

DSP
Architects

GEOTECHNICAL ENGINEERING DOCUMENTATION

**PROJECT
PROPOSED FOUR DOUBLE
STOREY DWELLINGS**

**PROJECT ADDRESS
MARIE CLOSE
TULLAMARINE VIC 3043**

**DATE
AUGUST 2012**

The Planning Permit Professionals Pty Ltd
L1 / 1134C Mt Alexander Road, Essendon VIC 3040

T:9379 0050 **F:** 03 9011 6145 **E:** info@dsparchitects.com.au **W:** www.dsparchitects.com.au **ABN:** 72 284 780 834

SITE INVESTIGATION REPORT

FOR THE PROPOSED THREE TOWNHOUSE DEVELOPMENT AT

**No. 31 WOODS STREET
NEWPORT**

**FOR RICHARD JUDGE
31 WOODS STREET
NEWPORT 3015**

**FILE NO: 15H15751
DATE: 01 DECEMBER 2010**

PROPOSED CONSTRUCTION

It is understood the proposed construction is to be three townhouses supported on either raft slab or waffle slab foundations.

FIELD WORK

The fieldwork was undertaken on 19 November 2010 and comprised the drilling of three boreholes to a target depth between 1.5m and 2.0m. A hand auger and a mechanical drill rig were used to advance the boreholes. In addition, a footing probe of the existing residence was also undertaken.

The engineering logs detailing the soil conditions found at the time of the investigation are attached at the end of this report.

SITE DESCRIPTION

At the time of the investigation the site was dipping to the south by approximately 2°. Woods Street bounded the site to the north. An existing single storey, weatherboard residence supported on stump footings and detached bungalow and shed occupied the site. A few trees ranging to 4m in height were located to the front of the site; refer to Drawing 1.

SITE GEOLOGY

Reference to the Geological Survey of Victoria's 1:63,360 scale Melbourne Sheet indicates that the site is underlain by silty clays and boulders derived from the underlying basalt of the Quaternary Aged Newer Volcanics.

The fieldwork confirmed these conditions.

SUB-SURFACE PROFILE

- Fill material, Concrete, Clayey Gravel and Silt, to between 0.3m and 0.4m depth; overlying,
- Natural, high plasticity Silty CLAY, to the full depth of the boreholes, 1.5m+ and 2.0m+.

SITE CLASSIFICATION

Due to the previous site usage, it is recommended the site is classified as Class P (problem/fill site) in accordance with the Australian Standard AS2870-1996. Footings may however be proportioned to a Class H (highly reactive) classification provided they are founded in the natural clays.

FOOTING DETAILS

The following are the footing details of the existing residence at the footing probe location shown on Drawing 1:

Location:	Refer to drawing 1
Type of foundation:	STUMP footing
Founding Depth:	900 mm
Depth of concrete base:	300 mm
Projection:	80 mm
Founding Material:	Very Stiff silty CLAY

FOUNDATION RECOMMENDATIONS

RAFT SLAB

The site should be cleared of any rubbish and topsoil containing grass roots, organic matter and vegetation from below the slab area. The area may be filled to make a level area for the slab construction. Maximum depths of filling under the slab can be as follows as a guide.

Controlled filling: 800mm maximum for sand/granular materials
400mm for other materials

Uncontrolled filling: 600mm for sand/granular materials
300mm for other materials

Controlled fill is material that has been placed and compacted in layers within a defined moisture range by compaction equipment to a defined density. Uncontrolled or rolled fill consists of material compacted in layers by repeated rolling by an excavator.

Following the site preparation as outlined above; the slab can be constructed on grade.

Class H classification applies.

Slab edge beams and any load bearing internal beams must penetrate through any fill material and silt and be founded at least 100mm into the natural silty clay profile. A slab free board (height to top of slab from surrounding ground level) of 150mm is recommended. An allowable bearing pressure of 120 kPa is available for edge beams that are founded in the clay.

