BEDS TO PREVENT SURFACE EROSION DURING RE VEGETATION PERIOD.

PERSONNEL LOADING:  
BASED ON SANITARY FACILITIES PROVIDED.  
MALE EMPLOYEES - 9 OFFICE / 10 WAREHOUSE  
FEMALE EMPLOYEES - 9 OFFICE / 10 WAREHOUSE  
TOTAL MAX - 9 OFFICE / 10 WAREHOUSE

AUTHORITIES LIST:

BUILDER TO ALLOW FOR ALL WORKS TO COMPLY AND INCLUDE ALL REQUIRED CONDITIONS IN ACCORDANCE WITH THE PLANNING PERMIT AND SHALL BE RESPONSIBLE FOR COMPLIANCE WITH ALL PLANNING CONDITIONS AT THE COMPLETION OF WORKS.

PROJECT CONSULTANTS LIST:

CONSULTING STRUCTURAL ENGINEER  
CONSULTING CIVIL ENGINEER  
CONSULTING LAND SURVEYOR  
CONSULTING GEOTECHNICAL ENGINEER  
CONSULTING MECHANICAL SERVICES ENGINEER

SITE GEOTECHNICAL INVESTIGATION:  
REFER TO GEOTECHNICAL INVESTIGATION REPORT NO. BY:

AUSTRALIAN STANDARDS:  
ALL WORKS SHALL COMPLY WITH BUT NOT LIMITED TO THE FOLLOWING AUSTRALIAN STANDARDS:  
REFER TO RELEVANT YEARS FOR ALL CURRENT AMENDMENTS.

AS 2444-2001 PORTABLE EXTINGUISHERS  
AS 2293.1 EMERGENCY LIGHTING AND EXIT SIGNS  
AS 1428-2009 ACCESS AND MOBILITY  
AS 1288 GLASS AND GLAZING IN BUILDINGS - SELECTION AND INSTALLATION  
AS 1562 DESIGN AND INSTALLATION OF SHEET ROOF AND WALL CLADDING  
AS 1684 NATIONAL TIMBER FRAMING CODE  
AS 1869 INSTALLATION OF PART CLEBOARD FLOORING  
AS 2049 ROOF TILES  
AS 2050 FIXING OF ROOF TILES  
AS 2870 (PT1) RESIDENTIAL SLABS AND FOOTINGS  
AS 2904 DAMP-PROOF COURSES AND FLASHING  
AS 3600 CONCRETE STRUCTURES  
AS 2600.1 CODE OF PRACTICE FOR PHYSICAL BARRIERS USED IN PROTECTION OF BUILDINGS AGAINST SUBTERRANEAN TERMITES.  
AS 3700 MASONRY STRUCTURES  
AS 3740 WATERPROOFING OF WET AREAS IN RESIDENTIAL BUILDINGS  
AS 3786 SMOKE ALARMS  
AS 4055 WIND LOADINGS FOR HOUSING  
AS 4100 STEEL STRUCTURES

NO.	SECTION	SCALE	REV
08	SECTION A	1:100	I
09	SECTION B	1:100	I
10	SECTION C & D	1:100	I
11	ELECTRICAL PLANS	1:100	I
12	WINDOW AND DOOR SCHEDULE	1:100	I
13	ACCESSIBLE PLAN DETAILS	1:50	I

SUMMARY OF COMPLIANCE REQUIREMENTS		Compliance Solution
<i>Class 5 - Conditioned Spaces - Parts J1, J2, J3, J5, J6 &amp; J7 apply in this report</i>		
<b>J1: Building Fabric:</b> <b>Roof &amp; Ceiling -</b> *1" Stramit Speed Deck Ultra or Equivalent, R2.5 Foil Backed Insulation, Roof Space & Suspended ceiling tiles (R3.2 Total System Required) <b>External Walls -</b> *WT01 Foyer Walls to Unconditioned Space (Warehouse & Toilet), 150mm Thick Concrete Tilt panel, R1.5 Foil Faced fibrous Insulation Board or blanket, 16mm Furring Channel with 10mm Plasterboard (R1.8 Total system Required) *WT02 James Hardie Exotec Panel fixed to 35mm Batten, Vapour Permeable foil on 90mm Stud walls with R2.5 Insulation. (R2.8 Total system Required) *WT04 Shiplap Cladding on 15mm Battens, Vapour Permeable foil on 90mm Stud walls with R2.5 Insulation (R2.8 Total system Required) <b>Floors -</b> *Grd Floor - Concrete Slab on Ground, Nil insulation Required *1 <sup>st</sup> floor Suspended Floor, 19mm T&G, R2.0 Insulation (R2.0 Total system Required)	R2.5 Foil R1.5 R2.5 R2.5 N/A R2.0	
<b>J2: Glazing:</b> W01 Fixed - U Value 3.6 SHGC 0.64 D04 - U Value 2.0 SHGC 0.43 W03-W08 Awnings - U Value 5.0 SHGC 0.46 W09 Fixed - U Value 3.6 SHGC 0.64 W10-W13 Fixed If Shading device installed - U Value 3.6 SHGC 0.64 W10-W13 Awnings If Shading device installed - U Value 5.0 SHGC 0.46 W10-W13 Fixed No Shading device - U Value 3.2 SHGC 0.26 W10-W13 Awnings No Shading device - U Value 3.9 SHGC 0.35 Glazed Internal Doors - U Value 6.2 SHGC 0.59 <i>*Refer to Glazing calculator in this report for Codes used</i>	Values as per Glazing Calculator in this report to be met.	
<b>J3: Building Sealing:</b> All windows must comply with AS 2047:1999 performance test or be provided with weather seals to all edges. An entrance to a building, if leading to a conditioned space must have an airlock, self-closing door (automatic or door closer fitted) or the like where the conditioned space has a floor area greater than 50m2 Seal Gaps and Cracks around windows & doors where possible, Between the stud & frames. Create an impermeable barrier around the external windows & doors. Seal around penetrations through the walls for building services.	windows & doors fitted install weather seals. N/A Applicable	
<b>J5: Air-Conditioning &amp; Ventilation Systems:</b> Air-Conditioning & Ventilation Systems must meet the requirements of Part J5 of the BCA/NCC	Builder to meet RBS requirement satisfaction	
<b>J6: Artificial Lighting &amp; Power:</b> All Artificial Lighting and Power must meet the requirements of Part J6 of the BCA/NCC.	Refer to Lighting Calculations	
The total maximum illumination power load for the Circulation spaces for the total building additions to meet compliance.	Builder to meet RBS requirement satisfaction	
<b>J7: Heated Water Supply &amp; Swimming Pool &amp; Spa pool Plant:</b> A Heated water supply system for food preparation and sanitary purposes must be designed & installed in accordance with Part B2 of the NCC Volume Three - Plumbing Code of Australia. Pool & Spa Requirements to be met as per Part J7 of the BCA/NCC	Builder to meet RBS requirement satisfaction	
<b>J8: Facilities for Energy Monitoring:</b> Applies to buildings with a conditioned floor area of over 500m2. They must have the facility to record the consumption of gas & electricity	Builder to meet RBS requirement satisfaction N/A	



3D CONCEPT - ARTIST IMPRESSION



3D CONCEPT - ARTIST IMPRESSION



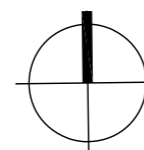
3D CONCEPT - ARTIST IMPRESSION

CONSTRUCTION ISSUE

REV.	DATE	DETAILS / AMENDMENTS	REV.	DATE	DETAILS / AMENDMENTS
A.	13/03/18	INITIAL DESIGN	H.	08/05/19	PRELIMINARY WORKING DRAWINGS
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C.	05/04/18	TOWN PLANNING APPLICATION			
D.	01/05/18	BOE APPLICATION			
E.	17/07/18	TOWN PLANNING APPLICATION RFI			
F.	07/02/19	TOWN PLANNING APPLICATION RFI AMENDMENT			
G.	18/03/19	PRELIMINARY DRAFT			

NOTES:

NORTH:



PROJECT:

CLIENT:

DRAWING: GENERAL NOTES / DRAWING INDEX

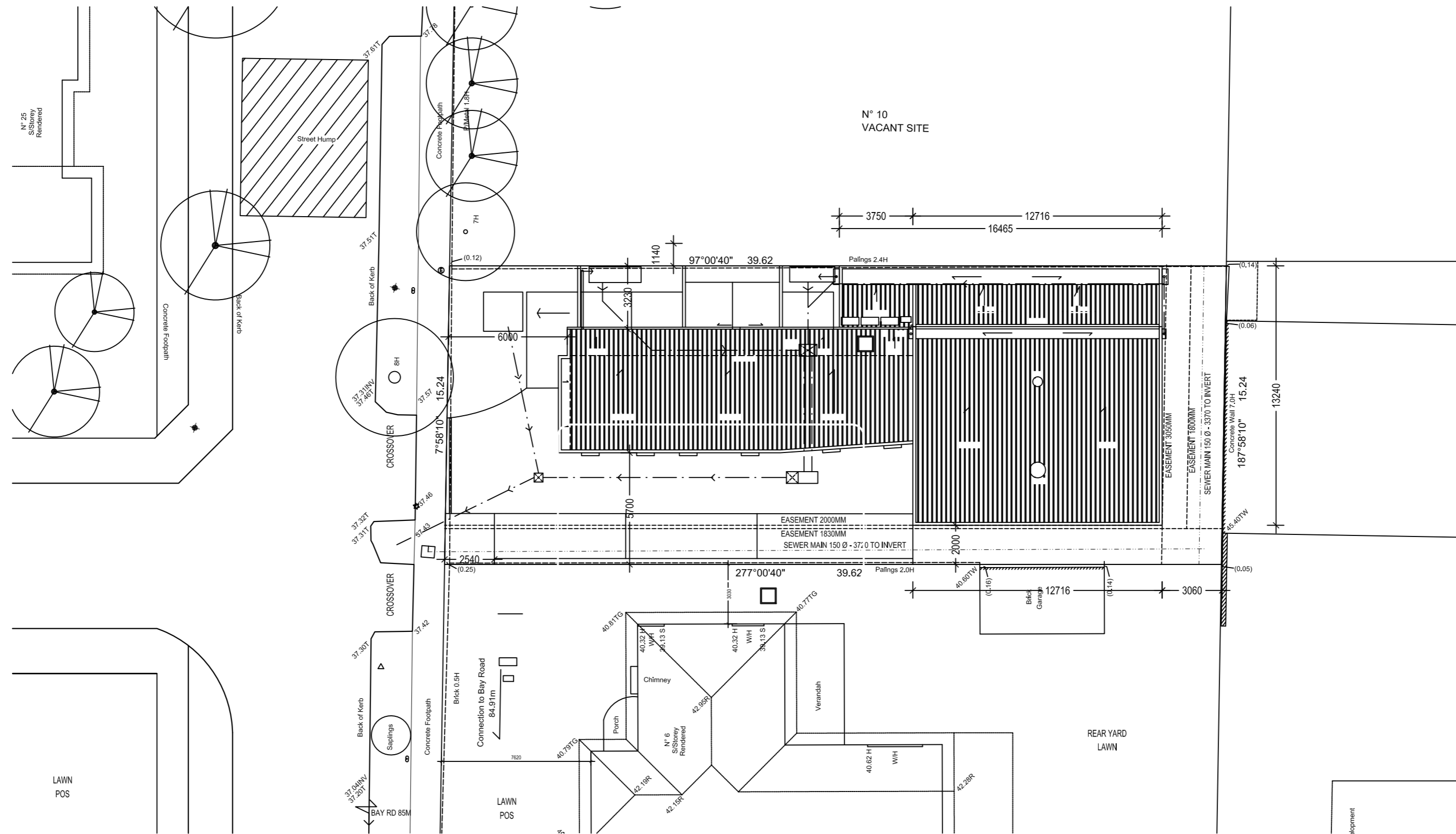
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DATE: 22/07/19  
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SHEET No.

01

REV: I.





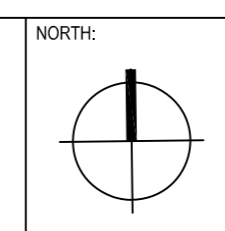
**SITE PLAN**  
SCALE 1:200

SUBJECT SITE AREA ANALYSIS	
LOT SIZE:	603m <sup>2</sup>
SITE COVERAGE:	291m <sup>2</sup> - 48% (INCLUDING UPPER STOREY PROJECTIONS AND OUTBUILDINGS)
PERMEABLE AREA (GARDEN AREA):	70m <sup>2</sup> - 11%
CAR SPACES:	
OFFICES:	3 SPACES
FACTORY:	5 SPACES
PROPOSED AREAS:	
OFFICE AREA:	117.4m <sup>2</sup>
FACTORY AREA:	180m <sup>2</sup>

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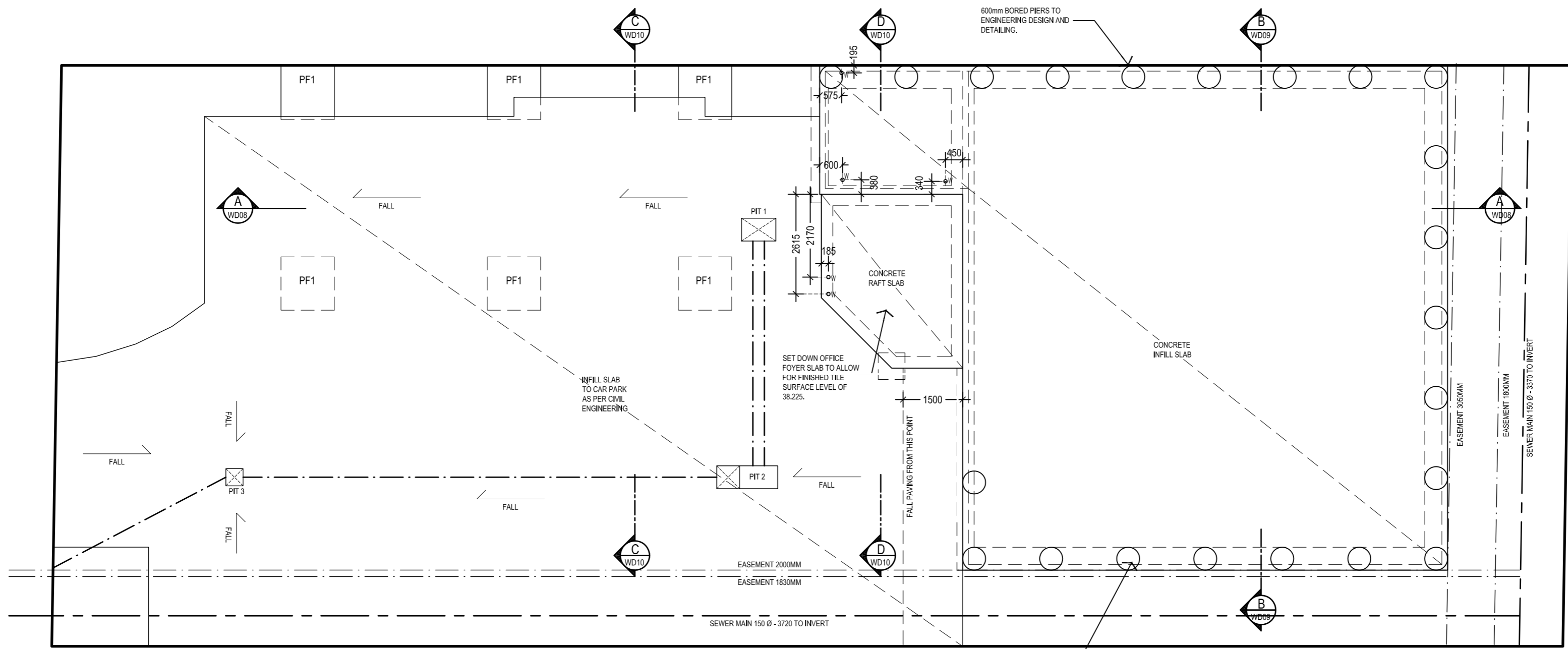
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PROJECT:  
CLIENT:

DRAWING: **SITE PLAN**  
SCALE: 1:200 @A2  
DATE: 22/07/19  
DRAWN BY: CHECKED:

SHEET No. **02**  
REV: **I.**



WASTE PIPE LOCATION

TOILET WASTES SHOWN 140mm OFFSET FROM BACK OF STUD WALL. ADJUST AS REQUIRED DEPENDANT ON TOILET SELECTION.

140

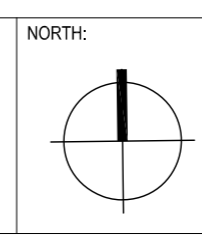
DRAWINGS TO BE READ IN CONJUNCTION WITH CIVIL AND STRUCTURAL ENGINEERING.

**SLAB PLAN**  
SCALE 1:100

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G.	18/03/19	PRELIMINARY DRAFT			

NOTES:



PROJECT:

CLIENT:

DRAWING: **SLAB PLAN**

SCALE: 1:100 @A2

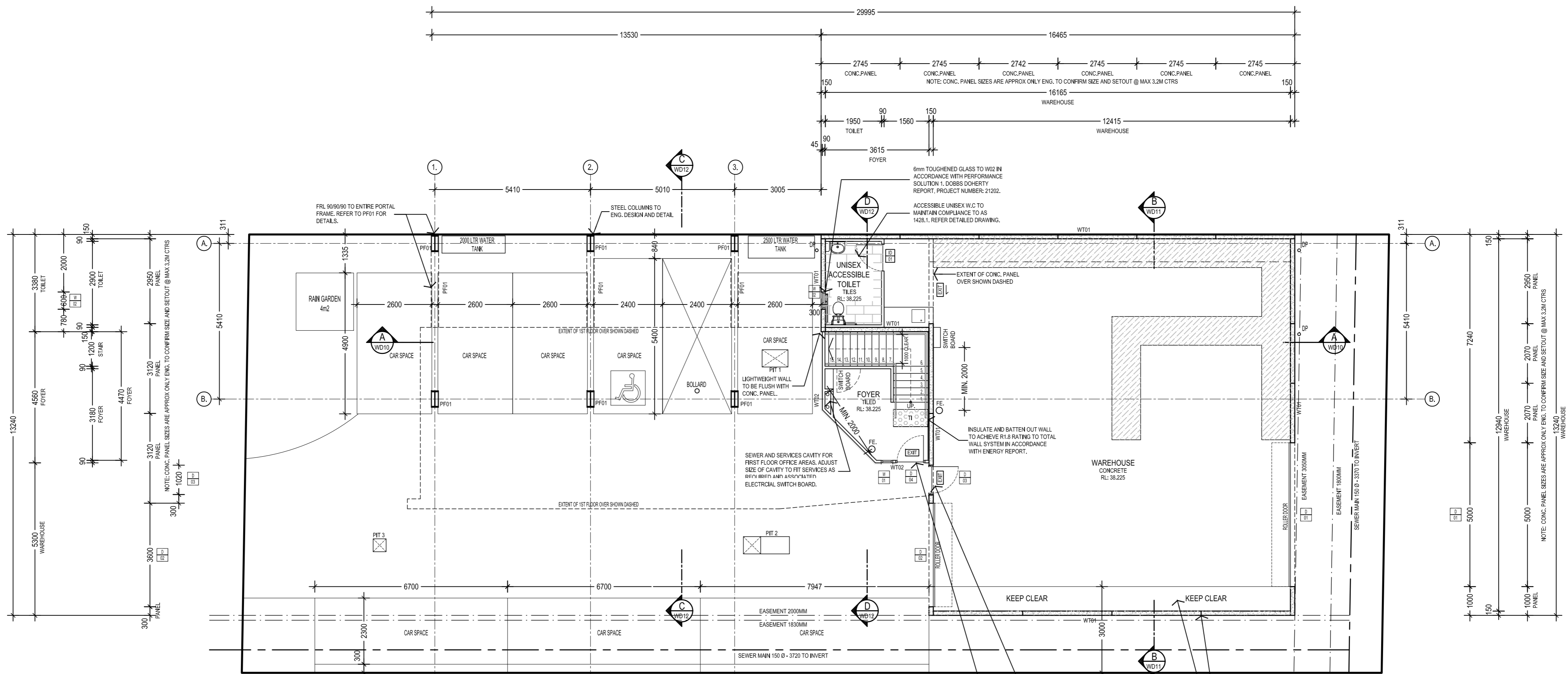
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SHEET No.

**03**

REV: **I.**



**STAIR NOTES**

GROUND FLOOR STAIR: (16 RISERS)  
 RISER - Approx 185 mm  
 GOING - 250 mm

**NOTES:**

- NON-SLIP TREADS IN ACCORDANCE WITH AS 4586.
- ENCLOSED 40mm HARDWOOD TREAD NOSING.
- CHECK ON SITE DIMENSIONS PRIOR TO COMMENCING THE MANUFACTURE OF STAIRS.
- GOING: 250MM MIN. 355MM MAX
- RISER: 190MM MAX. 115 MIN.

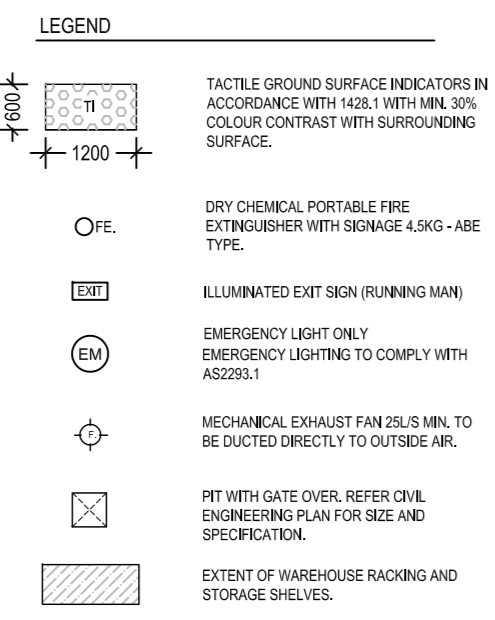
**BALUSTRADES:**

1000MM HIGH ABOVE FLOOR OR TREAD NOSING. OPENINGS IN BALUSTRADE TO ALLOW A MAXIMUM 125MM DIAMETER SPHERE TO PASS THROUGH.

STAIR TO COMPLY WITH REQUIREMENTS OF THE BCA & CLAUSE 11 OF AS 1428.1

PROVIDE CONTRASTING STRIP TO THE NOSING OF THE STAIRS.

STAIR TO COMPLY WITH REQUIREMENTS OF THE AS 1428.1 FIGURE 26(B)



**GENERAL NOTES.**

NEW FLOOR COVERINGS MUST COMPLY WITH NCC CLAUSE C 1.10A - EARLY FIRE HAZARD INDICES.

TIMBER FRAMING SCHEDULE TO PARTITION WALL TO AS 1684-2010.

ALL EXHAUST FANS DUCTED TO OUTSIDE AIR.

REFER APPROVED PELED ENGINEERING CIVIL DRAWINGS FOR PIT LOCATIONS AND SPECIFICATIONS.

