CONSULTING ENGINEERS

ABN 71 162 701 528

Tasmania
PO Box 128
Prospect TAS 7250

New South Wales
Po Box 538
Dapto NSW 2530

PROPOSED DEVELOPMENT

For : *Shyam Sundar*

At : *32 William St, Blackhead, NSW*

Job Number : *24/25 NSW 093*

Attachments

- RJK Consulting Structural Engineering Plans – Sheets 1 to 5 (Certified – 19/06/2025)
- RJK Consulting Civil Engineering Plans – Sheets 1 to 2 (Certified – 19/06/2025)
- CSIRO Guide – Foundation Maintenance and Footing Performance

Project Brief

Structural design, drafting and certification of foundation, steel beam and garage walls.
Civil design & drafting including driveway long section.

Limitations

- Lintels not designed for girder trusses or point loads
- Design based on class M
- Engaged for design only
- Limited by information provided regarding assets and site survey

Site inspections have not been allowed for in fee structure.

Risden Knightley
Principal Engineer

19/06/2025

SHYAM SUNDAR
PROPOSED RESIDENCE
32 WILLIAM STREET,
BLACK HEAD
JUNE 2025

LIST OF PAGES

DRAWING LIMITATIONS

ENGINEERING DESIGN IS BASED ON ARCHITECTURAL DOCUMENTS PROVIDED BY 'PARKWOOD MODULAR BUILDINGS'. SITE CLASSIFICATION AND LAND STABILITY HAS BEEN ASSESSED BY 'REGIONAL GEOTECHNICAL SOLUTIONS' AND CLASSIFIED AS AN 'M' WITH WIND CLASSIFICATION OF 'ASSUMED N3'. REFER NOTES.

RJK CONSULTING ENGINEERS MUST BE CONSULTED FOR ANY OTHER ALTERATIONS OR RE-DESIGN CAUSED BY DISCREPANCIES TO LEVELS OR SITE CONDITIONS. IT SHOULD BE NOTED THAT ALL LINTELS ARE NOT DESIGNED FOR POINT LOADS AND THE ROOF TRUSS MANUFACTURER IS TO RECHECK ALL LINTELS.

THE STRUCTURAL ENGINEER FROM RJK CONSULTING ENGINEERS HAS BEEN ENGAGED TO PROVIDE ENGINEERING DESIGN AND CERTIFICATION SERVICES ONLY AND AS SUCH HAS USED PROFESSIONAL ENGINEERING JUDGEMENT AND INTERPRETATION OF THE AVAILABLE CONTOURS AND SITE AND SOIL INVESTIGATION IN DETERMINING ASPECTS OF STRUCTURAL DESIGN.

RJK CONSULTING ENGINEERS RECOMMEND THAT STRUCTURAL INSPECTIONS ARE CARRIED OUT BY A SUITABLY QUALIFIED PROFESSIONAL WHO IS ABLE TO ASSESS ON SITE THAT THIS JUDGEMENT SUITS THE CONDITIONS FOUND ON SITE. WE ARE PREPARED TO BE ENGAGED TO PROVIDE THIS STRUCTURAL SERVICE AS REQUIRED, BUT WE HAVE NOT BEEN ENGAGED TO UNDERTAKE INSPECTIONS AT THIS STAGE.

CORROSION NOTES:

A) APPROXIMATELY '250m' TO THE NEAREST POINT OF HIGH WATER MARK
B) IDENTIFIED AS CORROSION CLASSIFICATION 'C-5M' ACCORDING TO AS 4312:2019
C) ALL MATERIALS AND WORKMANSHIP MUST COMPLY WITH ALL RELEVANT AUSTRALIAN STANDARDS INCLUDING BUT NOT LIMITED TO AS4312:2019 ATMOSPHERIC CORROSIVITY ZONES AND OTHERS REFERENCED WITHIN.

Regulated Design Record

Project Address: 32 WILLIAM STREET, BLACK HEAD

Project Title:

Consent No: | **Body Corporate Reg No:**

Drawing Title: COVER SHEET | **Drawing No:** 1 of 5

Rev	Date dd.mm.yy	Description	DP Full Name	Reg No
A	18.06.25	PROPOSED RESIDENCE	RISDEN JAMES KNIGHTLEY	PDP 0000981 / DEP 0002881

CONSULTING ENGINEERS

Risden Knightley - 991537
Registered Professional Engineer
BE Civil FIEAust CPEng NPR
19/06/2025
Tasmanian Accreditation No. CC2539X

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TASMANIA - PO BOX 128, PROSPECT TAS 7250

JOB NAME :	SHYAM SUNDAR
LOCATION :	32 WILLIAM STREET, BLACK HEAD
DESCRIPTION:	PROPOSED RESIDENCE
DRAWING:	COVER SHEET

DRAWN BY: PV CHECKED BY: RJK
SCALE: 1:20
DATE: JUNE 2025

JOB NUMBER	SHEET	Size
24/25 NSW 093	1 of 5	A3

EXCAVATION AND SITE PREPARATION

F1 THE SITE IS TO BE STRIPPED OF ALL VEGETATION AND ORGANIC MATERIAL PRIOR TO CUTTING OR FILLING

F2 ALL TRENCHES MUST BE CLEAN AND FREE FROM ALL LOOSE MATERIAL.

F3 BASES OF FOOTINGS SHALL BE HORIZONTAL U.N.O.

F4 THE BASE FOR SLAB ON GRADE SHALL BE PREPARED AS DETAILED BELOW:

- FILL WITH APPROVED STRUCTURAL FILL COMPACTED AND WATERED TO 150MM FINISHED THICKNESS. ADDITIONAL FILL REQUIRED BELOW THIS LAYER SHALL BE STRUCTURAL FILL COMPACTED AND WATERED PLACED IN LAYERS NOT EXCEDDING 200MM FINISHED THICKNESS.

- PLACE 30MM MAX SAND BINDING WATERED AND COMPACTED UNDER ENTIRE SLAB AND SLAB THICKENINGS.

- LAY 0.2MM "FORTECON" MEMBRANE. TAPE ALL JOINTS AND SEAL ALL PENETRATIONS. PLACE UNDER ENTIRE SLAB INCLUDING SLAB THICKENINGS AND INTEGRAL FOOTINGS. TURN UP AT OUTSIDE

* IF TRENCHING OR OTHER SITE WORK INDICATES THE PRESENCE OF FOUNDATION MATERIALS SIGNIFICANTLY DIFFERENT THAN THOSE INDICATED ON DRAWINGS, PLEASE NOTIFY THIS OFFICE AS SOON AS POSSIBLE.

FOUNDATION

F1 FOUNDING LEVELS SHOWN ARE DERIVED FROM ARCHITECTURAL OR SURVEY DRG.NO.

F2 FOUNDING DEPTHS OR REDUCED LEVELS TO UNDERSIDE OF FOOTINGS SHOWN ON DRAWINGS ARE FOR TENDERING PURPOSES ONLY. FOUNDING DEPTH IS NOMINALLY 700 MINIMUM BELOW EXISTING OR CUT GROUND SURFACE LEVEL UNO. EXCAVATE THROUGH FILL AS REQUIRED TO PLACE FOOTINGS ACCORDINGLY. ALL EXCAVATIONS SHALL BE APPROVED BEFORE PLACEMENT OF STRUCTURAL FILL, HARDCORE, BLINDING AND/OR REINFORCEMENT.

F3 FOUNDATION MATERIAL SHALL HAVE A UNIFORM BEARING CAPACITY OF 100kPa MINIMUM U.N.O.

F4 BASES OF FOOTINGS SHALL BE HORIZONTAL, UNO.

F5 EXCESS DEPTHS AND WIDTHS IN FOUNDATIONS TO THOSE SPECIFIED SHALL BE FILLED WITH MINIMUM A.S. GRADE 15 CONCRETE. THE CONCRETE FILL SHALL NOT BE BONDED TO THE FOUNDATION UNLESS APPROVED. THE COST OF FILLING SHALL BE BORNE BY THE CONTRACTOR.

F6 WHERE DETAILED ON THESE DRAWINGS AND WHEREVER GROUND WATER IS ENCOUNTERED PROVIDE 50mm THICK CONCRETE BLINDING IMMEDIATELY AFTER APPROVAL OF FOUNDATION.

CONCRETE

C1 WORKMANSHIP, MATERIALS AND DESIGN SHALL BE IN ACCORDANCE WITH AS 3600 AND ASSOCIATED CODES LISTED THEREIN AND THE SPECIFICATION.

C2 CONCRETE SHALL BE 25 MPA MINIMUM, WITH 20MM NOMINAL MAXIMUM AGGREGATE SIZE AND 80MM SLUMP

C3 DO NOT PLACE CONDUITS, PIPES AND THE LIKE WITHIN CONCRETE COVER.

C4 ALL CONCRETE SHALL BE PROPERLY CURED BY KEEPING ALL EXPOSED SURFACES IN A MOIST OR DAMP CONDITION FOR AT LEAST THE FIRST 7 DAYS AFTER PLACEMENT.

C5 WHERE BRITTLE FLOOR COVERINGS ARE TO BE USED (EG. TILED AREAS), EXTRA MEASURES ARE REQUIRED TO CONTROL THE EFFECT OF SHRINKAGE CRACKING. SOME MEASURES INCLUDE THE FOLLOWING:
- A FLEXIBLE GROUT BED SHALL BE PROVIDED UNDER TILES.
- THE PLACEMENT OF FLOOR COVERINGS SHALL BE DELAYED (3 MONTHS MINIMUM)

SLABS ON GRADE

SG1 SUB-BASE PREPARATION

THE SUB-BASE FOR SLABS ON GRADE SHALL BE PREPARED AS FOLLOWS:
- STRIP OFF ALL VEGETATED TOPSOIL AND CUT TO REQUIRED LEVEL;
- PROOF ROLL SUB-BASE TO STANDARD SPECIFIED;
- WHERE SUB-BASE DISTURBED FOR EXCAVATIONS FILL WITH STRUCTURAL FILL TYPE A OR B THOROUGHLY COMPACTED IN 150 MAXIMUM LAYERS.

