

Proposed Garage

13 Mountain Drive, Thredbo

GENERAL

1. These structural drawings are to be used for structural works purposes only. They are to be read in conjunction with all other project disciplines drawings. No other trade or architectural details are to be inferred from these drawings.
2. The drawn details are to be read in conjunction with all notes provided herein and all text which accompanies such detail. Any discrepancy between notes, text and/or details must be referred to the engineer for clarification.
3. All works related to these drawings are to be carried out in accordance with the relevant building codes and Australian standards as required by the certifying authority.
4. Any dimensions, whether scaled or written, are provided for information only. Works dimensional set out is not to be carried out according to these drawings and should be based on architectural information. The builder is to coordinate these drawings with architectural set out and report any discrepancies to both architect and engineer.
5. The drawings are provided showing the works in a completed state only. No inference is to be made regards construction methods. The builder retains sole responsibility for all construction methods and techniques which are employed.
6. The structural design depicted in these drawings has been carried out with due regard to construction risk mitigation. As the builder is responsible for all construction methods and techniques, it remains the builders responsibility to ensure risk and safety management is practised onsite.

TEMPORARY BRACING

1. The structure shown in these drawings has been detailed as stable in its final built condition.
2. During construction, and at every stage until completion, the structure shown in these drawings does not possess the stability required to be self supporting.
3. It remains the responsibility of the builder to provide temporary bracing to all building elements during the construction process. This bracing must be installed such that all elements remain in a stable state and experience no overstress.

WORKS INSPECTIONS

1. Inspections will likely be required to allow as-built certification of the works by the engineer. The builder is to obtain such certification requirements through liaison with the certifying authority and engineer.
2. Where inspections are required, the builder shall give a minimum two working days notice to the contract engineer.
3. Any engineer inspection is carried out with the sole intent to ensure that the structural construction works generally comply with the structural design. Inspections, the results of, and any associated documentation in no way relieves the builder of their full responsibility to ensure complete and detailed works compliance with the structural design. The engineer takes no responsibility for any other job aspects observed during the course of an inspection.
4. Where required inspections are not organised by the builder, the engineer takes no responsibility for any inability to certify completed works.

DESIGN LOAD ALLOWANCES

Design loads have been allowed for in accordance with the relevant sections of AS/NZS 1170. Loads are based upon the occupancy types shown on the architectural drawings.

Superimposed Dead Load	N/A
Typical Floor..	Sheet metal roofing
Roof.....	
Floor Live Loads	
Typical.....	1.5 kPa
Garage.....	Typical residential cars (max 2.5t)
Roof Live Loads	
Typical.....	0.25 kPa
Wind Loads	
Category	N3 in accordance with AS4055.
Snow Loads	
Snow loads are accounted for in accordance with AS/NZS 1170.3 (Alpine, Sg = 5.80 kPa).	

SITE PREPARATION & FOUNDATIONS

1. All site preparation, foundation and soil-related works are based upon assumed parameters inferred from site visits. The builder must confirm these parameters via liaison with a suitably qualified geotechnical professional prior to commencement of any construction works. The structural engineer takes no responsibility for the suitability of the provided structural design should any works be undertaken without this confirmation.
2. Per the information referred to in sub-clause 1, the site parameters used in structural design are:

Site Classification..... M (to AS 2870)

Sub-soil type..... Clayey Sand

Allowable Bearing Capacity..... 100 kPa
3. All works shall be founded on a consistent sub-soil in accordance with the parameters above. This site class, sub-soil type and the stated bearing capacity shall be confirmed by a suitably qualified geotechnical professional prior to any works commencing.
4. Where the structure is classified as being within the scope of AS 2870 (refer AS 2870 Clause 1.1), then the design has been carried out in accordance with that code. The owner should familiarise themselves with the footings performance allowances made under this code (particular attention is drawn to acceptable levels of cracking and/or foundation movement).
5. All topsoil, roots and organic matter shall be removed from the area in which the footings and/or slab are to rest. This is to be carried out to a depth as required to remove these undesirable materials.
6. Any excavation is to be carried out in accordance with authority conditions. Batters are to be provided to the direction of a suitably qualified geotechnical professional. Temporary drainage is to be provided to ensure stability of batters in all conditions. In no case are excavations to undermine any adjacent structure. Advice should be sought from the engineer in any case where this is a possibility.
7. Any over-excavation beyond required levels shall be back-filled under the supervision of a suitably qualified professional to achieve the required bearing capacity. Mass concrete filling is possible only at the discretion of the engineer.
8. Where the structure is classified as being within the scope of AS 2870, further site preparation shall be carried out per the requirements of that code, possibly including but not limited to sand blinding, controlled filling, provision of vapour barriers, sloping of soils away from structure and protection of services, etc.
9. Footings and/or slabs are to be poured within 24 hours of inspection and reinforcement approval under dry conditions.
10. Unless noted otherwise, all footings and piers are to be centred under columns, walls and piers over.
11. Retaining walls are not to be back filled until core filled and cured. At a minimum this is to be 7 days from point of core filling and if required, the provision of top edge support (refer details). Back fill is to be granular and free draining. A suitable dewatering system is to be employed such as strip drains or geotabric with polymer drainage sheet connected to free flowing outlets. Walls are to be waterproofed where required by the architectural specification.

CONCRETE

1. All concrete materials and construction requirements are to be in strict accordance with AS 3600 and any associated standards. All concrete mixes are to be of normal weight proportioned to meet the following characteristics. Mixes are to be tested in accordance with the requirements set out in AS3600.

Drying Shrinkage Strain 800 microns @ 56 days

Maximum Aggregate Size 20mm

Slump..... Suitable for method of placement, 100mm for strip footings

Ad-mixtures Only by engineers permission
2. Concrete characteristic compressive strength (28 days) and clear cover to reinforcement are to be in accordance with the following table for respective structural elements. Covers are minimum and are to be maintained at all chamfers, drip grooves, etc.

Element	Strength	Cover (External)	Cover (Internal)
Piers/Footings	20 MPa	40	n/a
Slab on Ground	32 MPa	40	20

3. Refer to notes on reinforcement for its material and construction requirements.
4. Sizes shown are the structural minimum and may only be varied with the written permission of the engineer (inclusive of any induced detailing, reinforcement changes, etc).
5. Construction joints are permitted only at the written approval of the engineer. Specific detailing will be provided.
6. No penetrations, blockouts, services embedment, etc, other than that shown on the structural drawings are allowed. Contact the engineer where changes to these details are required.
7. Concrete shall be placed to ensure that no segregation of materials occurs, and be laid such that the concrete fills all forms and encompasses all reinforcement as a dense, monolithic mass with no voids or entrapped air. Mechanical vibration shall be used.
8. Pouring of elements where formwork restricts movement such as slabs over columns shall be timed to ensure allowance for wet concrete settlement. Minimum pour separation of 1 day.
9. Concrete shall be finished to the architectural specification ensuring that required structural sizes are maintained and cover to reinforcement is not reduced.
10. Curing of concrete shall commence as soon as practical after finishing. It shall involve the prevention of loss of excess moisture and protection from extremes of temperature for a minimum of 7 days. Techniques allowed include fogging or ponding of water, covering with plastic or wet hessian and the use of curing compounds. Selection of method and responsibility for proper execution of curing remains the responsibility of the builder.
11. Concrete shall be protected from freezing, the effects of rain or running water and from excess drying during the curing period.
12. Where concrete repairs are found to be necessary, the engineer shall be contacted for written instruction. No repairs are to be carried out otherwise.

REINFORCEMENT

1. All reinforcing materials, the manufacture and the placement of such materials is to be in accordance with relevant Australian Standards including but not limited to AS3600 and AS/NZS 4671.
2. Reinforcement shall be of the proper class, in accordance with AS/NZS 4671, as denoted in the structural drawings. Such classes include:

N D500N, Hot rolled deformed 500MPa

R R250N, Hot rolled round 250 MPa

S D250N, Hot rolled deformed 250 MPa, typically pool reinforcement
3. Ductility class L reinforcement shall not be used unless specifically detailed (exception being as is normally detailed for mesh in slab on grade).
4. All reinforcement shall be uniformly supported on bar chairs, and tied together sufficiently, to ensure correct position and cover is achieved and maintained throughout concrete placement and hardening. Plastic tipped steel bar chairs are only permitted where the use does not compromise cover requirements (i.e. no raw steel of the chair is permitted to lie within the reinforcement cover zone).
5. Bundled bars are to be tied together sufficiently to ensure they remain in full contact.
6. Splicing of reinforcement shall only be made as shown on the structural drawings. Splicing shall be made by lapping bars or alternatively with the use of mechanical means (proprietary couplers). Lapped splice lengths shall be in accordance with the following.