As the edge beams and load bearing internal beams must be founded 100mm into the natural clay profile, depths between 0.4m and 0.5m, blinding concrete may be used to bring up a working platform from depth. Alternatively the slab can be designed as a suspended system and be supported on deep piers/piles which are founded a minimum of 300mm into the natural clays, or to a minimum depth of 1000mm, whichever is the deeper.

Internal beams can be founded in the compacted fill material as outlined above. An allowable bearing pressure of 50kPa is available beneath the internal beams.

Where pipes connect to the slab, allowance should be made for differential movement by sleeving or taping pipes with foam to allow 25mm radial clearance.

WAFFLE RAFT

For a class H classification, waffle rafts are suitable for clad frame and articulated masonry veneer construction only.

The site should be cleared of any rubbish, fill material and topsoil containing grass roots, organic matter and vegetation from below the slab area. Preferably, it is recommended that the site be stripped to expose the natural silty clay. Any soft spots should be located by proof rolling the site with a heavy smooth drum roller. Any soft spots should be removed and replaced with a clayey sand compacted to at least 95% Standard dry density ratio within +/- 2% of the Optimum moisture content. The clayey sand should be compacted in near horizontal layers not exceeding 200mm in thickness.

A class H classification applies.

Following the site preparation as outlined above; the waffle slab can be constructed on grade. It is recommended that the beam depth for a waffle raft be a minimum of 0.31m below the top of the slab for clad frame construction and 0.39m below for articulated masonry veneer construction. An allowable bearing pressure of 50 kPa is available.

If site stripping of the upper fill and silts has not occurred, then beams for the waffle raft should be founded 100mm into the natural silty clay profile. An allowable bearing pressure of 120 kPa is available in the natural clays.

If the site is to be cut and filled, suitable materials for filling shall not include organic soils, contaminated soils, soils containing dissolvable or leachable substances, silts or soils containing deleterious material. Where depths of fill exceed those outlined in Section 6.4.2. of the Australian Standard AS2870-1996, the edge and load bearing beams shall be founded through the fill and 100mm into the natural clays.

Where pipes connect to the slab, allowance should be made for differential movement by sleeving or taping pipes with foam to allow 25mm radial clearance.

GENERAL CONSTRUCTION AND MAINTENANCE REQUIREMENTS

The ground surface and paving around the building should be graded or drained to prevent the ponding of water adjacent to footings.

Mature trees present on this site or on adjacent land can affect the performance of the foundations. Tree root barriers or deepened foundations may be needed to protect the foundations from the tree roots.

Trees or large shrubs should not be planted or allowed to exist closer to the building than 1 x the mature height of the tree. Closer planting may be possible by the correct use of tree root barriers or similar.

Tree root barriers must be 1.8m deep or into the weathered rock, whichever is smaller, and filled with concrete with a reinforcement mesh, or geotextile equivalent. Deeper root barriers may be required; however this is best assessed during installation or comprehensive knowledge of the tree/s in question.

The presence of services on this and adjacent sites should be determined and their effect on the proposed foundations considered. The depth of any adjacent building foundations should be considered in the proposed foundation design and construction.

All brickwork should be well articulated by provision of full height joints at a maximum continuous spacing of 5.0m, or as per Table 2 of TN61 third edition from Cement Concrete & Aggregates Australia.

Surface cracking for concrete slabs is to be expected as the concrete cures. This problem is of no structural significance and will not affect the performance of the slab.

Care has been taken to identify any filling on this site. If any doubt exists, or site excavations do not match with the soil report findings, this office should be contacted immediately for further advice.

If the removal of a pre-existing structure or vegetation disturbs the foundation soil, then we recommend the local deepening of the footings to a depth of at least 200mm below the disturbed level. If construction is to commence in late summer or autumn and large trees are to be removed, the moisture condition should be stabilized by steadily soaking the dry areas around any removed trees. (APEX should be consulted for further advice.)

Water run-off shall be collected and channeled away from the house during construction.