SG2 BASE PREPARATION

THE BASE FOR SLABS ON GRADE SHALL BE PREPARED AS DETAILED AND AS FOLLOWS:
- FILL WITH STRUCTURAL FILL TYPE A COMPACTED AND WATERED TO 150 MINIMUM FINISHED THICKNESS. ADDITIONAL FILL REQUIRED BELOW THIS LAYER SHALL BE TYPE A OR B STRUCTURAL FILL COMPACTED AND WATERED, PLACED IN LAYERS NOT EXCEEDING 200 FINISHED THICKNESS.
- PLACE 25 MAX. SAND BLINDING WATERED AND COMPACTED, UNDER ENTIRE SLAB AND SLAB THICKENINGS.
- LAY 0.2MM "FORTECON" MEMBRANE. TAPE ALL JOINTS AND SEAL ALL PENETRATIONS. PLACE UNDER ENTIRE SLAB INCLUDING SLAB THICKENINGS AND INTEGRAL FOOTINGS. TURN UP AT OUTSIDE EDGES.

SG3 STRUCTURAL FILL

STRUCTURAL FILL SHALL BE AS FOLLOWS:
TYPE A - 20 FINE CRUSHED ROCK
TYPE B - 40+ FINE CRUSHED ROCK
EXCAVATED MATERIAL NOT TO BE USED WITHOUT APPROVAL.

STRUCTURAL TIMBER

T1 ALL STRUCTURAL TIMBER WORKMANSHIP AND MATERIALS SHALL BE INACCORDANCE WITH AS1720 AND AS1684, THE SAA STANDARDS CITED IN AS1720, AS1684 AND THE SPECIFICATION.

T2 TIMBER SHOWN ON STRUCTURAL DRAWINGS SHALL BE SEASONED HARDWOOD OF STRESS GRADE F17 UNLESS OTHERWISE SPECIFIED.

T3 REFER ARCHITECT'S OR OTHER DRAWINGS FOR NON-STRUCTURAL TIMBER DETAILS.

T4 SHWD IS SEASONED HARDWOOD, SSWD IS SEASONED SOFTWOOD LVL IS LAMINATED VENEER LUMBER.

T5 WHERE THE USE OF TREATED PINE FOR DURABILITY IS NOTED ON THE STRUCTURAL DRAWINGS, ENSURE IT COMPLIES WITH THE FOLLOWING TREATMENTS LEVELS:

INTERIOR ABOVE GROUND = H2
EXTERIOR ABOVE GROUND = H3
EXTERIOR IN GROUND = H6
} ALL IN ACCORDANCE WITH AS1684

T6 INSTALL PROPRIETARY TIMBER CONNECTORS IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.

T7 RETIGHTEN BOLTED CONNECTIONS IN UNSEASONED TIMBER PRIOR TO THE FIXING OF CLADDING. ENSURE OVERSIZED WASHERS ON ALL TIMBER FACES ARE USED.

STEELWORK

S1 WORKMANSHIP, MATERIALS AND DESIGN SHALL BE IN ACCORDANCE WITH A.S. 4100, ASSOCIATED CODES LISTED THEREIN AND THE SPECIFICATION.

S2 BOLTING PROCEDURES ARE IDENTIFIED AS FOLLOWS:

BOLTING PROCEDURE	GRADE MPa	BOLT TO A.S.	METHOD OF INSTALLATION	NOTES
4.6/S	4.6	AS 1111	SNUG TIGHTENED	-
8.8/S	8.8	AS 1252	SNUG TIGHTENED	-

ALL BOLTS TO BE OF SUCH LENGTH THAT AT LEAST ONE FULL THREAD IS EXPOSED BEYOND THE NUT AFTER THE NUT HAS BEEN TIGHTENED.

S3 UNLESS NOTED OTHERWISE, CONNECTIONS SHALL BE AS FOLLOWS:

CONNECTION LOCATION	BOLT No. AND/OR SIZE	PRO-CEDURE	CLEAT THICKNESS	NOTE
GENERAL MEMBERS	<200 MAX DIM 2M16 >200 2M20	8.8/S 8.8/S	8 10	WASHER UNDER ROTATING PART

NOTE: ALL BOLTS, EXCEPT HD BOLTS, TO BE HOT DIP GALVANISED UNO. HD BOLTS TO BE HOT DIP GALVANISED WHEN EXPOSED TO THE WEATHER.

S4 WELDING CATEGORIES SHALL BE AS FOLLOWS:
UNLESS NOTED OTHERWISE SP TO A.S. 1554
PURLIN AND GIRT CLEATS GP TO A.S. 1554

S5 UNLESS NOTED OTHERWISE ALL FILLET WELDS SHALL BE 6MM CONTINUOUS FILLET WELDS, SP CATEGORY.

S6 ALL BUTT WELDS SHALL BE PRE-QUALIFIED COMPLETE PENETRATION SP CATEGORY AND SHALL UTILIZE "RUN-ON RUN-OFF" PLATES.

S7 GROUT UNDER BASE PLATES SHALL BE 2:1 SAND/CEMENT MORTAR MIXED NEARLY DRY AND RAMMED HARD MINIMUM 20 THICK. ALTERNATIVELY USE MASTER BUILDER'S MASTERFLOW TYPE 870A CEMENT GROUT (FLOWABLE GRADE) 20 THICK.

S8 ALL EXPOSED STEELWORK TO BE HOT DIP GALVANISED IN ACCORDANCE WITH GRADE HDG900 TO AS/NZ2312. PREPARESTEELWORK TO CLASS 2 / AS1627.4. MAKE GOOD DAMAGE TO GALVANISING WITH CIG "HOT ZINC STICK" U.N.O. WITHIN 100M FROM THE NON-SURF COAST OR 1KM FROM THE SURF COAST, HOT DIP GALVANISE ABOVE IN ACCORDANCE WITH GRADE HDG900 TO AS/NZ2312. REFER SPECIFICATION FOR BARRIER AND/OR FINISH COATS.

S9 FABRICATED STEEL BEAMS AND TRUSSES SPANNING GREATER THAN 5M WITH AN UPWARDS PRE CAMBER OF 1/500 SPAN U.N.O.

-

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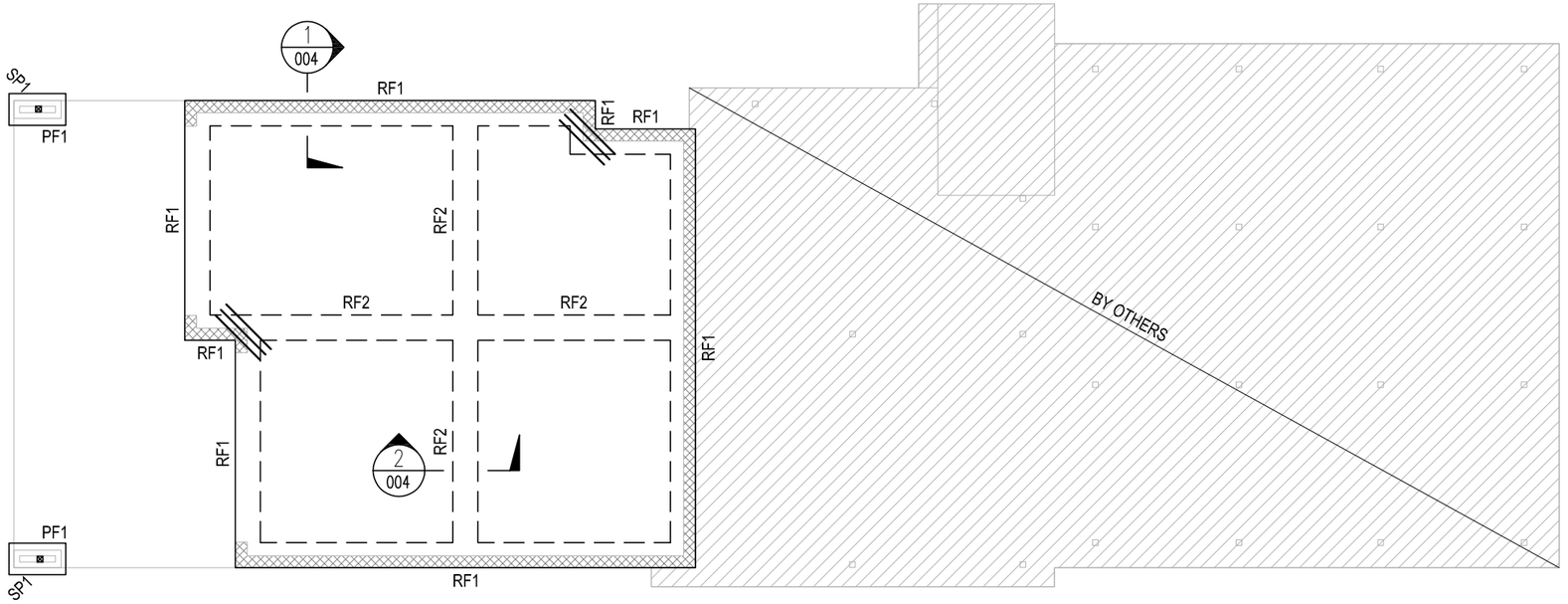

GROUND FLOOR SLAB LAN

1:100

1. RAFT SLAB @100mm DEPTH FOUNDED ON NATURAL SOIL OR WELL COMPACTED FILL WITH ALLOWABLE BEARING CAPACITY OF 100kPa.
2. RAFT SLAB TYPICAL SL82 MESH TOP THROUGHOUT U.N.O
3. REFER TO ARCHITECTURAL DRAWINGS FOR LEVELS, RL's, STEPS AND FOLDS
4. ALL PAD FOOTING & RAFT BEAMS FOUNDED ON RESIDUAL CLAY WITH ALLOWABLE BEARING CAPACITY OF 100kPa.