For single bars in normal 32MPa concrete

Slabs 350mm thick or less, wall verticals

N12	N16	N20	N24
500	700	950	1200

Slabs greater than 350mm thick, wall horizontals and beams

N12	N16	N20	N24	N28
600	900	1250	1600	1950

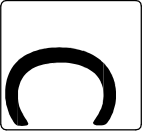
Columns

N12	N16	N20	N24	N28
500	650	800	1050	1350

The above values are to be increased for (multiply given lengths by)

25MPa concrete	x 1.15
Bundled bars	x 1.2 for 3 bars
	x 1.33 for 4 bars
Lightweight concrete	x 1.3
Elements in slip forms	x 1.3
Epoxy coated bars.	x 1.5
7. Where offsets are used in lapped splices, the offset shall be of one bar diameter only. The maximum slope of the inclined section of bar at the offset is to be 1 in 6.
8. Splicing of mesh shall be made such that the two outermost cross bars of sheets being joined are overlapped. In addition, the minimum length of overlap shall be 100mm.
9. Site bending of reinforcement is permissible if required however shall avoid any impact loading (such as with a hammer), and any damage to the bars surface. Bending in one location may only be performed twice and any further bend shall not be made within 20 bar diameters of the previous. No heat is to be used.
10. No welding of reinforcement is to be carried out without the written permission and direction of the engineer.
11. At the time of concrete placement, the surface condition of the reinforcement shall not impair the bond with concrete. Minor surface rust is acceptable.

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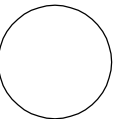


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Notes Sheet 1		
Proposed Garage @ 13 Mountain Drive, Thredbo		
P. Davies		
Not to Scale		
22100-S01		A

MASONRY

- 1. All masonry associated materials and the placement of such materials is to be in accordance with relevant Australian Standards including but not limited to AS3700.
- 2. Masonry units are to comply with the following specification:

Minimum unconfined compressive strength
Bricks :..... 20 MPa
Blocks :..... 15MPa

Location	Unit	Mortar Class	Built in Components
Interior	Protected	M2	R1
Exterior	Protected	M3	R4
Below DPC (Ground Contact)	General Purpose	M3	R4

- 3. Lay pattern for all masonry shall be stretcher bond unless noted otherwise.
- 4. All mortar joints including bedding and perpends shall be fully bedded. Joints shall be 10mm thick. The depth of raking, if any, shall not exceed 5mm.
- 5. For grouted masonry, the grout shall be a core filling specific mix of minimum compressive strength 20MPa with maximum 10mm aggregate.
- 6. Finishing at the top of load bearing walls is to consist of the bricks being trowelled smooth followed with placement of a slip joint such as two layers of DPC or approved equivalent. The wall is to finish below the soffit of the slab being poured over. Non-load bearing walls are to finish 20mm clear of the slab over and the gap is to be filled with a fire rated gap filler.
- 7. Wall ties for both cavity and veneer walls are to be of Type A and a durability rating as specified above. Ties are to be embedded a minimum of 50mm into the mortar joint with a minimum 15mm cover to exposed surfaces. Ties are to be located:
 - At maximum 600mm centres in each direction (including head restraint ties in non-load bearing brickwork).
 - Adjacent to any lateral support or control joint with the first row of ties being within 300mm of that support or joint.
- 8. No chasing is permitted in load bearing brickwork without the written permission and direction of engineer.
- 9. Joints are to be located to the architectural specification. At a minimum, joints are to be provided in accordance with the relevant standards. Where joints are located in concrete slabs, these joints are to be replicated in any brickwork laid upon.
- 10. Solid walls (230mm thick) are to be provided with header courses at maximum 600mm centres (every 7th course minimum for typical bricks). Header courses can consist of alternating headers and stretchers.
- 11. Additional blockwork specific items:
 - a. Cores are to be thoroughly cleaned of any excessive mortar protrusions prior to grouting.
 - b. Cleanout holes are to be provided and sufficiently cleaned to ensure full bedding of grout on entire founding surface.
 - c. Reinforcement shall be located accurately in accordance with details. Laps shall be tied together side by side to ensure proper cover is maintained. It is preferred that plastic bar positioners are used to maintain correct positioning.
 - d. The height of grout lifts should be limited in accordance with the grout workability to ensure that the grout can be properly compacted (by vibration or rodding), to ensure a proper bond is achieved with the blockwork and to ensure no blow outs in bedding occurs.

STEELWORK

- 1. All steelwork associated materials, the manufacture and the erection of such materials is to be in accordance with relevant Australian Standards including but not limited to AS4100.
- 2. All steel is to be of minimum yield stress of 250MPa in accordance with Australian standards shown in Table 2.1 of AS4100 unless noted otherwise.
- 3. Welds shall be GP unless noted otherwise. The minimum size of a fillet weld shall be 6mm, except where material is 6mm or thinner, then it shall be the thickness of the material (based on the thinner material being joined).
- 4. All bolts are to comply with AS111, AS1110 and/or AS/NZS1252. Bolts are to be of the category denoted in structural details, being one of the following:
 - 4.6/S Grade 4.6, snug tightened
 - 8.8/S Grade 8.8, snug tightened
 - 8.8/TB Grade 8.8, fully tensioned
 - 8.8/TF Grade 8.8, fully tensioned
- 5. Surface preparation for bolted joints is to be in strict accordance with AS4100. One washer is to be located under any rotated part. The length of a bolt shall be such that a minimum of one clear thread plus runoff is showing after tightening. Any nut subject to vibration shall be secured to prevent loosening. Tapered washers shall be provided where the slope of surfaces in contact exceeds 1:20. Tensioned bolts shall be installed by the part-turn method of tensioning or with the use of a direct-tension indicating device.
- 6. All seal plates for hollow members are to be vented in a manner which will not compromise performance. Drain holes are to be provided in any members undergoing galvanising.
- 7. All finishes are to comply with the following. Decorative finishes are permissible so long as they do not hinder the performance of the finish specified below. Any site activity which compromises the factory finish is to be repaired such that the factory finish is achieved.

Location	Finish Type	Code
Internal	Per Shop	Per Shop
External/Built in	Shop	Shop

- 8. Fire rating has not been allowed for. The builder is to ensure fire rating is provided as per the architectural and project specifications.
- 9. Workshop drawings for structural steelwork shall be provided to the engineer at least 10 working days prior to the commencement of materials ordering or fabrication. Materials ordering or fabrication shall not be undertaken until the engineer has confirmed the suitability of such drawings by writing. The purpose of checking drawings is solely to ensure conformance with structural intent. No responsibility is taken by the engineer other than for this purpose. The builder retains sole responsibility for ensuring architectural intent, dimensional correctness and fitness for site delivery/installation is achieved.
- 10. Baseplates/endplates are to be grouted with a high strength non-shrink grout ensuring full bedding is achieved. Post installed anchors shall only be used where detailed. Anchors shall be installed in full compliance with manufacturers specification ensuring that no damage to the reinforcement is made. Anchors are to be load tested according to manufacturer recommendations.

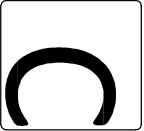
TIMBER

- 1. All timber associated materials, the manufacture and the erection of such materials is to be in accordance with relevant Australian Standards including but not limited to AS1720 and/or AS1684.
- 2. All timber is to be of the wood type (hard/soft/manufactured), of the minimum strength and durability grades as shown in the structural drawings.
- 3. All timber is to be seasoned and to be of a moisture content suitable for the location it is being used.
- 4. All fixings, nails, bolts, brackets, etc, are to be galvanised as required to suit the location of use.
- 5. Bolts shall be pre-bored at a diameter equal to the shank. Washers shall be used at the end of each bolt in accordance with Table 4. .11 of AS1720.1.
- 6. All connections are to be made in accordance with the relevant standard.
- 7. Where manufactured timber is used, all works are to be carried out in accordance with the manufacturers specification.

FORMWORK

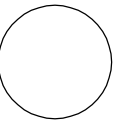
- 1. All concrete formwork design and construction remains the responsibility of the builder. All formwork shall be designed to support all loads supported by it including, but not limited to, materials loads prior to and after pour, the wet weight of the concrete, construction equipment, live loads and any lateral or PT induced loads.
- 2. Formwork finishes are to be specified by the architect.
- 3. Stripping times shall comply with the relevant Australian Standards. Attention is to be given to back-propping removal in multi-storey construction to avoid slabs being loaded beyond design limits (including allowance for strengths less than specified at 28 days).