DRAWINGS TO BE READ IN CONJUNCTION WITH DOBBS DOHERTY - REPORT NO: 21202 / REV 1 - 17\_07\_19

**DOOR NOTES**

ALL EXIT DOORS TO BE OPENABLE WITHOUT A KEY FROM THE DIRECTION OF EGRESS WITH A SINGLE-HANDED DOWNWARD ACTION OF A SINGLE-HANDED DEVICE LOCATED BETWEEN 900-1200MM ABOVE FINISHED FLOOR LEVEL.

DOORS IN DISABLED ACCESS PATH TO HAVE LATCHES AT A MAXIMUM HEIGHT OF 1100MM.

INWARD OPENING DOORS TO FULLY ENCLOSED SANITARY COMPARTMENTS & DISABLED TOILETS SHALL BE FITTED WITH ESCAPE HINGE SETS.

PROVIDE HYDRAULIC DOOR CLOSERS TO DOORS LEADING TO AMENITIES. EXIST DOORS & DOORS LEADING FROM AIR-CONDITIONED SPACE TO NON-AIR-CONDITIONED SPACE.

PROVIDE DRIP MOULD &/OR STORM SEALS TO UNPROTECTED EXTERNAL DOORS.

SIGNAGE FOR SANITARY AND EXIT DOORS IN ACCORDANCE WITH D3.6 (BRAILLE, TACTILE) AND AS 1428.1.

FRONT ENTRY DOOR FITTED WITH COMPLIANT ESCAPE LATCH MECHANISM TO BCA D2.21. MAINTAIN MIN. 850mm MIN. CLEAR OPENING. DOORS TO SWING INWARDS IN ACCORDANCE WITH PERFORMANCE SOLUTION 2. DOBBS DOHERTY - PROJECT NUMBER: 21202.

ALL PRECAST PANEL CONTROL JOINTS TO BE SEALED AND PROTECTED WITH FIRE RATED MASTIC SEALANT. MIN 90MM.

KEEP CLEAR LINE MARKING CLEARLY SHOWING AREA WITHIN 3M OF PROPERTY BOUNDARY TO BE KEPT CLEAR OF COMBUSTIBLES IN ACCORDANCE WITH FIRE ENGINEER REPORT PERFORMANCE SOLUTION.

**GROUND FLOOR PLAN**  
 SCALE 1:100

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DRAWING: **GROUND FLOOR PLAN** SHEET No. **04**

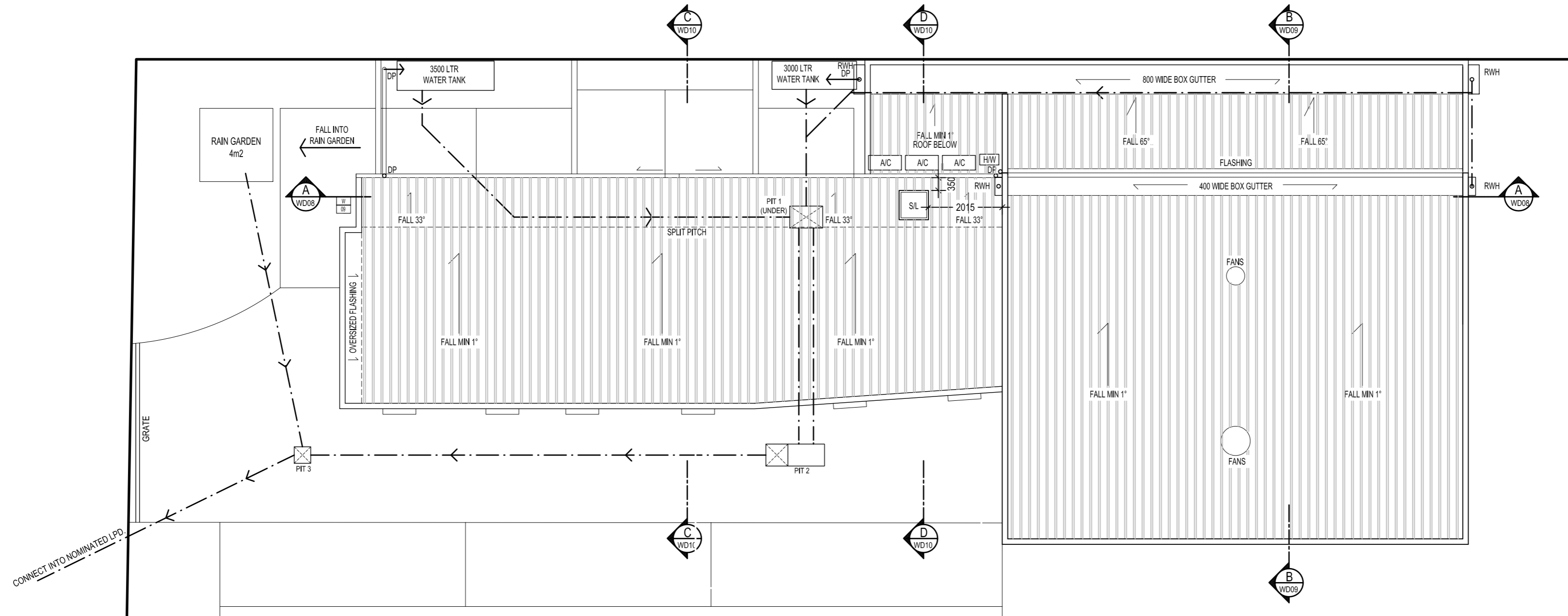
SCALE: @A2 1:100 DATE: 22/07/19

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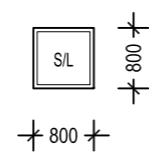
LEGEND	
	STORM WATER PIPE. PIPE COVERAGE IN ACCORDANCE WITH AS 3500 TABLE 5.7. PIPE SIZE IN ACCORDANCE WITH CIVIL ENGINEERING
	INSPECTION OPENINGS TO AS 3500 PART 5.6.15.
	A/C EXTERNAL UNITS.
	HOT WATER UNIT.

DOWNPIPES MUST NOT SERVE MORE THAN 12M OF GUTTER LENGTH FOR EACH DOWN PIPE IN ACCORDANCE WITH PART 3.5.2 OF THE BCANCC.

ROOFING SPECIFICATION:	
GUTTERS:	COLORBOND QUAD GUTTER PROFILE 'MONUMENT'.
BOX GUTTERS:	ZUINCALUME SIZES AS NOTED.
DOWN PIPES:	100mm DIA PVC
ROOF:	COLORBOND 'SHALE GREY' STRAMIT SPEED DECK ULTRA OR APPROVED EQUIVALENT - AT MIN. 1° UO/W WIRE SAFETY MESH TO WAREHOUSE AREAS AS REQUIRED.

STORM WATER LAYOUT TO BE READ IN CONJUNCTION WITH ENGINEERS CIVIL PLAN AND APPROVED PLANNING PERMIT INCLUDING WSUD REQUIREMENTS. CIVIL DRAWINGS DATED 03\_07\_19 REV A

REFER TO ENERGY REQUIREMENTS FOR ROOF AND CEILING INSULATION REQUIREMENTS.

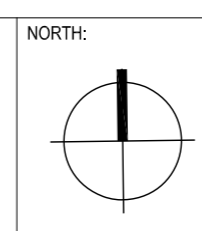


ROOF PLAN  
SCALE 1:100

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D.	01/05/18	BOE APPLICATION			
E.	17/07/18	TOWN PLANNING APPLICATION RFI			
F.	07/02/19	TOWN PLANNING APPLICATION RFI AMENDMENT			
G.	18/03/19	PRELIMINARY DRAFT			

NOTES:



PROJECT:

CLIENT:

DRAWING: ROOF PLAN

SCALE: 1:100 @A2

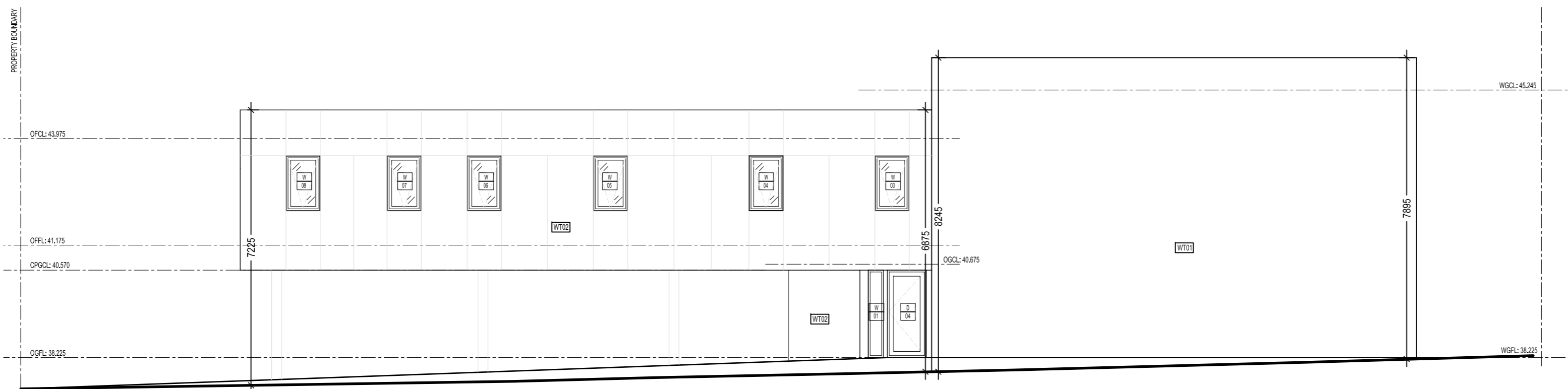
DATE: 22/07/19

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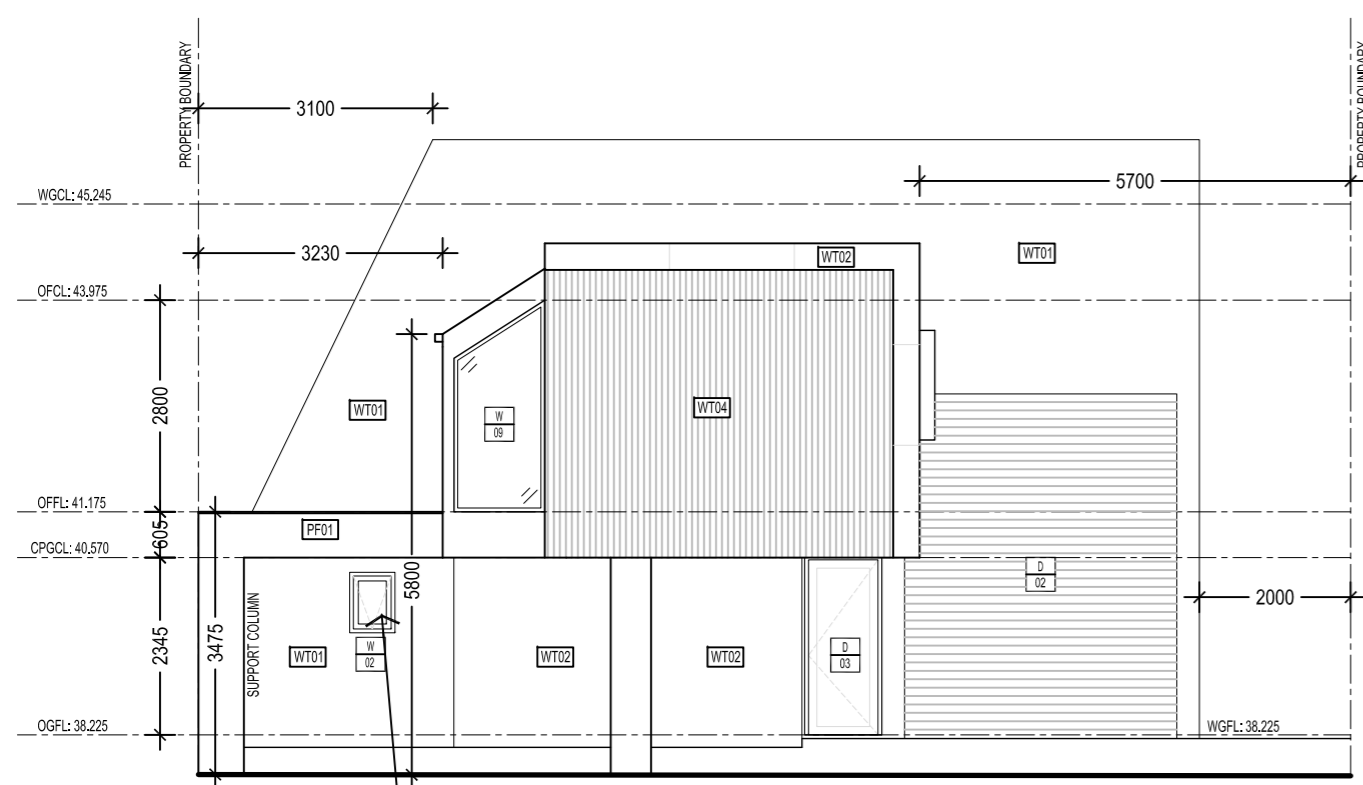
SHEET No. 06

REV: I.

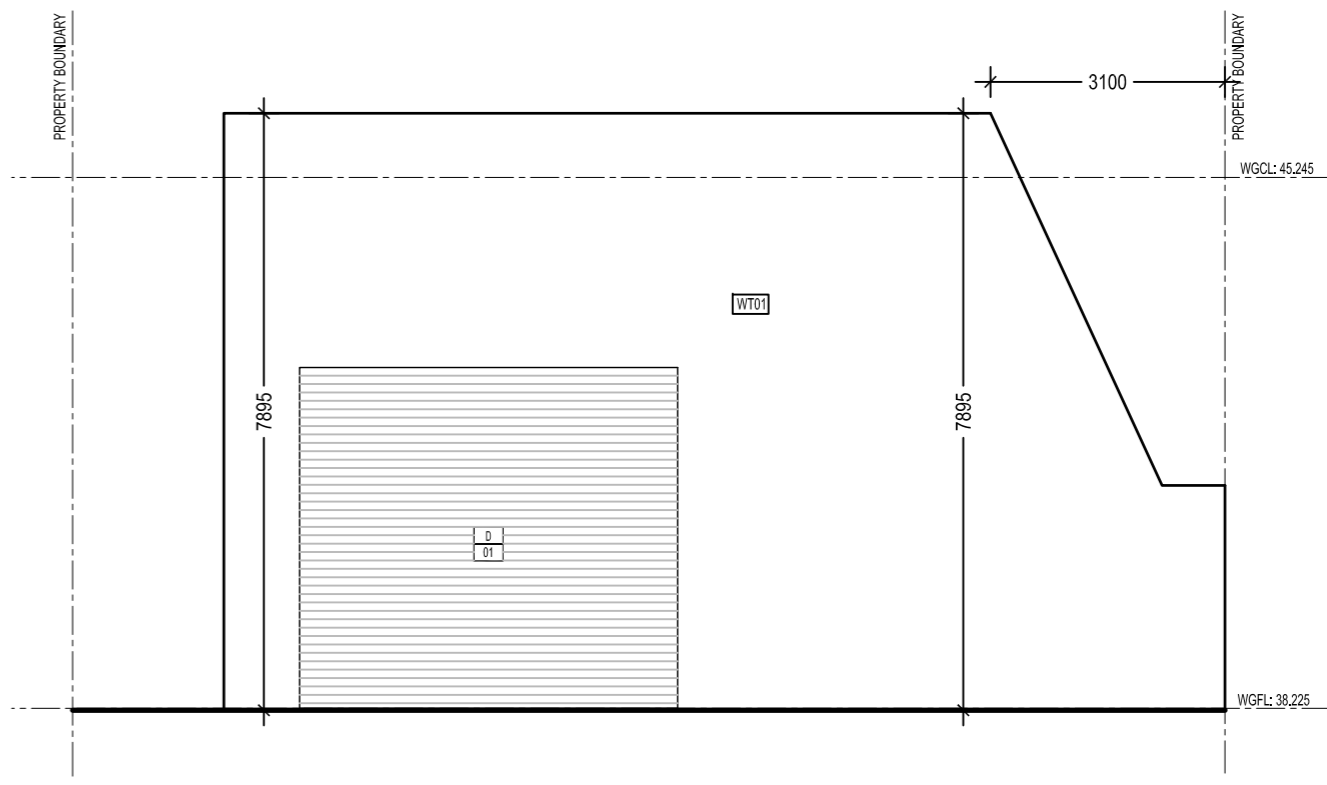




**SOUTH ELEVATION**  
SCALE 1:100



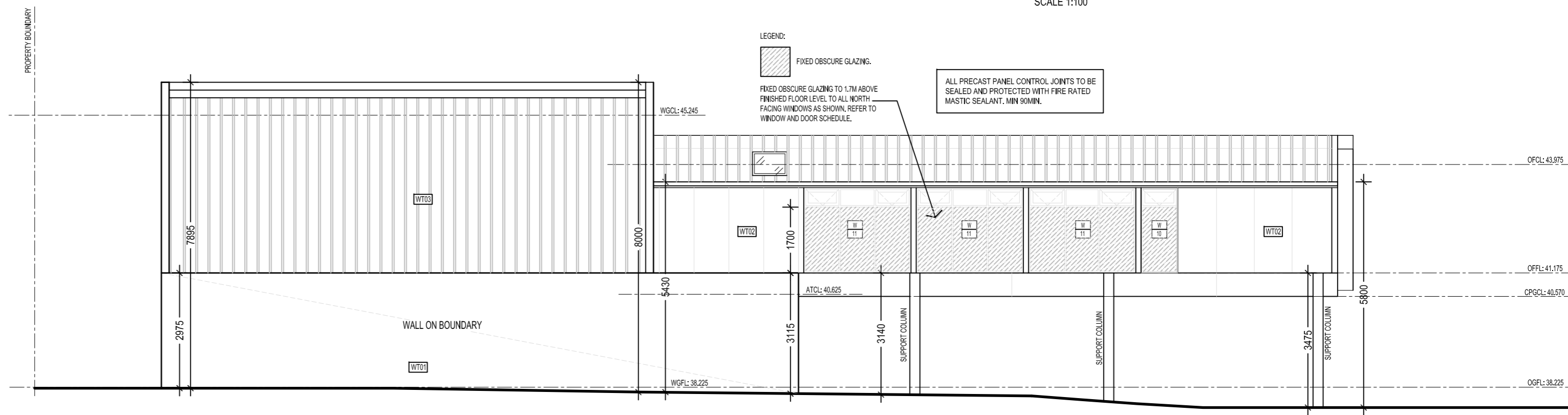
**WEST ELEVATION (FACADE)**  
SCALE 1:100



**EAST ELEVATION**  
SCALE 1:100

**MATERIALS AND FINISHES SCHEDULE**

WT02	JAMES HARDIE EXOTEC CLADDING WITH 'BRONZE' PAINT FINISH TO BE SELECTED.
WT04	150mm INNOCCLAD SECRET FIXED SHIPLAP CLADDING. PRODUCT CODE WC17533. WEATHERED WOOD FINISH.
WT01	CONCRETE TILT PANEL.
WINDOWS AND DOORS - ALUMINIUM 400 SERIES, COLOUR 'MONUMENT' OR SIMILAR.	
ROLLER DOOR - COLORBOND - COLOUR 'MONUMENT' OR SIMILAR.	
DRIVEWAYS - CONCRETE FINISH.	
WT03	COLORBOND 'SHALE GREY' ROOF CLADDING TO MATCH ROOFING. REFER TO ROOF PLAN.



**NORTH ELEVATION**  
SCALE 1:100

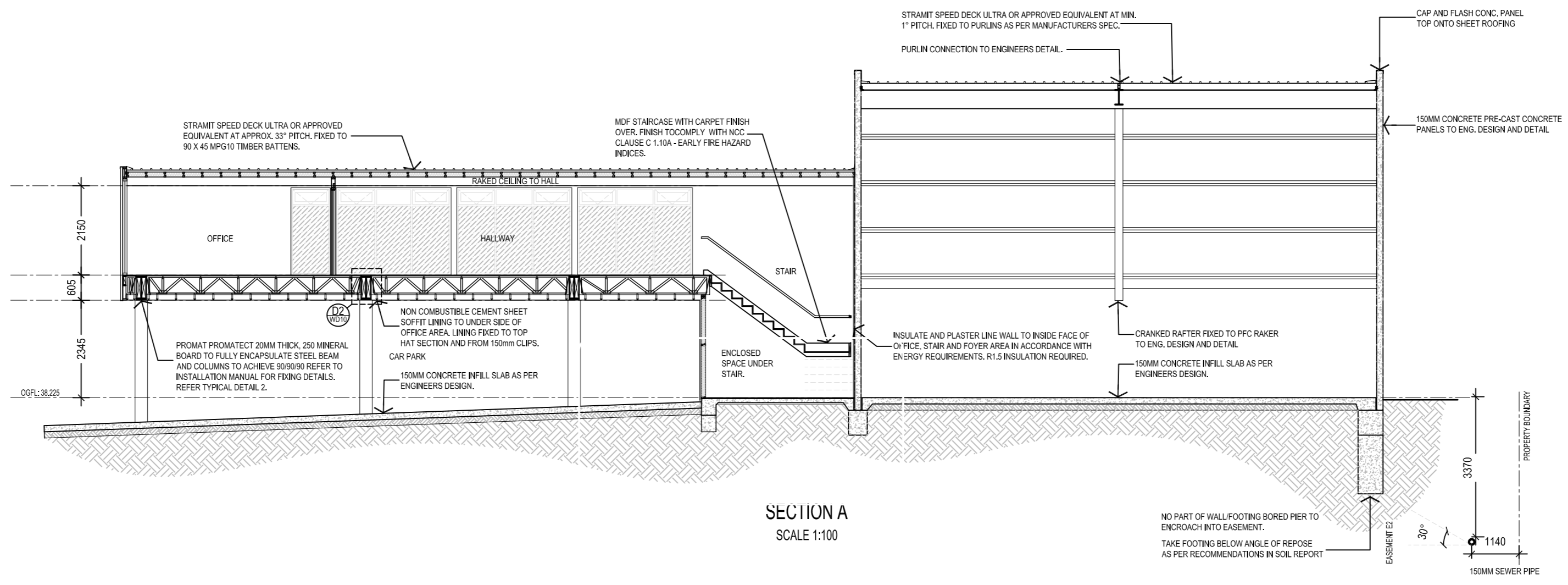
**CONSTRUCTION ISSUE**

REV.	DATE	DETAILS / AMENDMENTS	REV.	DATE	DETAILS / AMENDMENTS
A.	13/03/18	INITIAL DESIGN	H.	08/05/19	PRELIMINARY WORKING DRAWINGS
B.	27/03/18	TOWN PLANNING DRAFT	I.	24/07/19	CONSTRUCTION ISSUE WORKING DRAWINGS
C.	05/04/18	TOWN PLANNING APPLICATION			
D.	01/05/18	BOE APPLICATION			
E.	17/07/18	TOWN PLANNING APPLICATION RFI			
F.	07/02/19	TOWN PLANNING APPLICATION RFI AMENDMENT			
G.	18/03/19	PRELIMINARY DRAFT			

NOTES:

NORTH:

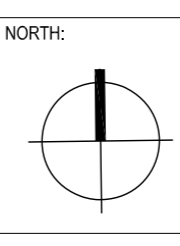
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CLIENT:	SCALE: 1:100 @A2	DATE: 22/07/19
	DRAWN BY:	CHECKED:
		REV: I.