Excavations near the edge of the footing system shall be backfilled in such a way as to prevent access of water to the foundation. For example, excavations should be backfilled above or adjacent to the footing with moist clay compacted by hand rodding or tamping. Porous material such as sand, gravel or building rubble should not be used.

The owner's attention is drawn to Appendix B of A.S.2870 "Performance Requirements and Foundation Maintenance", and the attached REPORT ADDENDUM.

Yours Faithfully,



JEREMY NG
B.Eng. (Geological), MIEAust



Haidar HAMMOUD
MANAGER

ENGINEERING LOGS

BORE 1: Refer to Drawing 1

Depth (m)	Fill or Natural	Strata Description	Moisture	Cohesion / Density	Observations
0.0 - 0.3	Fill	Concrete, Clayey Gravel and Silt: dark grey	damp / moist	firm / stiff	
0.3 - 1.5	Nat.	Silty CLAY (CH): HP, dark grey-brown	damp / moist	V.stiff	

End of bore at 1.5m - Target depth reached.

No groundwater observed

BORE 2: Refer to Drawing 1

Depth (m)	Fill or Natural	Strata Description	Moisture	Cohesion / Density	Observations
0.0 - 0.4	Fill	Clayey Silt and Silty Clay: dark brown, some gravels	moist	firm / stiff	
0.4 - 1.5	Nat.	Silty CLAY (CH): HP, dark grey-brown	damp / moist	stiff / V.stiff	

End of bore at 1.5m - Target depth reached.