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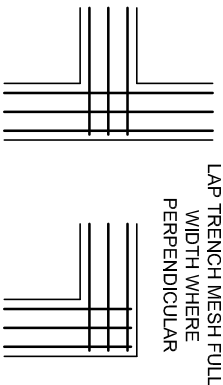
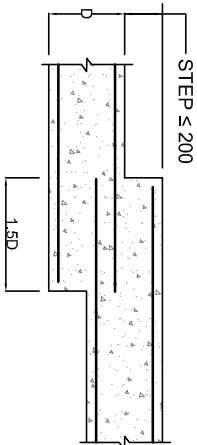
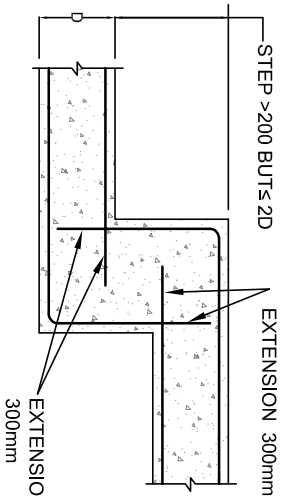
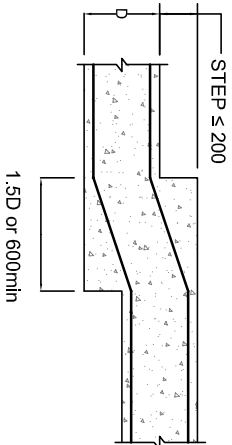
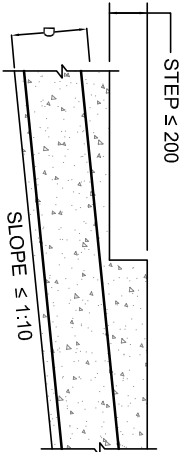
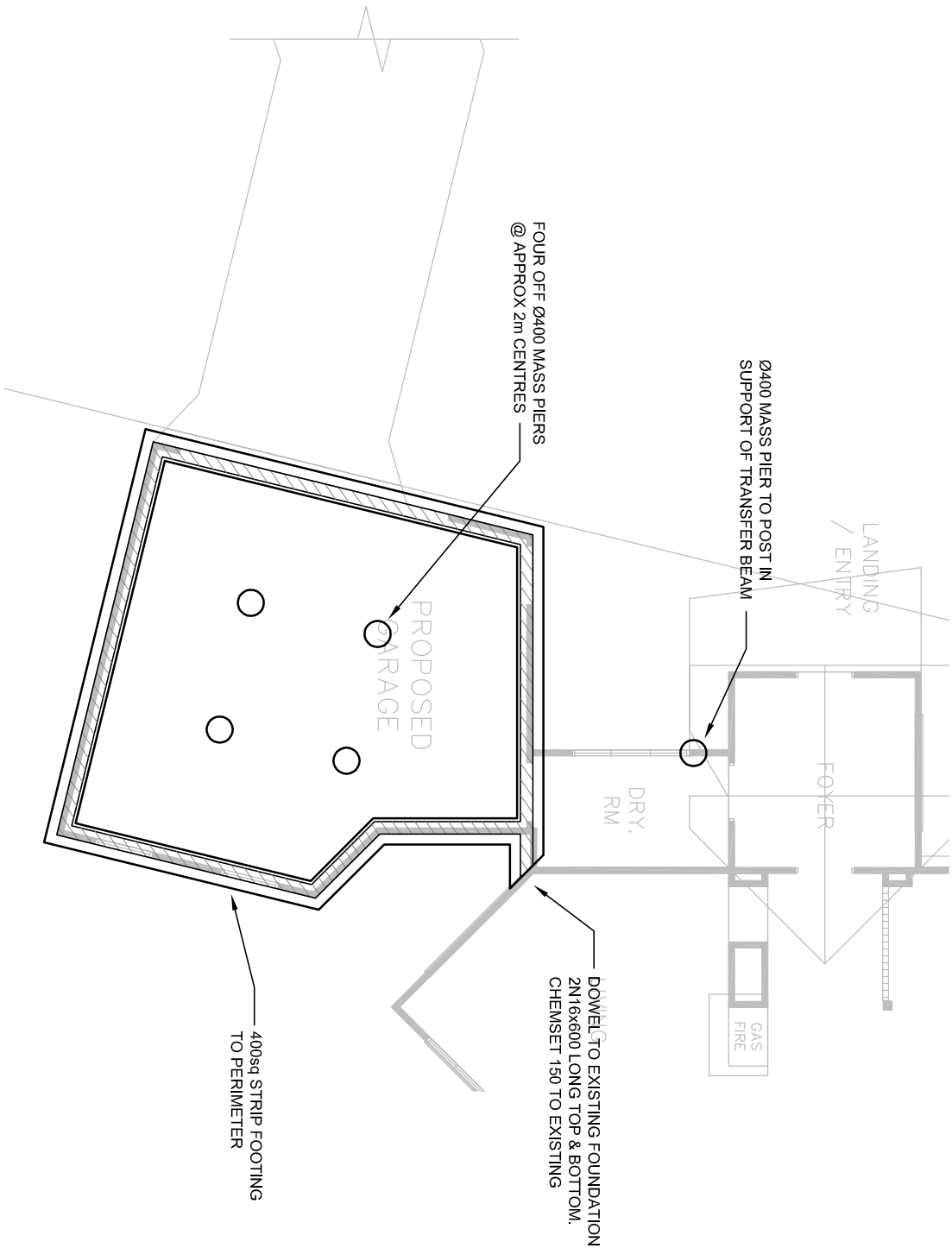
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Notes Sheet 2		
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FOOTINGS PLAN

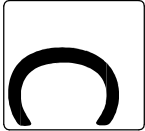
- 1. Refer relevant notes on general notes sheet.
- 2. All levels and falls to architects details.
- 3. All works to be carried out in strict accordance with NCC & relevant Australian Standards.



TYPICAL FOOTING STEPS

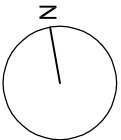
TYPICAL FOOTING INTERSECTIONS

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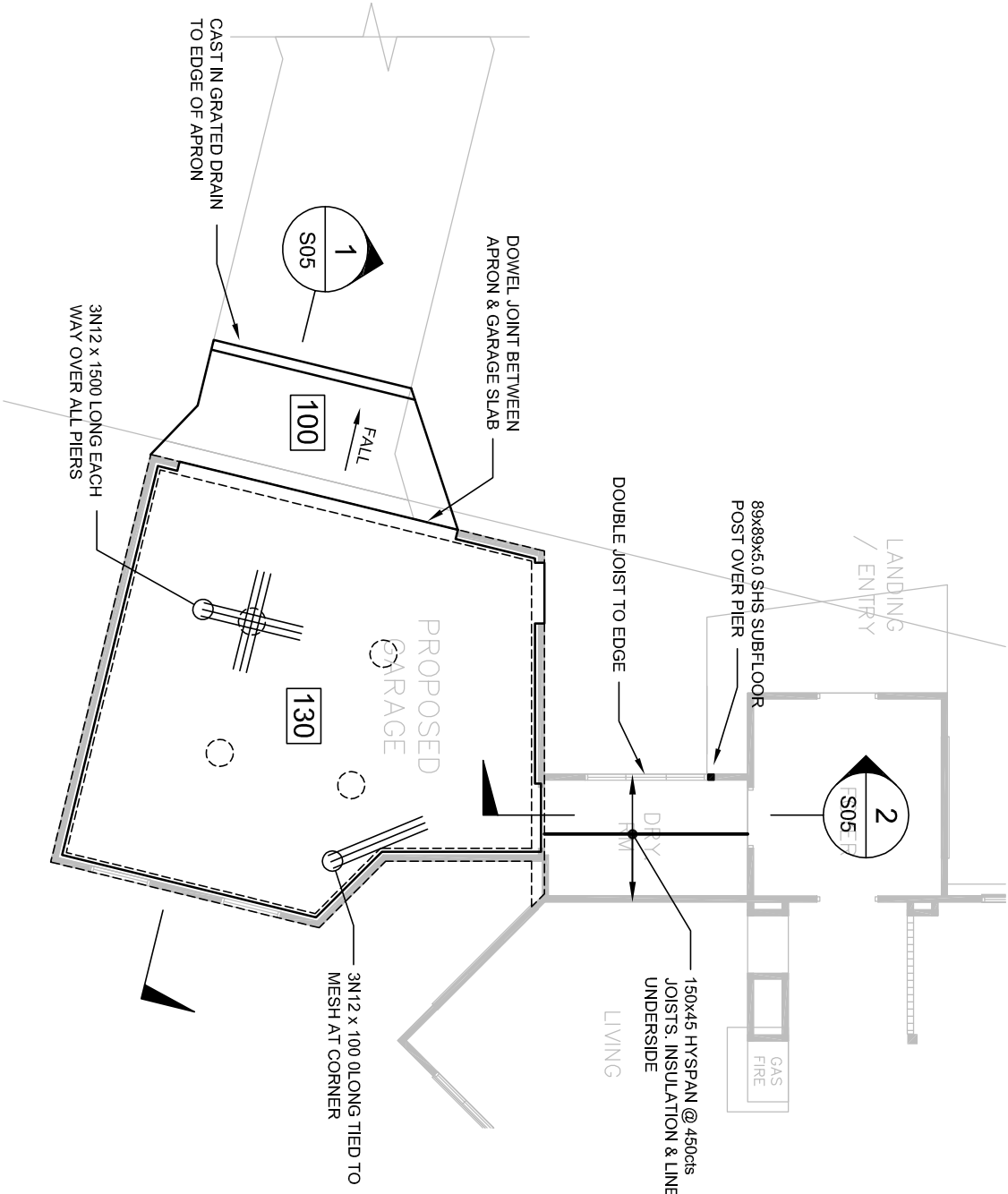
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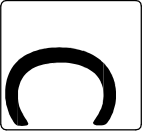
Footings Plan		
Proposed Garage @ 13 Mountain Drive, Thredbo		
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1. Refer relevant notes on general notes sheet.
2. All levels and falls to architects details.
3. All works to be carried out in strict accordance with NCC & relevant Australian Standards.