PAD FOOTING SCHEDULE

MARK	B	W	D	REINFORCEMENT
PF1	500	900	600	MASS CONCRETE

MARK	DESCRIPTIONS	SIZE
SP1	STEEL POST	89x89x3.5 SHS

LEGEND

ITEM	DESCRIPTION
	DENOTES TIMBER WALL ABOVE
	DENOTES 190 CORE FILLED BLOCKWORK

CONCRETE QUALITY

ELEMENT	SLUMP	AGGREGATE (MAX.SIZE)	CEMENT TYPE	STRENGTH f'c
SLAB ON GROUND	80mm	20mm	GP	25

REINFORCEMENT COVER SCHEDULE

MEMBER	COVER (mm)			EXPOSURE CLASSIFICATION
	TOP	BTM	SIDES	
INTERNAL SLABS	20mm	30mm	45mm	A1
EXTERNAL SLABS	45mm	30mm	45mm	B1

*WPM : WATER PROOFING MEMBRANE

FOOTING AND SLAB NOTES

UNLESS NOTED OTHERWISE BELOW NOTES APPLY:

- IF NOTES ARE SILENT ON DETAIL REFER TO RELEVANT STANDARD
- SLAB IS DESIGNED FOR AS - 2870 FOUNDATIONS CLASSIFICATION
- CLASSIFICATION 'M'
- SOIL FOUNDING LAYER - 'REFER TO REGIONAL GEOTECHNICAL SOLUTIONS'S SOIL REPORT'
- SOIL FOUNDING DEPTH - 'REFER TO REGIONAL GEOTECHNICAL SOLUTIONS'S SOIL REPORT'
- GEOTECHNICAL REPORT - PROVIDED BY 'REGIONAL GEOTECHNICAL SOLUTIONS'
- SLABS HAVE BEEN DESIGNED WITH CRACK CONTROL AS PER AS - 2870 AND PERFORMANCE SIMILAR TO NEARBY EXISTING STRUCTURES
- FOR INCREASE CRACK CONTROL, INCREASE REINFORCEMENT MESH BY 1 SIZE OR BY ADDING AN ADDITIONAL LAYER OF SL62 MESH. COVER TO BE INCREASED BY ADDITION DEPTH OF 20MM. ALLOW MINIMUM 60 DAYS CONCRETE CURING PRIOR TO TILE PLACEMENT OR CONCRETE FINISH.
- ALL FOOTINGS TO BE FOUND ON NATURAL UNDISTURBED MATERIAL.REMOVAL OF TREES OR BUILT OBJECTS CONSTITUTES A DISTURBED SITE AND RECLASSIFICATION IS REQUIRED.
- SLABS SHALL BE MINIMUM 100 THICK WITH SL82 MESH TOP 30MM COVER. EDGE AND THICKENING BEAMS TO BE MIN 300MM WIDE WITH L11TM200 BTM 50 COVER UNO.
- PROVIDE DRAINAGE AS PER AS 2870 AND DIRECT ALL SURFACE WATER AWAY FROM SLAB. FLEXIBLE CONDUITS AND PIPES TO BE INSTALLED THROUGH OR UNDER SLAB AS PER AS 2870. FLEXIBLE JOINTS TO HAVE SUFFICIENT FLEXIBILITY / ARTICULATION TO ACCOMMODATE EXPECTED FOUNDATION MOVEMENT.
- FLOORS HAVE BEEN DESIGNED FOR 1.5kPa. VEHICLES LIMITED TO GARAGE AREA WITH MAXIMUM MASS OF 2500KG.
- MASONRY VENTS TO SUB FLOOR SPACES IN ACCORDANCE WITH NCC REQUIREMENTS.

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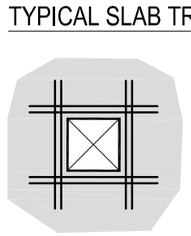
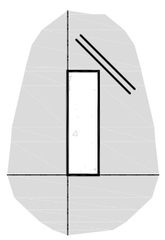
TYPICAL SLAB TRIMMER DETAILS:



PROVIDE 2N12 BARS TOP EXTEND 600 MIN. PAST EACH EDGE OF THE PENETRATION.

SLAB PENETRATION TRIMMER

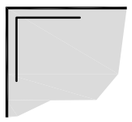


2N16 DIAGONAL TRIMMER BARS AT COLUMN CORNERS NOT ADJACENT SLAB CONTROL JOINTS

COLUMN TRIMMER

3N12-1200 LONG (75 SPACING) TRIMMERS BARS AT ALL RE-ENTRANT CORNERS, TIED TO UNDERSIDE OF TOP REINFORCEMENT.

SLAB RE-ENTRANT CORNER TRIMMER



1N12 L-BARS TOP IN CORNER OF SLAB, 1000 LEGS.

SLAB CORNER TRIMMER

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JOB NAME :	SHYAM SUNDAR
LOCATION :	32 WILLIAM STREET, BLACK HEAD
DESCRIPTION:	PROPOSED RESIDENCE
DRAWING:	GROUND FLOOR SLAB PLAN

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SCALE: 1:100
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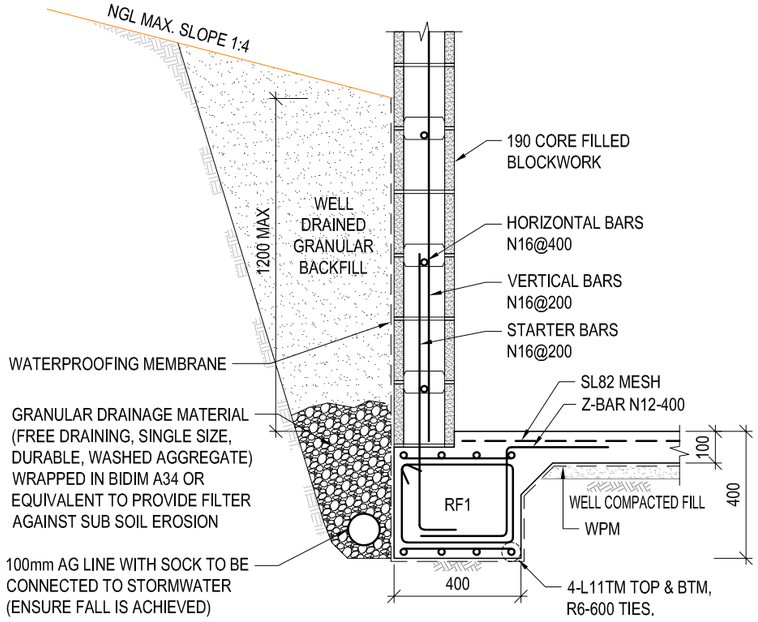
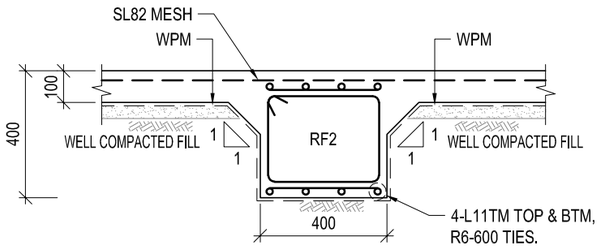


SECTION 1-1
1:20



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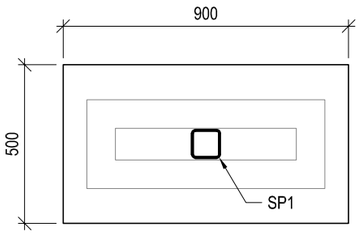

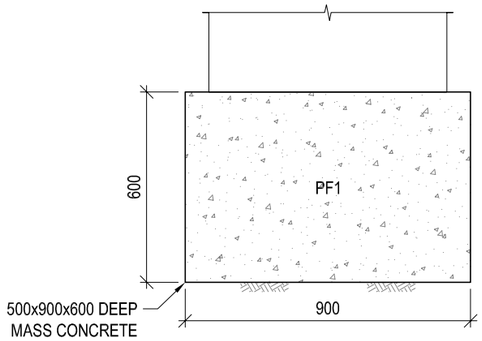

DETAIL PF1
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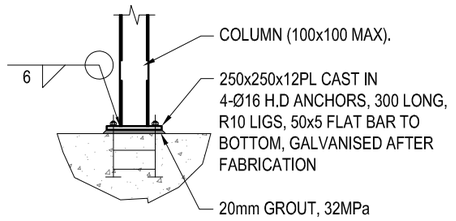
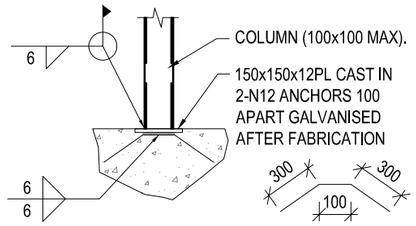
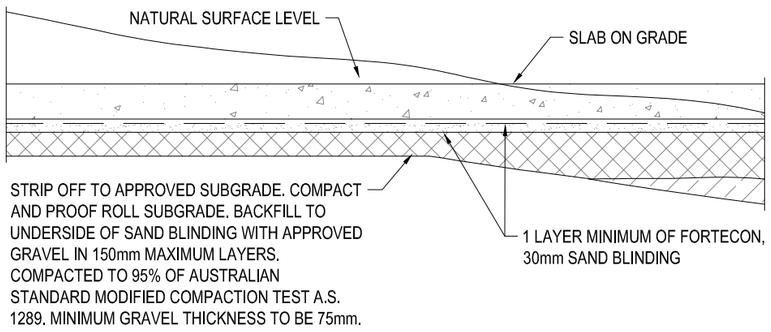