**CONSTRUCTION ISSUE**

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D.	01/05/18	BOE APPLICATION			
E.	17/07/18	TOWN PLANNING APPLICATION RFI			
F.	07/02/19	TOWN PLANNING APPLICATION RFI AMENDMENT			
G.	18/03/19	PRELIMINARY DRAFT			

NOTES:



PROJECT:

CLIENT:

DRAWING: SECTION A

SCALE: 1:100 @A2

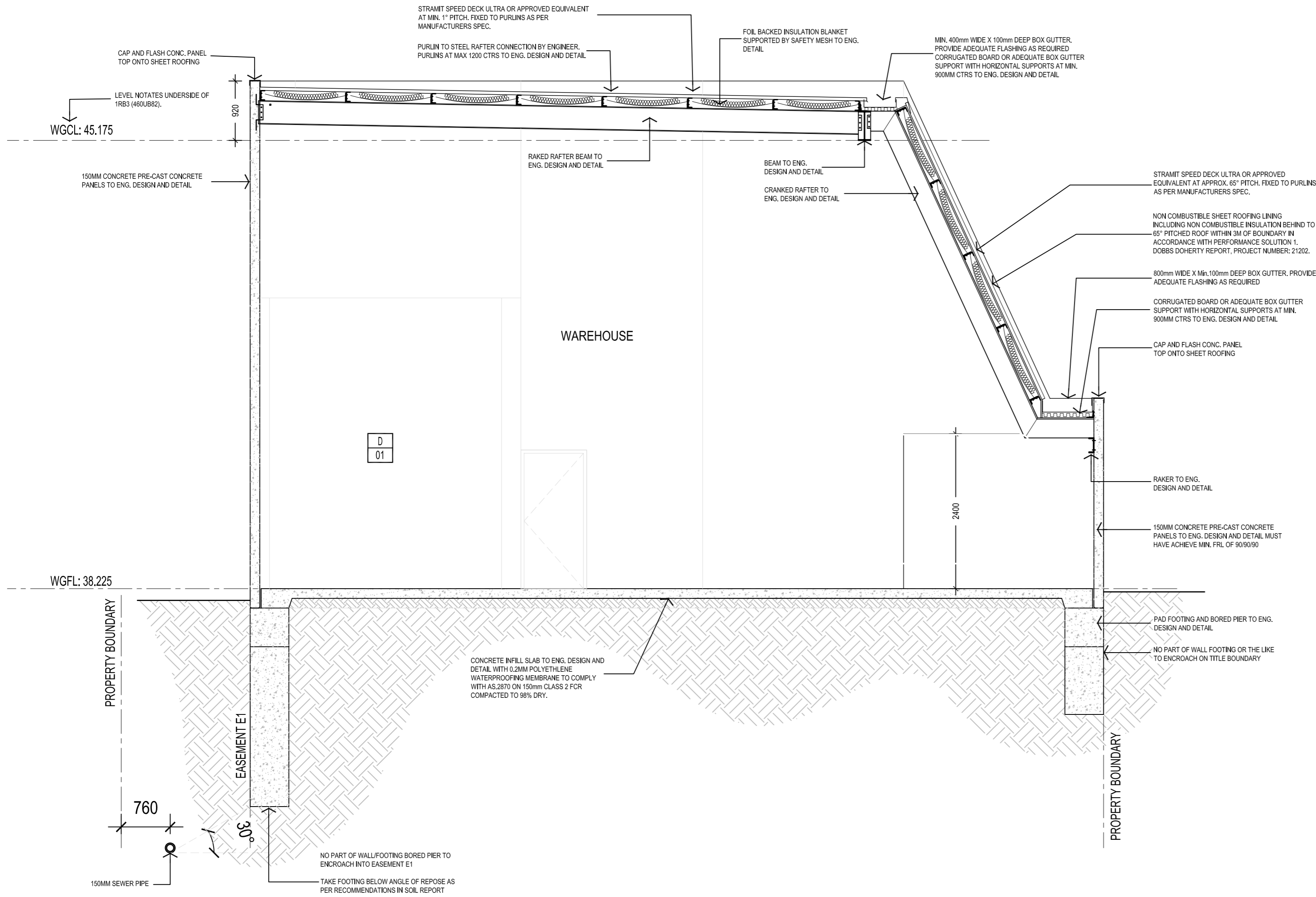
DATE: 22/07/19

CHECKED:

SHEET No. 08

REV. I.

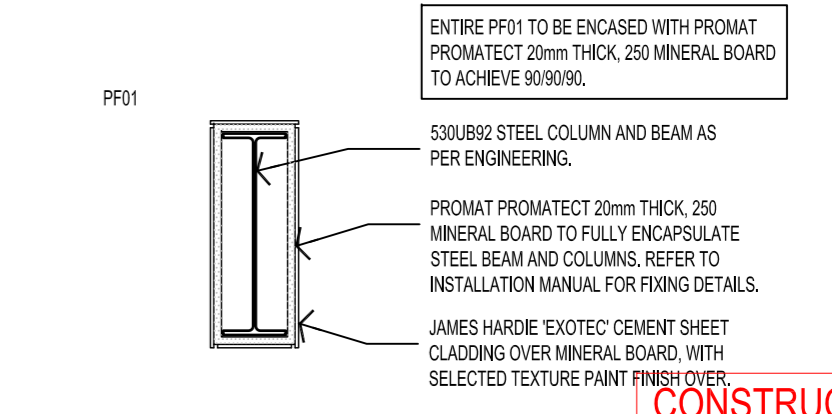
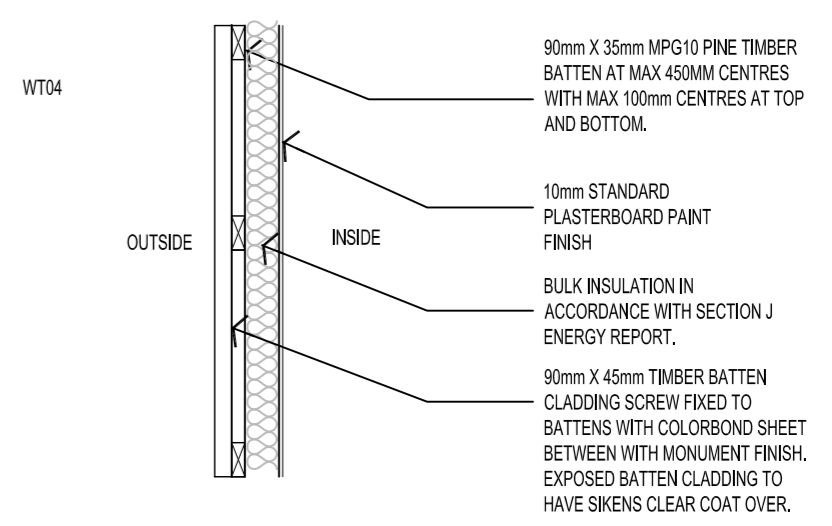
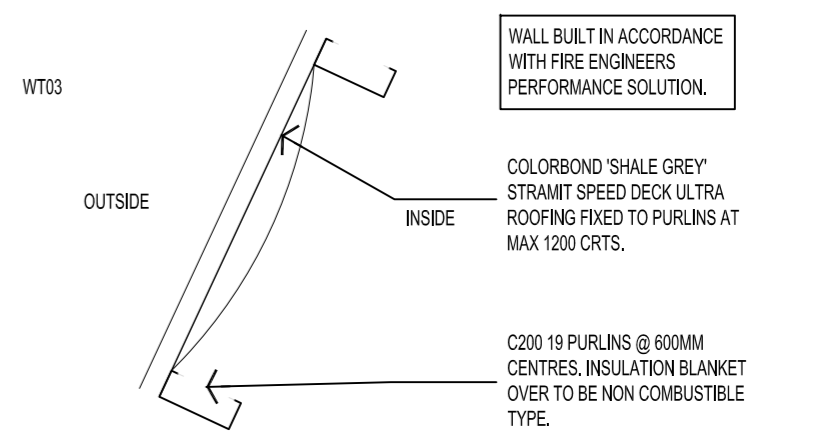
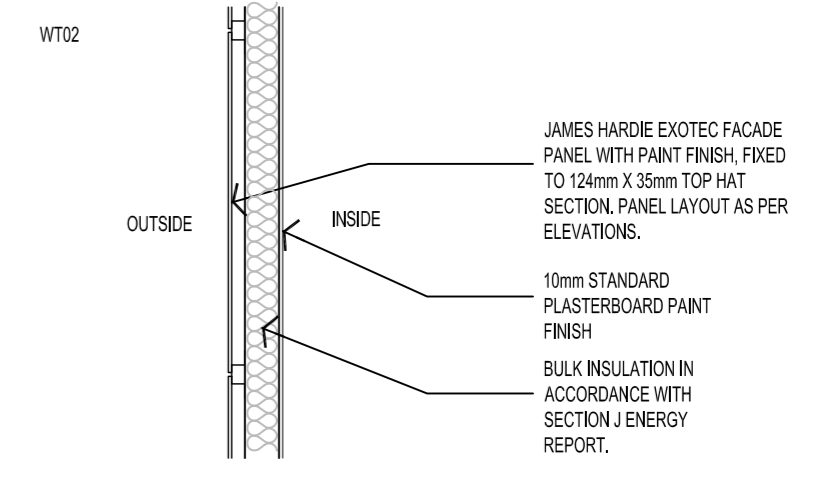
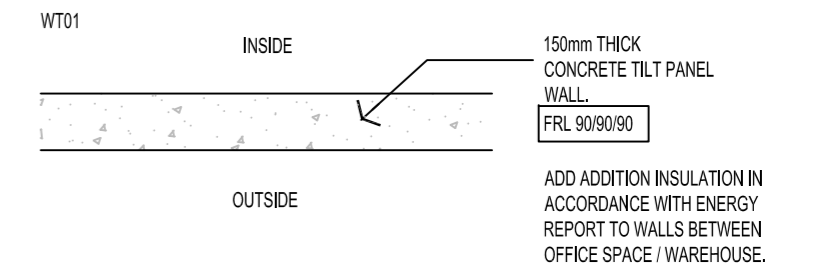




SECTION B  
SCALE 1:50

WALL TYPE SCHEDULE

ALLOW BREATHABLE WRAP TO ALL EXTERIOR STUD WALLS AS REQUIRED.



CONSTRUCTION ISSUE

REV.	DATE	DETAILS / AMENDMENTS	REV.	DATE	DETAILS / AMENDMENTS
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F.	07/02/19	TOWN PLANNING APPLICATION RFI AMENDMENT			
G.	18/03/19	PRELIMINARY DRAFT			

NOTES:

NORTH:

PROJECT: \_\_\_\_\_

CLIENT: \_\_\_\_\_

DRAWING: SECTION B

SHEET No. 09

SCALE: 1:50 @A2

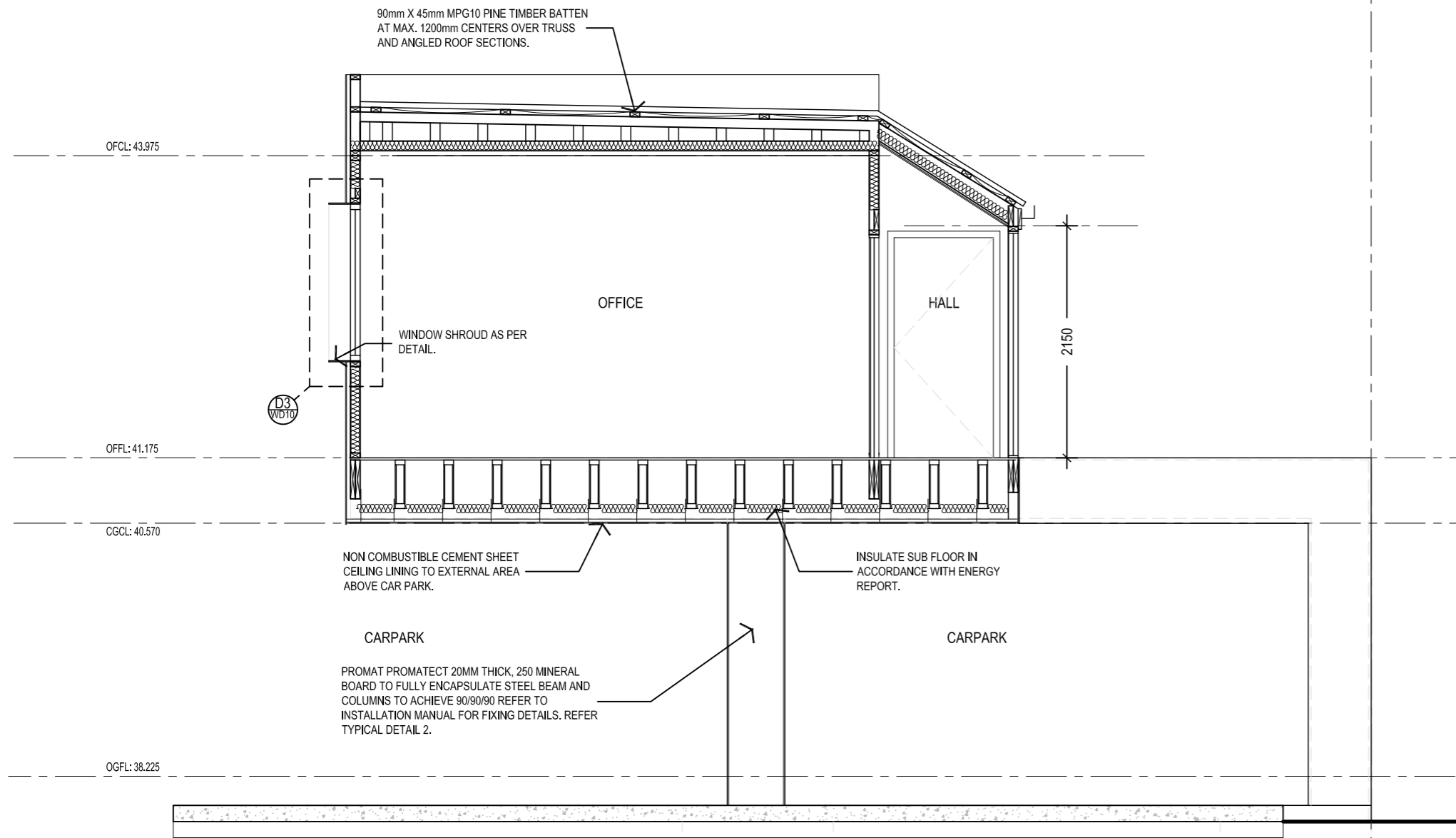
DATE: 22/07/19

DRAWN BY: \_\_\_\_\_

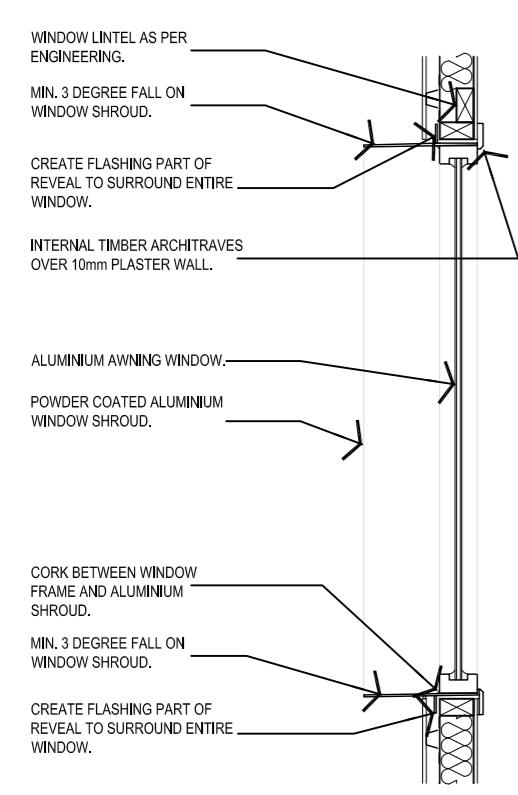
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REV: I.

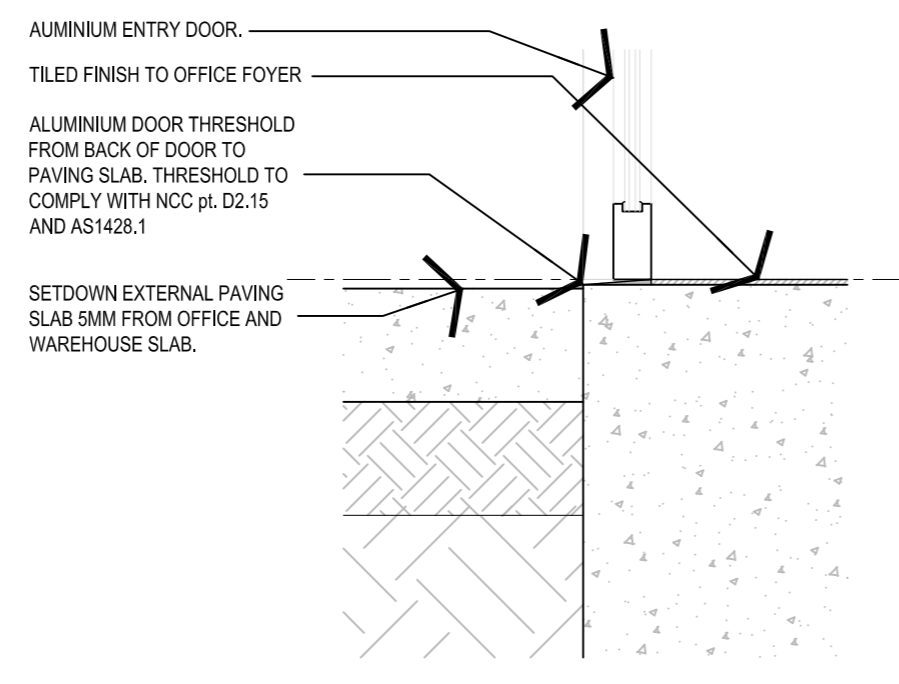
© Design21 Architecture



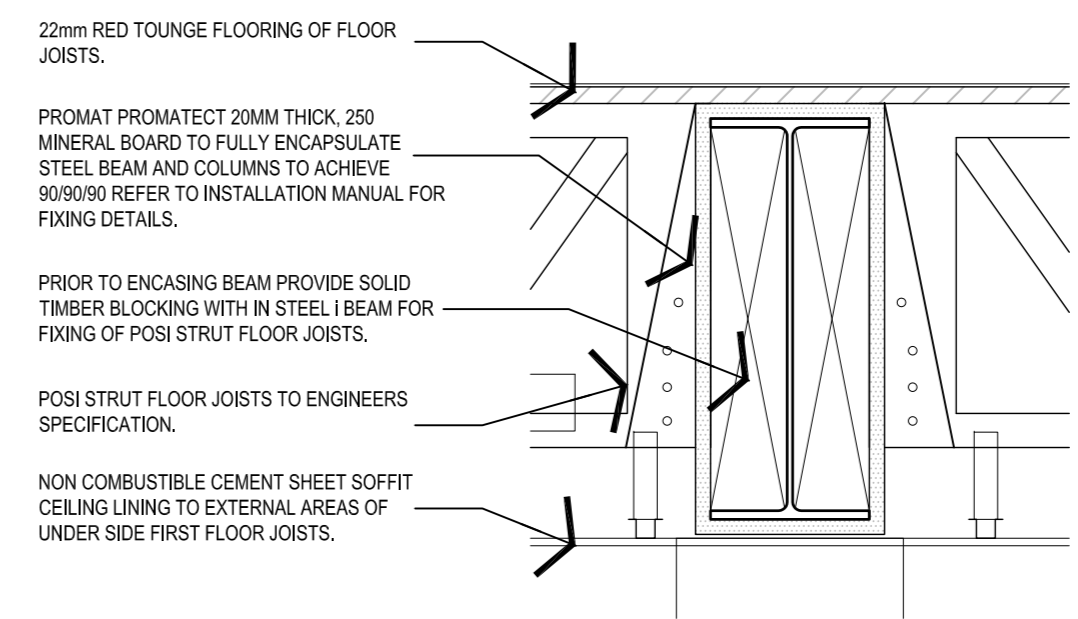
SECTION C  
SCALE 1:50



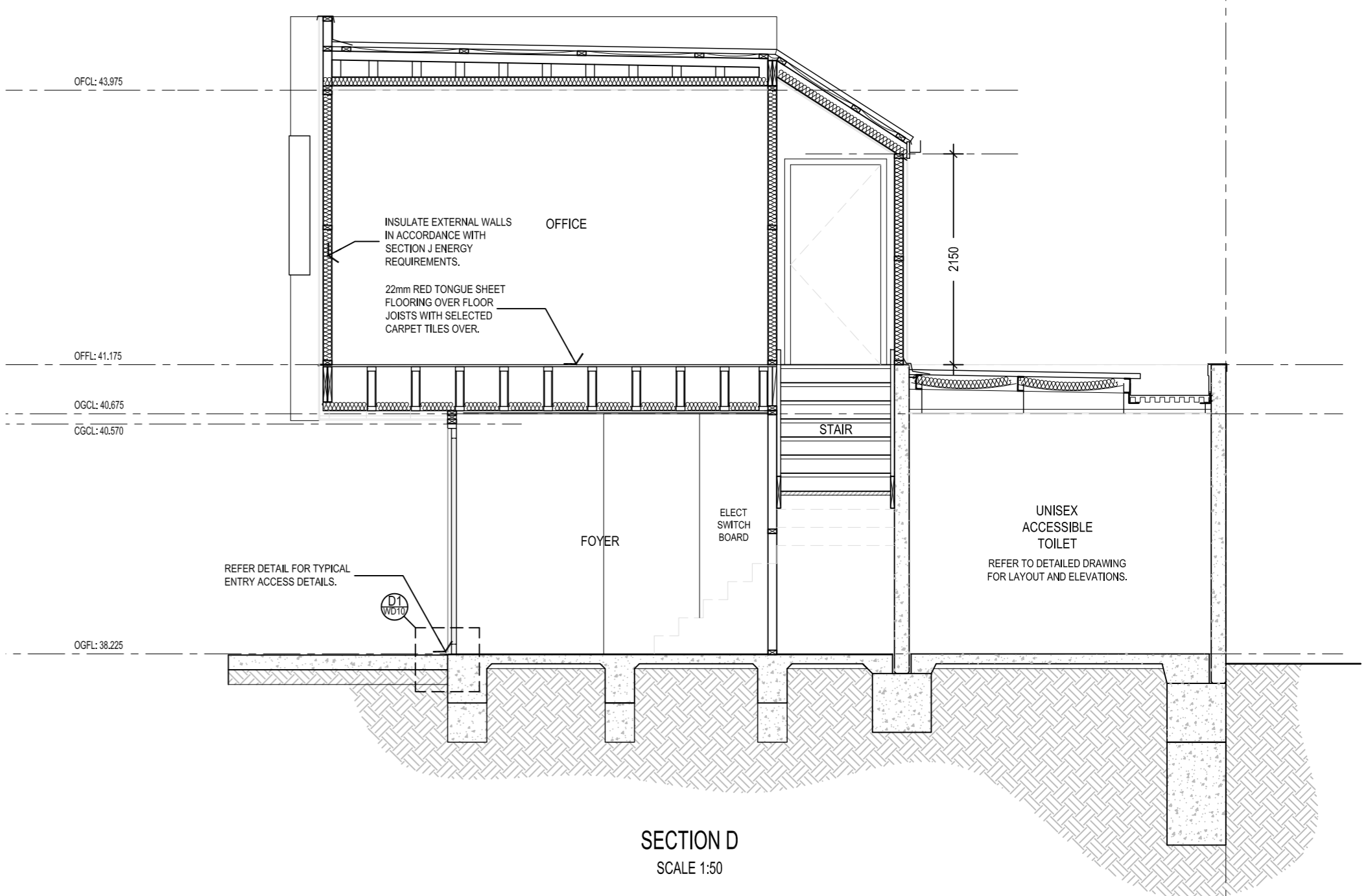
DETAIL 3  
SCALE 1:20



DETAIL 1  
SCALE 1:10



DETAIL 2  
SCALE 1:10

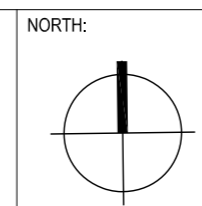


SECTION D  
SCALE 1:50

CONSTRUCTION ISSUE

REV.	DATE	DETAILS / AMENDMENTS	REV.	DATE	DETAILS / AMENDMENTS
A.	13/03/18	INITIAL DESIGN	H.	08/05/19	PRELIMINARY WORKING DRAWINGS
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E.	17/07/18	TOWN PLANNING APPLICATION RFI			
F.	07/02/19	TOWN PLANNING APPLICATION RFI AMENDMENT			
G.	18/03/19	PRELIMINARY DRAFT			