SLAB PLAN

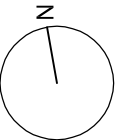


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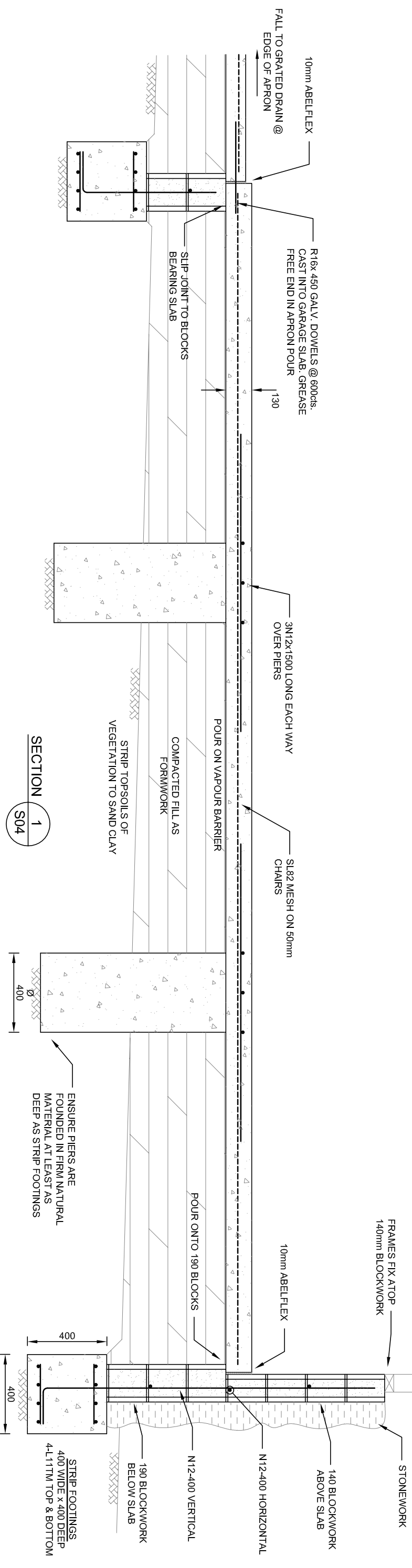
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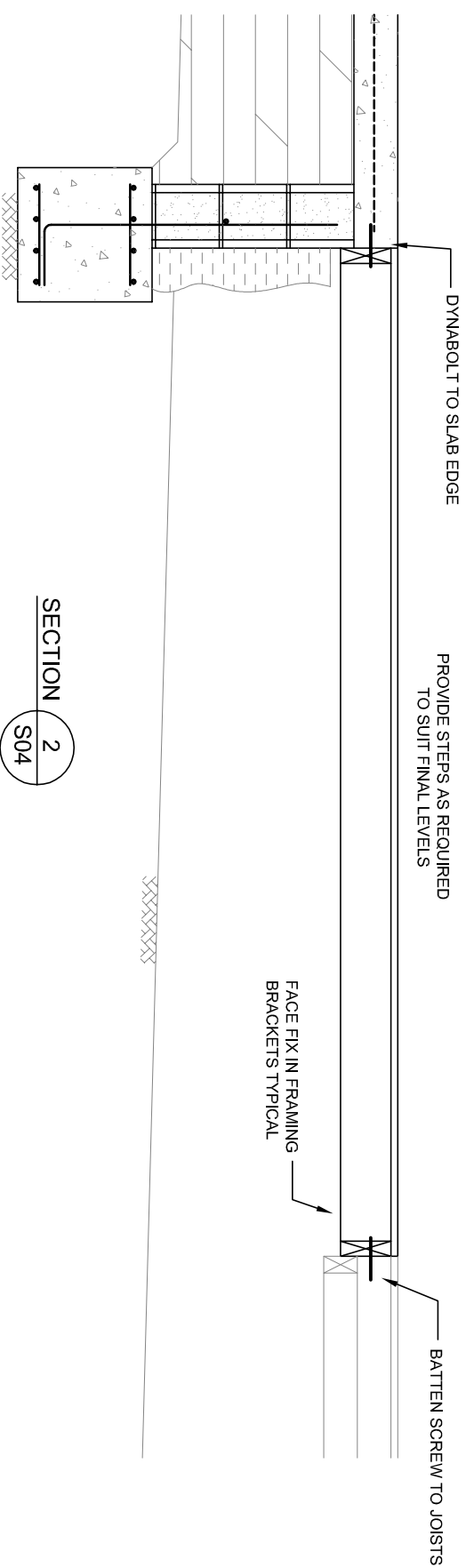


Slab Plan		
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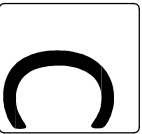
TYPICAL PERIMETER WALL DETAILS



TYPICAL JUNCTION DETAILS

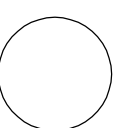


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Ground Floor Details

Proposed Garage @ 13 Mountain Drive, Thredbo

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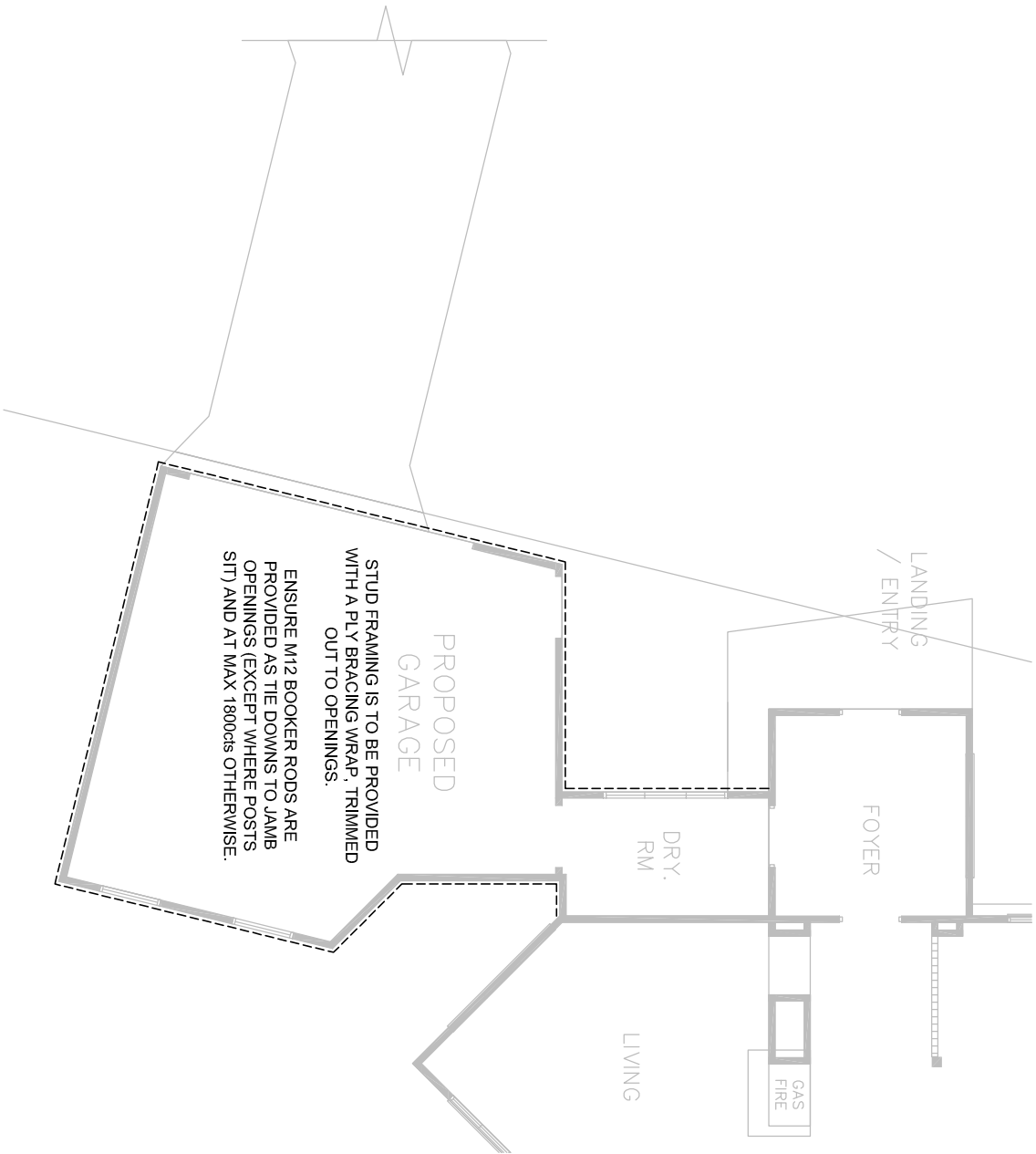
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BRACING PLAN