STEEL POST CONNECT WITH FOOTING OP1
1:20



STEEL POST CONNECT WITH FOOTING OP2
1:20



TYPICAL RAFT SLAB PREPARATION
1:20

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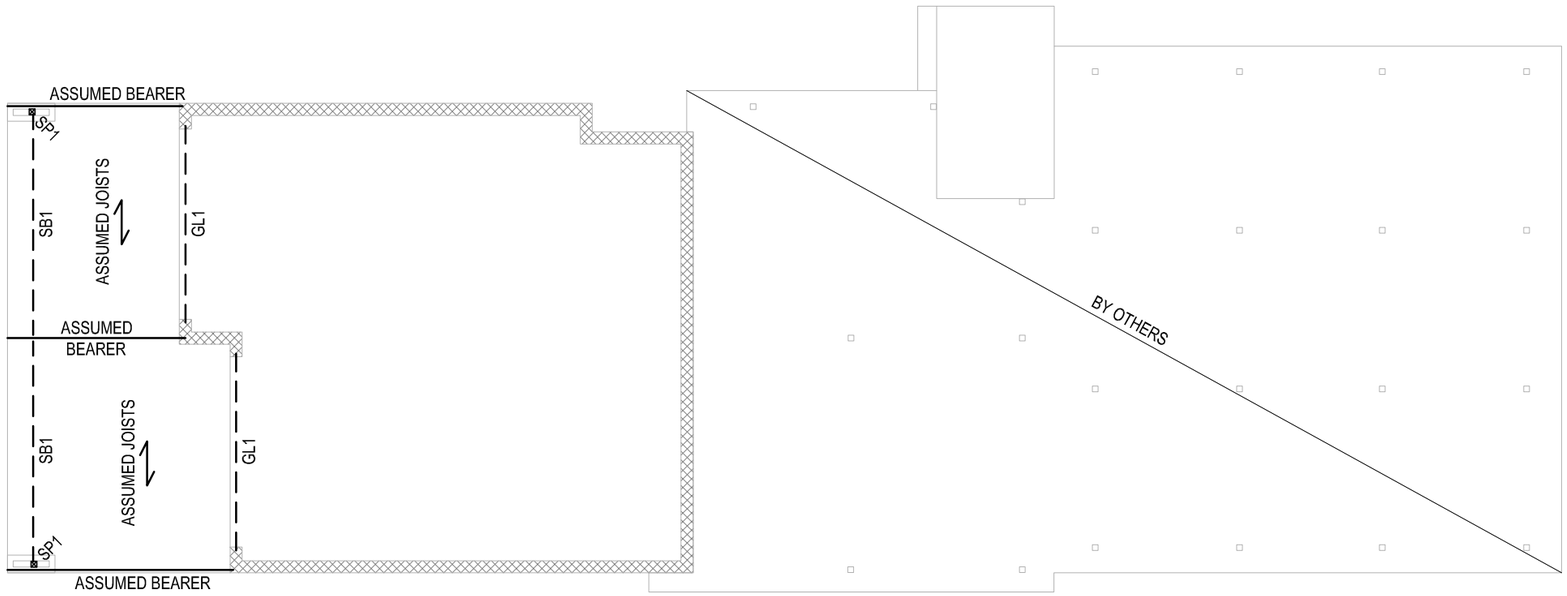

STEEL BEAM & POST AND GARAGE WALLS PLAN

1:100

MARK	DESCRIPTIONS	SIZE
GL1	GARAGE LINTEL	BOND BEAM 190x390 DEEP (2 COURSES) WITH N20 TOP & BTM, R6-150 LIGS.
SB1	STEEL BEAM	310 UB 46.2
SP1	STEEL POST	89x89x3.5 SHS

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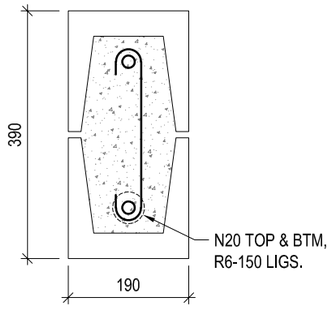

SECTION THROUGH GARAGE LINTEL GL1

1:10

SPECIFIC TIEDOWNS (JD4)	
DESIGN WIND CLASSIFICATION TRUSS PLAN RAFTER SPAN TRUSS & RAFTER SPACING BATTEN SPACING LINTEL SPAN ROOF MATERIAL	ASSUMED N3 REFER MANUFACTURER
BOTTOM PLATE TO SLAB GENERALLY	1-100mm M10 MASONRY ANCHOR WITH BROAD HEAD WASHER @1200 CTRS MAX
BOTTOM PLATE TO SLAB AT BRACING UNITS	1-100mm M10 MASONRY ANCHOR WITH BROAD HEAD WASHER TO EACH END OF BRACING UNIT
BOTTOM PLATE TO TIMBER FLOOR FRAME GENERALLY	75mm No.14 TYPE17 SCREW WITH BROAD HEAD WASHER @1200 CTRS MAX GENERALLY
BOTTOM PLATE TO TIMBER FLOOR FRAME AT BRACING UNITS	1-M10 BOLT WITH BROAD HEAD WASHER THROUGH PLATE, JOIST & BEARER AT EACH END OF BRACING UNIT
TOP & BOTTOM PLATES TO STUDS	30 x 0.8mm G.I. LOOPED STRAP @ 1200 MAX CTRS WITH 6/30x2.8mmØ NAILS EACH END OF STRAP
RAFTERS OR TRUSS TO TOP PLATE OR BEAM	30 x 0.8mm G.I. LOOPED STRAP WITH 4/30x2.8mmØ NAILS EACH END OR 2 FRAMING ANCHORS 4/30x2.8mmØ NAILS EACH LEG
LINTELS & PLATES TO STUDS AT EACH END OF OPENING	30 x 0.8mm G.I. LOOPED STRAP WITH 6/30x2.8mmØ NAILS EACH END & 1/M12 BOLT TO BOTTOM PLATE TO FLOOR AT EACH SIDE OF OPENING
LINTELS & TOP PLATES OVER SPAN OF OPENING	30 x 0.8mm G.I. LOOPED STRAP @ 1200 CTS WITH 8/30x2.8mmØ NAILS EACH SIDE OR 1/M12 BOLT THOUGH TOP PLATE & LINTEL
ROOF BATTENS TO TRUSSES OR RAFTERS	WITHIN 1200mm OF ANY EDGE 75 LONG No.14 TYPE 17 BATTEN SCREW OR 1 FRAMING ANCHOR WITH 4 / 2.8mmØ NAILS EACH LEG. GENERAL AREAS 75 LONG No.14 TYPE 17 BATTEN SCREW OR 1 FRAMING ANCHOR WITH 4 / 2.8mmØ NAILS EACH LEG.
OTHER	REFER TO AS1684.2 - 2006

FRAMING NOTES

UNLESS NOTED OTHERWISE BELOW NOTES APPLY:

LINTELS DESIGNED FOR STEEL SHEET ROOF SYSTEM

- ALL FRAMING IN ACCORDANCE WITH AS 1684
- ROOF STRUCTURE TO BEAR ON EXTERNAL WALLS UNLESS NOTED OTHERWISE
- TRUSS SPACING 900mm
- ALTERNATIVE ROOF SYSTEM SUPPORTS ARE TO BE SUBMITTED TO BUILDING SURVEYOR FOR APPROVAL PRIOR TO MANUFACTURER
- TRUSS ROOF AND FLOOR SYSTEMS DESIGNED BY MANUFACTURER REQUIRE MANUFACTURERS CERTIFICATION OF COMPLIANCE. THESE SYSTEMS ARE TO BE INSTALLED IN STRICT COMPLIANCE OF MANUFACTURER WRITTEN SPECIFICATION AND PLANS.
- PROVIDE FIXINGS AND CEILING PLANE BRACING PER TRUSS MANUFACTURERS WRITTEN SPECIFICATION
- REFER TRUSS MANUFACTURER FOR LINTEL WHERE GIRDER TRUSSES OCCUR OVER NOMINATED BEAMS, LINTELS ETC
- STUDS SHALL BE INSTALLED AT 450 MAX CENTRES AND NOGGED AT 1350 MAXIMUM VERTICAL CENTRES
- PROVIDE DOUBLE JOISTS/ FLOOR TRUSS UNDER ALL PARALLEL WALLS ABOVE.
- BATTENS SHALL BE 45 X 90 MGP10 AT 900 CENTRES SCREW FIXED TO RAFTER/TRUSS
- REFER TIE DOWN TABLE FOR CONNECTIONS

rjk CONSULTING ENGINEERS

Risden Knightley - 991537
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JOB NAME :	SHYAM SUNDAR
LOCATION :	32 WILLIAM STREET, BLACK HEAD
DESCRIPTION:	PROPOSED RESIDENCE
DRAWING:	STEEL BEAM & POST AND GARAGE WALLS PLAN

DRAWN BY: PV		CHECKED BY: RJK	
SCALE: 1:100			
DATE: JUNE 2025			
JOB NUMBER	SHEET		Size
24/25 NSW 093	5 of 5		A3

FOUNDATION MAINTENANCE AND FOOTING PERFORMANCE

Preventing soil-related building movement

This Building Technology Resource is designed as a homeowner's guide on the causes of soil-related building movement, and suggested methods to prevent resultant cracking.