NOTES:

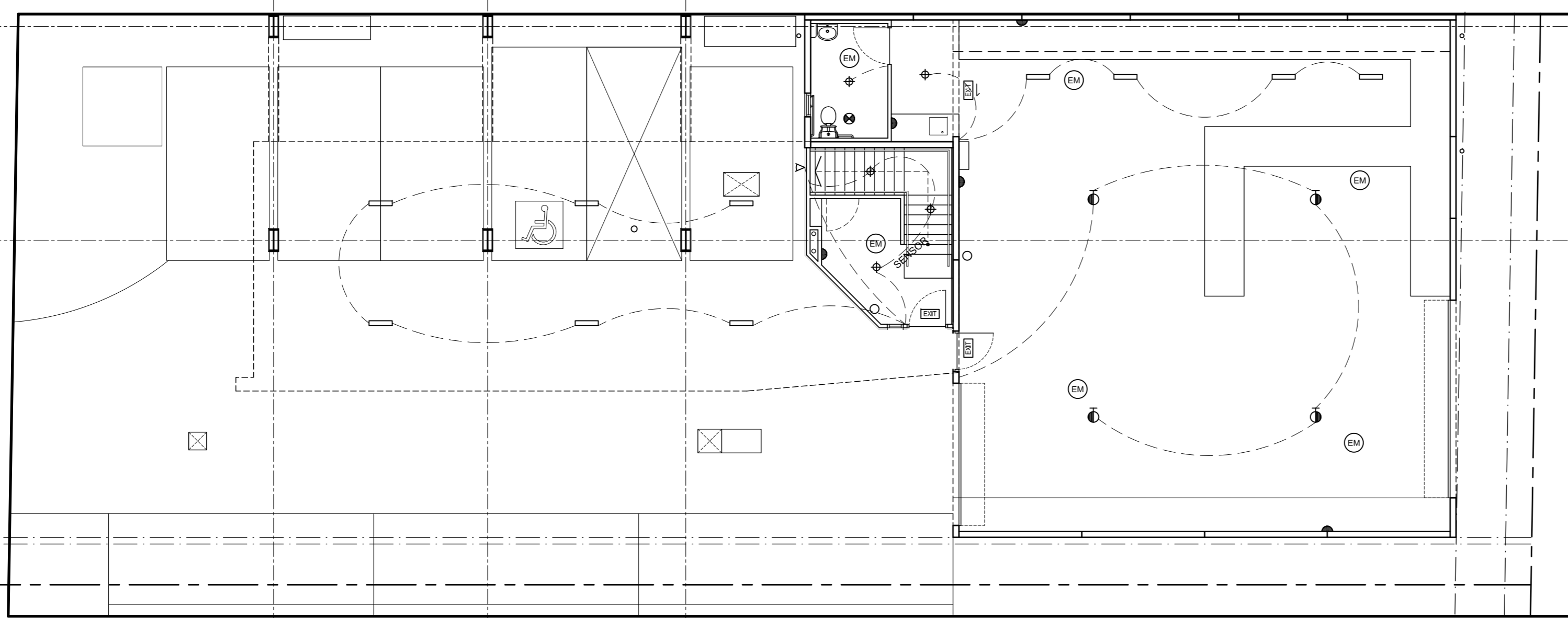


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CLIENT:

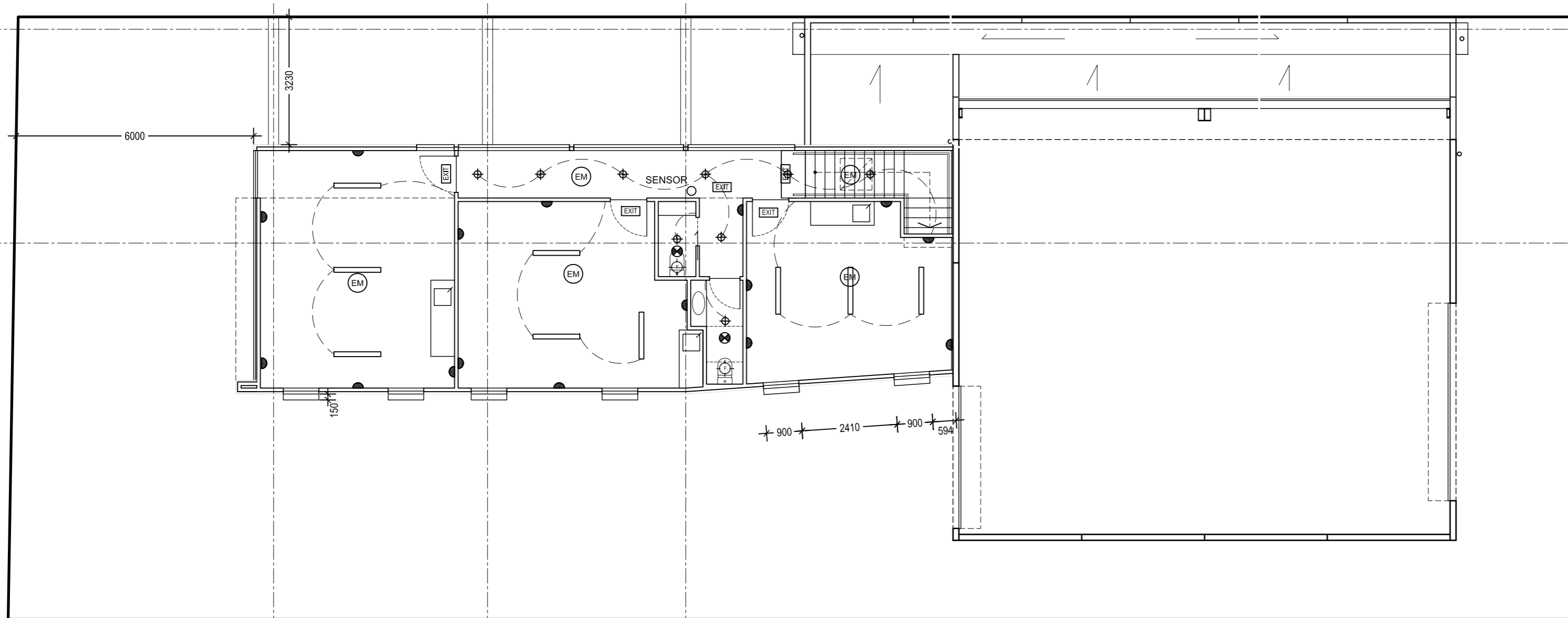
DRAWING: SECTION C / D & DETAILS  
SCALE: 1:50 @A2  
DATE: 22/07/19  
DRAWN BY:  
CHECKED:

SHEET No. 10  
REV. I.





GROUND FLOOR ELECTRICAL PLAN  
SCALE 1:100



FIRST FLOOR ELECTRICAL PLAN  
SCALE 1:100

**CEILING & ELECTRICAL SERVICES NOTES:**

- 1) EXHAUST FANS TO BE DUCTED TO OUTSIDE AIR THROUGH ROOF UNO.
- 2) INTERNAL CEILING LININGS TO BE FLUSH JOINTED PLASTERBOARD WITH SQUARE SET CORNICES.
- 3) CEILING LINING TO WET AREAS TO BE MOISTURE RESISTANT PLASTERBOARD.
- 4) CEILING HEIGHTS VARY ACCORDING TO RAKING AND OTHERWISE REFER ELEVATIONS AND SECTIONS.
- 5) GPO'S, LIGHT FITTINGS TO BE CO-ORDINATED WITH CABINETWORK LAYOUT.
- 7) ARTIFICIAL LIGHTING IN ACCORDANCE WITH NCC F4.4 AND AS 1680.  
MINIMUM LUMINANCE LEVELS.  
- OFFICE AREAS: 320LX.  
- CORRIDORS: 40LX.  
- AMENITY AREAS: 80LX  
- WAREHOUSE: 160LX

DATA POINT AND GPO LOCATIONS TO BE CONFIRMED ON SITE WITH OWNER PRIOR TO ROUGH IN.

**LEGEND**

**LIGHT POINTS**

- 150W HIGH BAY LIGHT
- LED DOWNLIGHTS - 24WATT
- 48W WHITE FLUSH MOUNT LED LEDLUX

**GENERAL PURPOSE OUTLETS**

- DOUBLE @ 350 AFL UNO
- SINGLE @ 350 AFL UNO
- WEATHERPROOF DOUBLE @ 1000 AFL UNO

**FANS**

- CEILING MOUNTED EXHAUST FAN DUCTED TO OUTSIDE AIR.

**SWITCHES**

- SWITCH 1000mm ABOVE FLOOR LEVEL UNO.
- DIMMER SWITCH 1000mm AFL UNO (TO INTERNAL LIGHT FITTINGS ONLY).

**MISCELLANEOUS**

- CAT 6E - DATA POINT
- MODEM POINT
- HARDWIRED SMOKE ALARM (INTERLINKED)
- 2-WAY 2 WAY SWITCHED LIGHT
- 500x500 FLUSH PANEL MDF ROOF ACCESS PANEL
- MOVEMENT ACTIVATED SENSOR TO REMOTE LIGHT FITTING(S)

**EMERGENCY LIGHTING TO COMPLY WITH AS2293.1**

- ILLUMINATED EXIT SIGN (RUNNING MAN)
- NEW EMERGENCY LIGHT ONLY EMERGENCY LIGHTING TO COMPLY WITH AS2293.1

**CONSTRUCTION ISSUE**

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A.	13/03/18	INITIAL DESIGN	H.	08/05/19	PRELIMINARY WORKING DRAWINGS
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F.	07/02/19	TOWN PLANNING APPLICATION RFI AMENDMENT			
G.	18/03/19	PRELIMINARY DRAFT			

NOTES:

NORTH:

PROJECT:

CLIENT:

DRAWING: ELECTRICAL PLANS

SCALE: 1:100 @A2

DATE: 22/07/19

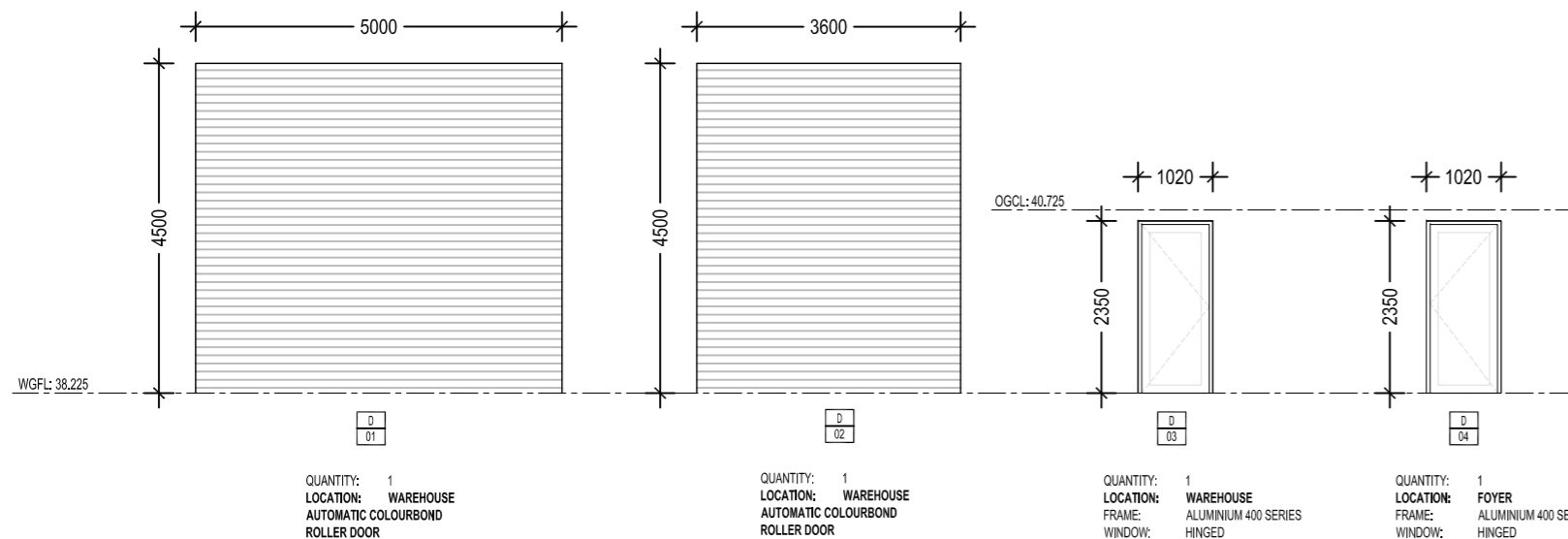
CHECKED:

SHEET No. 11

REV: I.

DOOR SCHEDULE

WSGL: 45245



QUANTITY: 1  
LOCATION: WAREHOUSE  
FRAME: ALUMINIUM 400 SERIES  
WINDOW: AUTOMATIC COLOURBOND ROLLER DOOR

QUANTITY: 1  
LOCATION: WAREHOUSE  
FRAME: ALUMINIUM 400 SERIES  
WINDOW: AUTOMATIC COLOURBOND ROLLER DOOR

QUANTITY: 1  
LOCATION: WAREHOUSE  
FRAME: ALUMINIUM 400 SERIES  
WINDOW: HINGED  
GLASS: DOUBLE GLAZED CLEAR  
FLYSCREEN: NO  
NOTES: BLACK HARDWARE

QUANTITY: 1  
LOCATION: FOYER  
FRAME: ALUMINIUM 400 SERIES  
WINDOW: HINGED  
GLASS: DOUBLE GLAZED CLEAR  
FLYSCREEN: NO  
NOTES: BLACK HARDWARE

FRONT ENTRY DOOR FITTED WITH COMPLIANT ESCAPE LATCH MECHANISM TO BCA D2.21. MAINTAIN MIN. 850mm MIN. CLEAR OPENING.

FRONT ENTRY DOOR FITTED WITH COMPLIANT ESCAPE LATCH MECHANISM TO BCA D2.21. MAINTAIN MIN. 850mm MIN. CLEAR OPENING.

- GENERAL NOTES:**
- GLAZING CONTRACTOR TO PROVIDE THERMAL RISK ASSESSMENT PRIOR TO COMMENCING FABRICATION.
  - ALL WINDOWS ARE VIEWED FROM OUTSIDE OR AS NOTED.
  - ALL GLAZING TO CONFORM TO AS.1288-2006 (PART1&2)
  - GLAZING TO CONFORM TO REQUIREMENTS OF BCA PART J. REFER TO ENERGY RATING REPORT FOR REQUIRED SHADE CO-EFFICIENTS AND SHGC.
  - UNDERCUT ALL BATHROOM DOORS AS REQUIRED.
  - PROVIDE LIFT OFF HINGES TO ALL SWING BATHROOM DOORS.
  - A-GRADE SAFETY GLASS TO ALL WET AREA WINDOWS.
  - DOUBLE HUNG COUNTER BALANCE SYSTEM TO ALL WINDOWS SHOWN AS SLIDING.
  - ALL WINDOWS TO BE ORDERED WITH EXTENDED SILLS.

- DOOR NOTES**
- ALL EXIT DOORS TO BE OPENABLE WITHOUT A KEY FROM THE DIRECTION OF EGRESS WITH A SINGLE-HANDED DOWNWARD ACTION OF A SINGLE-HANDED DEVICE LOCATED BETWEEN 900-1200MM ABOVE FINISHED FLOOR LEVEL.
- DOORS IN DISABLED ACCESS PATH TO HAVE A LATCHES AT A MAXIMUM HEIGHT OF 1100MM.
- INWARD OPENING DOORS TO FULLY ENCLOSED SANITARY COMPARTMENTS & DISABLED TOILETS SHALL BE FITTED WITH ESCAPE HINGE SETS.
- PROVIDE HYDRAULIC DOOR CLOSERS TO DOORS LEADING TO AMENITIES. EXIST DOORS & DOORS LEADING FROM AIR-CONDITIONED SPACE TO NON-AIR-CONDITIONED SPACE.
- PROVIDE DRIP MOULD &/OR STORM SEALS TO UNPROTECTED EXTERNAL DOORS.
- SIGNAGE FOR SANITARY AND EXIT DOORS IN ACCORDANCE WITH D3.6 (BRAILLE, TACTILE) AND AS 1428.1

CODE	SIZE (W x H)	DOOR TYPE	LOCATION
ID01	920 x 2040	NEW FLUSH SEMI SOLID CORE HINGED DOOR	ACCESSIBLE W.C
ID02	920 x 2040	FLUSH PANEL SOLID TIMBER DOOR	OFFICE
ID03	770 x 2040	FLUSH SEMI SOLID CORE HINGED DOOR	AMBULANT W.C
ID04	720 x 2040	FLUSH SEMI SOLID CORE CAVITY SLIDER	W.C
ID05	920 x 2040	FLUSH PANEL SOLID TIMBER DOOR	OFFICE
ID06	920 x 2040	FLUSH PANEL SOLID TIMBER DOOR	OFFICE

D 2.21 ESCAPE TYPE LATCHES FITTED TO LOCKABLE OFFICE DOORS ID2, ID5, & ID6.

ALL DOOR AND WINDOW FRAMES / FINISH TO BE POWDER COATED IN 'MONUMENT' FINISH OR SIMILAR.

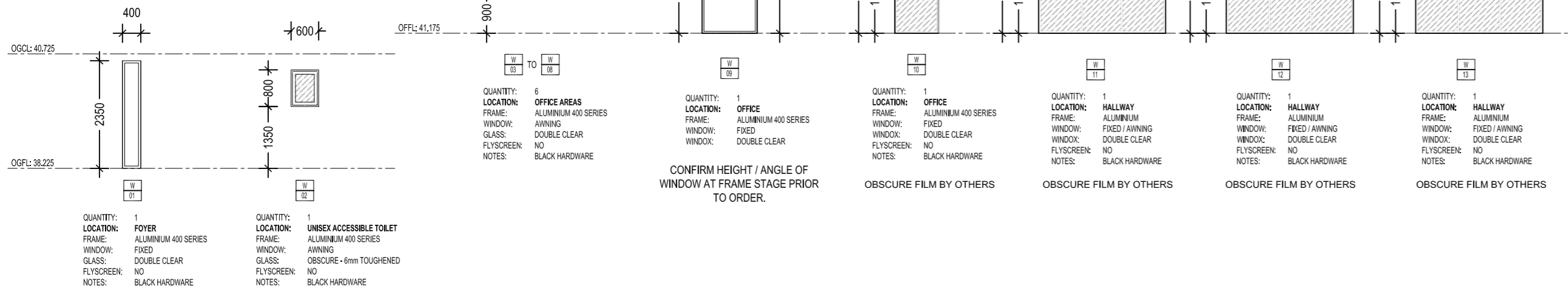
**FIRE ENGINEER PERFORMANCE SOLUTION NOTES:**

W02 - ALUMINIUM FRAME, MINIMUM 6mm TOUGHENED GLASS.

D03 & 4 - DOORS TO OPEN INWARDS IN ACCORDANCE WITH PERFORMANCE SOLUTION 2.

D02 - NO PROTECTION REQUIRED.

WINDOW SCHEDULE



QUANTITY: 6  
LOCATION: OFFICE AREAS  
FRAME: ALUMINIUM 400 SERIES  
WINDOW: AWNING  
GLASS: DOUBLE CLEAR  
FLYSCREEN: NO  
NOTES: BLACK HARDWARE

QUANTITY: 1  
LOCATION: OFFICE  
FRAME: ALUMINIUM 400 SERIES  
WINDOW: FIXED  
GLASS: DOUBLE CLEAR  
NOTES: BLACK HARDWARE

QUANTITY: 1  
LOCATION: OFFICE  
FRAME: ALUMINIUM 400 SERIES  
WINDOW: FIXED  
GLASS: DOUBLE CLEAR  
FLYSCREEN: NO  
NOTES: BLACK HARDWARE

QUANTITY: 1  
LOCATION: HALLWAY  
FRAME: ALUMINIUM  
WINDOW: FIXED / AWNING  
GLASS: DOUBLE CLEAR  
FLYSCREEN: NO  
NOTES: BLACK HARDWARE

QUANTITY: 1  
LOCATION: HALLWAY  
FRAME: ALUMINIUM  
WINDOW: FIXED / AWNING  
GLASS: DOUBLE CLEAR  
FLYSCREEN: NO  
NOTES: BLACK HARDWARE

QUANTITY: 1  
LOCATION: HALLWAY  
FRAME: ALUMINIUM  
WINDOW: FIXED / AWNING  
GLASS: DOUBLE CLEAR  
FLYSCREEN: NO  
NOTES: BLACK HARDWARE

CONFIRM HEIGHT / ANGLE OF WINDOW AT FRAME STAGE PRIOR TO ORDER.