- 1. All levels and falls to architects details.
- 2. Refer timber & steel notes on general notes page.
- 3.All works to be carried out in strict accordance with NCC & AS1684.
- 4. Where connection details are not shown, builder is to complete works in accordance with AS1684, inclusive of all required bracing, tie downs, etc.
- 5. No detail relieves the builder of the ultimate responsibility to ensure all framing works are carried out in accordance with AS1684.



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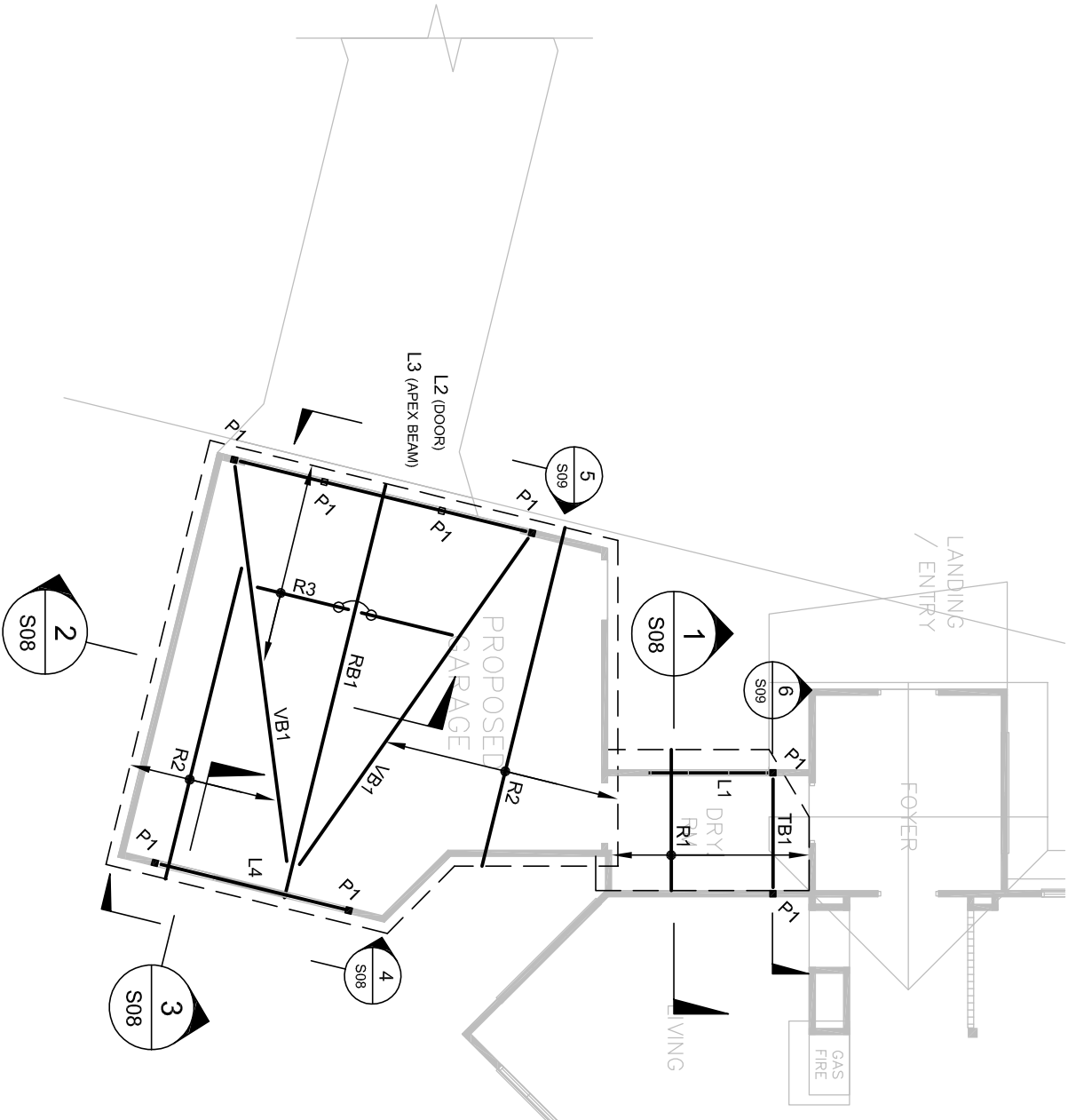
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ROOF PLAN

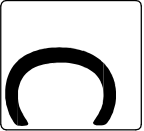
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MEMBER SCHEDULE

MEMBER	TYPE	SIZE
P1	POST	89x89x5.0 SHS
L1	LINTEL	200x45 HYPAN
L2	LINTEL	200 PFC
L3	LINTEL	200 PFC
L4	LINTEL	200 PFC
RB1	RIDGE	250UB25
VB1	VALLEY	250UB25
TB1	TRANSFER	200 PFC
R1	RAFTER	150x45 HYPAN @ 600cts
R2	RAFTER	240x45 HYPAN @ 450cts
R3	RAFTER	240x45 HYPAN @ 600cts