Buildings can and often do move. This movement can be up, down, lateral or rotational. The fundamental cause of movement in buildings can usually be related to one or more problems in the foundation soil. It is important for the home owner to identify the soil type in order to ascertain the measures that should be put in place in order to ensure that problems in the foundation soil can be prevented, thus protecting against building movement. Generally soil classification is provided by a geotechnical report.

SOIL TYPES

The types of soils usually present under the topsoil in land zoned for residential buildings can be split into two approximate groups – granular and clay. Quite often, foundation soil is a mixture of both types. The general problems associated with soils having granular content are usually caused by erosion. Clay soils are subject to saturation and swell/shrink problems.

As most buildings suffering movement problems are founded on clay soils, there is an emphasis on classification of soils according to the amount of swell and shrinkage they experience with variations of water content. Table 1 below is a reproduction of Table 2.1 from Australian Standard AS 2870-2011, Residential slabs and footings.

CAUSES OF MOVEMENT

SETTLEMENT DUE TO CONSTRUCTION

There are two types of settlement that occur as a result of construction:

- Immediate settlement occurs when a building is first placed on its foundation soil, as a result of compaction of the soil under the weight of the structure. The cohesive quality of clay soil mitigates against this, but granular (particularly sandy) soil is susceptible.
- Consolidation settlement is a feature of clay soil and may take place because of the expulsion of moisture from the soil or because of the soil's lack of resistance to local compressive or shear stresses. This will usually take place during the first few months after construction but has been known to take many years in exceptional cases.

These problems may be the province of the builder and should be taken into consideration as part of the preparation of the site for construction.

EROSION

All soils are prone to erosion, but sandy soil is particularly susceptible to being washed away. Even clay with a sand component of say 10% or more can suffer from erosion.

SATURATION

This is particularly a problem in clay soils. Saturation creates a bog-like suspension of the soil that causes it to lose virtually all of its bearing capacity. To a lesser degree, sand is affected by saturation because saturated sand may undergo a reduction in volume, particularly imported sand fill for bedding and blinding layers. However, this usually occurs as immediate settlement and should normally be the province of the builder.

SEASONAL SWELLING AND SHRINKAGE OF SOIL

All clays react to the presence of water by slowly absorbing it, making the soil increase in volume (see table below, from AS 2870). The degree of increase varies considerably between different clays, as does the degree of decrease during the subsequent drying out caused by fair weather periods. Because of the low absorption and expulsion rate, this phenomenon will not usually be noticeable unless there are prolonged rainy or dry periods, usually of weeks or months, depending on the land and soil characteristics.

The swelling of soil creates an upward force on the footings of the building, and shrinkage creates subsidence that takes away the support needed by the footing to retain equilibrium.

SHEAR FAILURE

This phenomenon occurs when the foundation soil does not have sufficient strength to support the weight of the footing. There are two major post-construction causes:

- Significant load increase.
- Reduction of lateral support of the soil under the footing due to erosion or excavation.

In clay soil, shear failure can be caused by saturation of the soil adjacent to or under the footing.

TREE ROOT GROWTH

Trees and shrubs that are allowed to grow in the vicinity of footings can cause foundation soil movement in two ways:

- Roots that grow under footings may increase in cross-sectional size, exerting upward pressure on footings.

TABLE 1. GENERAL DEFINITIONS OF SITE CLASSES.

Class	Foundation
A	Most sand and rock sites with little or no ground movement from moisture changes
S	Slightly reactive clay sites, which may experience only slight ground movement from moisture changes
M	Moderately reactive clay or silt sites, which may experience moderate ground movement from moisture changes
H1	Highly reactive clay sites, which may experience high ground movement from moisture changes
H2	Highly reactive clay sites, which may experience very high ground movement from moisture changes
E	Extremely reactive sites, which may experience extreme ground movement from moisture changes

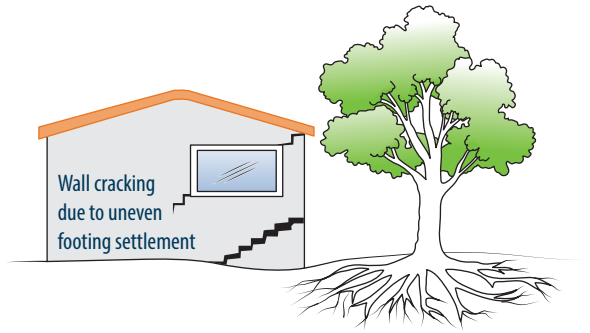


FIGURE 1 Trees can cause shrinkage and damage.

- Roots in the vicinity of footings will absorb much of the moisture in the foundation soil, causing shrinkage or subsidence.

UNEVENNESS OF MOVEMENT

The types of ground movement described above usually occur unevenly throughout the building's foundation soil. Settlement due to construction tends to be uneven because of:

- Differing compaction of foundation soil prior to construction.
- Differing moisture content of foundation soil prior to construction.

Movement due to non-construction causes is usually more uneven still. Erosion can undermine a footing that traverses the flow or can create the conditions for shear failure by eroding soil adjacent to a footing that runs in the same direction as the flow.

Saturation of clay foundation soil may occur where subfloor walls create a dam that makes water pond. It can also occur wherever there is a source of water near footings in clay soil. This leads to a severe reduction in the strength of the soil which may create local shear failure.

Seasonal swelling and shrinkage of clay soil affects the perimeter of the building first, then gradually spreads to the interior through absorption. The swelling process will usually begin at the uphill extreme of the building, or on the weather side where the land is flat. Shrinkage usually begins on the side of the building where the sun's heat is greatest.

EFFECTS OF UNEVEN SOIL MOVEMENT ON STRUCTURES

EROSION AND SATURATION

Erosion removes the support from under footings, tending to create subsidence of the part of the structure under which it occurs. Brickwork walls will resist the stress created by this removal of support by bridging the gap or cantilevering until the bricks or the mortar bedding fail. Older masonry has little resistance. Evidence of failure varies according to circumstances and symptoms may include:

- Step cracking in the mortar beds in the body of the wall or above/below openings such as doors or windows.
- Vertical cracking in the bricks (usually but not necessarily in line with the vertical beds or perpends).

Isolated piers affected by erosion or saturation of foundations will eventually lose contact with the bearers they support and may tilt or fall over. The floors that have lost this support will become bouncy, sometimes rattling ornaments etc.

SEASONAL SWELLING/SHRINKAGE IN CLAY

Swelling foundation soil due to rainy periods first lifts the most exposed extremities of the footing system, then the remainder of the perimeter footings while gradually permeating inside the building footprint to lift internal footings. This swelling first tends to create a dish effect, because the external footings are pushed higher than the internal ones.

The first noticeable symptom may be that the floor appears slightly dished. This is often accompanied by some doors binding on the floor or the door head, together with some cracking of cornice mitres. In buildings with timber flooring supported by bearers and joists, the floor can be bouncy. Externally there may be visible dishing of the hip or ridge lines.

As the moisture absorption process completes its journey to the innermost areas of the building, the internal footings will rise. If the spread of moisture is roughly even, it may be that the symptoms will temporarily disappear, but it is more likely that swelling will be uneven, creating a difference rather than a disappearance in symptoms. In buildings with timber flooring supported by bearers and joists, the isolated piers will rise more easily than the strip footings or piers under walls, creating noticeable doming of flooring.

As the weather pattern changes and the soil begins to dry out, the external footings will be first affected, beginning with the locations where the sun's effect is strongest. This has the effect of lowering the external footings. The doming is accentuated, and cracking reduces or disappears where it occurred because of dishing, but other cracks open up. The roof lines may become convex.

Doming and dishing are also affected by weather in other ways. In areas where warm, wet summers and cooler dry winters prevail, water migration tends to be toward the interior and doming will be accentuated, whereas where summers are dry, and winters are cold and wet, migration tends to be toward the exterior and the underlying propensity is toward dishing.

MOVEMENT CAUSED BY TREE ROOTS

In general, growing roots will exert an upward pressure on footings, whereas soil subject to drying because of tree or shrub roots will tend to remove support from under footings by inducing shrinkage.

COMPLICATIONS CAUSED BY THE STRUCTURE ITSELF

Most forces that the soil causes to be exerted on structures are vertical – i.e. either up or down. However, because these forces are seldom spread evenly around the footings, and because the building resists uneven movement because of its rigidity, forces are exerted from one part of the building to another. The net result of all these forces is usually rotational. This resultant force often complicates the diagnosis because the visible symptoms do not simply reflect the original cause. A common symptom is binding of doors on the vertical member of the frame.

EFFECTS ON FULL MASONRY STRUCTURES

Brickwork will resist cracking where it can. It will attempt to span areas that lose support because of subsided foundations or raised points. It is therefore usual to see cracking at weak points, such as openings for windows or doors.

In the event of construction settlement, cracking will usually remain unchanged after the process of settlement has ceased.

With local shear or erosion, cracking will usually continue to develop until the original cause has been remedied, or until the subsidence has completely neutralised the affected portion of footing and the structure has stabilised on other footings that remain effective.

In the case of swell/shrink effects, the brickwork will in some cases return to its original position after completion of a cycle, however it is more likely that the rotational effect will not be exactly reversed, and it is also usual that brickwork will settle in its new position and will resist the forces trying to return it to its original position. This means that in a case where swelling takes place after construction and cracking occurs, the cracking is likely to at least partly remain after the shrink segment of the cycle is complete. Thus, each time the cycle is repeated, the likelihood is that the cracking will become wider until the sections of brickwork become virtually independent.

With repeated cycles, once the cracking is established, if there is no other complication, it is normal for the incidence of cracking to stabilise, as the building has the articulation it needs to cope with the problem. This is by no means always the case, however, and monitoring of cracks in walls and floors should always be treated seriously.