No groundwater observed

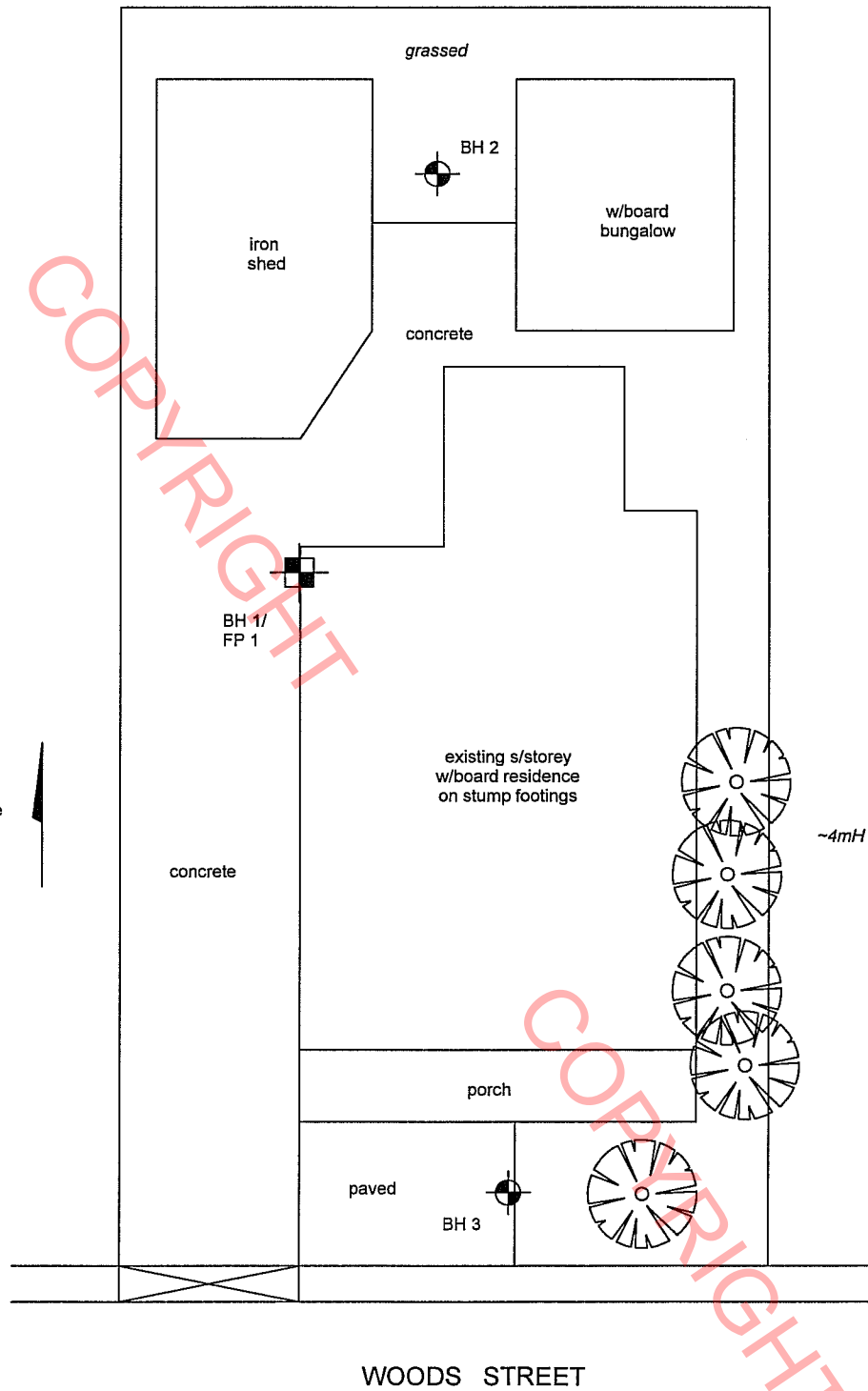
BORE 3: Refer to Drawing 1



Depth (m)	Fill or Natural	Strata Description	Moisture	Cohesion / Density	Observations
0.0 - 0.35	Fill	Clayey Silt and Silty Clay:	damp / moist	stiff	
0.35 - 2.0	Nat.	Silty CLAY (CH): HP, dark grey-brown grading to pale grey - becoming damp with depth	damp / moist	V.stiff / Hard	

End of bore at 2.0m - Target depth reached.

No groundwater observed

Site: No. 31 Woods Street - Newport
 Drilling Date: 19 November 2010
 Drilled by: M. Hammoud
 Drilling method: hand auger & mechanical auger



-  Footing probe
-  Borehole location

APEX SOIL TESTING (AUST.) PTY LTD

24 Collins Place
Kilsyth
ph (03) 9724 9794
fax (03) 9723 8899

TITLE: **No. 31 WOODS STREET - NEWPORT
BOREHOLE & FOOTING PROBE LOCATION PLAN**

CLIENT: **Richard Judge** DATE: **01.12.10**

DRAWN BY: **JN** SCALE: **not to scale** JOB No: **15H15751** DRAWING No: **1**

REPORT ADDENDUM

LIMITS OF INVESTIGATION:

1. The recommendations made in this report are based on the assumption that the test results are representative of the overall subsurface conditions. The client should also be aware that our recommendations are based only on the results of our test site locations at the time of testing. It is the responsibility of the owner/builder to confirm that the location of our test sites has broadly covered the area for the FINAL proposed construction.
While the test sites may represent the general subsurface conditions, variation between test sites should not be discounted.

If footing excavations reveal soil conditions different from those shown in our attached LOG SECTION sheet, APEX must be consulted IMMEDIATELY and excavations stopped IMMEDIATELY.