OBSCURE FILM BY OTHERS

OBSCURE FILM BY OTHERS

OBSCURE FILM BY OTHERS

OBSCURE FILM BY OTHERS

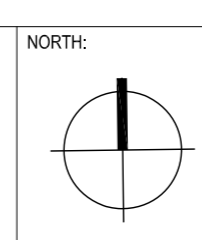
Window Schedule – external glazing and internal glazing to walls that are part of the conditioned envelope

ID	Façade	U-Value	SHGC	WERS Code	Description
W03-W08 Awnings	South	5.0	0.46	CAP-051-01	Capral 35 Awning Window into 400 Narrowline 6Clr/12/6Clr Double Glazed
W09 Fixed	West	3.6	0.64	CAP-152-01	Capral Urban 582 Fixed Light 6Clr/6/6Clr Double Glazed
W10-W13 Fixed w/shading device	North	3.6	0.64	CAP-152-01	Capral Urban 582 Fixed Light 6Clr/6/6Clr Double Glazed
W10-W13 Awnings w/shading device	North	5.0	0.46	CAP-051-01	Capral 35 Awning Window into 400 Narrowline 6Clr/12/6Clr Double Glazed
W10-W13 Fixed no shading device	North	3.2	0.26	THC-057-12	Thermeco – Series EC45 NTB Fixed Window 6EVanClr/12Ar/6Clr Double Glazed w TPS Spacer
W10-W13 Awnings no shading device	North	3.9	0.35	THC-059-08	Thermeco – Series EC45 NTB Awning Window 638TransLam/12Ar/4Clr Double Glazed w TPS Spacer
ID02, ID05, ID06	Internal	6.2	0.59	CAP-047-01	Capral 200 Hinged Door into 400 Narrowline 6Clr Single Glazed
W01 Fixed	South	3.6	0.64	CAP-152-01	Capral Urban 582 Fixed Light 6Clr/6/6Clr Double Glazed
D04	South	2.0	0.43	CPT-016-01	Entry Door 6.38Clr/12Ar/6ET Double Glazed

CONSTRUCTION ISSUE

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F.	07/02/19	TOWN PLANNING APPLICATION RFI AMENDMENT			
G.	18/03/19	PRELIMINARY DRAFT			

NOTES:



PROJECT:

CLIENT:

DRAWING: WINDOW & DOOR SCHEDULE

SCALE: 1:100 @A2

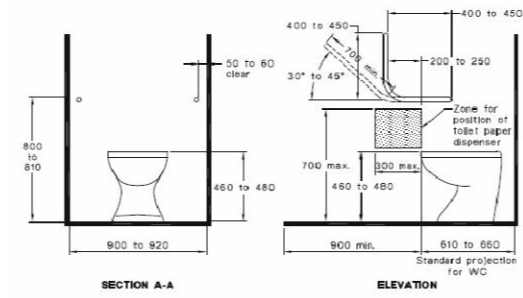
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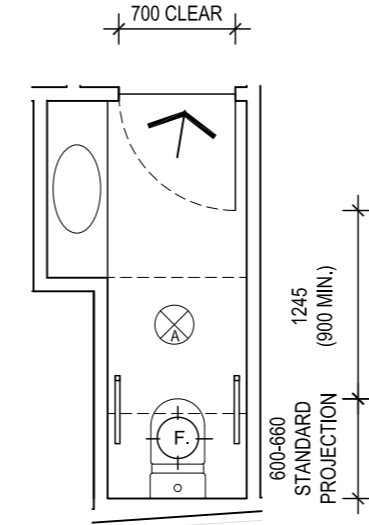
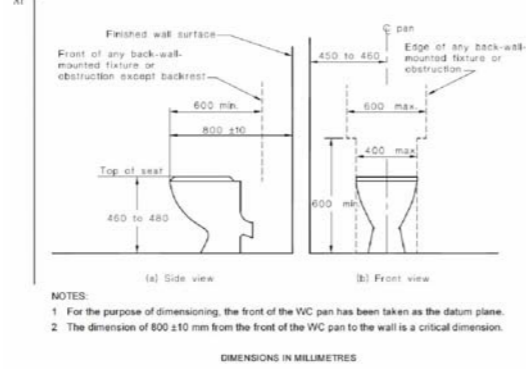
SHEET No. 12

REV. I.

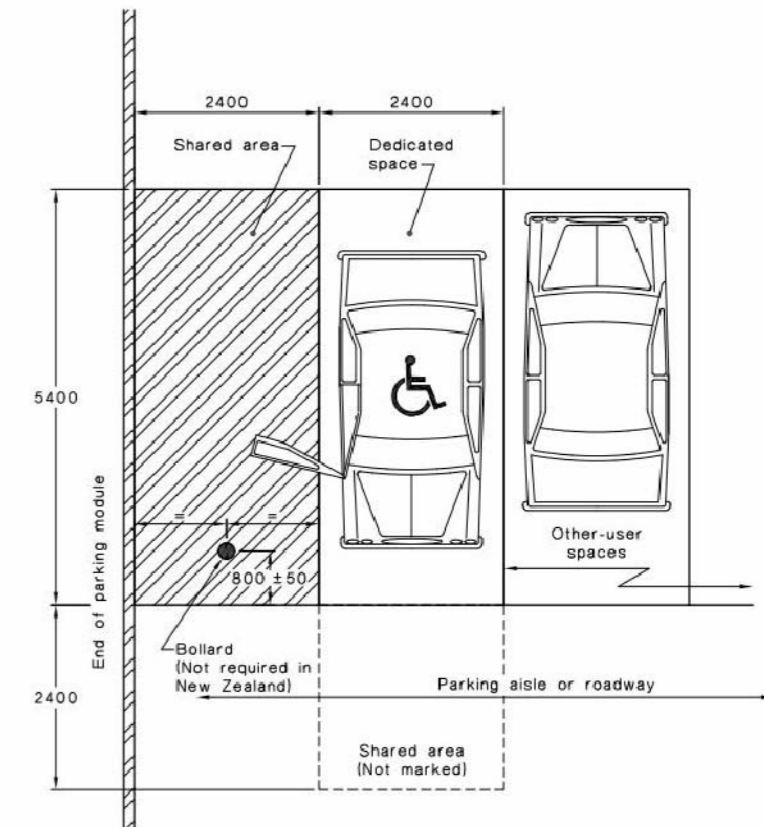
16.5 Coat hook  
A coat hook shall be provided within the sanitary compartment and at a height between 1350 mm to 1500 mm from the floor.



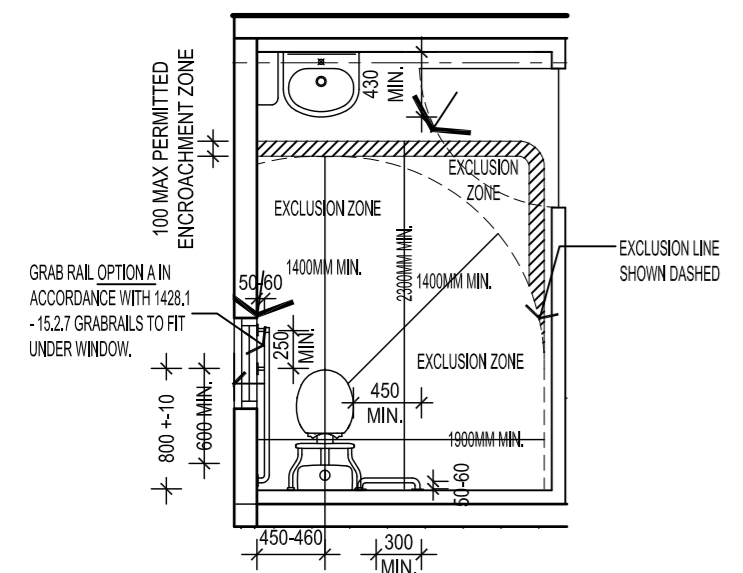
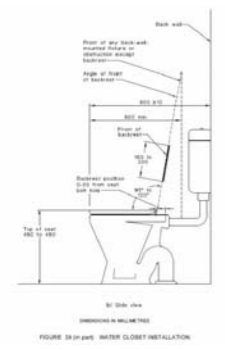
15.2.2 WC pan clearances  
WC pan clearances, including set-out, seat height and seat width shall be as shown in Figure 38.



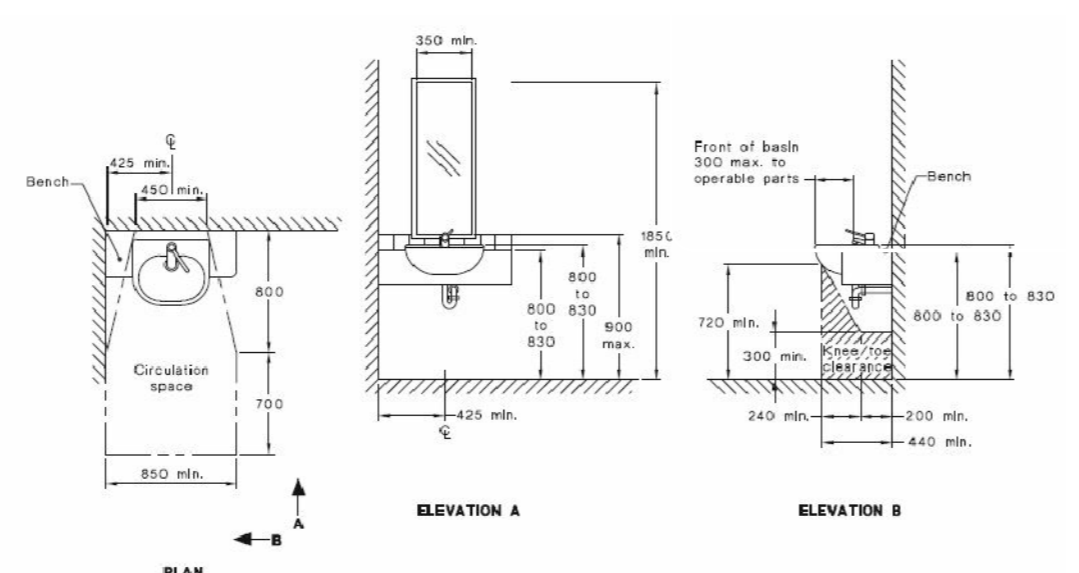
ALL ACCESSIBLE SANITARY FACILITIES  
MUST COMPLY WITH AS.1428.1  
OFFICE UNISEX AMBULANT TOILET PLAN  
SCALE 1:50



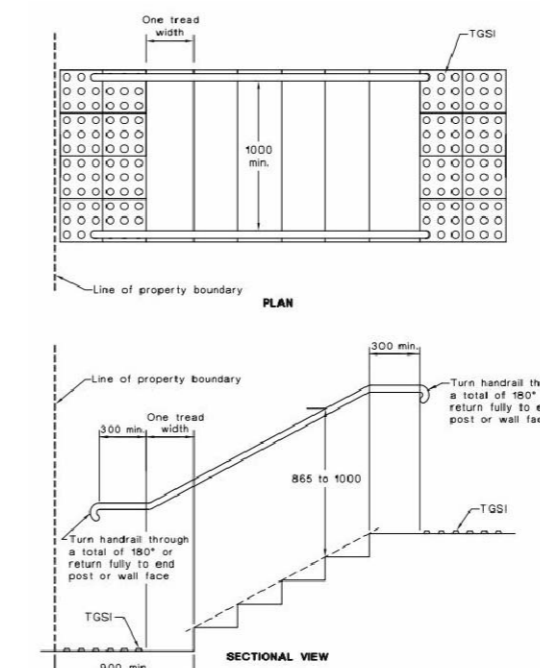
DIMENSIONS IN MILLIMETRES  
FIGURE 2.2 EXAMPLE OF AN ANGLE PARKING SPACE WITH SHARED AREA ON ONE SIDE ONLY—DIMENSIONS FOR AUSTRALIA ONLY\*



ALL ACCESSIBLE SANITARY FACILITIES  
MUST COMPLY WITH AS.1428.1  
WAREHOUSE UNISEX ACCESSIBLE TOILET PLAN  
SCALE 1:50



NOTE: 'Operable parts' means the centre-line of the tap, or where a level handle is provided, the end point of the level measure throughout its arc of movement, or where a sensor is provided where the sensor is reliably activated.  
DIMENSIONS IN MILLIMETRES  
FIGURE 44(A) SEMI-RECESSED WASHBASIN INSTALLATION —OTHER THAN FOR SOLE-OCCUPANCY UNIT



DIMENSIONS IN MILLIMETRES  
FIGURE 26(A) STAIRWAY LOCATION AND HANDRAIL EXTENSIONS AT BOUNDARY

TYPICAL ACCESSIBLE DETAILS.  
SCALE 1:50

CONSTRUCTION ISSUE

REV.	DATE	DETAILS / AMENDMENTS	REV.	DATE	DETAILS / AMENDMENTS
A.	13/03/18	INITIAL DESIGN	H.	08/05/19	PRELIMINARY WORKING DRAWINGS
B.	27/03/18	TOWN PLANNING DRAFT	I.	24/07/19	CONSTRUCTION ISSUE WORKING DRAWINGS
C.	05/04/18	TOWN PLANNING APPLICATION			
D.	01/05/18	BOE APPLICATION			
E.	17/07/18	TOWN PLANNING APPLICATION RFI			
F.	07/02/19	TOWN PLANNING APPLICATION RFI AMENDMENT			
G.	18/03/19	PRELIMINARY DRAFT			

NOTES:  
NORTH:  
PROJECT:  
CLIENT:

DRAWING: ACCESSIBLE DETAILS  
SHEET No. 13  
SCALE: @A2 1:50  
DATE: 22/07/19  
DRAWN BY: CHECKED:

REV. I.



# Fire Engineering Report

# Executive Summary

\_\_\_\_\_ has appointed \_\_\_\_\_ to undertake a fire engineering evaluation for the \_\_\_\_\_ Building.

This Fire Engineering Report (FER) evaluates the proposed Performance Solutions against the Building Code of Australia (BCA) Performance Requirements. All other aspects of the design are assumed to comply with the DTS Provisions or have been granted dispensations by approval authorities / referral agencies.

The following variations to the Deemed-to-Satisfy provisions have been identified by the Relevant Building Surveyor (RBS) and are addressed in this report:

**Table 1 Proposed Performance Solutions and Reference Criteria**

Proposed Performance Solution	Building Code of Australia		IFEG Subsystem
	DTS Provision	Performance Requirement	
To provide technical justification for deletion of Fire Resistance Level (FRL) to the steep external wall / roof in lieu of 90/90/90.	C1.1 / Spec C1.1 Table 5	CP1, CP2	C
To provide technical justification for unprotected openings in external walls within 3m of a fire source feature: <ul style="list-style-type: none"><li>▪ non automatic roller shutter door D 02,</li><li>▪ warehouse window W 02.</li></ul>	C3.2	CP2	C
To provide technical justification for door swing against the direction of egress travel.	D2.20	DP2(b)	E

The proposed Performance Solutions have been evaluated and it is our considered opinion that the building design meets the BCA Performance Requirements with the inclusion of the following specification of required fire safety measures:

**Table 2 Specification of Required Fire Safety Measures**

System	Performance Standard in addition to the BCA DTS Provisions
Construction Requirements	Openings in external walls and non-fire rated pitched roof within 3m of adjacent property boundaries will be protected in accordance with Table 11.  The doors providing access to the car park from the warehouse and office foyer at Ground Floor will swing inwards. Additional signage will be provided on the inside face of the doors to clearly indicate "PULL".

Other than the abovementioned requirements and the specifically addressed deviations from the DTS provisions in this report, it is assumed that all other parts of the building's passive and active fire safety system will be installed and maintained as required by the BCA DTS Provisions.



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# 1 Introduction

## 1.1 Purpose

The client has appointed \_\_\_\_\_ to undertake a fire engineering evaluation for the Building.

This Fire Engineering Report (FER) evaluates the proposed Performance Solutions against the Building Code of Australia (BCA) Performance Requirements. All other aspects of the design are assumed to comply with the DTS Provisions or have been granted dispensations by approval authorities / referral agencies.

This report is only to be used for the Building with the design as described in the referenced documentation. The report is not to be used to support any other design scheme as changes to the design may affect the evaluation. \_\_\_\_\_ takes no responsibility for any issues associated with the misuse of this report.

## 1.2 Relevant Legislation

The primary legislation applicable to the development is the Building Code of Australia 2019 (BCA) (ABCB, 2019). The BCA provides a set of Performance Requirements which must be complied with. The prescriptive deemed-to-satisfy (DTS) Provisions are also described in the BCA. A design that complies with the DTS Provisions is deemed to comply with the Performance Requirements. A Performance Solution is a design that does not comply with the DTS Provisions however is shown to comply with the Performance Requirements by way of an evaluation.

The evaluation of a proposed Performance Solution can be undertaken using a variety of methods. These are defined in Clause A2.2(2) of the BCA. One or more, or a combination of these methods are adopted to determine whether the proposed Performance Solution complies with the Performance Requirements of the BCA. The relevant Performance Requirements are determined in accordance with Clause A2.2(3) of the BCA. Compliance with Performance Requirements is undertaken in accordance with A2.2(1) of the BCA.

### 1.3 Reference Documentation

The report is based on information contained in the following documents and drawings:

**Table 3 Reference Documentation**

Document	Prepared by	Issue
s		

### 1.4 Relevant Fire Engineering Guidelines

The Fire Engineering process is based on the International Fire Engineering Guidelines (IFEG) (ICC, NRC, DBH, ABCB, 2005).

In accordance with IFEG, a Fire Engineering Brief (FEB) should be prepared. The FEB is required to include a trial design, the framework for evaluation and acceptance criteria for proposed Performance Solutions. Approval by stakeholders indicates acceptance of proposed trial designs, calculation methods, assumptions, and acceptance criteria for use in the FER.

Where issues are relatively minor and there is no need to obtain documented stakeholder approval before proceeding with the evaluation, an FER can stand alone. In this case, the report will include the relevant information usually contained within an FEB as well as calculations, justification and evaluations to demonstrate that proposed Performance Solutions satisfy the agreed acceptance criteria and therefore comply with the Performance Requirements of the BCA.

We understand that provisions for the fire brigade comply with the DTS provisions and no application under Building Regulation 129 will be made. Hence, the fire brigade is not considered to be a referral agency for this project and have not been identified as a stakeholder in the FEB/FER process on the advice from the RBS.



## 1.5 Project Stakeholders

The project stakeholders are listed below:

**Table 4 Relevant Stakeholders**

Contact	Organisation	Role
		Client
		Building Designer
		Relevant Building Surveyor
		Fire Safety Engineer

## 1.6 Report Limitations

The following limitations are applicable with respect to the fire engineering evaluation undertaken in this report:

- The report is limited to the evaluation of proposed Performance Solutions for the BCA DTS variations identified in this report for compliance with relevant BCA Performance Requirements. With the exception of these proposed Performance Solutions, all other fire safety aspects of the building are to comply with the BCA DTS Provisions.
- This evaluation deals with the fire safety provisions of the BCA only and does not consider amenity or non-fire related matters in the building such as health, amenity, security, energy efficiency, occupational health & safety, compliance with Disability Discrimination Act (DDA) etc, which are to be addressed by others. Consequently, the outcomes of this evaluation have not been checked or verified for their fitness for purpose of any non-fire safety related matters including the ones outlined above.
- This evaluation is not a full compliance or conformance audit for any fire safety system. Therefore, operational checks of fire safety equipment, verification of construction techniques, fire resistance levels or the witnessing of fire drills or exercises are specifically excluded from the scope of this evaluation. The operational status of systems, items of equipment and staff training should be addressed as part of the inspection, commissioning, enforcement, maintenance, testing, training and management procedures for the building.
- This evaluation will be consistent with the objectives and limitations of the BCA and therefore specifically excludes multiple ignition sources, acts of terrorism, protection of property (other than adjoining property), business interruption or losses, personal or moral obligations of the owner/occupier, reputation, environmental impacts, broader community issues etc.
- Arson has been shown statistically to contribute to fire. This report has addressed the incidence of minor forms of arson as a single ignition source. However major arson involving accelerants and/or multiple ignition sources are beyond the scope of this evaluation and have been excluded.

- Reports marked 'Not for Construction' may be subject to change and are not released as final reports. [redacted] accepts no liability pending release of the final version of the report.
- The design concepts outlined in this report are for a complete and operational building and do not address protection of the building during construction, renovation or demolition.
- Any change in building, occupant or fuel conditions from those considered in this report, or any deviation from the implementation of the fire safety strategy outlined in this report, may result in outcomes not anticipated by the proposed strategy and should be reviewed.
- Evaluation of the expected level of fire induced property damage with respect to the contents and building structure is specifically excluded.
- The recommendations in this evaluation are based on information provided by others. [redacted] has not verified the accuracy and/or completeness of this information and accepts no responsibility or liability for any errors or omissions which may be incorporated into this evaluation as a result.
- The recommendations, data and methodology documented in this evaluation are based on the listed documentation and specifically apply to the subject building and must not be utilised for any other purpose. Any modifications or changes to the building, fire safety management system, or building usage from that described may invalidate the findings of this evaluation necessitating a re-evaluation.
- All equipment, services and measures specified in the Trial Design or Required Fire Safety Measures described in this report or as required by the BCA DTS Provisions and not described in this report must be commissioned and maintained to their required standard of operation at the time of commissioning in accordance with the applicable maintenance standard or procedure.
- [redacted] incorporates all practical efforts in producing a fire safety strategy in accordance with BCA requirements and client's brief. It must be recognised that fire is a complex and variable phenomenon and that a fire may occur during the life of the building which may result in injury, death or property loss.

## 2 Principal Building Characteristics

The building and occupant characteristics described below are informative only. The information is based on referenced documentation and is current at the time of writing this report. It is not intended to restrict or limit the design and is subject to clarification or change as the design develops.

It is the responsibility of the design team, services engineers and building surveyor to ensure compliance with all parts of the BCA DTS provisions except where described as a proposed Performance Solution in this report or where other dispensations have been granted. A consolidated set of design criteria for design guidance is described in the Executive Summary.

### 2.1 Building Characteristics

The project comprises a 2-storey building containing office, carparking and warehouse.

**Table 5 Building Parameters**

BCA Parameter	
Occupancy	Office, Carpark, Warehouse
BCA Classification	Class 5, Class 7a, Class 7b
Rise in Storeys	2
Number of Storeys Contained	2
Effective Height	2.95m
Type of Construction	Type C

The building will be located at \_\_\_\_\_, shown in the figure below.



**Figure 1 Aerial Image of Site (Google Maps)**



The building is shown in the following figures.