Upheaval caused by growth of tree roots under footings is not a simple vertical shear stress. There is a tendency for the root to also

exert lateral forces that attempt to separate sections of brickwork after initial cracking has occurred.

The normal structural arrangement is that the inner leaf of brickwork in the external walls and at least some of the internal walls (depending on the roof type) comprise the load-bearing structure on which any upper floors, ceilings and the roof are supported. In these cases, it is internally visible cracking that should be the main focus of attention, however there are a few examples of dwellings whose external leaf of masonry plays some supporting role, so this should be checked if there is any doubt. In any case, externally visible cracking is important as a guide to stresses on the structure generally, and it should also be remembered that the external walls must be capable of supporting themselves.

EFFECTS ON FRAMED STRUCTURES

Timber or steel framed buildings are less likely to exhibit cracking due to swell/shrink than masonry buildings because of their flexibility. Also, the doming/dishing effects tend to be lower because of the lighter weight of walls. The main risks to framed buildings are encountered because of the isolated pier footings used under walls. Where erosion or saturation causes a footing to fall away, this can double the span which a wall must bridge. This additional stress can create cracking in wall linings, particularly where there is a weak point in the structure caused by a door or window opening. It is, however, unlikely that framed structures will be so stressed as to suffer serious damage without first exhibiting some or all of the above symptoms for a considerable period. The same warning period should apply in the case of upheaval. It should be noted, however, that where framed buildings are supported by strip footings there is only one leaf of brickwork and therefore the externally visible walls are the supporting structure for the building. In this case, the subfloor masonry walls can be expected to behave as full brickwork walls.

EFFECTS ON BRICK VENEER STRUCTURES

Because the load-bearing structure of a brick veneer building is the frame that makes up the interior leaf of the external walls plus perhaps the internal walls, depending on the type of roof, the building can be expected to behave as a framed structure, except that the external masonry will behave in a similar way to the external leaf of a full masonry structure.

WATER SERVICE AND DRAINAGE

Where a water service pipe, a sewer or stormwater drainage pipe is in the vicinity of a building, a water leak can cause erosion, swelling or saturation of susceptible soil. Even a minuscule leak can be enough to saturate a clay foundation. A leaking tap near a building can have the same effect. In addition, trenches containing pipes can become watercourses even though backfilled, particularly where broken rubble is used as fill. Water that runs along these trenches can be responsible for serious erosion, interstrata seepage into subfloor areas and saturation.

Pipe leakage and trench water flows also encourage tree and shrub roots to the source of water, complicating and exacerbating the problem. Poor roof plumbing can result in large volumes of rainwater being concentrated in a small area of soil:

- Incorrect falls in roof guttering may result in overflows, as may gutters blocked with leaves etc.
- Corroded guttering or downpipes can spill water to ground.
- Downpipes not positively connected to a proper stormwater collection system will direct a concentration of water to soil that is directly adjacent to footings, sometimes causing large-scale problems such as erosion, saturation and migration of water under the building.

SERIOUSNESS OF CRACKING

In general, most cracking found in masonry walls is a cosmetic nuisance only and can be kept in repair or even ignored. Table 2 below is a reproduction of Table C1 of AS 2870-2011.

AS 2870-2011 also publishes figures relating to cracking in concrete floors, however because wall cracking will usually reach the critical point significantly earlier than cracking in slabs, this table is not reproduced here.

PREVENTION AND CURE

PLUMBING

Where building movement is caused by water service, roof plumbing, sewer or stormwater failure, the remedy is to repair the problem. It is prudent, however, to consider also rerouting pipes away from the building where possible and relocating taps to positions where any leakage will not direct water to the building vicinity. Even where gully traps are present, there is sometimes sufficient spill to create erosion or saturation, particularly in modern installations using smaller diameter PVC fixtures. Indeed, some gully traps are not situated directly under the taps that are installed to charge them, with the result that water from the tap may enter the backfilled trench that houses the sewer piping. If the trench has been poorly backfilled, the water will either pond or flow along the bottom of the trench. As these trenches usually run alongside the footings and can be at a similar depth, it is not hard to see how any water that is thus directed into a trench can easily affect the foundation's ability to support footings or even gain entry to the subfloor area.

GROUND DRAINAGE

In all soils there is the capacity for water to travel on the surface and below it. Surface water flows can be established by inspection during and after heavy or prolonged rain. If necessary, a grated drain system connected to the stormwater collection system is usually an easy solution.

It is, however, sometimes necessary when attempting to prevent water migration that testing be carried out to establish watertable height and subsoil water flows. This subject may be regarded as an area for an expert consultant.

PROTECTION OF THE BUILDING PERIMETER

It is essential to remember that the soil that affects footings extends well beyond the actual building line. Watering of garden plants, shrubs and trees causes some of the most serious water problems.

For this reason, particularly where problems exist or are likely to occur, it is recommended that an apron of paving be installed around as much of the building perimeter as necessary. This paving should extend outwards a minimum of 900 mm (more in highly reactive soil) and should have a minimum fall away from the building of 1:60. The finished paving should be no less than 100 mm below brick vent bases.

It is prudent to relocate drainage pipes away from this paving, if possible, to avoid complications from future leakage. If this is not practical, earthenware pipes should be replaced by PVC and backfilling should be of the same soil type as the surrounding soil and compacted to the same density.

Except in areas where freezing of water is an issue, it is wise to remove taps in the building area and relocate them well away from the building – preferably not uphill.

It may be desirable to install a grated drain at the outside edge of the paving on the uphill side of the building. If subsoil drainage is needed this can be installed under the surface drain.

CONDENSATION

In buildings with a subfloor void, such as where bearers and joists support flooring, insufficient ventilation creates ideal conditions for condensation, particularly where there is little clearance between the floor and the ground. Condensation adds to the moisture already present in the subfloor and significantly slows the process of drying out. Installation of an adequate subfloor ventilation system, either natural or mechanical, is desirable.

TABLE 2. CLASSIFICATION OF DAMAGE WITH REFERENCE TO WALLS.

Description of typical damage and required repair	Approximate crack width limit	Damage category
Hairline cracks	<0.1 mm	0 – Negligible
Fine cracks which do not need repair	<1 mm	1 – Very Slight
Cracks noticeable but easily filled. Doors and windows stick slightly.	<5 mm	2 – Slight
Cracks can be repaired and possibly a small amount of wall will need to be replaced. Doors and windows stick. Service pipes can fracture. Weathertightness often impaired.	5–15 mm (or a number of cracks 3 mm or more in one group)	3 – Moderate
Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames distort. Walls lean or bulge noticeably, some loss of bearing in beams. Service pipes disrupted.	15–25 mm but also depends on number of cracks	4 – Severe

Source: Reproduced with the permission of Standards Australia Limited © 2011. Copyright in AS 2870-2011 Residential slabs and footings vests in Standards Australia Limited.

Warning: Although this Building Technology Resource deals with cracking in buildings, it should be said that subfloor moisture can result in the development of other problems, notably:

- Water that is transmitted into masonry, metal or timber building elements causes damage and/or decay to those elements.
- High subfloor humidity and moisture content create an ideal environment for various pests, including termites and spiders, and mould.
- Where high moisture levels are transmitted to the flooring and walls, an increase in the dust mite count can ensue within the living areas. Dust mites, as well as dampness in general, can be a health hazard to inhabitants, particularly those who are abnormally susceptible to respiratory ailments.

THE GARDEN

The ideal vegetation layout is to have lawn or plants that require only light watering immediately adjacent to the drainage or paving edge, then more demanding plants, shrubs and trees spread out in that order.

Overwatering due to misuse of automatic watering systems is a common cause of saturation and water migration under footings. If it is necessary to use these systems, it is important to remove garden beds to a completely safe distance from buildings.

EXISTING TREES

Existing trees may cause problems with the upheaval of footings by their roots, or shrinkage from soil drying. If the offending roots are subsidiary and their removal will not significantly damage the tree, they should be severed and a concrete or metal barrier placed vertically in the soil to prevent future root growth in the direction of the building. Soil drying is a more complex issue and professional advice may be required before considering the removal or relocation of the tree.

INFORMATION ON TREES, PLANTS AND SHRUBS

State departments overseeing agriculture can give information regarding root patterns, volume of water needed and safe distance from buildings of most species. Botanic gardens are also sources of information.

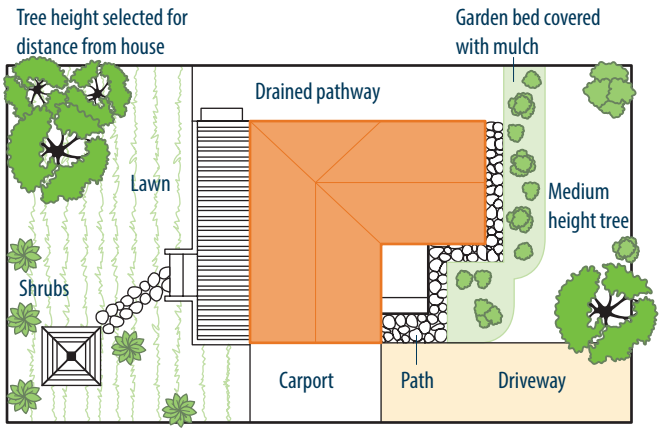


FIGURE 2 Gardens for a reactive site.