2. The recommendations in this report are based on the following:
(a) The information gained from our investigation. (b) The present "state of the art" in testing and design. (c) The building type and site treatment conveyed to us by the client. Should the client or his agent have omitted to supply us with the correct relevant information, or make significant changes to the building type and/or building envelope, our report may be made irrelevant and/or inappropriate. In such cases, we do not take responsibility for any consequences and we reserve the right to make an additional charge if more testing is necessary.
3. Notwithstanding the recommendations made in this report, we also recommend that whatever footings are close to any excavations or easements, that part of the footings should be deepened so that the projection from the underside of the footings and the bottom of the excavation make an angle not exceeding 30deg. in sandy soils and 45 deg. in clayey soils. (This angle is measured from the horizontal). We do not recommend a steeper angle unless sufficient testing is carried out to indicate otherwise or unless the footings are founded on solid rock.
4. Unless otherwise stated in our commission, any dimensions or slope direction and magnitude should not be used for any building costing calculations and/or positioning. Any sketch supplied should be considered as only an approximate pictorial evidence of our work.
5. Care has been taken to identify any filling on this site. A check should be made with all relevant authorities to obtain any records of filling. If any doubt exists on site at the time of construction, then APEX should be contacted immediately for further advice.

GENERAL BUILDING AND MAINTENANCE RECOMMENDATIONS: The maintenance of the building and the site is the responsibility of the owner. The owner should be familiar with the document – "Guide to home Owners on Foundation Maintenance and Footing Performance" (CSIRO ref 10-91) which is available from CSIRO.

6. **SITE DRAINAGE:** good site drainage is one of the most important design feature of any footing. The ground should be graded away from all footings at minimum slope of 1:20 and every effort made not to allow ponding of water against the footings. Unless the soil slopes well away from the footings at all times, excessive soil moisture may accumulate and cause wall and/or floor movements. Roof water should be diverted away from the building as soon as the roof is constructed by using temporary pipes. Soil drains should be constructed well before footing construction.
7. **SITE CLEARING:** If the removal of a pre-existing structure or vegetation disturbs the foundation soil, then we recommend the local deepening of the footings to a depth of at least 200mm below the disturbed level. If constructions to commence in late summer or autumn and large trees are to be removed, the moisture conditions should be stabilized by steady soaking the dry areas around the removed trees (APEX should be consulted for further advice).
8. **IN CLAY SITES:** (Classification "M", "H", "E") minor wall, floor and footing movement are inevitable, therefore, on such sites, we make the following additional construction recommendations to minimise the effects:
 - (a) APEX is of the opinion that BRICKWORK ARTICULATION joints or full height wall openings improve the performance of footings on clay sites. The builder should consider their use in long wall lengths and as specified in A.S.2870 or as specified by the designing engineer.
 - (b) DO NOT CONSTRUCT large archways, wing walls and narrow isolated wall panels near corners. Brick work over doors and windows should be avoided in single storey construction; in two storey construction, brick work construction joints should be used. If using brickwork over doors and windows without taking special structural precautions, please consult APEX for advice in this matter.
 - (c) Any extension to an earlier structure should be tied with extra wall ties and not by interlocking brickwork.
 - (d) Avoid excavations close to footings.
 - (e) Service pipes should be detailed to tolerate footing movement. Plastic piping should be used whenever possible.
9. In HIGHLY or EXTREMELY EXPANSIVE sites (Class "H", "E"), hard tiles should be laid on an appropriate sheeting material using a rubber based adhesive and grout. Alternatively, they can be laid directly on the concrete six months or more after construction.
10. **LIMITATION ON GARDENS:** The development of the gardens should not upset the drainage requirements nor the sub-floor ventilation and weephole drainage systems. Garden beds adjacent to the house should be avoided. Care should be taken to avoid over watering of gardens.
11. **RESTRICTIONS ON LARGE TREES:** in clayey sites, trees (including trees on neighbouring sites) should be kept at a distance away from the house of approximately the eventual mature height of the tree. For groups of trees it is recommended that the distance away from the house be increased to one and a half times the eventual mature height of the tree. The distances should be increased further if the clays in the area are considered to be very reactive. If trees are to remain, then special footing design or root barrier will be required.
12. **LEAKS** in plumbing, including stormwater and sewerage and drainage should be repaired promptly.
13. **SHRINKAGE CRACKING** can be expected in concrete floors in the first 3 to 9 months in any site. This type of cracking does not require any special attention unless there is some vertical movement in the cracks or if the cracks width exceeds 3mm