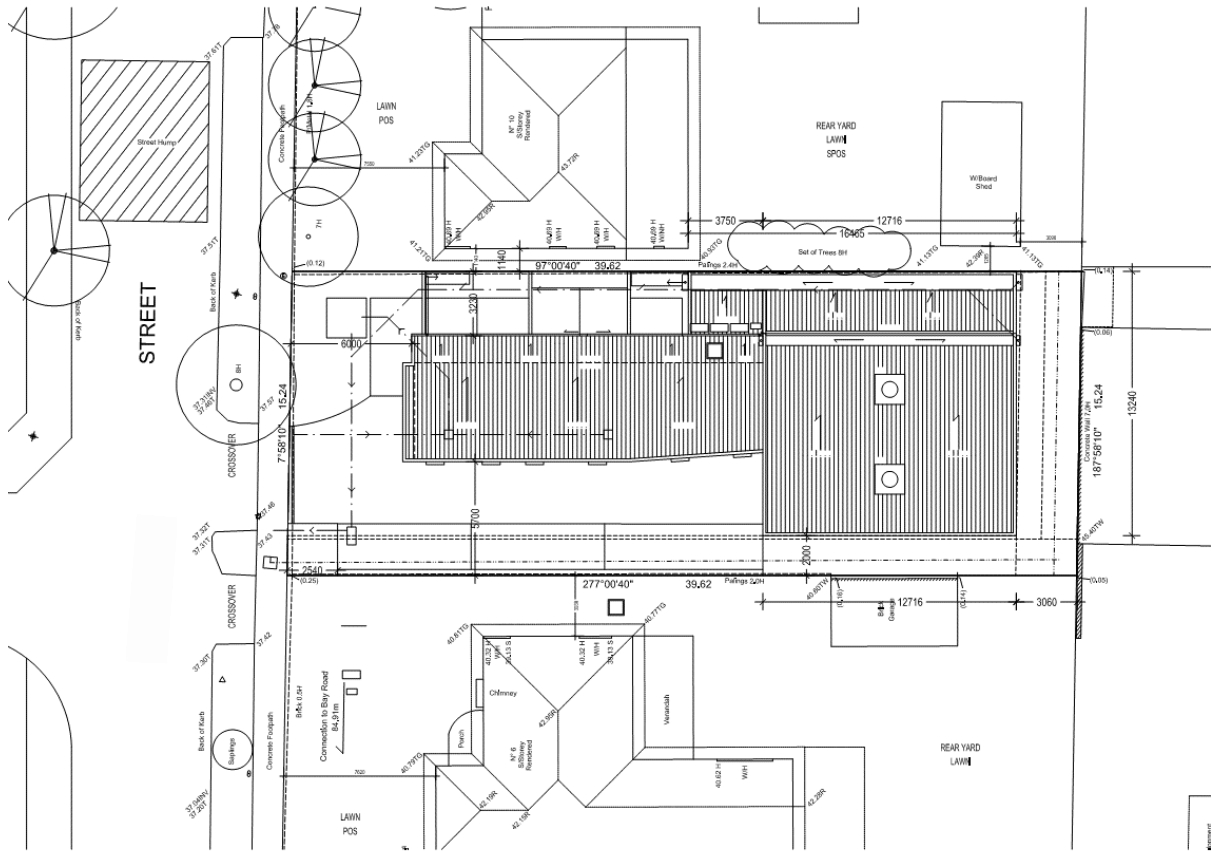


Figure 2 Site Plan

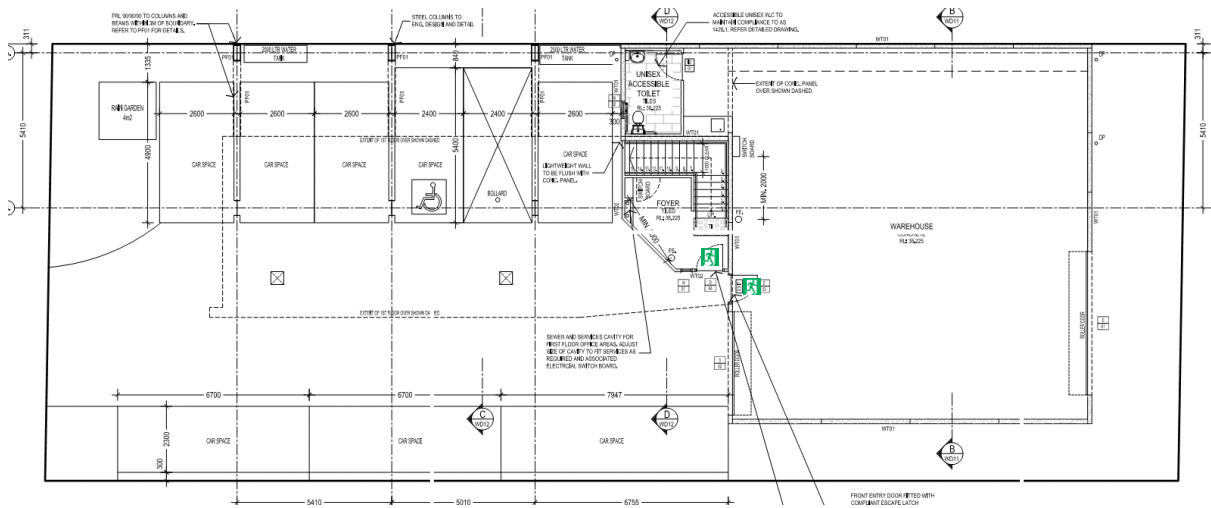


Figure 3 Ground Floor Plan

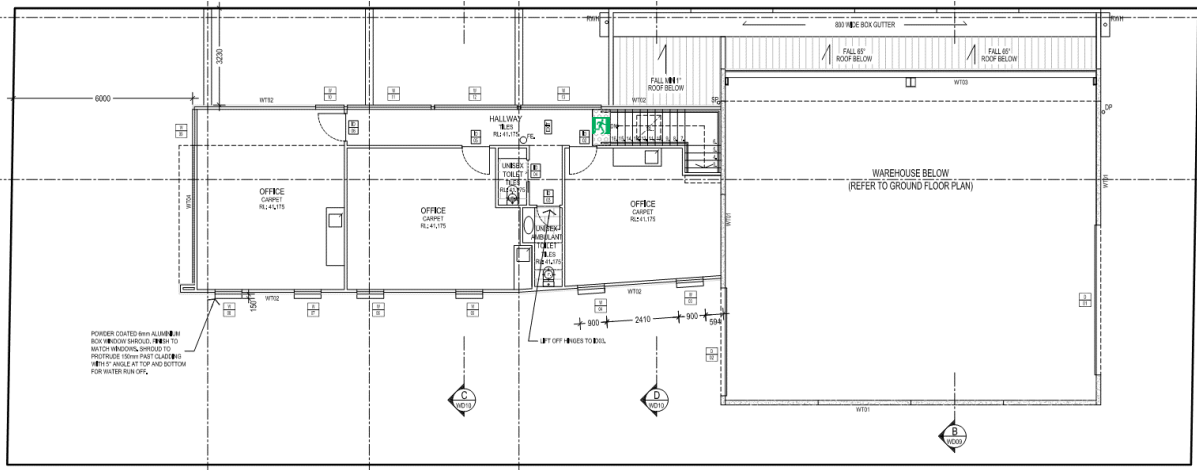


Figure 4 First Floor Plan

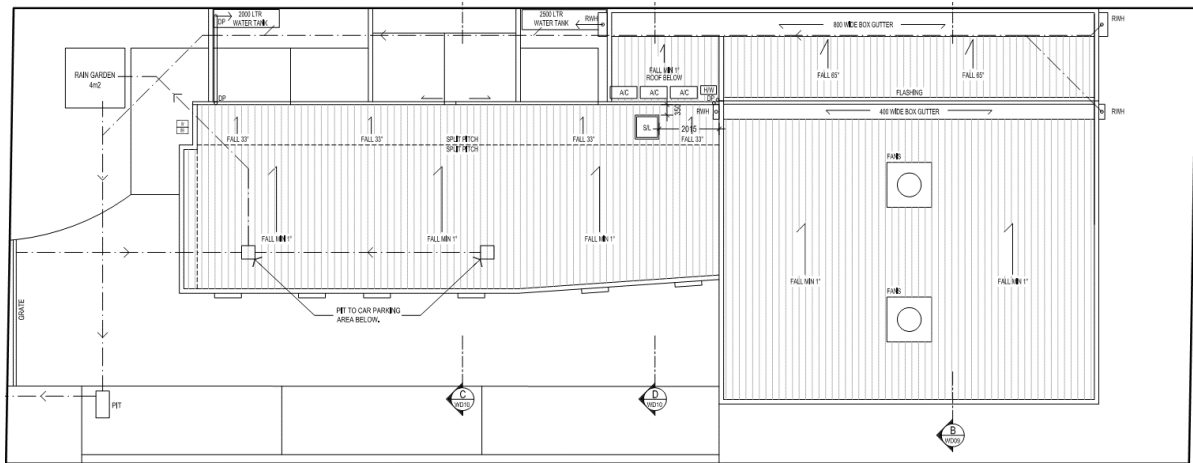


Figure 5 Roof Plan

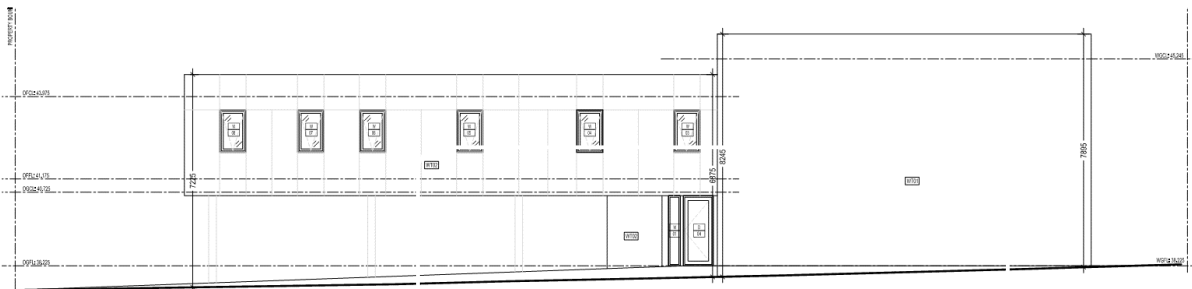


Figure 6 South Elevation

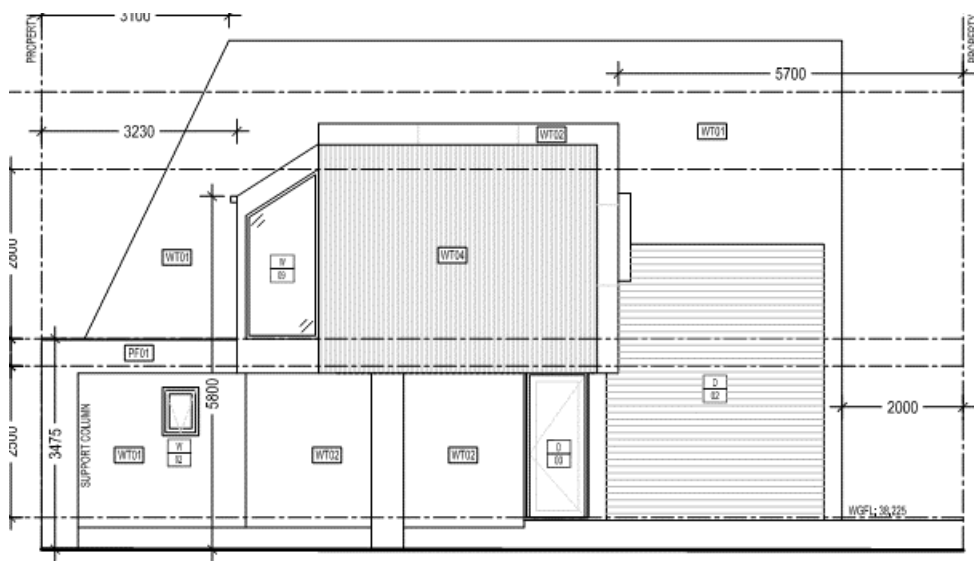


Figure 7 West Elevation

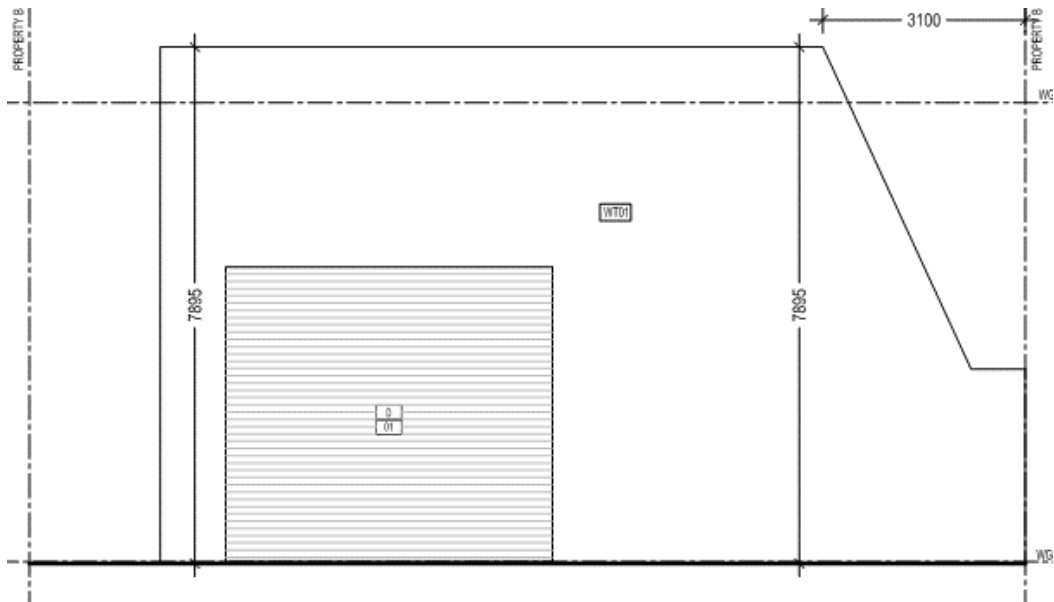


Figure 8 East Elevation

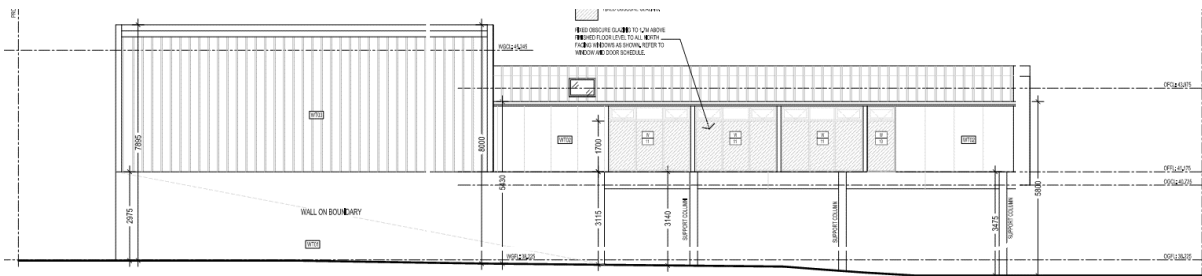


Figure 9 North Elevation

### 3 Occupant Characteristics

Building occupants will be representative of the general population and would be awake, alert and mobile at all times while in the building.

Their response time to a possible fire scenario is likely to be minimal provided they are given clear directives.

It is expected that the majority of the occupants in the building will not require physical assistance to evacuate the building in an emergency. Physically and/or mentally disabled occupants are expected to be assisted by other occupants in the building (e.g. co-workers, other staff, family, friends and other occupants).

Occupants would not normally engage in fire-fighting operations, apart from first-attack response to small fires. It has been assumed that occupants will have no formal emergency training.

The expected maximum distribution of occupants will be as follows:

- Office: The assumed total number of occupants would be consistent with a density of 10m<sup>2</sup> per occupant as described in BCA D1.13.
- Storage: The assumed total number of occupants would be consistent with a density of 30m<sup>2</sup> per occupant as described in BCA D1.13.

The occupant load above is used to give an indication of the possible occupant load in the building and is not intended to limit the permitted number of occupants in the building.



## 4 Fire Engineering Evaluation

### 4.1 Performance Solution 1 – Protection of Openings and Pitched Roof

#### 4.1.1 Introduction

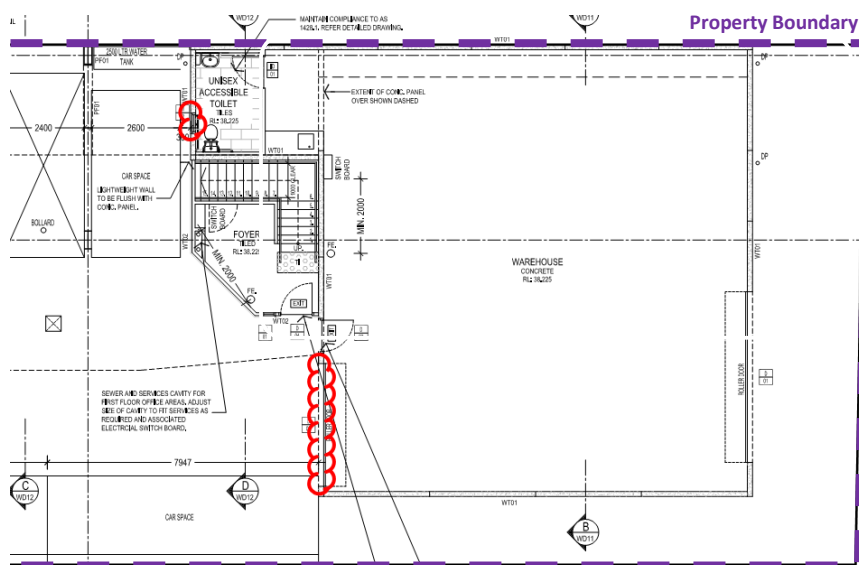
The following table briefly describes the proposed Performance Solution, the relevant BCA DTS Clause(s) and Performance Requirements and the relevant IFEG Subsystem.

**Table 6 Proposed Performance Solution and Reference Criteria**

Proposed Performance Solution	Building Code of Australia		IFEG Subsystem
	DTS Provision	Performance Requirement	
To provide technical justification for deletion of Fire Resistance Level (FRL) to the steep external wall / roof in lieu of 90/90/90.	C1.1 / Spec C1.1 Table 5	CP1, CP2	C
To provide technical justification for unprotected openings in external walls within 3m of a fire source feature: <ul style="list-style-type: none"> <li>non automatic roller shutter door D 02,</li> <li>warehouse window W 02.</li> </ul>	C3.2	CP2	C

It is understood that a section of the northern external wall / roof of the warehouse will not be fire rated. Therefore, for the purposes of evaluation in this report, this non-fire rated pitched roof will be considered an unprotected opening.

The proposed openings and non-fire rated pitched roof within 3m of a property boundary are described in the figures below.



**Figure 10 Ground Floor Plan – Unprotected Openings**

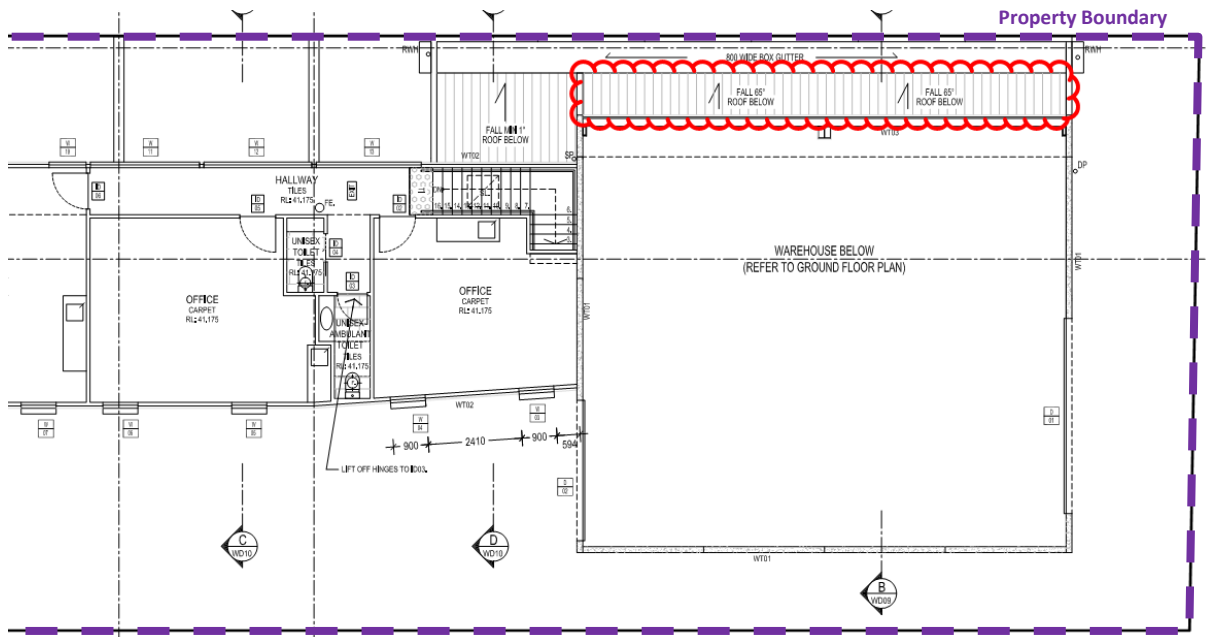


Figure 11 First Floor Plan – Non-Fire Rated Pitched Roof

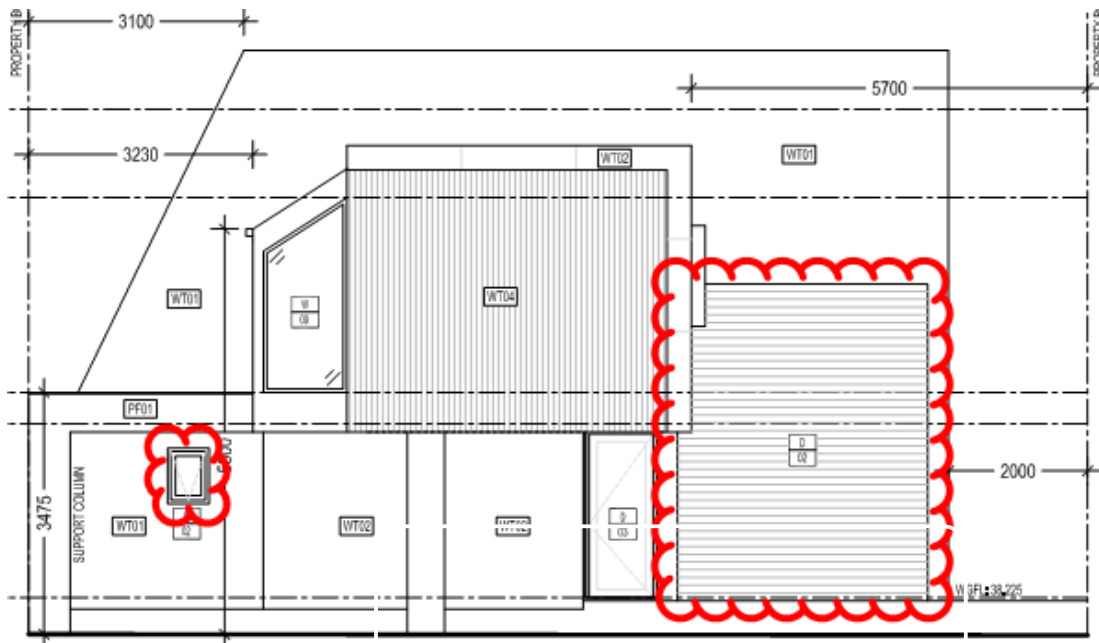


Figure 12 West Elevation – Unprotected Openings

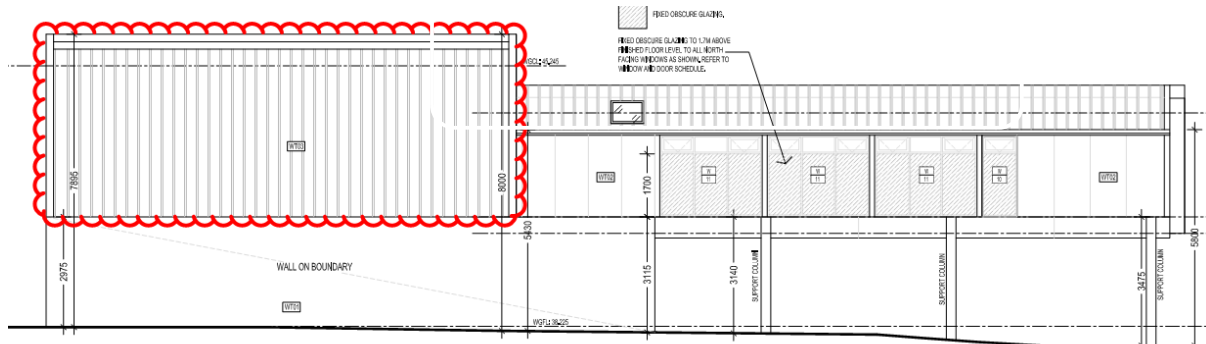


Figure 13 North Elevation - Non-Fire Rated Pitched Roof

The identified unprotected openings and non-fire rated pitched roof will have the following dimensions.