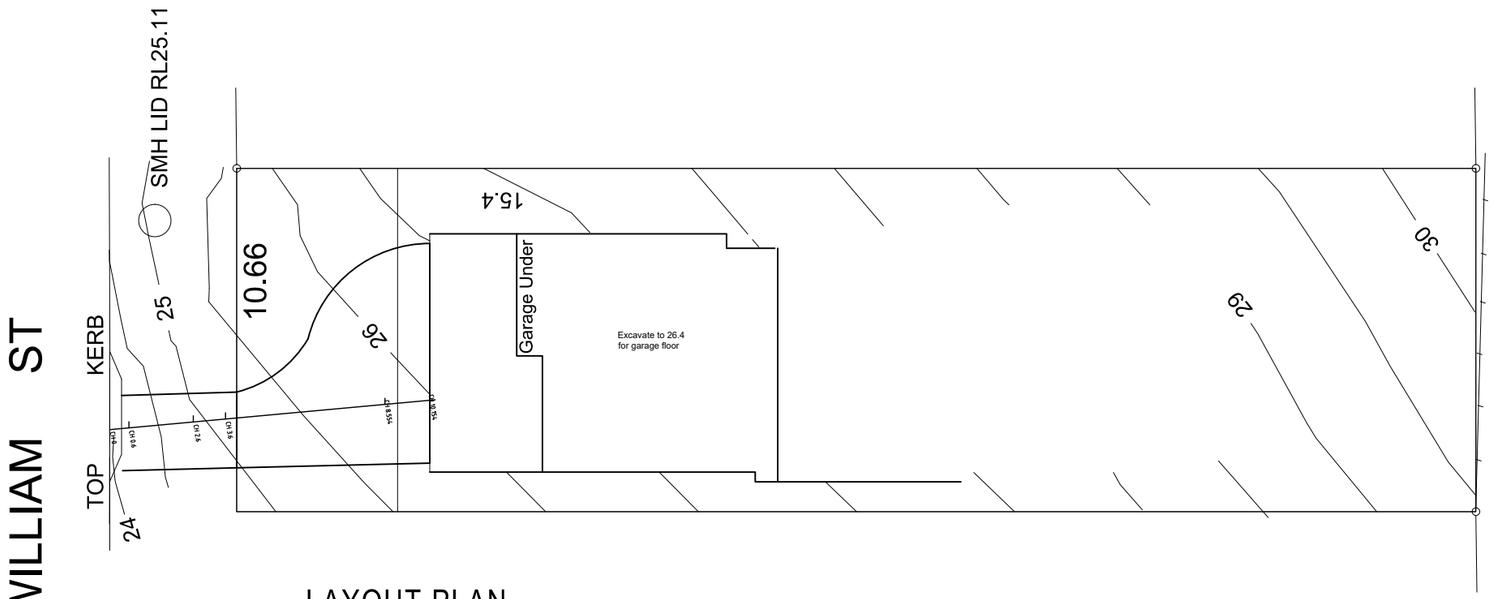
EXCAVATION

Excavation around footings must be properly engineered. Soil supporting footings can only be safely excavated at an angle that allows the soil under the footing to remain stable. This angle is called the angle of repose (or friction) and varies significantly between soil types and conditions. Removal of soil within the angle of repose will cause subsidence.

REMEDIATION

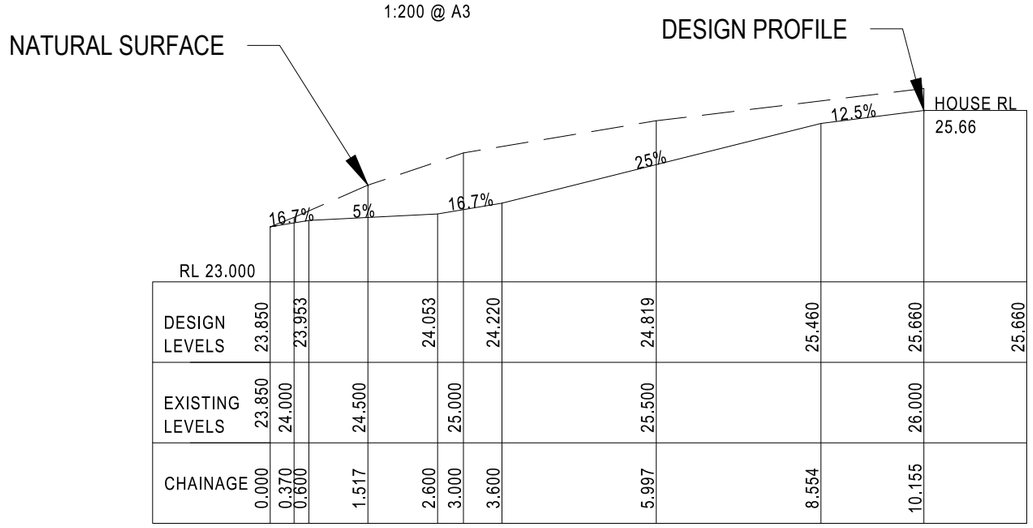
Where erosion has occurred that has washed away soil adjacent to footings, soil of the same classification should be introduced and compacted to the same density. Where footings have been undermined, augmentation or other specialist work may be required. Remediation of footings and foundations is generally the realm of a specialist consultant.

Where isolated footings rise and fall because of swell/shrink effect, the home owner may be tempted to alleviate floor bounce by filling the gap that has appeared between the bearer and the pier with blocking. The danger here is that when the next swell segment of the cycle occurs, the extra blocking will push the floor up into an accentuated dome and may also cause local shear failure in the soil. If it is necessary to use blocking, it should be by a pair of fine wedges and monitoring should be carried out fortnightly.



LAYOUT PLAN

SCALE 1:100 @ A1
1:200 @ A3



DESIGN LEVELS	23.850	23.953		24.053		24.220	24.819	25.460	25.660	25.660
EXISTING LEVELS	23.850	24.000		24.500		25.000	25.500		26.000	
CHAINAGE	0.000	0.370	0.600	1.517	2.600	3.000	3.600	5.997	8.554	10.155

DRIVEWAY LONG SECTION

SCALE 1:100 @ A1
1:200 @ A3

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Tasmanian Accreditation No. CC2539X

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JOB NAME :	DRIVEWAY AND STORMWATER
LOCATION :	32 WILLIAM STREET BLACKHEAD
DESCRIPTION:	HOUSE DEVELOPMENT
DRAWING:	DRIVEWAY PLAN

DRAWN BY: PV CHECKED BY: RJK
SCALE: 1:100
DATE: JUNE 2025

JOB NUMBER	SHEET	Size
24/25 NSW 093	1 of 2	A3

GENERAL NOTES:

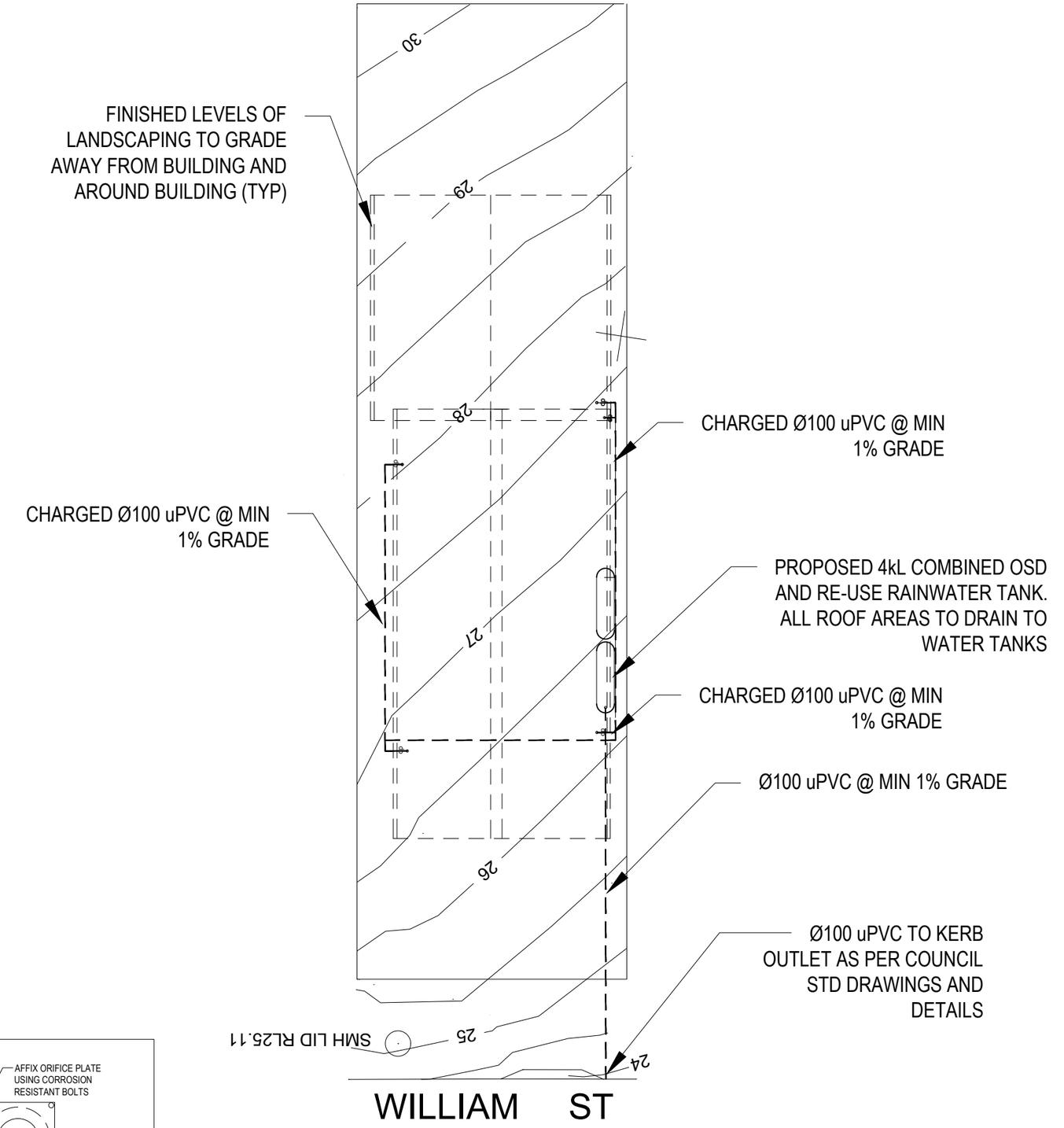
1. ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH COUNCIL'S DEVELOPMENT CONSTRUCTION SPECIFICATION AND AS3500.3.
2. PRIOR TO COMMENCEMENT OF EXCAVATION, THE CONTRACTOR SHALL LOCATE AND LEVEL ALL SERVICES AND WILL BE RESPONSIBLE FOR ADJUSTMENT AND REPAIR OF SERVICES. CONTRACTOR TO ENSURE APPROPRIATE CLEARANCES ARE MAINTAINED TO EXISTING SERVICES AT ALL STORMWATER CROSSINGS.
3. ALL CONSTRUCTION WORKS IS TO BE CARRIED OUT SO THAT ANY ADJOINING PROPERTY OWNERS ARE NOT DEPRIVED OF AN ALL WEATHER ACCESS OR SUBJECTED TO ADDITIONAL STORM WATER RUN-OFF DURING THE PERIOD OF CONSTRUCTION.
4. ALL WORKS ARE TO BE CONDUCTED TO THE REQUIREMENTS OF COUNCIL
5. TRAFFIC CONTROL MEASURES IN ACCORDANCE WITH THE RMS PUBLICATION "TRAFFIC CONTROL AT WORKSITES" ARE TO BE IN PLACE AND MAINTAINED AT ALL TIMES.
6. THE CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR OF ANY DAMAGE TO EXISTING INFRASTRUCTURE. SUCH REPAIR OR REINSTATEMENT TO BE CARRIED OUT IMMEDIATELY TO THE SATISFACTION OF SHOALHAVEN CITY COUNCIL.
7. APPROVAL UNDER S.138 OF THE ROADS ACT 1993 MUST BE OBTAINED FROM COUNCIL PRIOR TO COMMENCEMENT OF WORK WITHIN COUNCIL'S ROAD RESERVE.
8. THE CONTRACTOR WILL BE RESPONSIBLE FOR ORGANISING ALL INSPECTIONS REQUIRED BY THE PRINCIPAL CERTIFYING AUTHORITY.
9. ALL PIPE JOINS IN PITS, HEADWALLS AND OTHER DRAINAGE STRUCTURES ARE TO BE MORTARED TO PREVENT INFILTRATION.
10. THE ALL PITS SHALL BE A PRE-CAST REINFORCED CONCRETE PIT AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATION.
11. ALL ROOFWATER FROM DWELLING TO BE DIRECTED TO THE WATER TANK PRIOR TO DISCHARGING FROM THE SITE.
12. GUTTERS AND DOWNPIPES TO BE SIZED TO CAPTURE THE 20 YEAR ARI STORM.
13. REFER TO ARCHITECTURAL PLANS FOR FINAL SIZING AND LOCATION OF RAINWATER TANKS AND DRIVEWAY LONGITUDINAL SECTION.
14. ALL DRAINAGE PITS AND OSD PIT TO BE MINIMUM 150mm BELOW FINISH LEVEL OF PROPOSED DWELLING.
15. OSD PIT AND PIPE LEVELS SHOWN ON PLAN. IN THE ABSENCE OF A DETAILED LANDSCAPE PLAN. ANY CHANGES TO LEVELS REQUIRE RE-ASSESSMENT OF HYDRAULIC CALCULATIONS.
16. ADDITIONAL DRAINAGE MAYBE REQUIRE SUBJECT FUTURE LANDSCAPING DESIGN.
17. FINAL SURFACE LEVELS TO ENSURE OVERALL FLOTHS ARE APPROPRIATELY DIRECTED AS PART OF FUTURE LANDSCAPING DESIGN.
18. ANY CHANGES TO PIPE LOCATION. SIZE. LEVELS AND GRADES MAY REQUIRE RE-ASSESSMENT OF HYDRAULIC CALCULATIONS.
19. PLAN ONLY TO BE RELIED ON FOR STORMWATER INFORMATION. PLAN NOT TO BE USED OR RELIED UPON FOR ANY OTHER PURPOSE.

RAINWATER TANK NOTES:

1. WATER STORED IN THE TANK MUST BE PLUMBED INTO THE DWELLING SUCH THAT IT IS SUPPLIED TO EACH OF THE FIXTURES LISTED IN THE BASIX CERTIFICATE FOR THE PROPERTY. PLUMBING MUST BE IN ACCORDANCE WITH THE CURRENT EDITION OF AS 3500.1 WATER SERVICES – SECTION 16.
2. THE TANK INLET MUST BE LOCATED A MINIMUM OF 500MM BELOW THE OUTLET OF THE EAVE GUTTER.
3. THE RAINWATER TANK SHALL BE INSTALLED ON A FIRM FLAT STABLE PLATFORM IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. TANKS LOCATED OVER FILL MATERIAL SHOULD BE PLACED ON A CONCRETE SLAB.
4. PUMPS MUST BE LOCATED AND INSTALLED TO MINIMIZE ANY POTENTIAL NOISE NUISANCE TO SURROUNDING RESIDENTS. AND IN THE CASE OF A PERMANENT ELECTRIC PUMP. MUST BE INSTALLED BY A LICENSED ELECTRICIAN. PUMP PERFORMANCE MUST ACHIEVE A MINIMUM 300 kPa OUTPUT.
5. ANY TOWN WATER TOP-UP MUST BE BY INDIRECT CONNECTION BY MEANS OF A VISIBLE AIR GAP EXTERNAL TO THE RAINWATER TANK IN ACCORDANCE WITH THE PROVISIONS OF THE NATIONAL PLUMBING AND DRAINAGE CODE AND AS3500.1.
6. MARKING AND LABELLING OF RAINWATER SERVICES MUST BE IN ACCORDANCE WITH AS 3500.1:2021 SECTION 15.
7. THE APPLICANT MUST CONNECT THE RAINWATER TANK TO ALL TOILETS. THE COLD WATER TAP THAT SUPPLIES EACH CLOTHES WASHER AND AT LEAST ONE OUTDOOR TAP IN THE DEVELOPMENT AS IDENTIFIED IN BASIX.

LEGEND:

- STORMWATER CHARGED LINE PIT & PIPE
- OVERLAND FLOW DIRECTION
- NS CONTOURS - 0.2m INTERVALS
- S — APPROXIMATE POSITION OF SEWER
- E — APPROXIMATE POWER LINE
- NBN — APPROXIMATE NBN LINE
- W — APPROXIMATE WATER MAIN



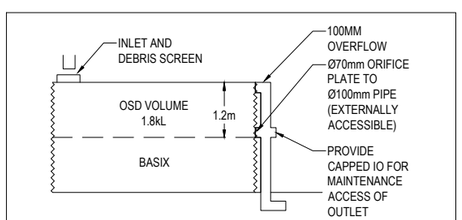
LAYOUT PLAN

SCALE 1:100 @ A1
1:200 @ A3

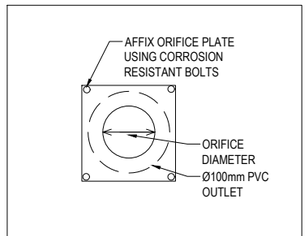
ON-SITE DETENTION CALCULATIONS:

SITE AREA:	500m²
APPROX PRE-DEVELOPED IMPERVIOUS AREA:	0m²
POST-DEVELOPED IMPERVIOUS AREA:	316m²
OSD TRIBUTARY AREA:	283m²
DWELLING:	
5 Year ARI (BASED ON RATIONAL METHOD):	
PEAK Q5 PRE-DEVELOPMENT FLOW:	16.2L/s
PEAK Q5 POST-DEVELOPMENT FLOW (W/O OSD):	16.6L/s
100 Year ARI (BASED ON RATIONAL METHOD):	
PEAK Q100 PRE-DEVELOPMENT FLOW:	33.9L/s
PEAK Q100 POST-DEVELOPMENT FLOW (W/O OSD):	39.7L/s
OSD VOLUME (PRELIMINARY SIZING):	
TOTAL VOLUME REQUIRED PER DWELLING:	1.8kL
ORIFICE SIZING:	70mm

ORIFICE SIZING BASED ON A RAINWATER TANK WITH A SURFACE AREA OF 1.5m² & 2.0m HIGH. SHOULD A RAINWATER TANK WITH A DIFFERENT SURFACE AREA BE USED, THE ON-SITE DETENTION AND ORIFICE SIZING SHOULD BE UPDATED ACCORDINGLY.



DWELLING RAINWATER TANK DETAIL
N.T.S



TYPICAL ORIFICE DETAIL
N.T.S

BEWARE!

ALL THE FINISH LEVELS FROM CONSTRUCTOR PLAN. ANY CHANGES TO PIPE LOCATION. SIZE. LEVELS AND GRADES REQUIRE RE-ASSESSMENT OF HYDRAULIC CALCULATIONS.

rjk CONSULTING ENGINEERS

Risden Knightley - 991537

Registered Professional Engineer
BE Civil FIEAust CPEng NPR

19/06/2025

Tasmanian Accreditation No. CC2539X

RJK CONSULTING ENGINEERS
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TASMANIA - PO BOX 128, PROSPECT TAS 7250

JOB NAME :	DRIVEWAY AND STORMWATER
LOCATION :	32 WILLIAM STREET BLACKHEAD
DESCRIPTION:	HOUSE DEVELOPMENT
DRAWING:	LAYOUT PLAN

DRAWN BY: PV		CHECKED BY: RJK	
SCALE: 1:100			
DATE: JUNE 2025			
JOB NUMBER	SHEET		Size
24/25 NSW 093	2 of 2		A3