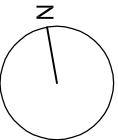


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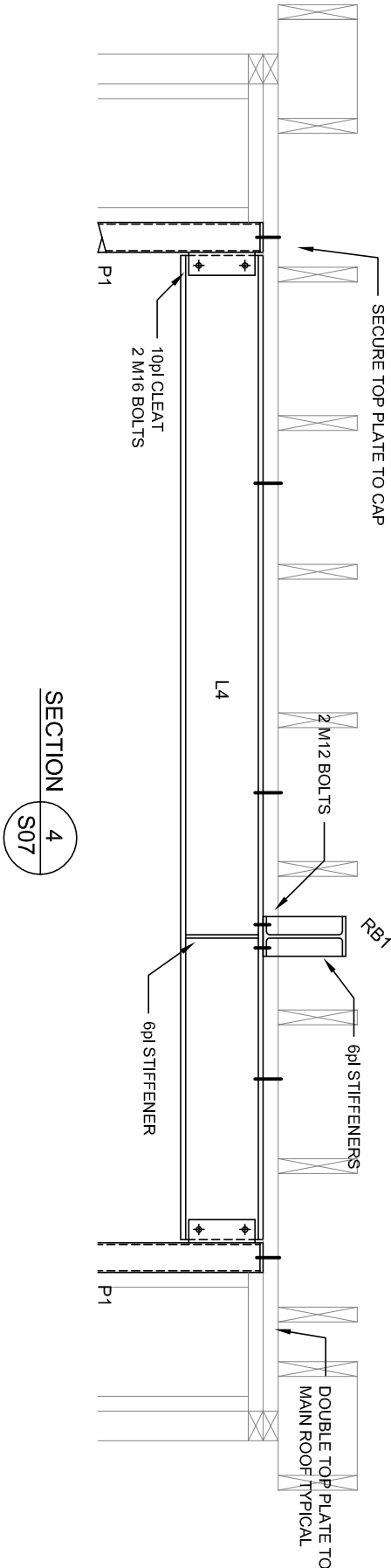
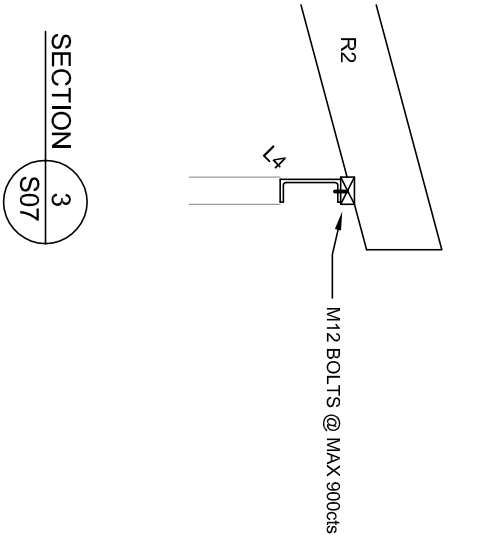
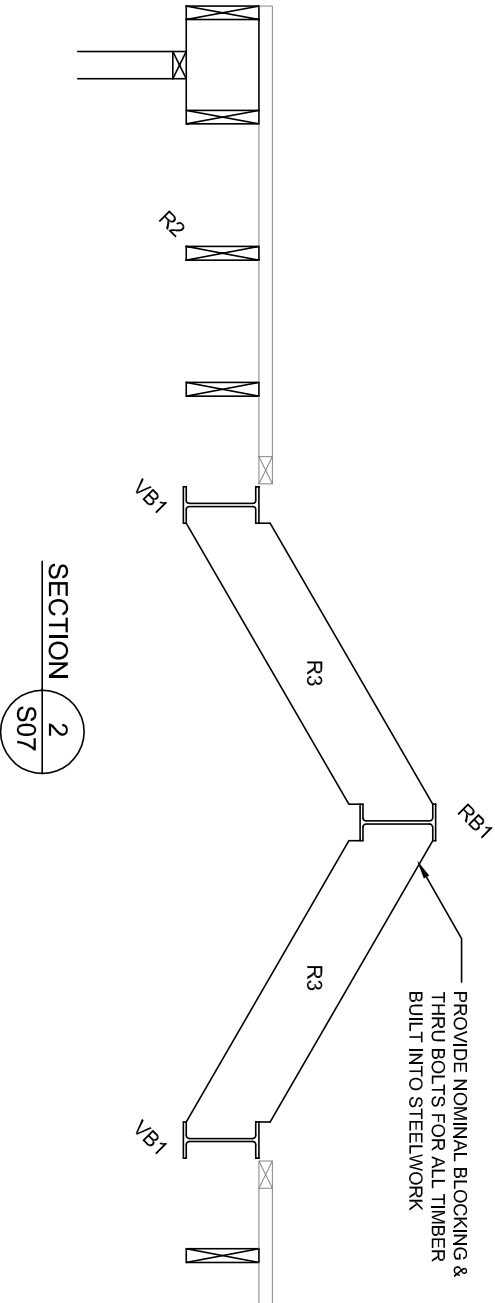
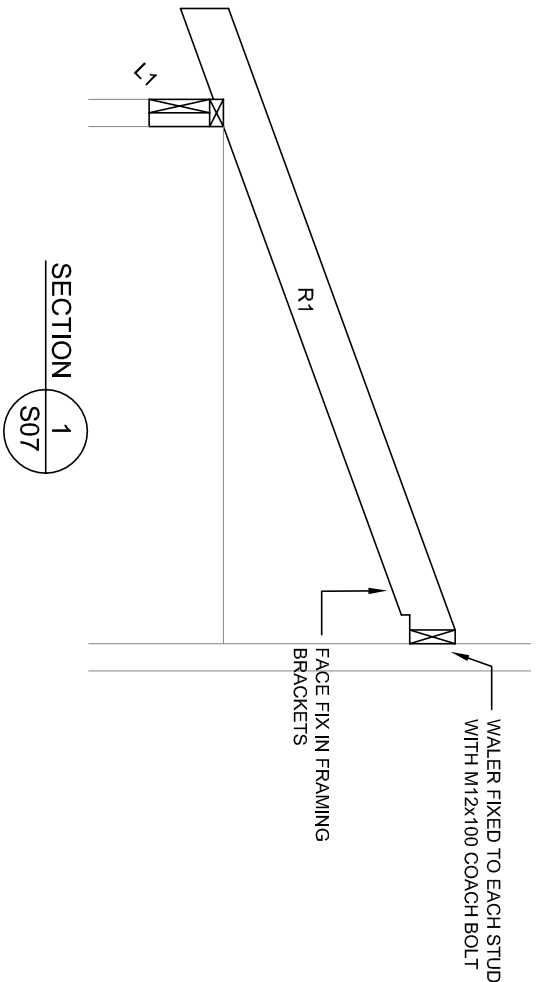


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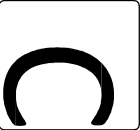
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Roof Plan		
Proposed Garage @ 13 Mountain Drive, Thredbo		
P. Davies		22100-S07
Not to Scale		A



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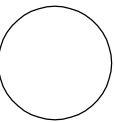


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Roof Details 1

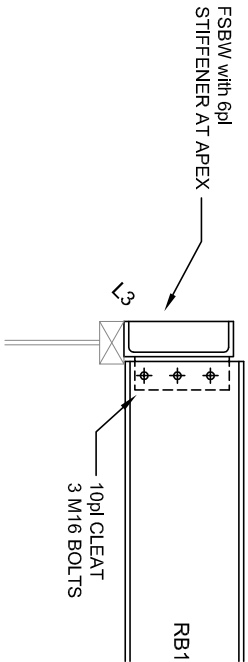
Proposed Garage @ 13 Mountain Drive, Thredbo

P. Davies

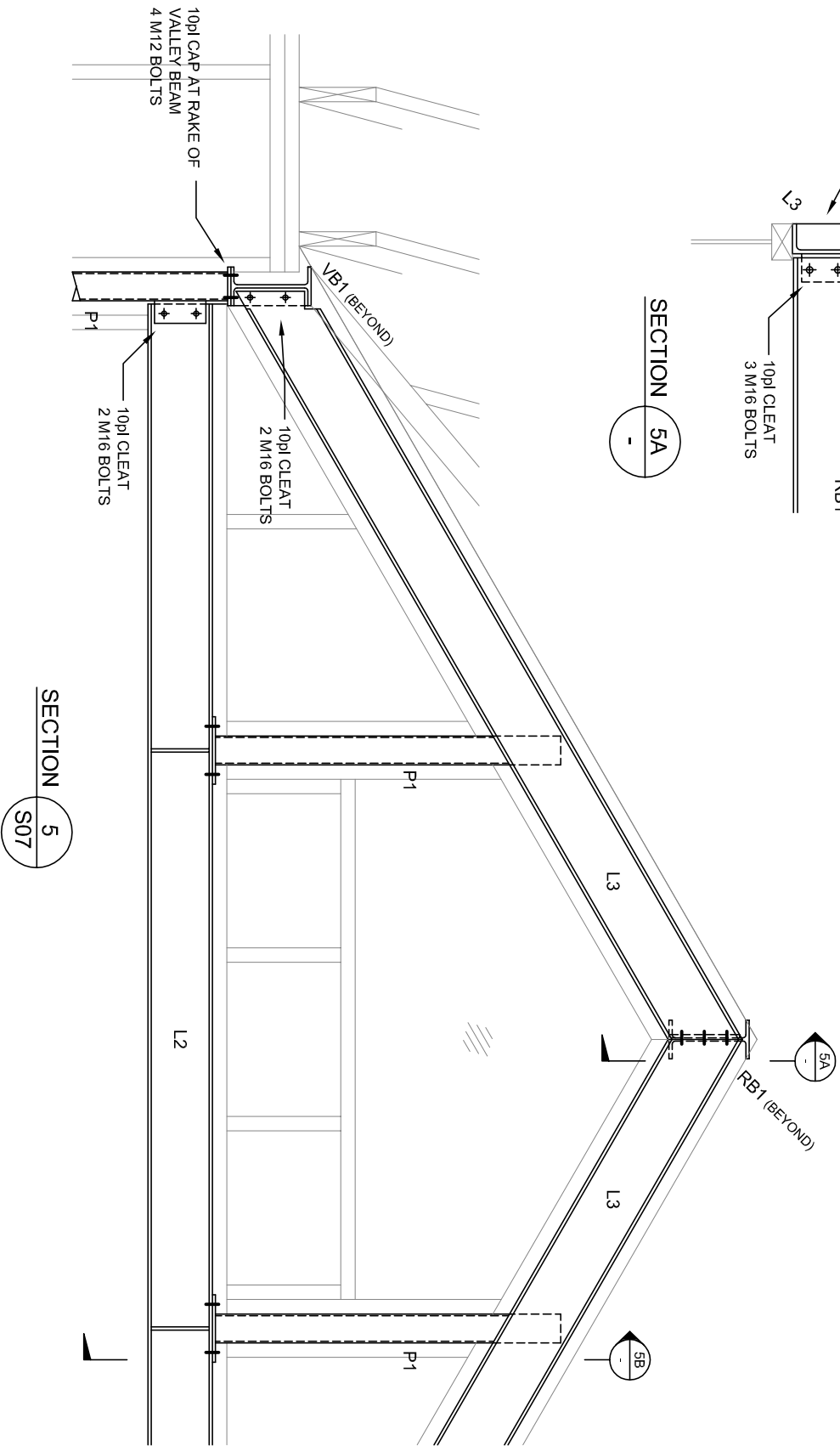
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22100-S08

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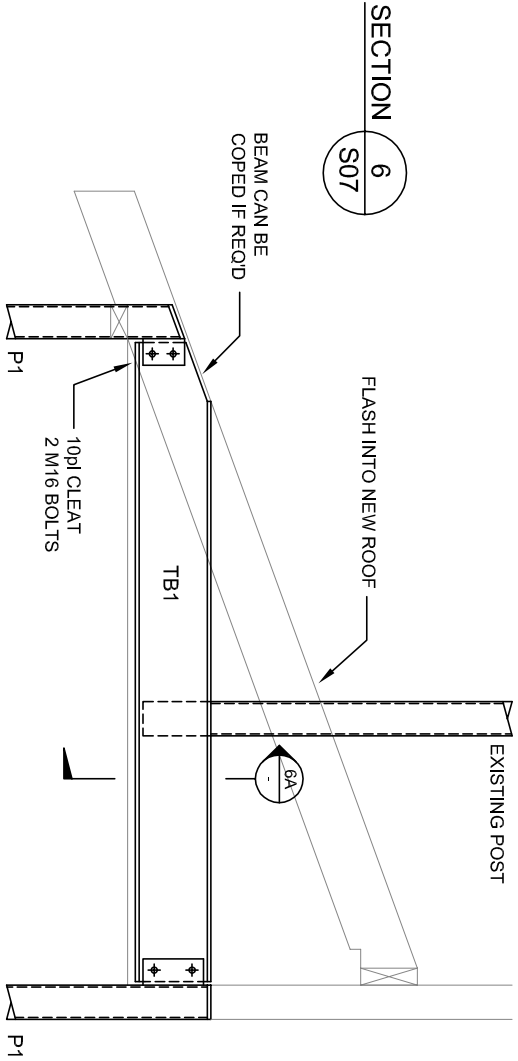
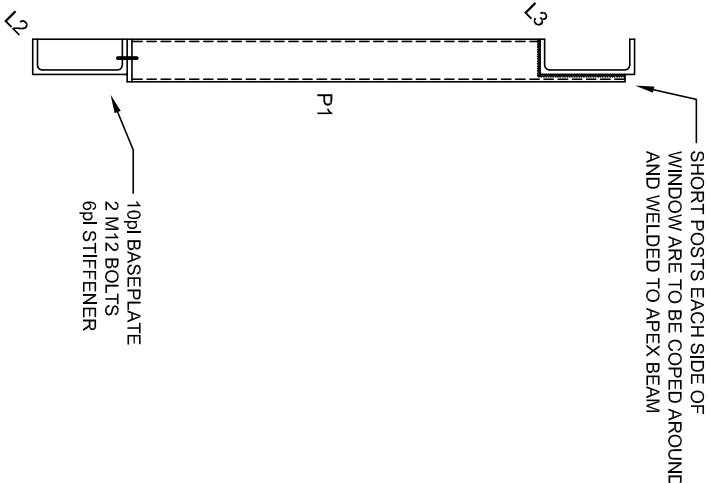


SECTION 5A
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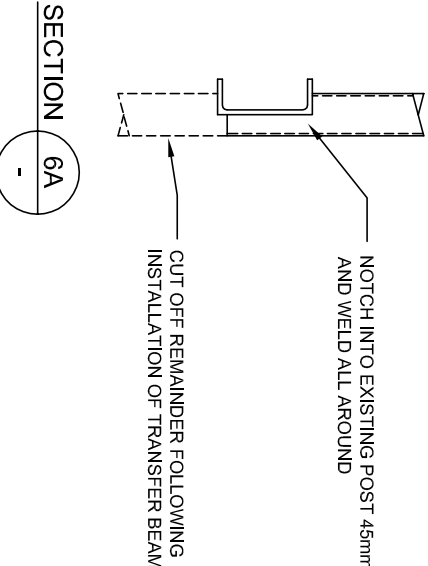


SECTION 5
S07

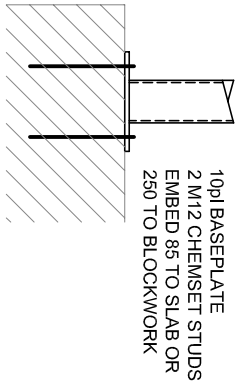
SECTION 5B
-



SECTION 6
S07



SECTION 6A
-



POST BASEPLATES

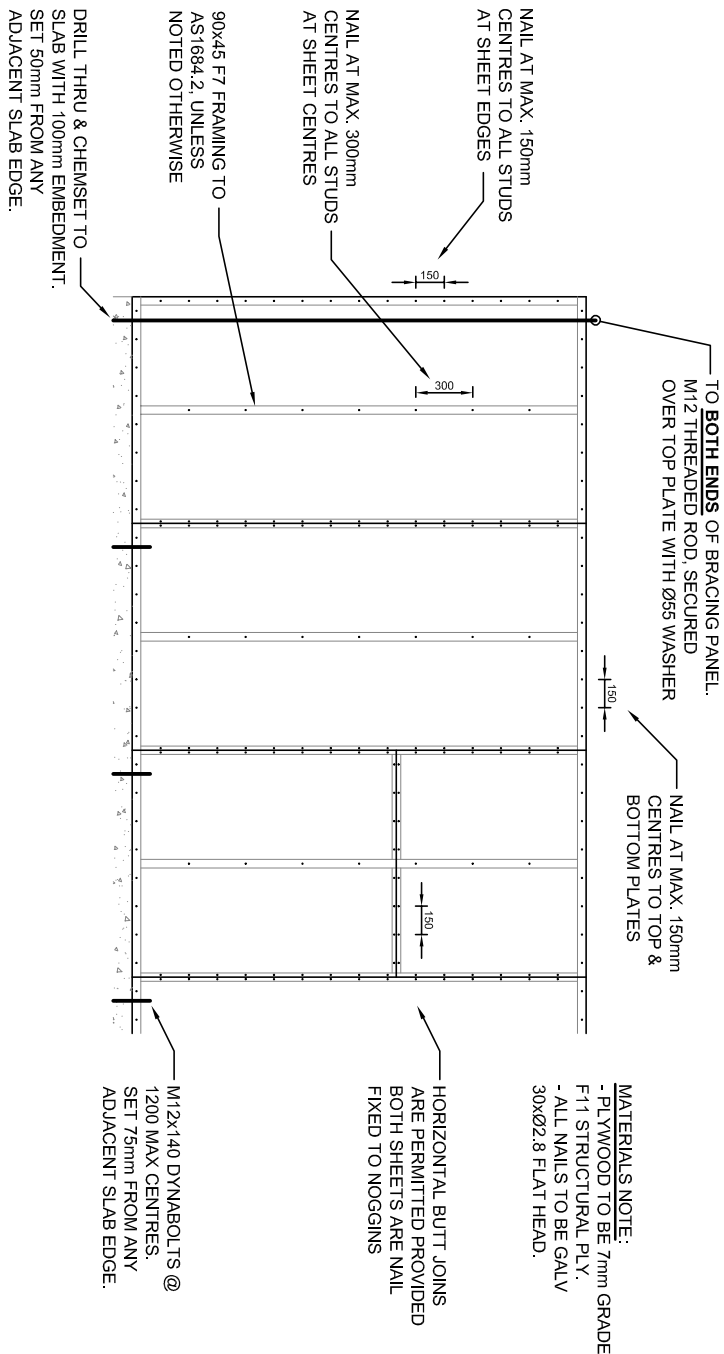
Rev	Issued For	Date	Roof Details 2		
			Proposed Garage @ 13 Mountain Drive, Thredbo		
			P. Davies		
			Not to Scale		
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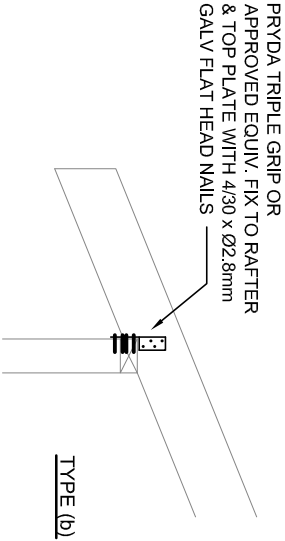


MATERIALS NOTE:
- PLYWOOD TO BE 7mm GRADE F11 STRUCTURAL PLY.
- ALL NAILS TO BE GALV 30xØ2.8 FLAT HEAD.

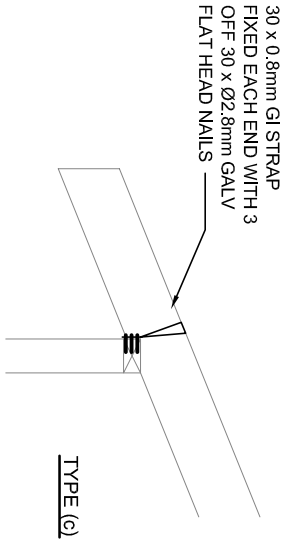
HORIZONTAL BUTT JOINS ARE PERMITTED PROVIDED BOTH SHEETS ARE NAIL FIXED TO NOGGINS

TYPE (h) PLYWOOD BRACING TO AS1684

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TYPE (b)

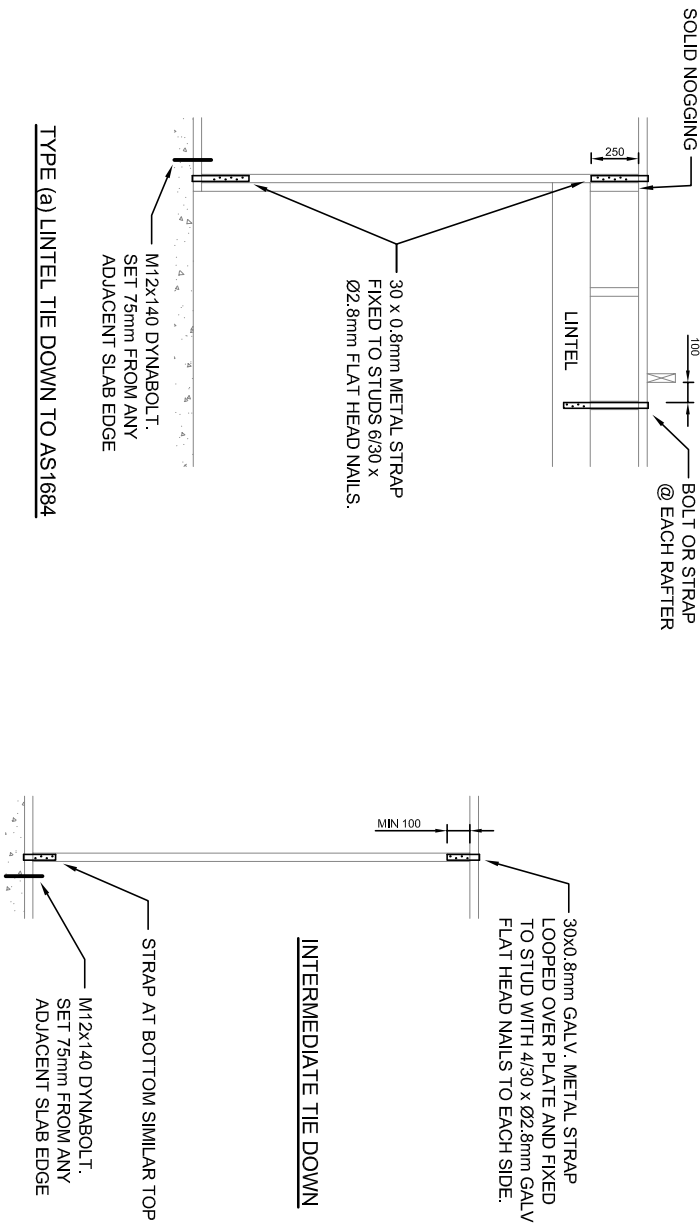


TYPE (c)

RAFTER TO WALL FRAME
TIE DOWN CONNECTIONS TO AS1684

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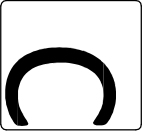
ALL RAFTERS TO BE BIRDSMOUTHED OR WEGED IN ACCORDANCE WITH AS1684.



TYPE (e) LINTEL TIE DOWN TO AS1684

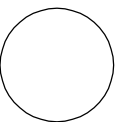
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			Proposed Garage @ 13 Mountain Drive, Thredbo		
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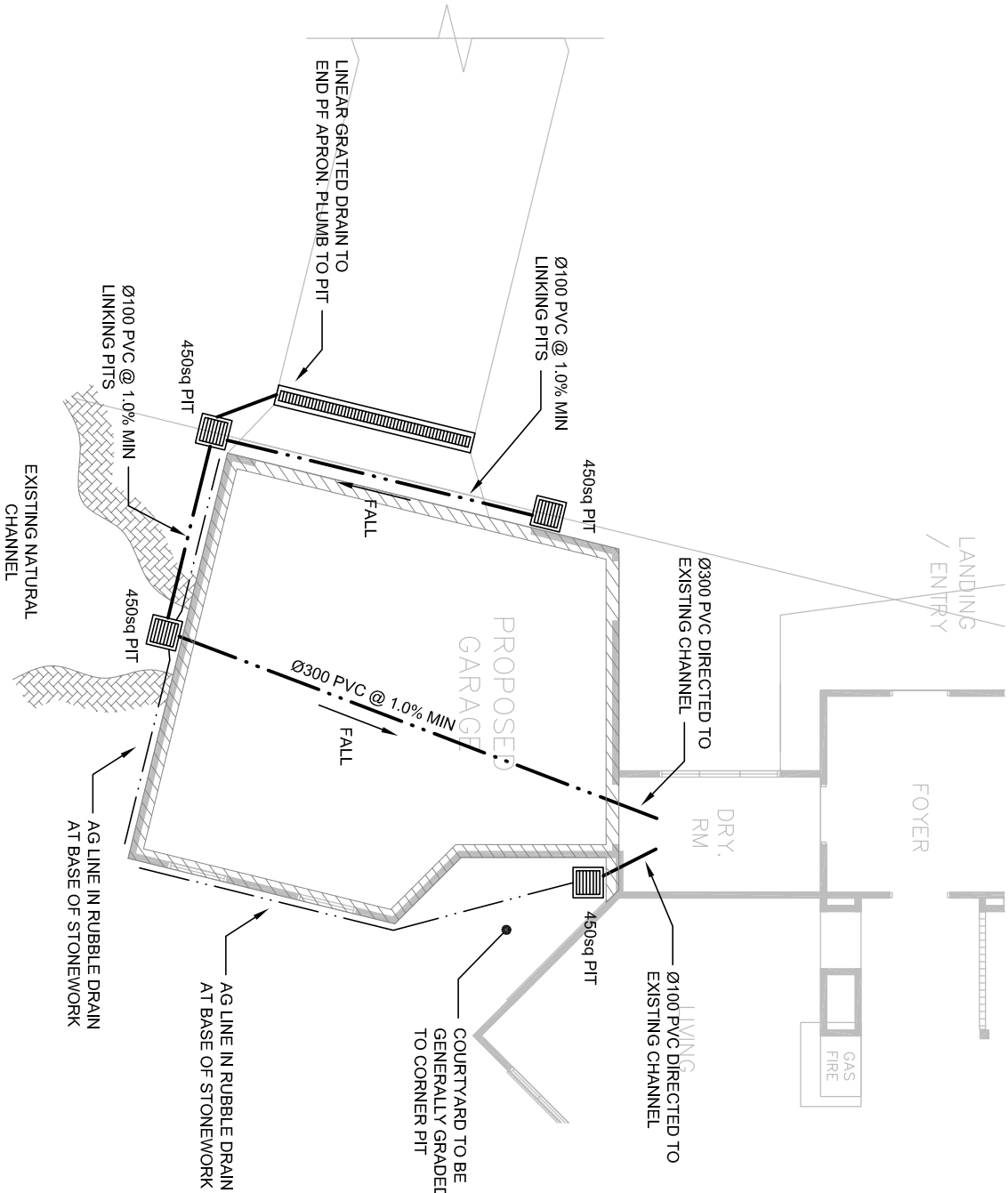


22100-S10

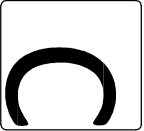
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1. Refer relevant notes on general notes sheet.
2. All levels and falls to architects details.
3. All works to be carried out in strict accordance with NCC & relevant Australian Standards.

DRAINAGE PLAN

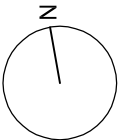


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Drainage Plan		
Proposed Garage @ 13 Mountain Drive, Thredbo		
P. Davies		22100-S11
Not to Scale		A