**Table 7 Dimensions of Unprotected Openings within 3m of an Allotment Boundary**

Opening ID	Opening Dimensions	Setback from Property Boundary	Orientation
W02	0.60m x 0.80m	2.00m	Perpendicular
D02	3.60m x 4.50m	2.30m	Perpendicular
Pitched Roof	12.71m x 4.92m	0.83m	24.7° from vertical

#### 4.1.2 Intent of the BCA

BCA Specification C1.1 prescribes the construction requirements for various building elements. Clause 5 of this specification outlines the requirements for Type C Construction. Of relevance to this project, it outlines that external walls of Class 7b buildings require an FRL of up to 90/90/90. It is understood that due to the steep slope of the pitched roof, it has been considered as an external wall in lieu of a roof.

Clause C3.2 of the BCA requires openings in external walls requiring an FRL and located within 3 m of the side or rear boundary of the allotment to be protected in accordance with Clause C3.4 of the BCA, and if wall-wetting sprinklers are used, they are located externally.

Clause C1.1 and Specification C1.1 requires that external walls located within 3m of a fire source feature are provided with an FRL. Clause 5.1(b) of Specification C1.1 permits the external walls to be tested from the outside only. Therefore, there is no DTS requirement to contain a fire in a building of Type C Construction however there is a requirement to protect from an external fire. As the fire rating of external walls need not provide any protection from fires spreading out of the building, fire spread to adjacent properties will not be assessed.

The Guide to the BCA indicates that the intent of these FRLs is to maintain structural stability, integrity and insulation of the fire rated elements during a fire to allow occupants to evacuate, fire brigade intervention and prevent fire spread to adjoining fire compartments/buildings.

Clause C3.4 of the BCA indicates that when protection is required windows must be protected with;

- internal or external wall-wetting sprinklers, as appropriate, used with windows that are automatic closing or permanently fixed in the closed position, or
- -/60/- fire windows that are automatic closing or permanently fixed in the closed position, or
- -/60/- automatic closing fire shutters.

The intent of providing an FRL to external walls and protection to openings is to prevent the spread of fire between buildings.

The intent of BCA Performance Requirement CP2 is to avoid spread of fire between fire compartments and buildings. CP2 does not reference a fire-resistance level (FRL).

#### **4.1.3 Hazards and Protective Measures**

In accordance with IFEG (ICC, NRC, DBH, ABCB, 2005), a review should be conducted to establish potential fire hazards. They are derived from the proposed Performance Solution and the specific building characteristics. The hazards have been identified as follows:

- External walls may be unable to contain the fire and prevent fire spread to adjoining properties.
- External walls may be unable to resist the fire and prevent fire spread from adjoining properties.
- An unprotected opening may allow fire to spread between the building and the fire source feature. As the requirement for a fire rating in the subject building is only from the outside, the source of fire to be considered is limited to a fire in the adjacent building / fire source feature.

In accordance with IFEG (ICC, NRC, DBH, ABCB, 2005), preventative and protective measures that already exist, are planned or could be used to address the hazards should then be identified. They are intended to provide a background for formulation of a trial design only and are not listed requirements. If included in the design, the following preventative and protective measures could address the hazards listed above:

- Limiting the combustible content and ignition sources within the building which will reduce the likelihood of a large fire.
- Providing openings to the outside such as windows will allow heat to escape and reduce the severity of a large fire.
- Providing a spatial separation between the external walls and adjacent property boundaries will reduce the risk of fire spread between buildings and structural collapse due to a fire in the adjoining building.
- Protective measures described in BCA DTS C3.4 prescribe means of protecting the openings.
- Other protective measures that can be used to reduce the transmission of radiant heat through openings include wing walls and window screens.
- Other factors that determine whether fire will spread include the size of openings, orientation, actual distance and the expected maximum temperature of the fire.



#### 4.1.4 Approach

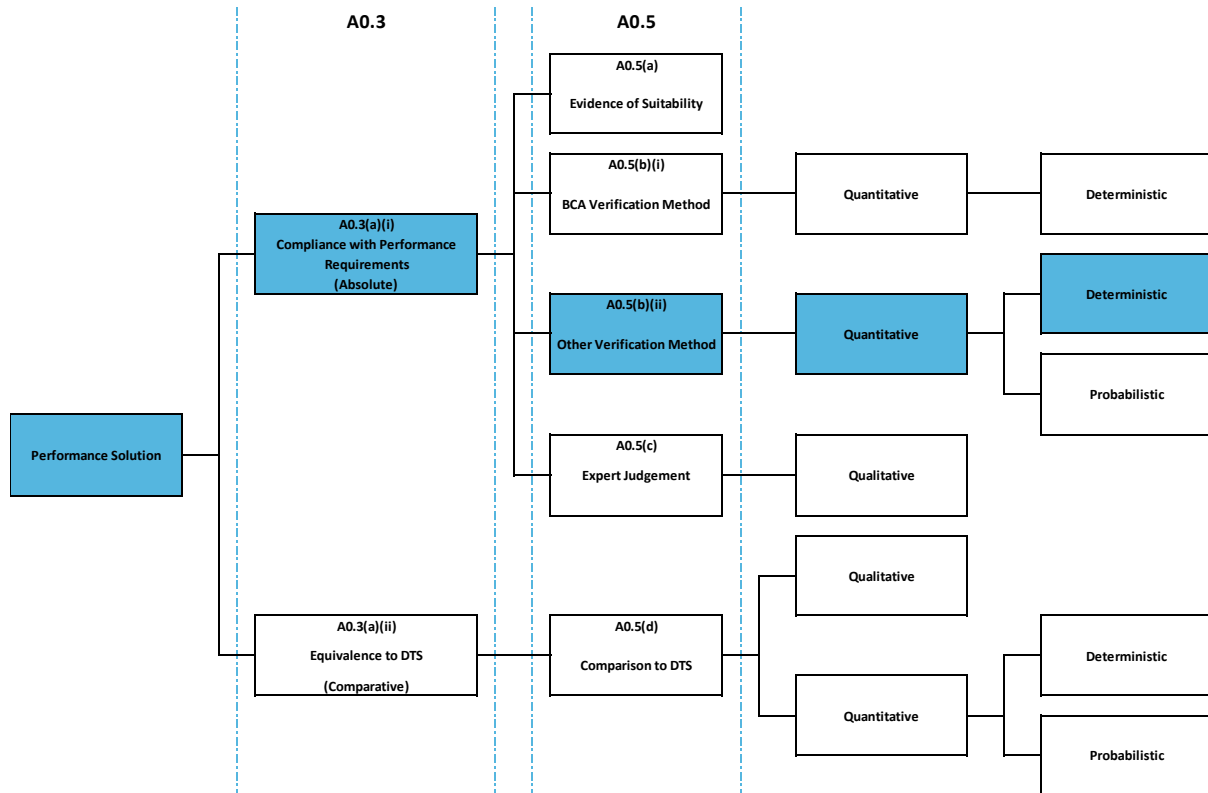


Figure 14 Method of Approach – Receiving

#### 4.1.5 Trial Design

The unprotected openings and pitched roof identified are proposed to not be protected in accordance with BCA Clause C3.4 / fire rated. Protection requirements will be determined from calculations.

The size, dimensions and proximity to the property boundary for the unprotected openings will be as indicated on referenced architectural drawings.

Building use will be as described on referenced architectural drawings.

If alternative methods of protection are required, they may include screens and windows that will remain in place and reduce the amount of radiant heat that is able to pass through the opening. Each option is described below.

##### 4.1.5.1 Option 1 & 2 - Toughened Glass

As referenced from (Warrington Fire Research (Aust) Pty Ltd, 2000), glass breaks in fires due to thermal stress from differential heating, which could lead to two types of thermal stresses, i.e. membrane and bending. Membrane stresses are produced by the temperature variation over the glass surface, and bending stresses are produced by the temperature variation across the thickness of the glass pane.

It has been identified that edge protected glass has a much higher probability than edge unprotected glass of breaking in a fire (Skelly, 1993). This is because the frame of the glass will shield the edges from exposure to the convective and radiative heat flux from the fire, causing a relatively high temperature difference between the protected part and the exposed part of the glass. This, in turn, induces a membrane stress on the glass surface.

Different types of glass products exhibit a wide range of properties when exposed to radiant heat. The results from small-scale tests (Kim, 1989) that were carried out at the National Research Council of Canada (NRCC) are summarised in the table below.

**Table 8 Maximum Temperatures of Glass at Failure (Small Scale Tests)**

Glass type	Radiation Exposure (kW/m <sup>2</sup> )	Failure time	Temperatures (°C)	
			Fire exposed side	Unexposed side
Plain Float Glass	10	< 8 min	160	140
Plain Float Glass	40	< 1 min	150-175	75-150
Heat strengthened	43	No failure at 20 min	350	300
Toughened (Tempered)	43	No failure at 20 min	350	300

The following window assemblies include toughened glazing and would be expected to exhibit the same resistance against radiant heat as the abovementioned experiments. The toughened glazing did not fail when tested to 43kW/m<sup>2</sup> (Kim, 1989) and therefore it is conservative to assume that the glazing will fail at 20 min when exposed to 40kW/m<sup>2</sup>.

Further testing by (Oxley, 2014) found that 6mm toughened glass specimens remained in place for in excess of 30 minutes when subjected to up to 50kW/m<sup>2</sup>.

The tested assemblies above are designed to attenuate radiant heat up to 40kW/m<sup>2</sup> by at least 50% such that incident radiant heat on the unexposed side is less than 20kW/m<sup>2</sup>.

**Table 9 Toughened Glazing in Conjunction with Fire Attenuation Screen (where required)**

<b>Option 1 – 6mm Toughened Glazing (+ 50% Fire Attenuation Screen)</b>	
<b>Windows</b>	<b>Doors</b>
<ul style="list-style-type: none"> <li>▪ Seals to stiles, head and sills or thresholds to have a flammability index of not more than 5 or be of silicone.</li> <li>▪ Metal frames and hardware.</li> </ul> <p><b>Fixed Glazing</b></p> <ul style="list-style-type: none"> <li>▪ 6mm toughened glazing (provided to outside pane if double glazed).</li> </ul> <p><b>Openable Glazing</b></p> <ul style="list-style-type: none"> <li>▪ 6mm toughened glazing and automatic closing, OR</li> <li>▪ 6mm toughened glazing and fire attenuation screen in accordance with <u>Option 3</u> (fire attenuation of 50%).</li> </ul>	<ul style="list-style-type: none"> <li>▪ Seals to stiles, head and sills or thresholds to have a flammability index of not more than 5 or be of silicone.</li> <li>▪ Metal frames and hardware.</li> <li>▪ 6mm toughened glazing (provided to outside pane if double glazed).</li> <li>▪ For swing doors, self-closers will be provided.</li> <li>▪ For sliding doors, self-closers OR a separate self-closing, fire attenuation screen (door) in accordance with <u>Option 3</u> (fire attenuation of 50%) will be provided.</li> </ul>
<b>Option 2 – 6mm Toughened Glazing (+ 40% Fire Attenuation Screen)</b>	
Same specification as <u>Option 1</u> above, except that the fire attenuation screen will be in accordance with <u>Option 4</u> (fire attenuation of 40%).	

Based on the abovementioned data and limits of tested assemblies, assuming a large incident radiant heat source from a fire source feature to the subject building, and the fire brigade being called at the time when the radiant heat source reaches its maximum, the fire brigade will have at least 20 minutes from the time of callout to take actions that would prevent fire spread between properties.

20 minutes is based on conservative inputs and is a realistic period of time to expect fire brigade to respond and spray water to prevent fire spread. As such, the 6mm Toughened Glazing assemblies are deemed to be adequate to remain in place and, in conjunction with expected brigade response, will be adequate in the prevention of fire spread.

Attenuation screens have been demonstrated to reduce the amount of radiant heat passing via an opening. There are different fire attenuation levels depending on the types of fire attenuation screen.

**Table 10 Fire Attenuation Screen**

Option 3 – Fire Attenuation Screen with minimum fire attenuation of 50%	Option 4 – Fire Attenuation Screen with minimum fire attenuation of 40%
<p>A fire attenuation screen must satisfy the following features:</p> <ul style="list-style-type: none"> <li>▪ Minimum 50% of heat flux attenuated.</li> <li>▪ Tested in accordance with AS 1530.4 Appendix B7.</li> <li>▪ Examples of such screens include, but are not limited to: <ul style="list-style-type: none"> <li>○ <i>Crimsafe Fire-Tuff® Stainless Steel Mesh</i></li> <li>○ <i>Alspec Invisi-Gard®</i></li> <li>○ <i>Alspec Vision-Gard®</i></li> <li>○ <i>Alspec Alu-Gard®</i></li> </ul> </li> </ul>	<p>A fire attenuation screen must satisfy the following features:</p> <ul style="list-style-type: none"> <li>▪ Minimum 40% of heat flux attenuated.</li> <li>▪ Tested in accordance with AS 1530.4 Appendix B7.</li> <li>▪ Examples of such screens include, but are not limited to: <ul style="list-style-type: none"> <li>○ <i>Greene Fire MicroLouvre™</i></li> <li>○ The screens listed in <u>Option 3</u></li> </ul> </li> </ul>

For the non-compliant openings which are proposed to be installed with attenuation screens, the selection and installation of such attenuation screens must be in accordance with the respective manufacturers’ requirements and further reflect a tested system. An attenuation screen is required to be fitted over the entire opening except for windows with fixed portions of glazing protected in accordance with Options 1 or 2 listed above.

**4.1.5.2 Option 5 – Maintained Clear Space**

Where larger openings in buildings exist such as roller doors and vehicle entry driveways, it is not often practical or necessary to provide protection measures to shield combustible elements from receiving radiant heat. Further, roller doors and the like can be in the open or closed position at any time and cannot be relied upon to shield combustibles that may be contained within the building. A spatial separation in the form of a clear space between the property boundary and combustibles in the building will achieve the same objective.

A vehicle entry to a carpark or similar arrangement where a permanent thoroughfare must be maintained will be an acceptable solution provided that the closest possible location of combustibles in the building is at least 3m away from property boundary.

A roller door to a warehouse, loading bay or similar will generally have a clear space in order to function however the clear space would not necessarily be inherent as part of the building use. In cases where the clear space is not inherently required to be kept clear as part of the building use, yellow painted floor marking will be provided and will include the words “KEEP CLEAR” in large legible letters. The line marking will be provided for a distance of at least 3m from the property boundary measured in a straight line from the outside of the building through the opening.

#### 4.1.6 Option 6 – Non-combustible External Wall (including insulation)

BCA Verification Method CV1(b) requires that external walls located less than 3m from the allotment boundary must withstand a radiant heat flux between 20kW/m<sup>2</sup> and 80kW/m<sup>2</sup>. For the sake of conservatism, external walls within 3m of the property boundary will be assessed at a radiant heat flux of 80kW/m<sup>2</sup>.

AS1530.1 defines a non-combustible material as one that can withstand being placed within the defined furnace with a wall temperature of 835±10°C without sustained flaming. A temperature of 835°C equates to an emitted heat flux of approximately 80kW/m<sup>2</sup>. Therefore, the external wall that is classified as non-combustible will meet CV1 and also CP2(a)(iii).

#### 4.1.7 Method of Evaluation

Assuming a large fire in a building on the adjacent property, radiant heat will be calculated at the unprotected openings in the subject building.

Radiant heat will be calculated based on the following equation from (Modest, 2003, 1993):

$$\dot{q}_e'' = F_{d1-2} \dot{q}''$$

Where:

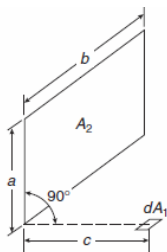
$\dot{q}_e''$  is the radiant heat flux received by the receiver [kW/m<sup>2</sup>]

$F_{d1-2}$  is the configuration factor [-]

$\dot{q}''$  is the radiant heat flux emitted from the source (emitter)[kW/m<sup>2</sup>]

##### 4.1.7.1 Perpendicular Configuration

The configuration factor for perpendicular receiving surfaces is determined using the following equation (SFPE, Third Edition 2002, pp. 1-77):



$$X = a/b \quad Y = c/b \quad A = 1/\sqrt{X^2 + Y^2}$$

$$F_{d1-2} = \frac{1}{2\pi} [\tan^{-1}(1/Y) - AY \tan^{-1}A]$$

Where:

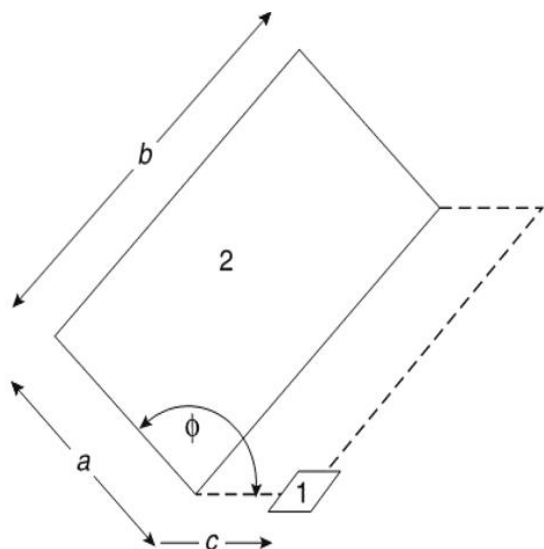
a is the half width of area A<sub>2</sub> (area of emitter)

b is the half height of area A<sub>2</sub> (area of emitter)

c is the distance from the emitter to the receiver

#### 4.1.7.2 Angled Configuration

The configuration factor for angled emitting and receiving surfaces is determined using the following equations (SFPE, Fifth Edition 2016):



$$F_{1-2} = \frac{1}{2\pi} \left\{ \tan^{-1} \left( \frac{1}{L} \right) + V (N \cos \phi - L) \tan^{-1} V \right. \\ \left. + \frac{\cos \phi}{W} \left[ \tan^{-1} \left( \frac{N - L \cos \phi}{W} \right) + \tan^{-1} \left( \frac{L \cos \phi}{W} \right) \right] \right\}$$

$$V = \frac{1}{\sqrt{N^2 + L^2 - 2NL \cos \phi}}$$

$$W = \sqrt{1 + L^2 \sin^2 \phi}$$

$$N = \frac{a}{b}$$

$$L = \frac{c}{b}$$

Where:

- a is the width of area  $A_2$  (area of emitter)
- b is the half height of area  $A_2$  (area of emitter)
- c is the distance from the emitter to the receiver
- $\phi$  is the angle between the emitter and the receiver

#### 4.1.8 Design Scenarios

##### 4.1.8.1 Receiving Radiation Assuming Worst Credible Radiant Heat Source on Adjacent Property

Fire spread from neighbouring buildings that could be located on adjacent properties will be considered for fire spread to the subject building. The buildings will be fictional building designs that fully comply with the BCA DTS Provisions for external wall construction with the designs manipulated to create the highest credible theoretical radiant heat source as follows:

The subject building is located in a commercial zone (refer Figure 15). Southern and eastern side of the building face a commercial zone while the northern side faces a residential zone.

It is assumed that the northern side is primarily populated with residential dwellings as well as some Class 2 to 9 buildings. If these properties are ever redeveloped, future buildings could be of almost any classification however is unlikely to be Class 7 or Class 8 industrial buildings.

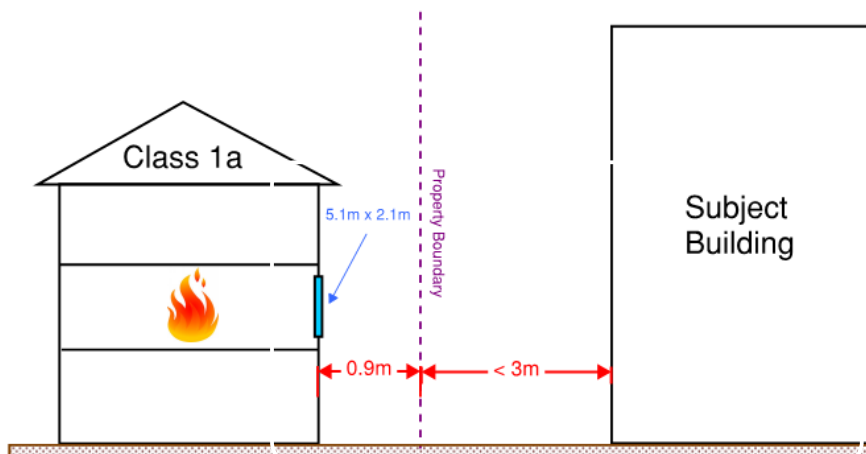
If the adjacent properties on the southern or eastern side are ever redeveloped, future buildings are likely to be of the same or similar classification, however, in the worst credible case may include a Class 6 retail.



**Figure 15 Planning Zone according to land.vic.gov.au**

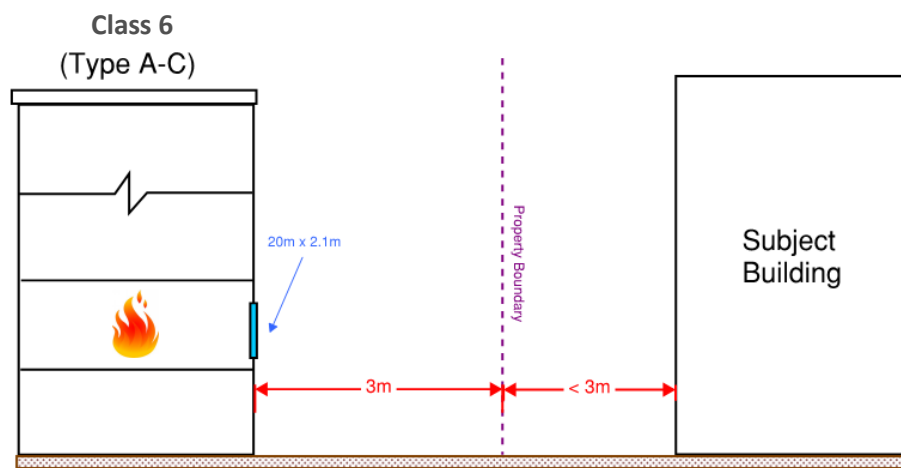
As such each of the highest radiant heat source buildings will be considered:

- A Class 1a dwelling will be assumed at 0.9m from the boundary. This is the minimum distance allowed by BCA Volume 2 without requiring the openings to be protected. It is also assumed that the Class 1a dwellings are unlikely to have a height of greater than 7.8 m or 3 storeys above the ground level. The radiation heat flux emitted by this type of building will be based on an opening dimension of **5.1 m wide x 2.1 m high** and the opening will be considered to project radiant heat to the lowest three levels above ground in the subject building;



**Figure 16 Class 1a Dwelling on Adjacent Property**

- A Class 6 building will be assumed at 3 m from the boundary. This is the minimum distance allowed by the BCA Volume 1 without requiring the openings to be protected. There is no maximum limit height or storeys imposed on the Class 6 building. The radiation heat flux emitted by this type of building will be based on an opening height of 2.1 m high. As these retail buildings can generally have a large amount of glazing on the external wall for lighting purposes and therefore the width of the openings in the external wall of a storey will vary greatly. In this instance, it is proposed that an analysis be carried out on the likely opening width of a potential Class 6 building on the site. A width of up to 20m will be considered and therefore the opening width will be **20 m wide x 2.1 m** high.



**Figure 17 Class 6 Building on Adjacent Property**

The potential sources of radiant heat from adjacent properties considered in this assessment will be the abovementioned Class 1a dwelling for the three levels above ground on the northern property boundary and the abovementioned Class 6 building for all levels on the southern and eastern property boundary.

Approval Document B (British Department for Communities and Local Government, 2006) provides the following guidance as to the design radiation emitted from various occupancies:

- 84kW/m<sup>2</sup> for residential, office, open-sided multi-storey car parks, or assembly and recreation building types.
- 168kW/m<sup>2</sup> for retail, commercial, industrial, storage or other non-residential building.

For this case, a radiant heat flux of 84kW/m<sup>2</sup> has been applied as the Class 1 buildings, and 168kW/m<sup>2</sup> as the Class 6 buildings.

#### 4.1.9 Acceptance Criteria

The acceptance criterion is that:

- Unprotected openings and the non-fire rated pitched roof are able to withstand radiation from a DTS compliant building on the adjoining title without ignition. Ignition is considered to occur at 20kW/m<sup>2</sup>, which corresponds with the normal ignition range of materials (ICC, NRC, DBH, ABCB, 2005).

#### 4.1.10 Evaluation

##### 4.1.10.1 Receiving Radiation

Receiving radiation is based on the size of the emitter on the neighbouring adjacent property and the distance to the unprotected opening(s) in the subject building. The dimensions of the opening in the subject building do not affect the results and therefore the calculations are based on the distance only. The calculated radiation levels and the required protection measures are summarised in the following table.

**Table 11 Received Radiant Heat Flux and Required Protection to Unprotected Openings**

Opening OID	Distance to allotment boundary	Orientation	Received Radiant Heat Flux	Protection Required (Note 1)
W02	2.00m	Perpendicular	3.7kW/m <sup>2</sup>	None
D02	2.30m	Perpendicular	11.2kW/m <sup>2</sup>	None
Pitched Roof	0.83m	24.7° from vertical	36.6kW/m <sup>2</sup>	Option 6, or 90/90/90 FRL (tested from outside only)

Note 1: Refer Table 12 for Description of Methods of Protection ([Click Here](#))

**Table 12 Methods of Protection Summary**

Protection Option	Description	
	Windows	Doors
<b>Option 1 – 6mm Toughened Glazing (+ 50% Fire Attenuation Screen)</b>	<ul style="list-style-type: none"> <li>▪ Seals to stiles, head and sills or thresholds to have a flammability index of not more than 5 or be of silicone.</li> <li>▪ Metal frames and hardware.</li> </ul> <p><b>Fixed Glazing</b></p> <ul style="list-style-type: none"> <li>▪ 6mm toughened glazing (provided to outside pane if double glazed).</li> </ul> <p><b>Openable Glazing</b></p> <ul style="list-style-type: none"> <li>▪ 6mm toughened glazing and automatic closing, OR</li> <li>▪ 6mm toughened glazing and fire attenuation screen in accordance with <u>Option 3</u> (fire attenuation of 50%).</li> </ul>	<ul style="list-style-type: none"> <li>▪ Seals to stiles, head and sills or thresholds to have a flammability index of not more than 5 or be of silicone.</li> <li>▪ Metal frames and hardware.</li> <li>▪ 6mm toughened glazing (provided to outside pane if double glazed).</li> <li>▪ For swing doors, self-closers will be provided.</li> <li>▪ For sliding doors, self-closers OR a separate self-closing, fire attenuation screen (door) in accordance with <u>Option 3</u> (fire attenuation of 50%) will be provided.</li> </ul>
<b>Option 2 – 6mm Toughened Glazing (+ 40% Fire Attenuation Screen)</b>	Same specification as <u>Option 1</u> above, except that the fire attenuation screen will be in accordance with <u>Option 4</u> (fire attenuation of 40%).	
<b>Option 3 – Fire Attenuation Screen (50%)</b>	<p>A fire attenuation screen must satisfy the following features:</p> <ul style="list-style-type: none"> <li>▪ Minimum 50% of heat flux attenuated.</li> <li>▪ Tested in accordance with AS 1530.4 Appendix B7.</li> <li>▪ Examples of such screens include, but are not limited to:                             <ul style="list-style-type: none"> <li>o <i>Crimsafe Fire-Tuff® Stainless Steel Mesh</i></li> <li>o <i>Alspec Invisi-Gard®</i></li> <li>o <i>Alspec Vision-Gard®</i></li> <li>o <i>Alspec Alu-Gard®</i></li> </ul> </li> </ul> <p>The selection and installation of attenuation screens must be in accordance with the respective manufacturers’ requirements and further reflect a tested system. An attenuation screen is required to be fitted over the entire opening except when used in conjunction with <u>Option 1</u> listed above.</p>	

Protection Option	Description
<b>Option 4 – Fire Attenuation Screen (40%)</b>	<p>A fire attenuation screen must satisfy the following features:</p> <ul style="list-style-type: none"> <li>▪ Minimum 40% of heat flux attenuated.</li> <li>▪ Tested in accordance with AS 1530.4 Appendix B7.</li> <li>▪ Examples of such screens include, but are not limited to: <ul style="list-style-type: none"> <li>o <i>Greene Fire MicroLouvre™</i></li> <li>o The screens listed in <u>Option 3</u> above</li> </ul> </li> </ul> <p>The selection and installation of attenuation screens must be in accordance with the respective manufacturers' requirements and further reflect a tested system. An attenuation screen is required to be fitted over the entire opening except when used in conjunction with <u>Option 2</u> listed above.</p>
<b>Option 5 – Maintained Clear Space</b>	<p>A vehicle entry to a carpark or similar arrangement where a permanent thoroughfare must be maintained will be an acceptable solution provided that the closest possible location of combustibles in the building is at least 3m away from property boundary.</p> <p>In cases where the clear space is not inherently required to be kept clear as part of the building use, yellow painted floor marking will be provided and will include the words "KEEP CLEAR" in large legible letters. The line marking will be provided for a distance of at least 3m from the property boundary measured in a straight line from the outside of the building through the opening.</p>
<b>Option 6 – Non-combustible External Wall (including insulation)</b>	<p>BCA Verification Method CV1(b) requires that external walls located less than 3m from the allotment boundary must withstand a radiant heat flux between 20kW/m<sup>2</sup> and 80kW/m<sup>2</sup>. For the sake of conservatism, external walls within 3m of the property boundary will be assessed at a radiant heat flux of 80kW/m<sup>2</sup>.</p> <p>AS1530.1 defines a non-combustible material as one that can withstand being placed within the defined furnace with a wall temperature of 835±10°C without sustained flaming. A temperature of 835°C equates to an emitted heat flux of approximately 80kW/m<sup>2</sup>. Therefore, the external wall that is classified as non-combustible will meet CV1 and also CP2:(a)(iii).</p>

The openings and non-fire rated pitched roof with protection as specified in the table above will be adequate to prevent fire spread due to received radiant heat levels. The proposed Performance Solution therefore satisfies the acceptance criteria.

#### 4.1.11 Conclusion

The calculations have determined that each of the openings with protection requirements as specified satisfies the agreed acceptance criteria. It is our considered opinion that the proposed Performance Solution satisfies Performance Requirements CP1 and CP2.

## 4.2 Performance Solution 2 – Direction of Door Swing

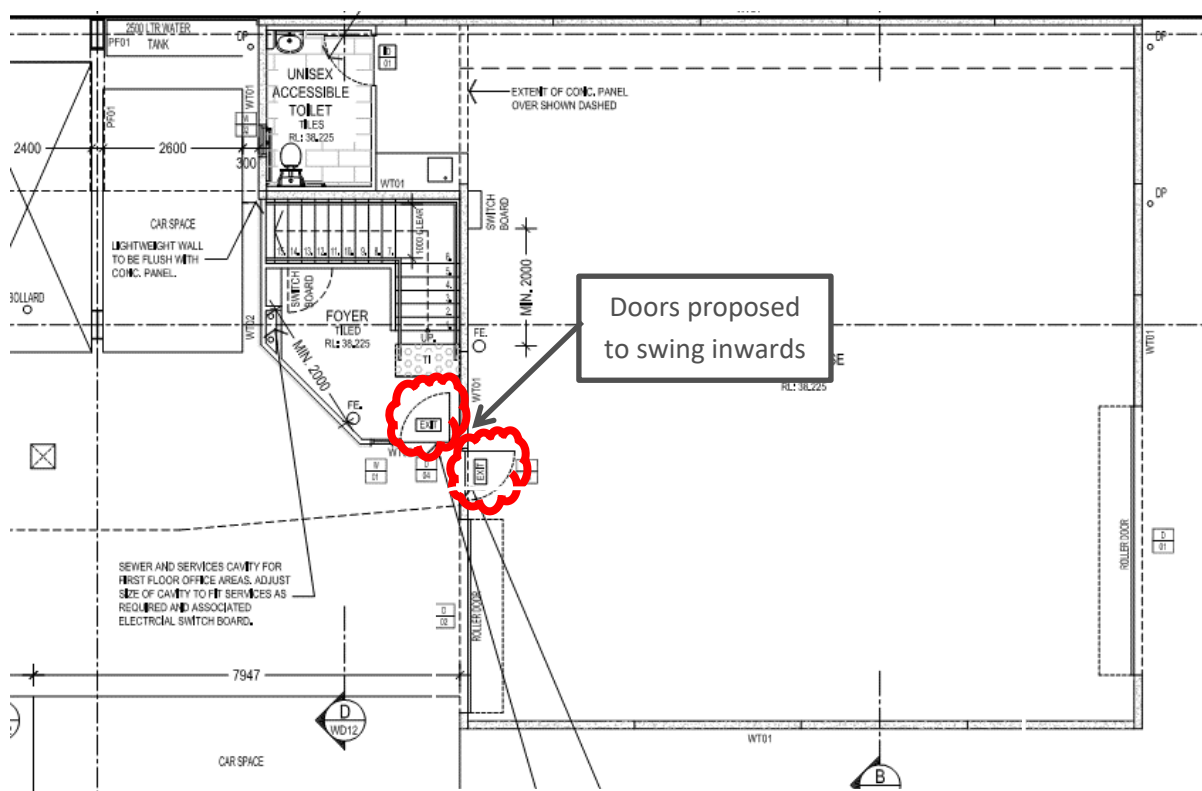
### 4.2.1 Introduction

The following table briefly describes the proposed Performance Solution, the relevant BCA DTS Clause(s) and Performance Requirements and the relevant IFEG Subsystem.

**Table 13 Proposed Performance Solution and Reference Criteria**

Proposed Performance Solution	Building Code of Australia		IFEG Subsystem
	DTS Provision	Performance Requirement	
To provide technical justification for door swing against the direction of egress travel.	D2.20	DP2(b)	E

The proposed Performance Solution is described in the figure below. The doors providing access to the car park from the warehouse and office foyer at Ground Level are proposed to swing inwards against the direction of egress travel.



### 4.2.2 Intent of the BCA

BCA Clause D2.20 prescribes that swinging doors in a required exit or forming part of a required exit must swing in the direction of egress unless it serves a building or part with a floor area of not more than 200m<sup>2</sup> and it is the only required exit from the building or part and it is fitted with a device to hold it in the open position.



The Guide to the BCA indicates that the intent of the DTS Provision is to minimise the risk that the door may obstruct a person evacuating.

### 4.2.3 Hazards and Protective Measures

In accordance with IFEG (ICC, NRC, DBH, ABCB, 2005), a review should be conducted to establish potential fire hazards. They are derived from the proposed Performance Solution and the specific building characteristics. The hazard has been identified as follows:

- The inward swinging doors may increase the potential for the exit to be blocked due to the pressure of people behind the first occupant attempting to open the door.

In accordance with IFEG (ICC, NRC, DBH, ABCB, 2005), preventative and protective measures that already exist, are planned or could be used to address the hazards should then be identified. They are intended to provide a background for formulation of a trial design only and are not listed requirements. If included in the design, the following preventative and protective measures could address the hazards listed above:

- Limit the maximum occupant numbers within the space.
- Implement additional protective features to the door itself (i.e. automatic opening door).

### 4.2.4 Approach

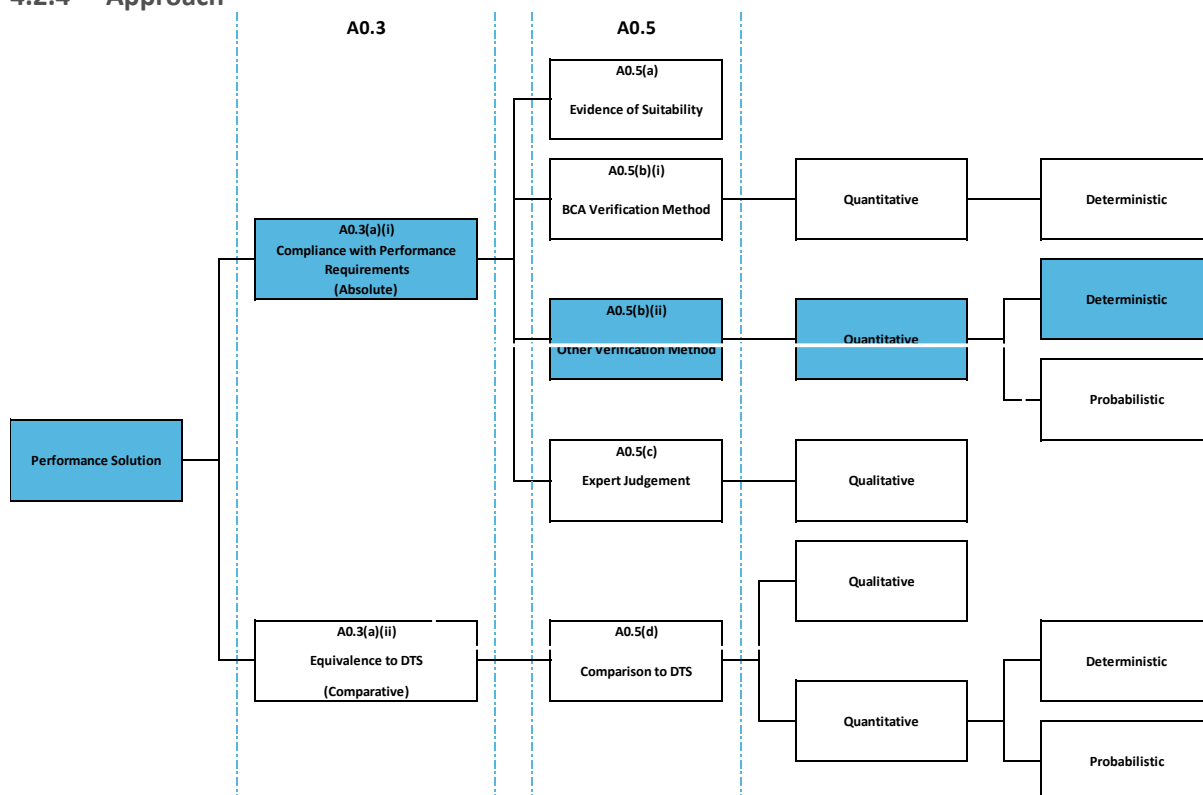


Figure 18 Method of Approach

#### 4.2.5 Trial Design

The doors providing access to the car park from the warehouse and office foyer at Ground Floor will swing inwards. Additional signage will be provided on the inside face of the doors to clearly indicate “PULL”.

#### 4.2.6 Method of Evaluation

A quantitative and absolute evaluation will be undertaken to evaluate the population within each of the respective spaces and then benchmark these against when The Life Safety Code (NFPA101, 2009), would require doors to swing in the direction of egress.

#### 4.2.7 Design Scenario(s)

The population of the spaces served by the inward swinging doors forming part of this analysis is as follows:

**Table 14 Assumed Population**

Space	Occupant Load	Reference
Office (119m <sup>2</sup> )	12	Occupant density for Office 10m <sup>2</sup> / person. BCA Vol. 1 D1.13.
Storage (173m <sup>2</sup> )	6	Occupant density for Storage 30m <sup>2</sup> / person. BCA Vol. 1 D1.13.

#### 4.2.8 Acceptance Criteria

The acceptance criteria for this part of the Performance Solution is that the population served by the exit door is less than the population that would require the door to swing in the direction of egress under NFPA 101 (50 occupants).

#### 4.2.9 Evaluation

The Life Safety Code (NFPA101, 2009), prepared by the National Fire Protection Association, is a code used frequently across the USA to address construction, protection and occupancy features necessary to minimise the danger to life from the effects of fire, including smoke, heat, and toxic gases created during fire.

Under the Means of Egress section of this code, Clause 7.2.1.4.2 states that;

*“Door leaves required to be of the side-hinged or pivoted-swinging type shall swing in the direction of egress travel under any of the following conditions:*

- 1) Where serving a room or area with an occupant load of 50 or more, except under the following conditions:*

- a. Door leaves in horizontal exits shall not be required to swing in the direction of egress travel where permitted by 7.2.4.3.8.1 or 7.2.4.3.8.2.*
  - b. Door leaves in smoke barriers shall not be required to swing in the direction of egress travel in existing health care occupancies, as provided in Chapter 19.*
- 2) Where the door assembly is used in an exit enclosure, unless the door opening serves an individual living unit that opens directly into an exit enclosure*
  - 3) Where the door opening serves a high hazard contents area”*

In the case of the subject building, NFPA would permit the door to swing inwards, provided that the door serves less than 50 occupants. As each door is expected to serve a maximum of 12 occupants, it would meet the requirements of NFPA 101 and therefore meet the agreed acceptance criteria.

#### **4.2.10 Conclusion**

The evaluation has determined that the Performance Solution with the inward swinging doors satisfies the agreed acceptance criteria. It is our considered opinion that the Performance Solution satisfies Performance Requirement DP2(b).

## 5 References

- ABCB. (2019). *National Construction Code Series Volume 1 - Building Code of Australia 2019*. Canberra: Australian Building Codes Board.
- British Department for Communities and Local Government. (2006). *Approved Document B*. London: National Building Specification.
- ICC, NRC, DBH, ABCB. (2005). *International Fire Engineering Guidelines 2005 Edition*. Canberra: ABCB.
- Kim, A. a. (1989). *The Effects of Sprinkler Location and Activation Time on the Protection of Glazing Systems*. Ottawa: International Fire Protection Engineering Institute -V.
- Modest, M. F. (2003, 1993). *Radiative Heat Transfer*. San Diego, California: Academic Press .
- NFPA101. (2009). *Life Safety Code*. Quincy, MA: National Fire Protection Association.
- Oxley, P. (2014). Can low emissivity glazing be utilized for preventing fire spread into buildings? *10th International Conference on Performance-Based Codes and Fire Safety Design Methods - Pushing the Boundaries* (pp. All - Specimen 2). Gold Coast, Queensland: SFPE, Society of Fire Safety.
- SFPE. (Fifth Edition 2016). *SFPE Handbook of Fire Protection Engineering*. New York, Heidelberg, Dordrecht, London: Springer.
- SFPE. (Third Edition 2002). *SFPE Handbook of Fire Protection Engineering*. Quincy, Massachusetts: NFPA.
- Skelly, M. R. (1993). An Experimental Investigation of Glass Breakage in Compartment Fires. *Journal of Fire Protection Engineering*, 25-34.
- Warrington Fire Research (Aust) Pty Ltd. (2000). *Guide for the Design of Fire Resistant Barriers and Structures*. Melbourne: Building Control Commission.

**Building Act 1993**  
*Section 238(1)(a)*  
**Building Regulations 2018**  
*Regulation 126*

**CERTIFICATE OF COMPLIANCE FOR PROPOSED BUILDING WORK**

**This certificate is issued to**

Postal address

Email

**This certificate is issued in relation to the proposed building work at:**

**Nature of proposed building work**

Construction of a 2-storey building containing office, carparking and warehouse.

Storeys contained	2
Rise in storeys (for Class 2-9 building only)	2
Effective height	2.95m
Type of construction	Type C
Version of BCA applicable to certificate	BCA 2019 Vol 1

**Building classification**

Part of building: Office, Carpark, Warehouse      BCA Classification: Class 5, Class 7a, Class 7b

**Prescribed class of building work for which this certificate is issued:**

Design or part of the design of building work relating to a fire safety matter.

**Documents setting out the design that is certified by this certificate**

Document No.	Document date	Type of document	Number of pages	Prepared by
	17 July 2019	Fire Engineering Report R1	35	

## Performance Solution

Performance solutions form part of the design certified by this certificate. The performance solutions comply with the following performance requirements of the NCC:

Relevant Performance Requirement	Details of performance solution required by regulation 124
CP1, CP2	<p>To provide technical justification for deletion of Fire Resistance Level (FRL) to the steep external wall / roof in lieu of 90/90/90.</p> <p>To provide technical justification for unprotected openings in external walls within 3m of a fire source feature:</p> <ul style="list-style-type: none"> <li>• non automatic roller shutter door D02,</li> <li>• warehouse window W02.</li> </ul> <p>The following has been used in determining that the Performance Solution complies with the Performance Requirement(s):</p> <p>(i) Assessment Method(s): A0.3(a)(i) &amp; A0.5(b)(ii)</p> <p>(ii) Expert Judgement: N/A</p> <p>(iii) Tests or Calculations: Radiant heat received based on fictional DTS building on adjoining allotment.</p> <p>(iv) Standard or other information: International Fire Engineering Guidelines (2005 Edition); SFPE Handbook of Fire Protection Engineering (Third Edition 2002)</p>
DP2(b)	<p>To provide technical justification for door swing against the direction of egress travel.</p> <p>The following has been used in determining that the Performance Solution complies with the Performance Requirement(s):</p> <p>(i) Assessment Method(s): A0.3(a)(i) &amp; A0.5(b)(ii)</p> <p>(ii) Expert Judgement: N/A</p> <p>(iii) Tests or Calculations: Benchmarking against The Lift Safety Code based on population within each respective space (BCA D1.13)</p> <p>(iv) Standard or other information: International Fire Engineering Guidelines (2005 Edition); NFPA101 Life Safety Code (2009)</p>

**The design certified by this certificate complies with the following provisions of Building Act 1993, Building Regulations 2018 or National Construction Code**

Act, Regulation or NCC	Section, Regulation, Part, Performance Requirement or other provision
BCA 2019 Vol 1	CP1, CP2, DP2(b), DP4

I did not prepare the design, or part of the design, set out in the document listed above.

I certify that the performance solutions referred to above comply with the performance requirements listed.

I believe that I hold the required skills, experience and knowledge to issue this certificate and can demonstrate this if requested to do so.



**Engineer**

Name:

Address:

Email:

Building practitioner registration  
category and class:

Building practitioner registration no.:

Date of issue of certificate:

Signature: