863217

PLAN MUST BE DRAWN WITHIN BLACK LINES

863217

HEILBRONN & PARTNERS PTY LTD hereby certify that the Company have surveyed the land comprised in this plan ~~(either personally or by~~ Ewan James ~~S~~ (Licensed Surveyor) for whom the Company accept responsibility, that the plan is accurate, that the said survey was performed in accordance with the Surveyors Act and that the said survey was completed on ...

Licensed Surveyor / Director

Licensed Surveyor / Director

Date 17/9/93

MERIDIAN: Vide RP189976 plus 16"

MAP REF: 9542-14444

SCALE: 1:750

FILE REF

ENDORSED: 11/11/93

ORIGINAL: ALLOT 4 SEC 92

YES SURVEY RECORDS DEPOSITED

REGISTERING DIST: BRISBANE

PLAN OF Lots 22-31, 36, 996, 998 & 999

Cancelling Balance of Lot 4 on plan C145612

PARISH: CLEVELAND

COUNTY: Stanley

TOWN/LOCALITY: CLEVELAND

LOCAL AUTHORITY: REDLAND S C

LAND AGENTS/MINING DISTRICT

MINING FIELD

PLAN 863217

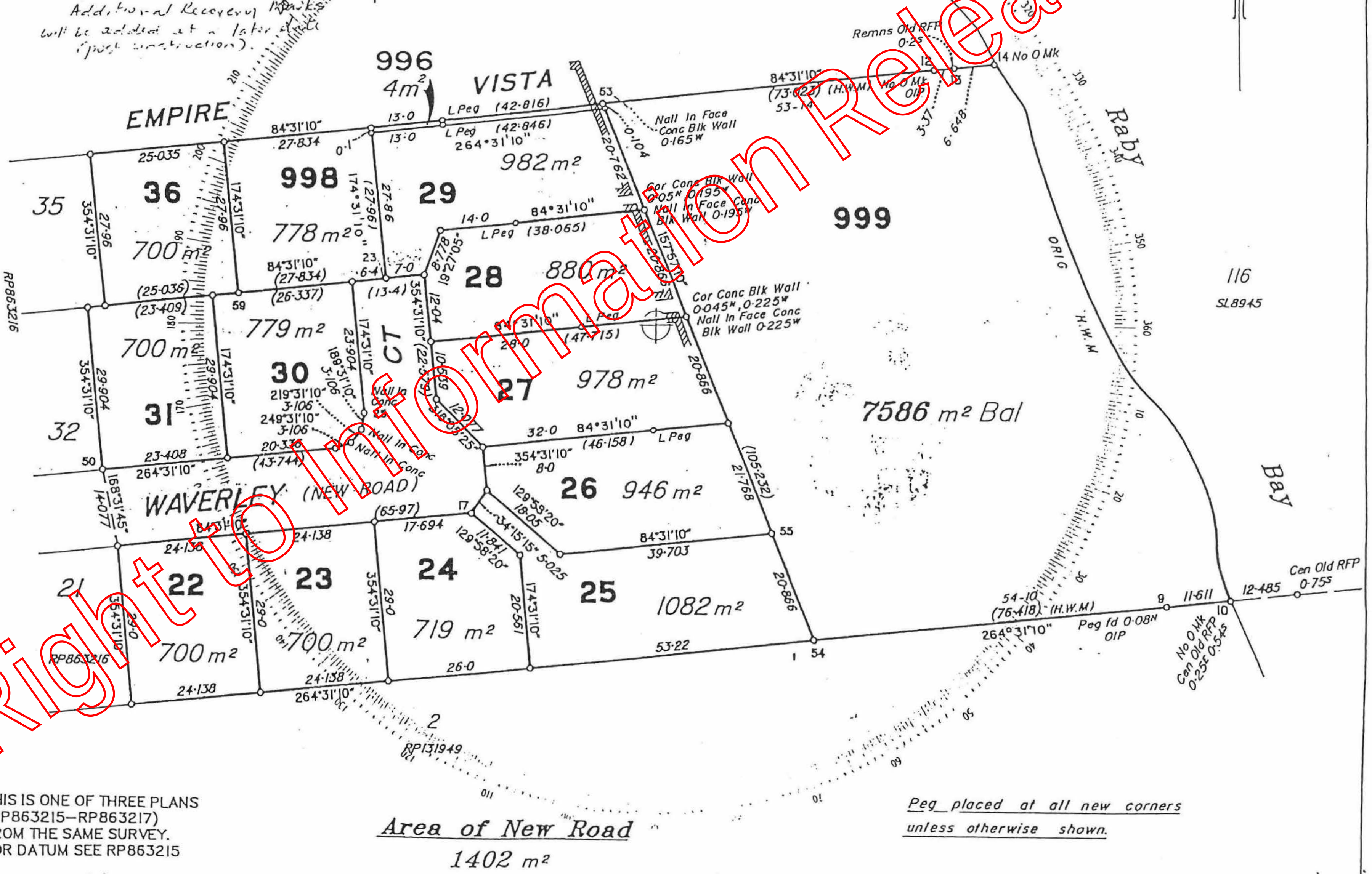
REFERENCE MARKS

STN	TO	ORIGIN	BEARING	DIST
9	OIP (New Ref)		79°07'30"	1·01
10	Pin		316°41'	17·935
14	Pin		232°09'35"	10·436
17				
23	Pin		239°57'10"	1·157
25				
50	Pin		94°49'50"	1·045
53	Cor Conc Blk Wall		336°11'10"	4·872
54	Pin		82°53'10"	0·985
55	Pin		230°56'40"	3·936
59	Pin		126°43'20"	0·387
12	OIP (New Ref)		174°31'10"	0·625

Additional Recovery Marks will be added at a later date (post construction).

Amendments by HEILBRONN & PARTNERS P/L Licensed Surveyor Director

Date 11/11/93



Peg placed at all new corners unless otherwise shown.

Area of New Road 1402 m²

THIS IS ONE OF THREE PLANS (RP863215–RP863217) FROM THE SAME SURVEY. FOR DATUM SEE RP863215

WARNING – PLAN MAY BE HOLLED – A FOLDED OR MUTILATED PLAN WILL NOT BE ACCEPTED

C798

863217

Hunt Robinson Pty. Ltd.

A.C.N. 010 953 027

P.O. Box 103
Buddina, Qld 4575
Phone (074) 93 2677
Fax (074) 93 1816

GEOTECHNICAL REPORT

Client: Jupiter Homes
Address: Lot 28 Waverly Court, Redland Bay
Job Number: JH 9555
Date Investigated: 2 May 1995
Wind Category: W41 Non Cyclonic

1.0 INTRODUCTION:

The purpose of this report is to classify the area mentioned above, in accordance with AS2870.1 - "Residential Slabs and Footings", and to design a footing system which will perform adequately under these soil conditions.

Bore holes have been drilled in the area of the proposed development to obtain a sample, representative of the surface and sub-surface soil strata.

The recommended footing system is to comply with the requirements of AS2870.1, AS2870.2 - "Guide to Design by Engineering Principles", the Building Code of Australia, and any other requirements specified by the relevant Local Authority.

2.0 SITE DESCRIPTION:

Vegetation: Poorly grassed.
Crossfall: Generally level.
Adjacent Construction: N/A.
Water Table: Not encountered.
Other Remarks: A very steep batter exists at the rear of the site. A sewer manhole was noted on the RHS boundary approx two thirds in from the road.
Shrink-swell index: Iss= 2.19%.

3.0 SITE SKETCH: See Attached

4.0 SOIL PROFILE:

2 Bore holes were drilled on the site, positions shown on attached site sketch. Soil profiles consist:-

Bore hole 1 - 300mm hard medium plasticity sandy CLAY FILL, 1200mm very stiff-hard medium-high plasticity sandy CLAY, to bore end at 1.5m.

Bore hole 2 - generally the same as bore hole 1.

5.0 SITE CLASSIFICATION - Site Classification - M (Ys=20-25mm as calculated using the Rapid Calculation Method from Section D1 of Appendix D of AS2870.2. This method uses Van der Merwe's equations for soil suction change of the sample for a depth of 1800mm, using a change in suction of 1.2, and/or estimated or known plasticity index values.)

6.0 RECOMMENDATIONS:

6.1 Excavation and Earthworks:

Strip topsoil and vegetation from the immediate area of the construction, removing all organic matter, or any matter which would inhibit compaction. Ensure the building platform is well-compacted and proof rolled to obtain a firm foundation base to support the slab and footing loads. If any soft spots are encountered whilst digging the footings, deepen the trenches down through to bear into the foundation material specified a minimum 300mm.

After the final building platform is created, ensure that positive drainage exists away from the house area. Use a minimum surface gradient of 1 in 10, or 50mm, away from the footing beams for at least one (1) metre.

6.2 Footings:

Unless otherwise specified, the footing beams are to bear a minimum 300mm into the recommended foundation material specified below, and in any case, not less than 300mm below finished ground level.

For single/double storey masonry veneer construction with suspended timber floors, we recommend a F3a footing system as specified below:-
Concrete strip footings/raft slab construction, with footing beams bearing a minimum of 350mm below finished ground level. Use footing beams a minimum 300mm deep reinforced with NS4a cages or, alternatively, use 300mm deep beams reinforced with 3-F11TM bottom only. Lap cages/TM a min 500mm, or 1 full panel at ends of runs. Use 50mm min cover.

For single/double storey masonry veneer construction with suspended concrete slab, we recommend a footing system as specified below:-
Concrete strip footings/raft slab construction, with footing beams bearing a minimum of 500mm below finished ground level. Use footing beams a minimum 450mm deep, 450mm wide reinforced with 4-F11TM top & bottom with R6 ligs @ 500mm crs. Lap cages/TM a min 500mm, or 1 full panel at ends of runs. Use 50mm min cover.

Slab ties are to be used from the footing, to support the floor reinforcing mesh:- Y12 @ 900mm, or R10 @ 600, or I8 @ 450mm crs. (For class H sites use Y12 @ 600mm, or R10 @ 450mm crs)

Stiffening beams, 300mm deep, reinforced with 3-F11TM, are to be used under all loadbearing walls and then on a max 5m grid.

For more information see the attached "Slab and Footing Layout" and "Footing Sections" drawings.

6.3 Recommended Foundation Material:

If all the footing beams bear into the material specified below, then the safe soil bearing capacity is estimated to be in excess of 100kPa, from the Dynamic Cone Penetrometer (DCP) values adjacent to each bore hole:

very stiff sandy CLAY

7.0 CONSTRUCTION REQUIREMENTS:

7.1 Floor Slab Details:

Recommended 100mm thick structural slab, reinforced with F72 (or LSDF652) slab mesh, containing the internal stiffening beams specified. The slab is

to be poured on a minimum 50mm compacted sand bed, with a visqueen vapour/moisture barrier. Minimum top cover to be 30mm unless otherwise specified.
All bracing walls to de deepened to a minimum 150mm thick, in positions where Dynabolts, Chemset bolts or Loxins are used.
The area under the floor slab shall be poisoned against termites in accordance with the requirements of the Building Code of Australia, and the Local Authority.

7.2 Waterproof Membrane:
Ground slabs and internal beams will be underlain with 0.2mm minimum thickness polythene film moisture barrier, continuous under the whole slab area, and terminated at the edge footing beams. Joints, (minimum lap of membrane 200mm), and intrusions through the barrier must be sealed with approved adhesive tape.

7.3 Concrete:
All concrete for foundations and slabs, unless noted otherwise, shall have a minimum 28day compressive strength of 20MPa, and a maximum nominal aggregate size of 20mm. All concrete must be mechanically vibrated to ensure all entrapped air is removed, and all concrete is moved around the reinforcement and into corners. Footing beams may be placed first, but all other beams and slabs to be placed monolithically. See attached drawings for details of connections between internal and external ground beams. All concrete surfaces to be cured for a minimum of seven (7) days by an approved method.

Steel wire reinforcement will comply with AS1304 and all extruded bars with AS1302. Minimum lap of reinforcement, unless otherwise specified, shall be, 225mm for fabric, 300mm for trench mesh, 350mm for 12mm bars, 450mm for 16mm bars.

All T and L junctions to be reinforced as detailed in attached sketches.
Cover to reinforcement: 50mm minimum for footing beams.
40mm minimum for internal beams with moisture barrier below.
30mm top cover to slab reinforcement.

7.4 Concrete Finishes:
Concrete must be finished with a surface suitable for its intended use, such as those outlined below:-

Floor Use	Finish Required
Vinyl sheet or tiles, or linoleum	Mechanical trowel or hard steel trowel
Carpet	Sponge float or wood float
Masonry or ceramic tiles	Screeded
Steep external paths or driveways	Broomed or exposed aggregate
Other external pavements	Sponge float, wood float, broomed, or exposed aggregate.

Slabs must be recessed as required to ensure ceramic tiles finish level with the other floor finishes.

8.0 DRAINAGE:

At no time during construction, or after, is water to be permitted to pond in or near footings. Ensure all fill batters away from the final house, making sure all surface runoff is directed away from the house. (Maximum batters are to be - 1:1.5 for clay soils, and 1:1.7 for sand soils.) The final floor level to be a minimum of 225mm above final ground level.

All roof drainage to be discharged either to the street, or into the Local Authority's stormwater system. Water is to be discharged a minimum of 2 metres from the foundations, for sand sites, and as far away as possible for clay sites. Existing or proposed trees shall be kept a minimum of 80% of their diameter away from the footings.

All external patio, carport and verandah slabs, and internal garage slabs to be graded at not less than 1 in 100 to remove all surface water away from the house area. Laundry floors must be graded to floor waste or external door, to enable washing machine overflow to escape. Where bathrooms are provided with a floor waste, the floor must be graded to the waste.

9.0 OWNER'S RESPONSIBILITIES:

Stable moisture conditions near the footings, is the responsibility of the owner/occupier of the dwelling. Large changes in moisture conditions around the structure's footings, will cause movement, and may lead to damage of the house. This report must be read in conjunction with the attached report, "Guide to Home Owners on Foundation Maintenance and Footing Performance", sheet No. 10-91, produced by Dr P.F. Walsh of the CSIRO.

10.0 SHRINKAGE REQUIREMENTS:

For moderately-highly reactive sites it is advisable to use flexible joints where services pass through the foundations as leakage could adversely affect structures supported by shallow footings. Placement of brittle floor coverings should be delayed a minimum of 3 months following placement of floor slab concrete to control the effects of shrinkage cracking. Alternatively, the size of the steel reinforcement in the slab is to be increased to F82 or F92 (or alternatives), or an additional layer of the specified reinforcing mesh can be placed beneath areas to be covered with brittle floor coverings.

Articulation in the brickwork is advisable on highly reactive sites, to allow the panels to move independently of each other, preventing the development of stresses in the wall, unsightly cracking, and failure in the wall may be avoided. The recommended panel lengths for articulated construction (from Table D7.2 - F, of the Australian Domestic Construction Manual), are listed below:-

Walling Materials	Maximum Length
110mm clay brick	8.5m
90mm clay brick	8.0m
90mm concrete modular unit	6.5m

11.0 SERVICES:

To prevent footing failures as a result of leaking sewers and plumbing services, the following notes should be adhered to:-

a) water pipes must be kept out of and from under all slabs. If the pipes are in the slab, they must be in conduits to allow for contraction and expansion of the pipes, otherwise the pipes will crack from fatigue

stresses.

b) sewers and their fixtures must not be installed under slabs. These services can be taken through the walls from outside the building.

c) stormwater downpipes must allow for differential movement between the building and the ground.

d) service trenches must be constructed and protected to prevent water backing up the trenches. This can be overcome by - correct grading of the trenches, placing septic systems at suitable positions and at correct levels, using clay plugs to prevent water passing through granular fill in the trenches, and where required, extending trenches downhill, with gravel filling, to carry water away from the house area.

12.0 REPORT LIMITATIONS:

Recommendations given in this report are based on information supplied regarding the proposed construction in conjunction with the findings of the soil investigation attached. Any change to the type of construction, the building location, or the shape of the building may require further investigation and analysis, and could make the recommendations above and attached invalid.

Every reasonable effort has been made to locate test sites so that the bores are representative of the soil conditions within the area of construction. The client should be made aware that exploration is limited by time available and by economic constraints. If soil conditions differ from those of the log sheet attached during excavation or construction, please notify this office immediately for further inspection and recommendations.

HUNT ROBINSON P/L
(Registered Professional Engineering Company of Queensland -#205)
Scott Brimelow BE(Civil), MIEAust, CPEng

Dated: 30 May 1995.

GEOFF MAIDEN & PARTNER

SOIL TESTING AND QUALITY CONTROL LABORATORY

P.O. BOX 2079, NERANG EAST, QUEENSLAND, AUST. 4211

TELEPHONE: (075) 96 2122 FAX (075) 96 1650

CC/LG

Job No. 95-251

9th May 1995

The Manager,
Hunt Robinson Pty. Ltd.,
P.O. Box 103,
BUDDINA, QLD 4575

Dear Sir,

Re: Proposed Residence at Lot 28 Waverly Court - Ormiston - Redland Bay

Please find attached, a copy of the test location plan, brief site description, two (2) borehole records and four (4) Dynamic Cone Penetrometer tests performed on behalf of Foundational Drilling Pty. Ltd.

We also carried out a shrink swell test on a sample of sandy clay obtained from borehole (1) location. The results of this testing are as follows:

Percentage Shrink	*3.9*
Percentage Swell	*0.1*
Shrink Swell Index (I_{ss})	*0.0219*

...../2

Job No. 95-251

We understand that the site classification and analysis of test results will be carried out by others.

Should you have any queries or require any additional information, please do not hesitate to contact this office.

For future reference, when ringing for information concerning this report, please quote our Job Number, which appears on every page of this report. This will reduce delays over the phone.

Ms C. Comuzzo
B.E.(Civil)
Engineer

Mr M. Morley
Ass. Dip. Eng. Assoc. I.E. Aust M.S.E.A.
Drilling Manager

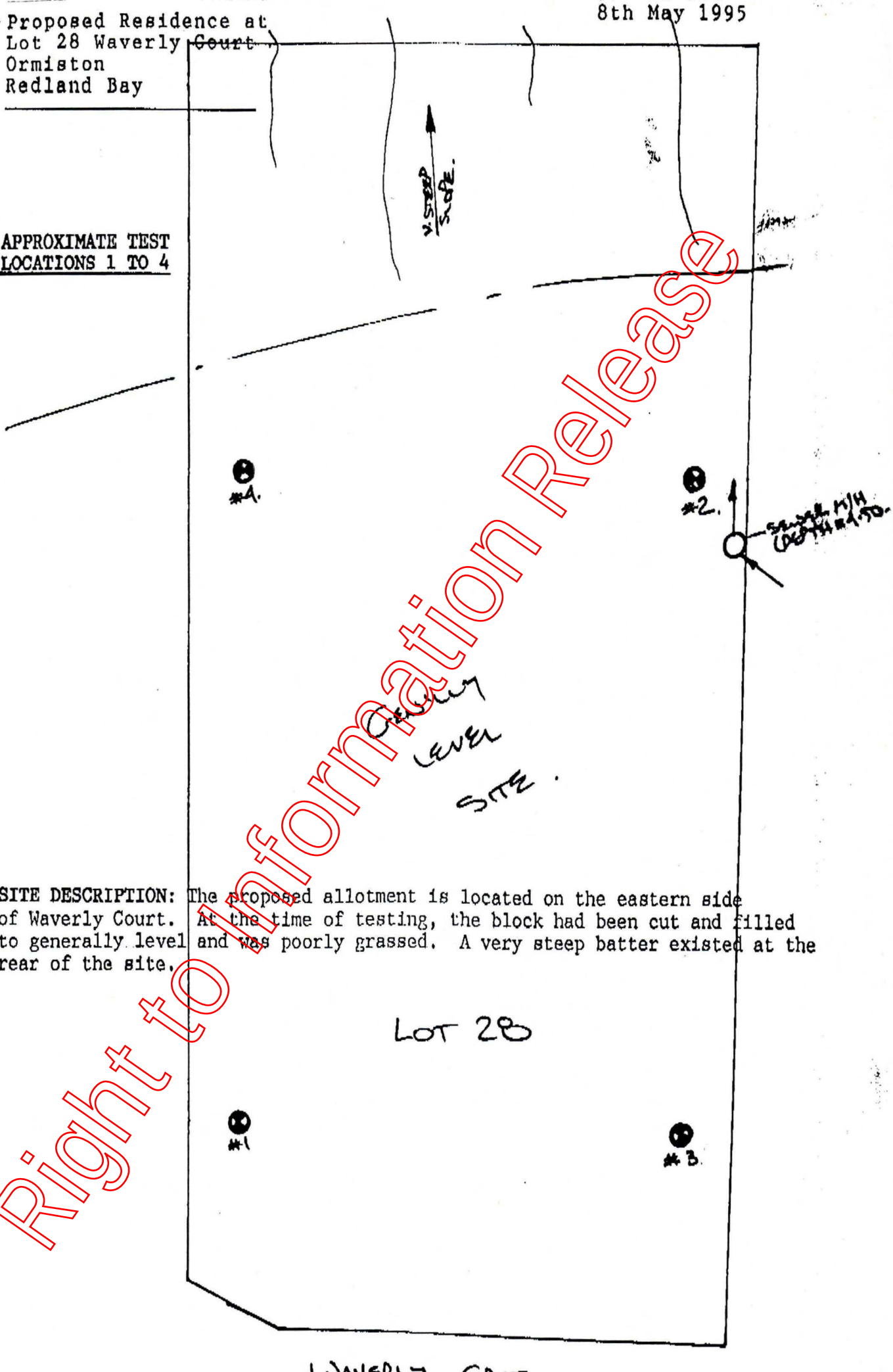
for and on behalf of GEOFF MAIDEN & PARTNER

report copies & invoice to : Foundational Drilling Pty. Ltd.

Proposed Residence at
Lot 28 Waverly ~~Court~~
Ormiston
Redland Bay

8th May 1995

APPROXIMATE TEST LOCATIONS 1 TO 4



SITE DESCRIPTION: The proposed allotment is located on the eastern side of Waverly Court. At the time of testing, the block had been cut and filled to generally level and was poorly grassed. A very steep batter existed at the rear of the site.

GEOFF MAIDEN & PARTNER

SOILTESTING AND QUALITY CONTROL LABORATORY

P.O. BOX 2079 NERANG EAST, QUEENSLAND. AUST. 4217

TELEPHONE (075) 96 2122 FAX (075) 961650

RECORD OF BOREHOLE NO. - 1

Client	Hunt Robinson Pty Ltd	Job No.	95-251
Project	Proposed Residence	Date	2.5.95
Location	Lot 28 Waverly Court - Ormiston - Redland Bay	Checked By	C.C.

DEPTH OF STRATA CHANGE	SOIL TYPE	DEPTH (m)	TYPE	RESULT
0.0-0.3	FILL CI SANDY CLAY medium plasticity fines, hard, orange brown, just moist (W<Wp), fine to coarse grained sand.			
0.3-0.7	CI-CH SANDY CLAY medium to high plasticity fines, very stiff to hard, dark grey brown, moist (W>Wp), fine to medium grained sand.	0.4-0.7	U50	PP = >600kPa
0.7-1.5	CI-CH SANDY CLAY medium to high plasticity fines, very stiff to hard, dark red brown, moist (W>Wp), fine to medium grained sand.	0.7-1.5	D	
	TOTAL DEPTH:- 1.5m			

Drill Type Jacro 200 F/A Water Noted - Steady Level -

DC Dynamic Cone Penetrometer
D Disturbed Sample
SPT Standard Penetration Test 'N' Value Number of Blows per 300mm
S Vane Shear Value (kPa)
PP Hand Penetrometer Reading (kPa)
"V" refusal - Maximum Depth of Penetration by "V" Bit
"T/C" refusal - Maximum Depth of Penetration by "T/C" Bit
PT Penetration Test

GEOFF MAIDEN & PARTNER

SOILTESTING AND QUALITY CONTROL LABORATORY

P.O. BOX 2079 NERANG EAST, QUEENSLAND. AUST. 4217

TELEPHONE (075) 96 2122 FAX (075) 961650

RECORD OF BOREHOLE NO. - 2

Client	Hunt Robinson Pty Ltd	Job No.	95-251
Project	Proposed Residence	Date	2.6.95
Location	Lot 28 Waverly Court - Ormiston - Redland Bay	Checked By	C.C.

DEPTH OF STRATA CHANGE	SOIL TYPE	DEPTH (m)	TYPE	RESULT
0.0-1.0	**FILL CL-CI SANDY CLAY** low to medium plasticity fines, very stiff, orange brown, just moist (W≈Wp), fine to medium sand with occasional bands of Clayey Sand throughout.	0.4-0.6	U50	(clayey sand in end of tube)
1.0-2.0	**CI-CH SANDY CLAY** medium to high plasticity fines, very stiff to hard, dark grey brown, moist (W>Wp), fine to medium grained sand.	1.0-1.3	U50	PP = >600kPa
	TOTAL DEPTH:- 2.0m			

Drill Type Jacro 200 F/A Water Noted - Steady Level -

DC Dynamic Cone Penetrometer
D Disturbed Sample
SPT Standard Penetration Test 'N' Value Number of Blows per 300mm
S Vane Shear Value (kPa)
PP Hand Penetrometer Reading (kPa)
"V" refusal - Maximum Depth of Penetration by "V" Bit
"T/C" refusal - Maximum Depth of Penetration by "T/C" Bit
PT Penetration Test

GEOFF MAIDEN & PARTNER

SOIL TESTING AND QUALITY CONTROL LABORATORY

P.O. BOX 2079 NERANG EAST, QUEENSLAND, AUST. 4217
TELEPHONE: (075) 96 2122 FAX (075) 96 1650

DYNAMIC CONE PENETROMETER TEST RESULTS

TEST PROCEDURE: x **G.M. & P.** **Other**

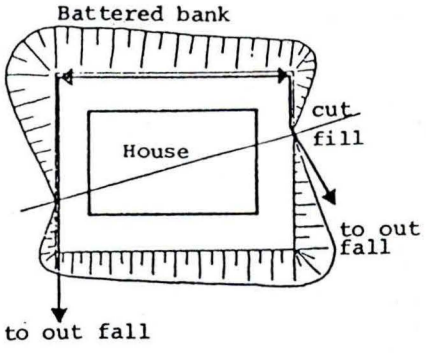
Client Hunt Robinson Pty. Ltd.	**Job No.** 95-251
Project Proposed Residence	**Date Tested** 2.5.95
Location Lot 28 Waverly Court - Ormiston - Redland Bay	

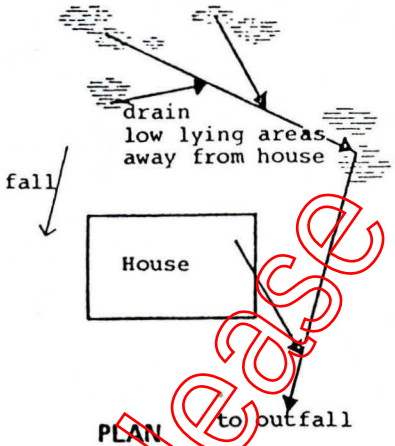
Hole No	1		2		3		4	
Location Level	As Per Attached Sketch 95-251 SK1		As Per Attached Sketch 95-251 SK1		As Per Attached Sketch 95-251 SK1		As Per Attached Sketch 95-251 SK1	
DEPTH	BLOWS	DENSITY INDEX %	BLOWS	DENSITY INDEX %	BLOWS	DENSITY INDEX %	BLOWS	DENSITY INDEX %
0.20	10		9		10		15	
0.40	8		4		6		6	
0.60	7		9		6		7	
0.80	7		9		8		9	
1.00	8		7		12		10	
1.20	10		5		12		9	
1.40	8		9		6		10	
1.60	8		8		7		9	
1.80	8	T.D.	8		6		10	
2.00			8	T.D.	6		10	T.D.
2.20					8			
2.40					9	T.D.		
2.60								
2.80								
3.00								
3.20								
3.40								

Type of Soil - refer to attached borehole records

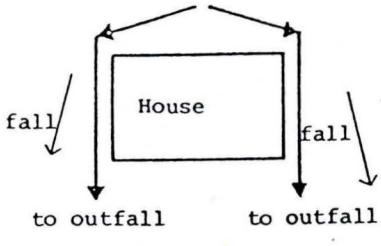
Water Table - **Tested By** N.K. **Checked By** G.B.

T.D. - Denotes Total Depth

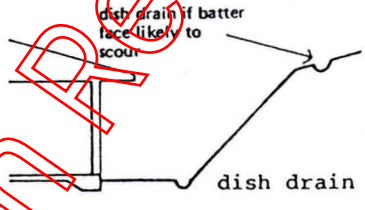




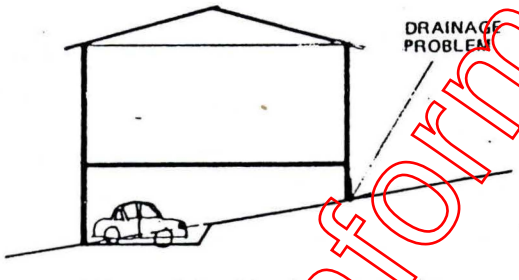
PLAN



PLANS

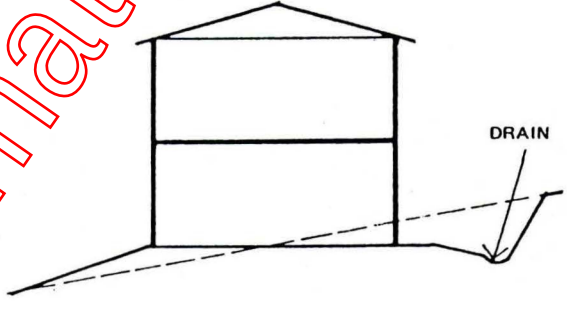


ELEVATION



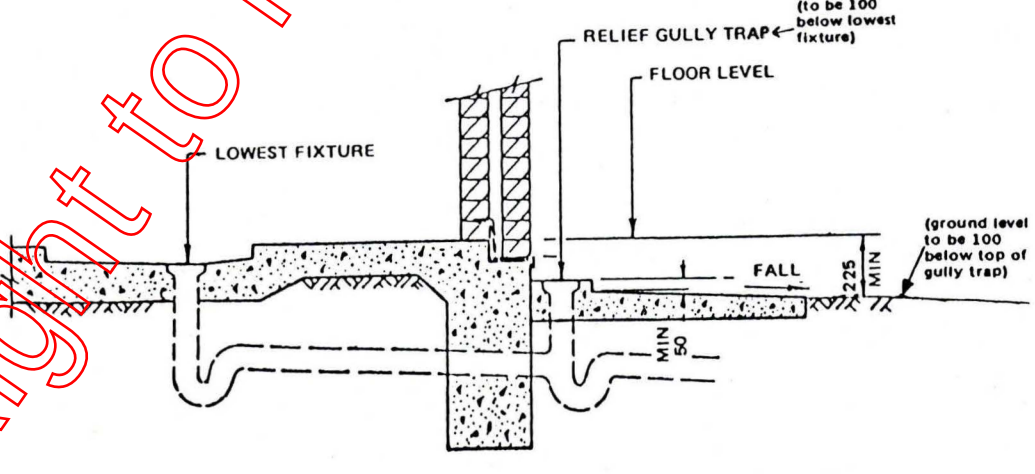
Older type design with perhaps one car under

DETAIL A



New high set with rumpus plus two cars under

DETAIL B



Hunt Robinson Pty. Ltd.

Warana
8 Commerce Ave
P.O. Box 103
ph 93 2677
fax 93 1816

Yatala
39 Old Pacific H'way
ph 807 4432
fax 807 3847

PROJECT Surface Drainage of Typical Residential or Low Rise Commercial Sites

Job No. JH 9555 | Sheet 1 of 1

Drawn S.J.Brimelow BE(Civil), GRADIEAust, PEng

Checked S.J.Hunt BE(Civil), MIEAust, CPEng, RPEQ

JOHN QUAK & ASSOCIATES PTY. LTD.

A.C.N. 010 929 487
CONSULTING ENGINEERS - CIVIL & STRUCTURAL
109 MOUNTJOY TERRACE, MANLY 4179
P.O. BOX 9153, MANLY 4179
TELEPHONE: (07) 3396 0611 FAX: 3396 0652
APPROVED PROFESSIONAL ENGINEERING COMPANY OF
QUEENSLAND - CERTIFICATE NO. 154

INCORPORATING 'BAYSIDE SOIL TESTING'

The Shire Clerk
Redland Shire Council
P.O. Box 21
CLEVELAND 4163

Our Ref: 6227

29th January 1996

RE: PROPOSED RESIDENCE AT LOT 28 WAVERLEY COURT, ORMISTON

Dear Sir/Madam,

ENGINEER'S CERTIFICATE

We, John Quak & Associates Pty. Ltd., are "Structural Engineers" within the definition of the Standard Building By-Laws.

The proposed structure is a two storey brick veneer residence with a concrete slab on ground.

The structural details shown on Drawing No: 96612 - 6227 sheet 1 to sheet 5 inclusive by John Quak & Associate Pty Ltd dated January 1996 have been designed and checked by us in accordance with the relevant Australian Standard Codes.

The structural content has been checked for compliance with the Building Act and all the amendments to date.

The design has been carried out in accordance with good Engineering practice.

We Certify that the design satisfies the above conditions. The building work, if constructed in accordance with the design and details shown and to good building practice, will be structurally adequate.

Design wind velocity is 41 metres per second.

The originals of this Certificate have been signed in blue or red pen. If the Certificate you are reading is not signed in blue or red pen, then it is a copy. This office can be contacted for confirmation of the content of this Certificate.

Yours faithfully,

John Quak
B.E. M.I.E. R.P.E.Q. 1561

JOHN QUAK & ASSOCIATES PTY. LTD.

A.C.N. 010 929 487
CONSULTING ENGINEERS - CIVIL & STRUCTURAL
109 MOUNTJOY TERRACE, MANLY 4179
P.O. BOX 9153, MANLY WEST 4179
TELEPHONE: (07) 3396 0611 FAX: 3396 0652
APPROVED PROFESSIONAL ENGINEERING COMPANY OF QUEENSLAND - CERTIFICATE NO. 154

The Shire Clerk
Redland Shire Council
P.O. Box 21
CLEVELAND 4163

Our Ref: 6227

21st February 1996

RE: BORED PIERS FOR PROPOSED RESIDENCE AT LOT 28 WAVERLEY COURT ORMISTON FOR MR CANTARELLA

Dear Sir/Madam

ENGINEER'S CERTIFICATE

We, John Quak & Associates Pty. Ltd. are 'Structural Engineers' within the definition of the Standard Building By- Laws.

The bored piers for the above proposed residence were inspected prior to the pouring of concrete on 13th February 1996.

Bore piers were constructed and reinforced to the details shown in Drawing No 96612-6227 by John Quak & Associates Pty Ltd dated January 1996.

All work as inspected is considered to be satisfactory and the bored piers as constructed are certified to be structurally adequate.

The originals of this Certificate have been signed in blue or red pen. If the Certificate you are reading is not signed in blue or red pen, then it is a copy. This office can be contacted for confirmation of the content of this Certificate.

Yours faithfully,

John Quak
B.E. M.I.E.A. R.P.E.Q. 1561

JOHN QUAK & ASSOCIATES PTY. LTD.

A.C.N. 010 929 487
CONSULTING ENGINEERS - CIVIL & STRUCTURAL
109 MOUNTJOY TERRACE, MANLY 4179
P.O. BOX 9153, MANLY WEST 4179
TELEPHONE: (07) 3396 0611 FAX: 3396 0652
APPROVED PROFESSIONAL ENGINEERING COMPANY OF QUEENSLAND - CERTIFICATE NO. 154

The Shire Clerk
Redland Shire Council
P.O. Box 21
CLEVELAND 4163

Our Ref: 6227

21st February 1996

RE: PERIMETER FOOTINGS FOR PROPOSED RESIDENCE AT LOT 28 WAVERLEY COURT, ORMISTON FOR MR CANTARELLA

Dear Sir/Madam

ENGINEER'S CERTIFICATE

We, John Quak & Associates Pty. Ltd. are 'Structural Engineers' within the definition of the Standard Building By- Laws.

The perimeter footings for the above proposed residence were inspected prior to the pouring of concrete on 15th February 1996.

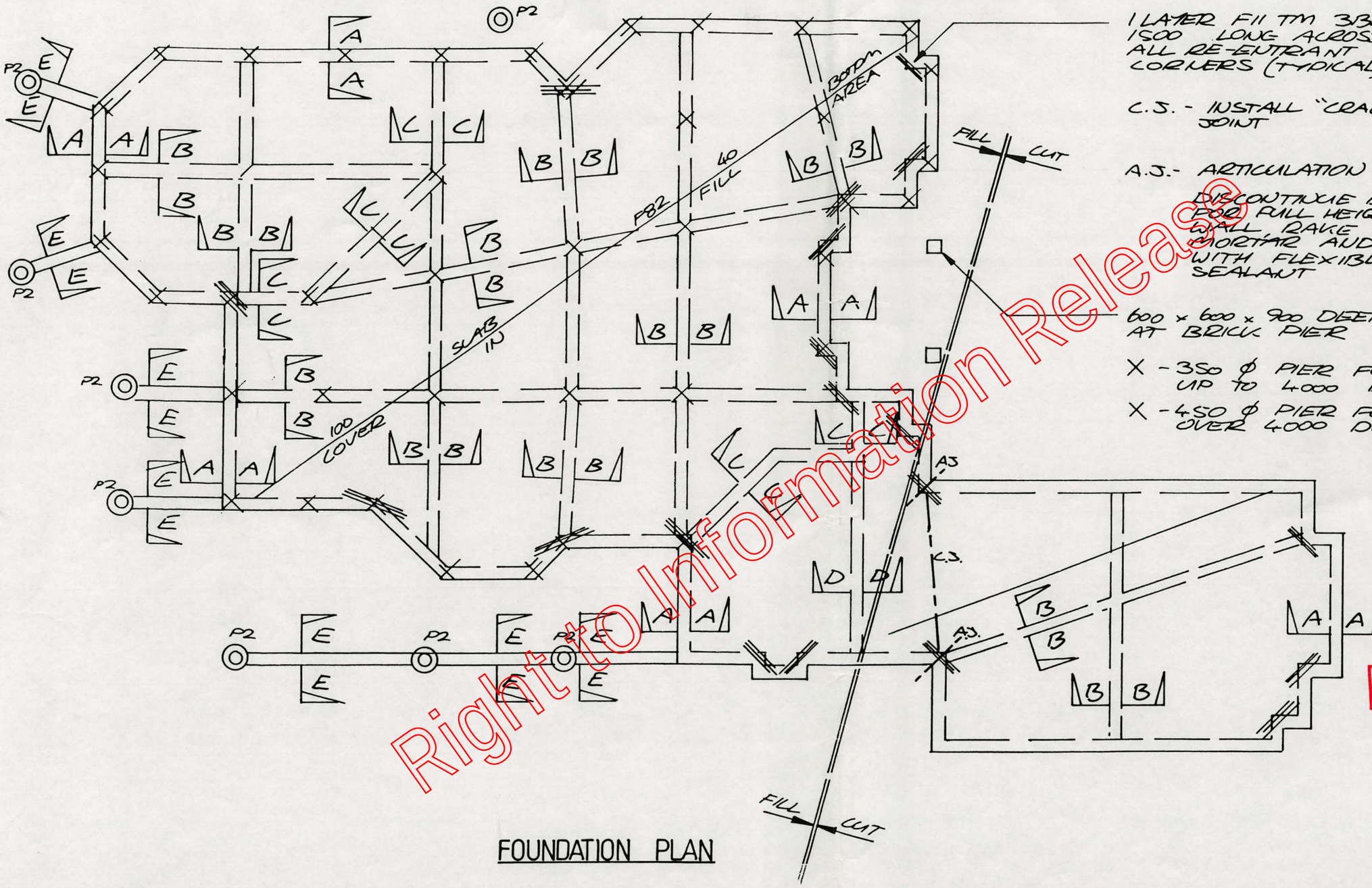
Footings were excavated and reinforced to the details shown on Drawing No 96 612-6227 by John Quak & Associates Pty Ltd dated January 1996.

All work as inspected is considered to be satisfactory and the footings as constructed are certified to be structurally adequate.

The originals of this Certificate have been signed in blue or red pen. If the Certificate you are reading is not signed in blue or red pen, then it is a copy. This office can be contacted for confirmation of the content of this Certificate.

Yours faithfully,

John Quak
B.E. M.I.E. R.P.E.Q. 1561



1 LAYER F11 TM 3BAR 1500 LONG ACROSS ALL RE-ENTRANT CORNERS (TYPICAL)

C.J. - INSTALL "CRACKA" JOINT

A.J.- ARTICULATION JOINT DISCONTINUE BRICKWORK FOR FULL HEIGHT OF WALL RAKE OUT ALL MORTAR AND FILL WITH FLEXIBLE SEALANT

600 x 600 x 900 DEEP FOOTINGS AT BRICK PIER

X - 350 Ø PIER FOR FILL UP TO 4000 DEEP

X - 450 Ø PIER FOR FILL OVER 4000 DEEP

AMENDED PLANS

REDLAND SHIRE COUNCIL
PLANS APPROVED SUBJECT TO
1. Building Act, 1975 - 1991
2. Standard Building By-Laws
3. Compliance with engineering details as submitted
4. Council requirements and conditions

numbered .....to.....

and noted on face of documents.

Any amendments to these documents require the further approval of Council.

DATE .....PERMIT No. .....

.....PRINCIPAL BUILDING SURVEYOR

COUNCIL COPY

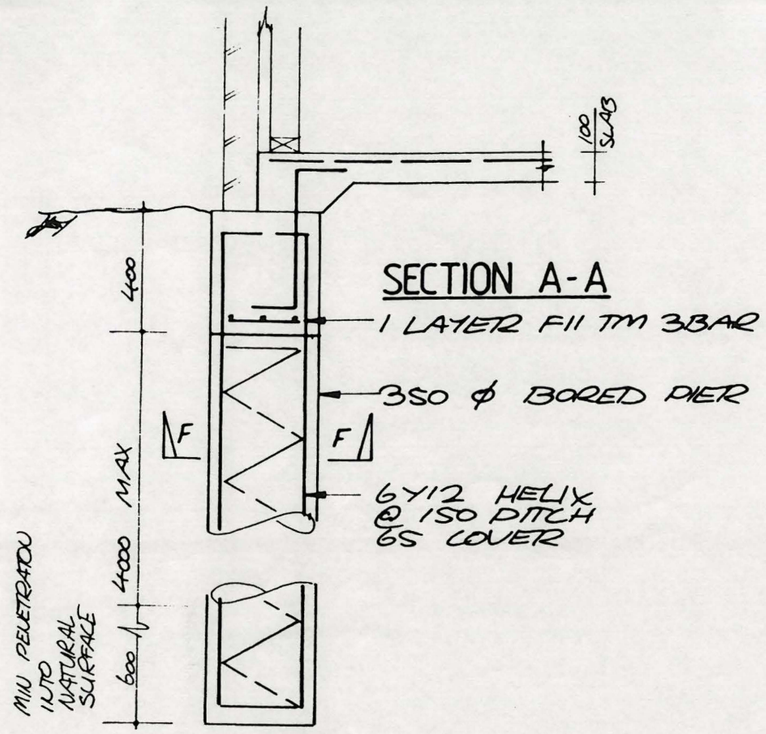
FOUNDATION PLAN

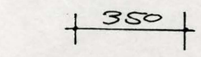
JOHN QUAK & ASSOC. PTY.LTD.
A.C.N. 010 929 487
CONSULTING ENGINEERS - CIVIL AND STRUCTURAL
109 MOUNTJOY TERRACE, MANLY 4179
P.O. BOX 9153, MANLY WEST 4179
TELEPHONE (07) 3980611 FAX. (07) 3980652
PROFESSIONAL ENGINEERING COMPANY OF QLD. CERT. NO. 154

STRUCTURAL DETAILS at
LOT 28 WAVERLEY CRT
ORMISTON for
MR CANTARELLA

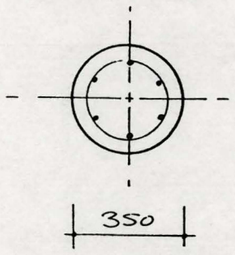
FOUNDATION PLAN

DESIGN J,.QUAK B.E. (CIVIL) M.I.E. (AUST) R.P.E.Q. 1561
SCALE 1 : 100 DRAWN NL
DATE JAN 96 DRAWING NO: 96 612 - 6227 SHEET NO 1 OF 5

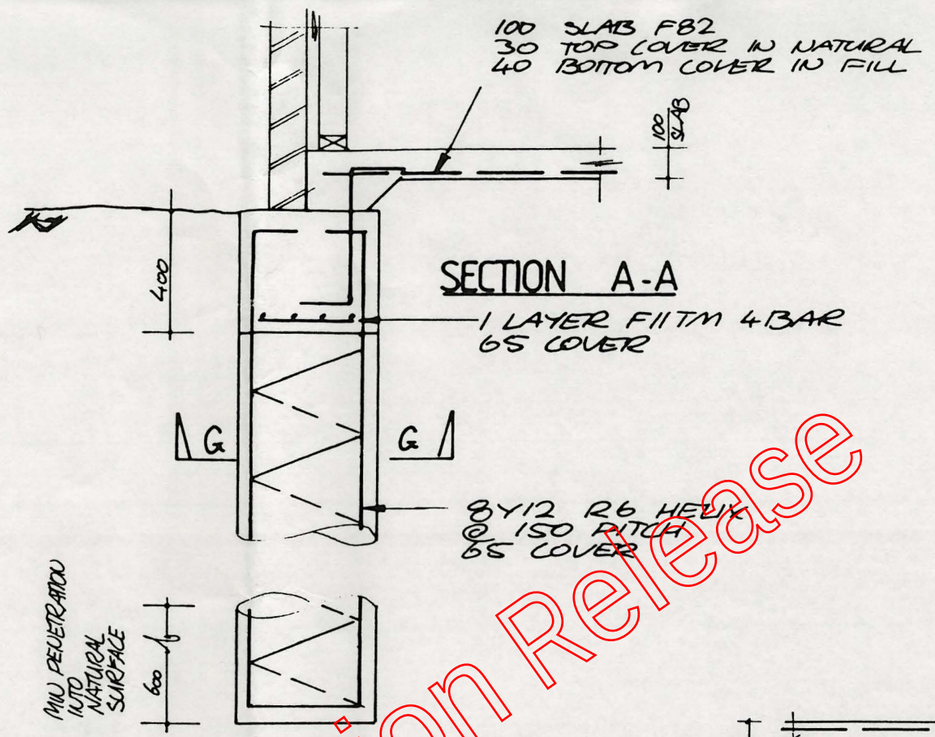


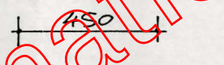


PIER DETAIL

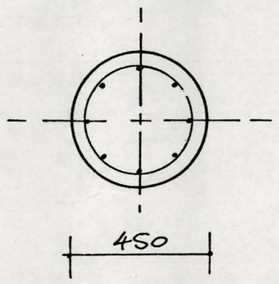


SECTION F-F





PIER DETAIL
(FILL OVER 4000 DEEP)



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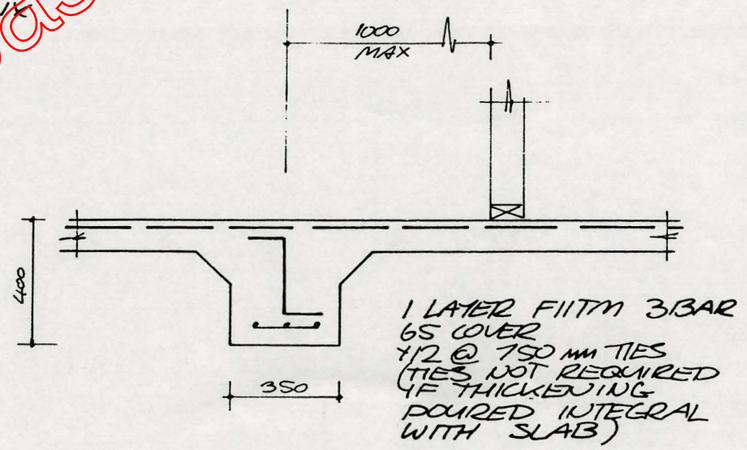
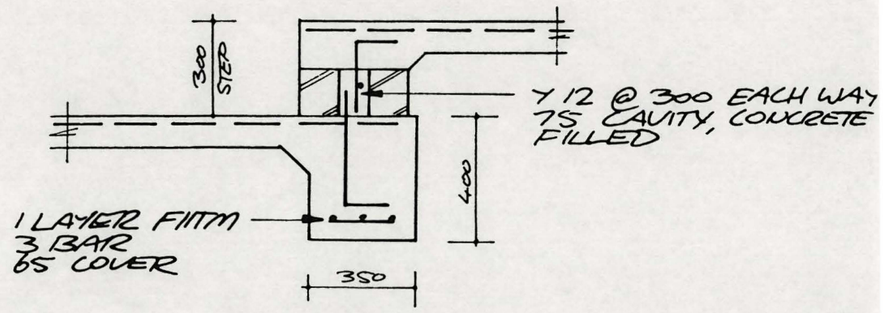
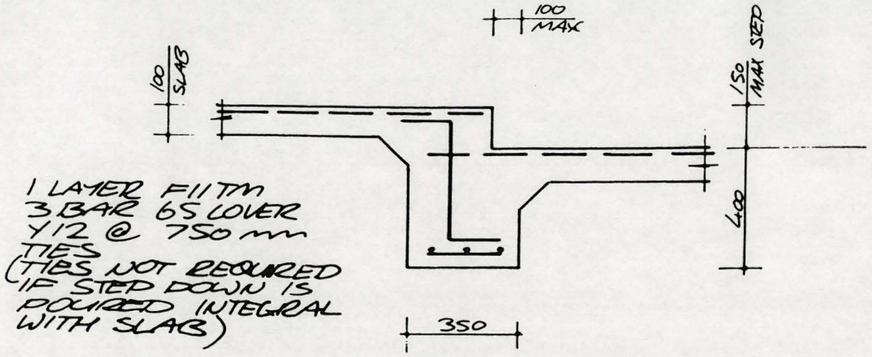


SECTION B-B



SECTION C-C

JOHN QUAK & ASSOC. PTY.LTD. A.C.N. 010 929 487 CONSULTING ENGINEERS - CIVIL AND STRUCTURAL 109 MOUNTJOY TERRACE, MANLY 4179 P.O. BOX 9153, MANLY WEST 4179 TELEPHONE (07) 3980611 FAX. (07) 3980652 PROFESSIONAL ENGINEERING COMPANY OF QLD. CERT. NO. 154		SECTIONS	DESIGN J,.QUAK B.E. (CIVIL) M.I.E. (AUST) R.P.E.Q. 1561 SCALE 1: 20 DRAWN NL DATE JAN 96 DRAWING NO: 96 612 - 6227 SHEET NO 2 OF 5



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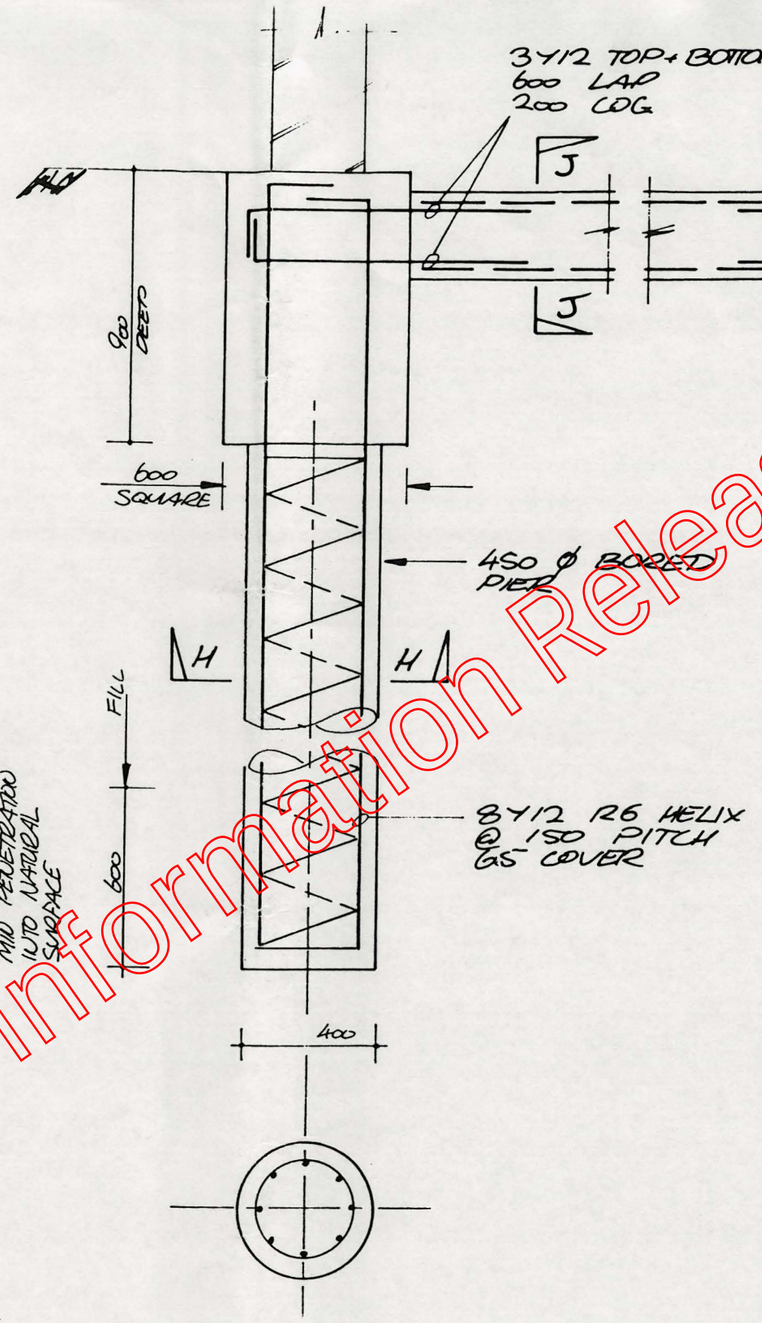
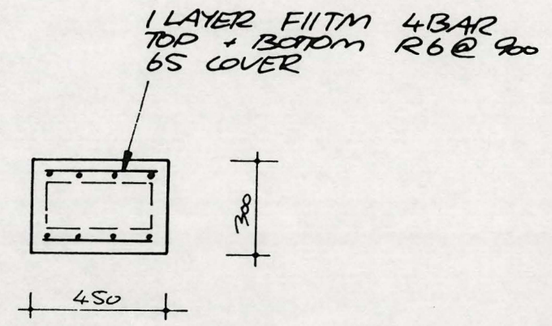


SECTION H-H



SECTION J-J

AMENDED PLANS

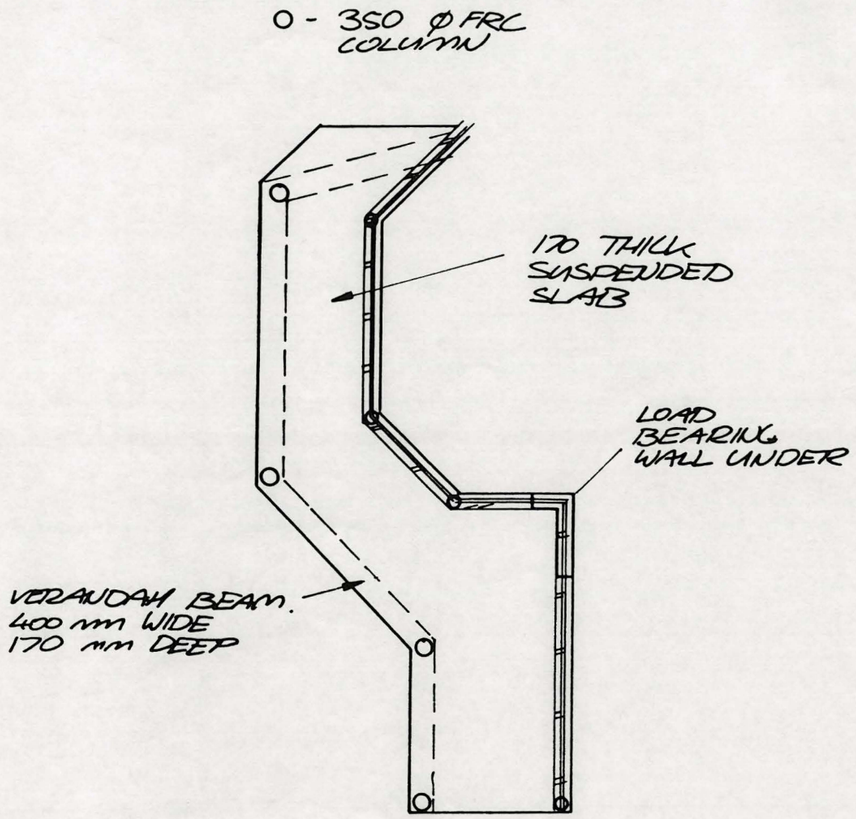
PIER DETAIL (P2)

JOHN QUAK & ASSOC. PTY.LTD.
A.C.N. 010 929 487
CONSULTING ENGINEERS - CIVIL AND STRUCTURAL
109 MOUNTJOY TERRACE, MANLY 4179
P.O. BOX 9153, MANLY WEST 4179
TELEPHONE (07) 3980811 FAX. (07) 3980852
PROFESSIONAL ENGINEERING COMPANY OF QLD. CERT. NO. 154

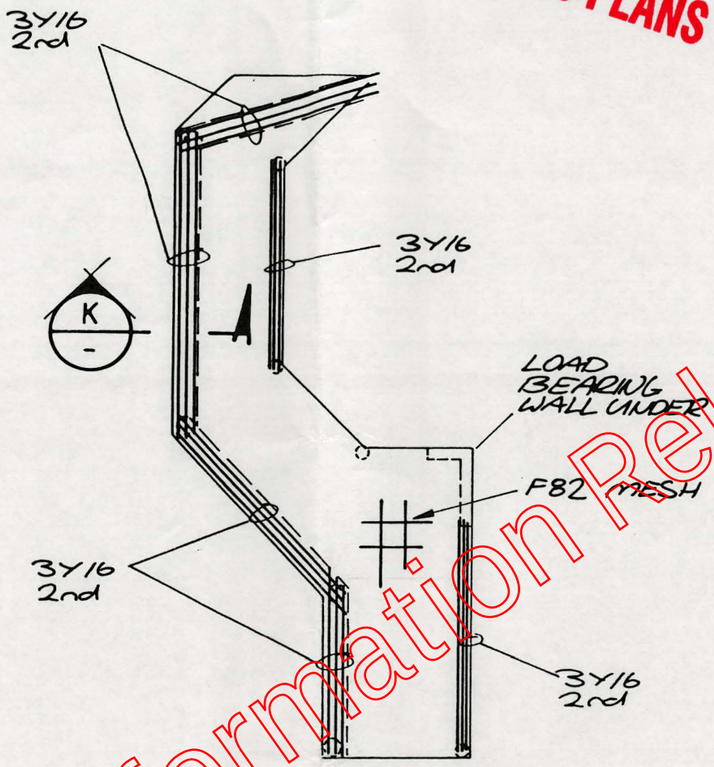
PIER DETAIL
SECTIONS

DESIGN J,.QUAK B.E. (CIVIL) M.I.E. (AUST) R.P.E.Q. 1561
SCALE 1 : 20
DRAWN NL
DATE JAN 96
DRAWING NO: 96 612 - 6227
SHEET NO 3 OF 5

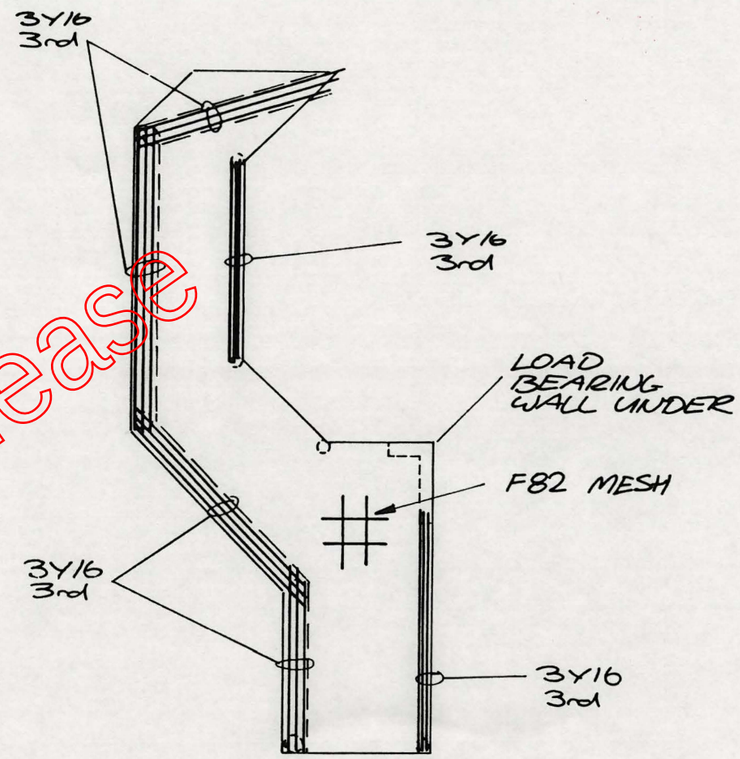
AMENDED PLANS



SLAB LAYOUT



BOTTOM REINFORCEMENT



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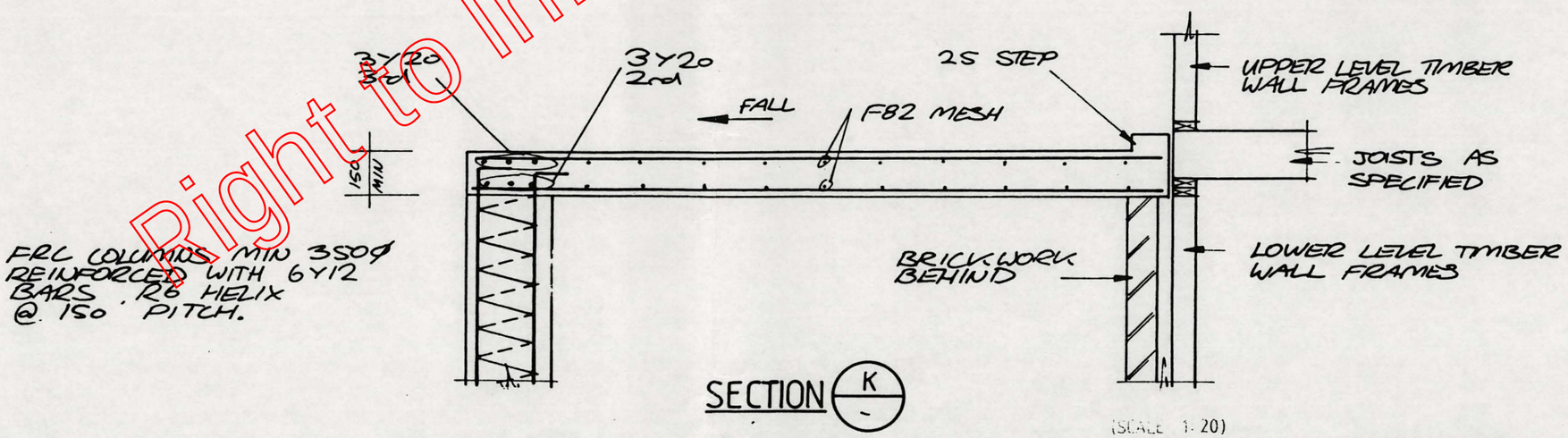
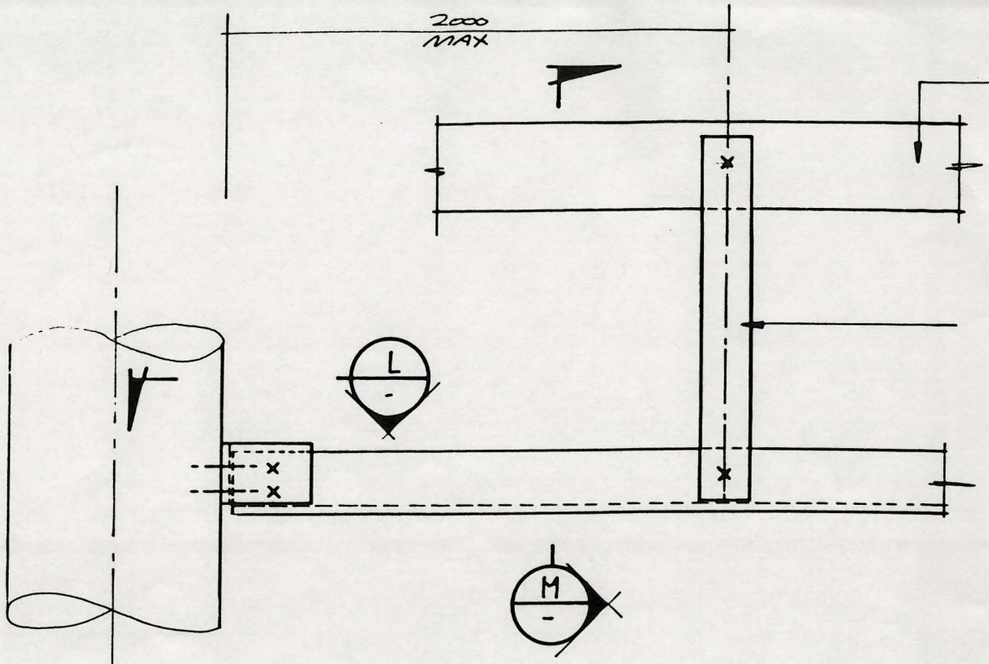


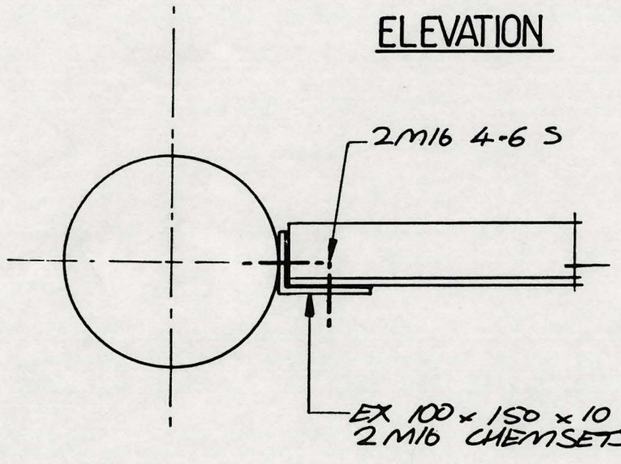
SECTION K

(SCALE 1:20)

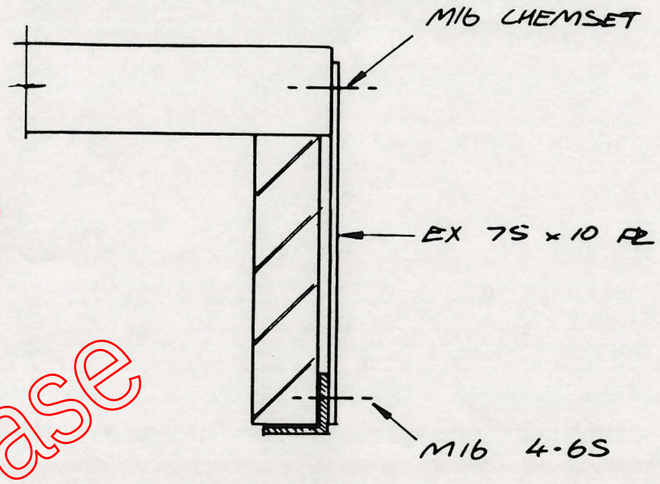
JOHN QUAK & ASSOC. PTY.LTD. A.C.N. 010 923 487 CONSULTING ENGINEERS - CIVIL AND STRUCTURAL 109 MOUNTJOY TERRACE, MANLY 4179 P.O. BOX 9153, MANLY WEST 4179 TELEPHONE (07) 3980811 FAX. (07) 3980852 PROFESSIONAL ENGINEERING COMPANY OF QLD. CERT. NO. 154		SUSPENDED SLAD DETAILS SECTION	DESIGN J,.QUAK B.E. (CIVIL) M.I.E. (AUST) R.P.E.Q. 1561 SCALE 1:100 1:20 DRAWN NL DATE JAN 96 DRAWING NO: 96612 - 6227 SHEET NO 4 OF 5



ELEVATION



SECTION L



SECTION M

AMENDED PLANS

NOTES

CONCRETE

1. ALL WORKMANSHIP AND MATERIAL SHALL COMPLY WITH AS 3600 CONCRETE STRUCTURES CODE.

2. CONCRETE SLAB SHALL HAVE THE FOLLOWING CHARACTERISTICS:

ELEMENT	F'C (MPa)	AGGREGATE (MM)	SLUMP (MM)
FOOTINGS	25	20	80
SLAB ON GROUND	25	20	80
SUSPENDED SLAB (EXTERNAL)	32	20	80

3. CONCRETE COVER TO REINFORCEMENT

ELEMENT	COVER
SLABS ON GROUND	30MM TOP COVER
BALCONIES	40MM TOP AND BOTTOM COVER
COLUMNS	40MM
GROUND BEAMS	50MM
SUSPENDED BEAMS (EXPOSED)	40MM

4. CONSTRUCTION JOINTS SHALL BE PLACED IN THE LOCATION SHOWN ON THE DRAWINGS, UNLESS WRITTEN APPROVAL IS OBTAINED FROM THE ENGINEER.

5. ALL REINFORCEMENT SHALL COMPLY WITH AS 1302, AS 1303 AND AS 1304

6. ALL CONCRETE SHALL BE CURED FOR A MINIMUM OF 7 DAYS

JOHN QUAK & ASSOC. PTY.LTD.
A.C.N. 010 929 467
CONSULTING ENGINEERS - CIVIL AND STRUCTURAL
109 MOUNTJOY TERRACE, MANLY 4179
P.O. BOX 9153, MANLY WEST 4179
TELEPHONE (07) 3980611 FAX. (07) 3980952
PROFESSIONAL ENGINEERING COMPANY OF QLD. CERT. NO. 154

LINTEL DETAILS

DESIGN J,.QUAK B.E. (CIVIL) M.I.E. (AUST) R.P.E.Q. 1561
SCALE 1 : 10
DRAWN NL
DATE JAN 96
DRAWING NO: 96 612 - 6227
SHEET NO 5 OF 5

HEFF
g.e.

t. r.p.e.q.

G.B. GREENHALGH
b.eng. m.i.e. aust. r.p.e.q.

P.R. DAVIS
b.eng. grad. dip. mngt. m.i.e. aust. r.p.e.q.

Karamisheff Nagel pty ltd
CONSULTING ENGINEERS

OUR REF: 92-229

YOUR REF:

DATE: 1 April 1996

LEVEL 6,
15 ASTOR TERRACE,
SPRING HILL,
BRISBANE Q. 4000
AUSTRALIA

PHONE (07) 3831 3194
FAX (07) 3832 3357

A.C.N. 010 635 837

The Shire Clerk
Redland Shire Council
P.O. Box 21
CLEVELAND QLD 4163

ATTENTION: Mr M. Beggs

Dear Sir,

QUEENSLAND CEMENT LIMITED

EMPIRE POINT ESTATE - STAGE 1

Following the completion of the batter work to Lot 29 associated with the above Project, we hereby request that the works be formally accepted "Off Maintenance" and the Maintenance Bond released by Council.

We trust that the above is satisfactory. Should you require any further information, please do not hesitate to contact the writer.

Yours faithfully,
KARAMISHEFF NAGEL PTY. LTD.

G.B. Nagel

gbn.rcs

REDLAND
Queensland

Your Ref: 92-229
Our Ref: S.3325.1 MKB:kam
Contact: Development Services

22 July, 1996

96-20182

Karamisheff Nagel Pty Ltd
Level 6
15 Astor Terrace
SPRING HILLS
BRISBANE QLD 4000

PUNCHED
16 AUG 1996

Dear Sir

QUEENSLAND CEMENT LTD - EMPIRE POINT STAGE 1

Reference is made to your letter dated 1st April 1996, requesting the above estate be accepted "off maintenance".

You are advised that Council is not prepared to accept subdivision works "off maintenance" until a satisfactory structural report is received for the retaining wall combination along the frontage of Lots 27-29.

Yours sincerely,

[redacted]

Director
Environment, Planning and Development

B/C Queensland Cement Ltd

REDLAND SHIRE COUNCIL
Box 21 Cleveland 4163 Queensland
Phone 3286 8686 Fax 3286 8765

DIRECTORS:
E.W. KARAMISHEFF b.e. l.l.e. aust r.p.e.q. l.g.e.
G.B. NAGEL b.eng.(hons) m.i.e. aust. r.p.e.q.
G.B. GREENHALGH b.eng. m.i.e. aust. r.p.e.q.
P.R. DAVIS b.eng. grad. dip. mngt. m.i.e. aust. r.p.e.q.

Karamisheff Nagel pty lt
CONSULTING ENGINEERS

OUR REF: 92-229
YOUR REF: S3325.1
DATE: 5 August 1996

LEVEL 8,
15 ASTOR TERRACE,
SPRING HILL,
BRISBANE Q. 4000
AUSTRALIA

PHONE (07) 3831 3194
FAX (07) 3832 3357

A.C.N. 010 635 837

The Shire Council
Redland Shire Council
P.O. Box 21
CLEVELAND QLD 4163

ATTENTION: Mr M. Beggs

Dear Sir,

QUEENSLAND CEMENT LIMITED

EMPIRE POINT - STAGE 1

We refer to you letter of 22 July 1996.

We hereby certify that the masonry block retaining wall along the rear boundary of Lots 27 to 29 of the above Project is structurally adequate. As the land behind the block wall comprises a ranging depth of fill, we consider that all house foundations should be founded in original ground and do not impose loadings on the existing rock wall.

We trust that this is satisfactory to finalise this matter.

Yours faithfully,
KARAMISHEFF NAGEL PTY. LTD.

G.B. Nagel

gbn:nao

MEMORANDUM

Redland SHIRE COUNCIL

Date: 27 August, 1996

File: S.3325st1 MKB:jmh

To: Manager Building Services

From: Supervising Engineer Development Services - Field

Subject: **CONCRETE BLOCK RETAINING WALL AT REAR OF LOTS 27, 28, 29 ON RP863217**

A series of modifications were made to the above mentioned retaining wall after the initial block wall was constructed by the subdividers contractor.

I have received the attached structural certification from the Consulting Engineers for this sub development. It is conditioned, and as such you may need to check the foundation designs for the houses on these lots.

[redacted]

Development Services Engineer - Field

attach.

[redacted]

I don't know where this is but is the comment conditioned important w.r.t. any applications we have ??

[redacted]

[redacted]

We have already taken this into account I have been to the site with [redacted] & Gary Nagel Engineer re these screens All has been sorted out quite some time ago

[redacted]

G:\Dds\Dds008\Wp\Memos\08-Aug\S3325.Doc

EAST COAST
GEOTECHNICAL PTY. LTD. FOUNDATION CONSULTANTS

3/246 EVANS ROAD, SALISBURY Q 4107
P.O. BOX 404, SALISBURY Q 4107

Ph: (07)3875 1933
Fax: (07)3277 7746
E-MAIL: manager@eastcoast-geotech.com.au
WEB SITE: www.eastcoast-geotech.com.au

GOLD COAST

Ph: (07)5529 2329
Fax: (07)5529 2182

CLIENT: HENDRICKS/HOUSE CONSULTING ENGINEERS
SUITE 37, 1st FLOOR, CLEVELAND HOUSE
CNR. BLOOMFIELD & QUEEN STREETS
CLEVELAND Q 4163

PROJECT: LOT 29 (NO. 10) WAVERLEY COURT
ORMISTON

UBD:185/L-7

REF. NO: 9A746

DATE: 19/5/1999

EAST COAST
GEOTECHNICAL PTY. LTD. FOUNDATION CONSULTANTS
ACN 065 058 095

3/246 EVANS ROAD, SALISBURY Q 4107
P.O. BOX 404, SALISBURY Q 4107

Ph: (07) 3875 1933
Fax: (07) 3277 7746
E-MAIL: manager@eastcoast-geotech.com.au
WEB SITE: www.eastcoast-geotech.com.au

GOLD COAST

Ph: (07) 5529 2329
Fax: (07) 5529 2182

25 May, 1999

Enquiries to: Tim Lowe

CLIENT: Hendriks House Consulting Engineers
Suite 37, 1st Floor, Cleveland House
Cnr Bloomfield & Queen Sts
CLEVELAND Q 4163

PROJECT: Lot 29 Waverley Court
ORMISTON UBD: 185/L-7

REF. NO: 9A746

COMMISSION: Site classification in accordance with Section 2 of A.S. 2870

SITE CLASSIFICATION:

After considering the results of our limited site investigation (recorded elsewhere in the report) at the time of our testing we have classified* this site as:

Class "P" due to depth of fill with a reactivity level similar to an "M " class site.

In accordance with section 2 of AS 2870 - 1996.

The design engineer must consider the effects of any proposed earthworks on the site classification.

EAST COAST GEOTECHNICAL PTY.LTD

L.E.BAGULEY.
Manager
B.E., M.I.E. Aust, NPER-3 No. 7013
R.P.E.Q. No.4566
Q.B.S.A. Licence 031545
N.S.W Contractor Licence 75467C

REF NO: 9A746

BUILDING AND SITE DESCRIPTION:

The proposed development is the construction of a residential dwelling.
The allotment is on the north east end of cul-de-sac.
The construction area is virtually flat to steeply sloping.
Vegetation on the construction area (and nearby surrounds) consists of mainly grasses.
Site drainage is fair.

UNDERGROUND SERVICES:

During our site investigation, underground services were found as noted on our attached site sketch. These services and the effect they may have on the proposed structure must be considered when the footing design is undertaken.

TESTING PROGRAMME:

3 No. test sites were established with a 100mm diameter power auger.
The locations are shown on accompanying sketch and excavated to the depths indicated on the log section. Numerous disturbed samples were collected and hand classified.

From the sample(s) collected the following laboratory testing was carried out:

SAMPLE	TEST SITE	DEPTH	L.S
A	2	1300mm	14%

The resistance of the soils encountered was tested with an approved 9kg penetrometer and the results recorded at the appropriate levels on the attached log section.

FINDINGS:

The soil profiles encountered are shown on the attached log section.
No water table was encountered during our testing programme.

However, we anticipate water seepage where the undontrolled fill overlies the more impermeable underlying strata, which may cause some problems in excavations down to this level or deeper. This seepage may also cause collapse of excavations which will increase concrete volumes significantly above those normally anticipated. Furthermore, if a delay occurs between the time the footing is excavated and when the concrete is placed (i.e. more than one hour) the recommended foundation soil may soften (or collapse) which will require further excavations and further increase in concrete volumes.

Using the method outlined in A.S. 2870, we have calculated the following predicted surface movement (Ys) values for the appropriate soil profiles:

TEST SITE NO	PREDICTED SURFACE MOVEMENT (Ys)
2	30 - 40 mm

The predicted surface movement (Ys) value has been calculated on the site as tested. The influence of any proposed earthworks has not been considered when calculating this Ys, therefore the site classification and predicted surface movement may vary when proposed earthworks (if any) are considered.

REF NO: 9A746

Fill was encountered at the following depths below our test surface level:

Test Site 1	Test Site 2	Test Site 3
0 - 400mm	0 - 1000mm	0 - 1400mm

As the fill is deeper than the limits prescribed in AS2870 then by definition this site must be classified as Class P. The footing system must be designed to cope with both reactivity and possible limited bearing capacity of the fill.

Although this fill is well compacted, because of its varying depth (it is wedge shaped) it does have potential to generate differential ground movements. Therefore we recommend that all significant structural footings be founded at levels in the natural undisturbed soil profile with suitable bearing capacity.

ALLOWABLE BEARING PRESSURE:

The bearing pressure of the strata encountered has been determined using the principles outlined in AS 2870-1996 and AS 1726-1993.

An allowable bearing capacity of 80 kPa is available in the uncontrolled fill.

An allowable bearing pressure of 250 kPa may be used at depths 300 mm and deeper into the natural very stiff silty clay.

EAST COAST GEOTECHNICAL PTY. LTD.
POSTAL ADDRESS : P.O. BOX 404, SALISBURY. QLD. 4107
PHONE : (07) 3875 1933 FAX : (07) 3277 7746

LOG SECTION & SITE SKETCH

SITE ADDRESS: LOT 29 WAVERLEY COURT ORMISTON
REF. NO. 9A746 DATE: 19/5/1999

TEST SITE NO. 1 LOCATION: refer to sketch

DEPTH mm	DESCRIPTION soil type/colour/consistency	FILL	DCP	Sample
100	FILL – Uncontrolled Type		3	
200	gravelly silty clay (rd–br)		8	
300	slightly moist & stiff/very stiff		9	
400	GRAVELLY SILTY CLAY (br–rd)		8	
500	slightly moist & stiff/very stiff		10	
600			7	
700			9	
800	SILTY CLAY (rd–br)		11	
900			10	
1000	–minor gravels		13	
1100				
1200				
1300	moist/slightly moist & very stiff			
1400				
1500				
1600				
1700	END –with power auger			
1800				
1900				
2000				
2100				
2200				
2300				
2400				
2500				

TEST SITE NO. 2 LOCATION: refer to sketch

DEPTH mm	DESCRIPTION soil type/colour/consistency	FILL	DCP	Sample
100	FILL – Uncontrolled Type		4	
200	gravelly silty clay (rd–br)		12	
300			15	
400			16	
500	slightly moist & very stiff/hard		20+	
600				
700				
800				
900				
1000	GRAVELLY SILTY CLAY (br–rd)			
1100	slightly moist & very stiff			
1200				
1300	SILTY CLAY (rd–br)			LS
1400	–minor gravels			
1500	moist & very stiff			
1600				
1700	END –with power auger			
1800				
1900				
2000				
2100				
2200				
2300				
2400				
2500				

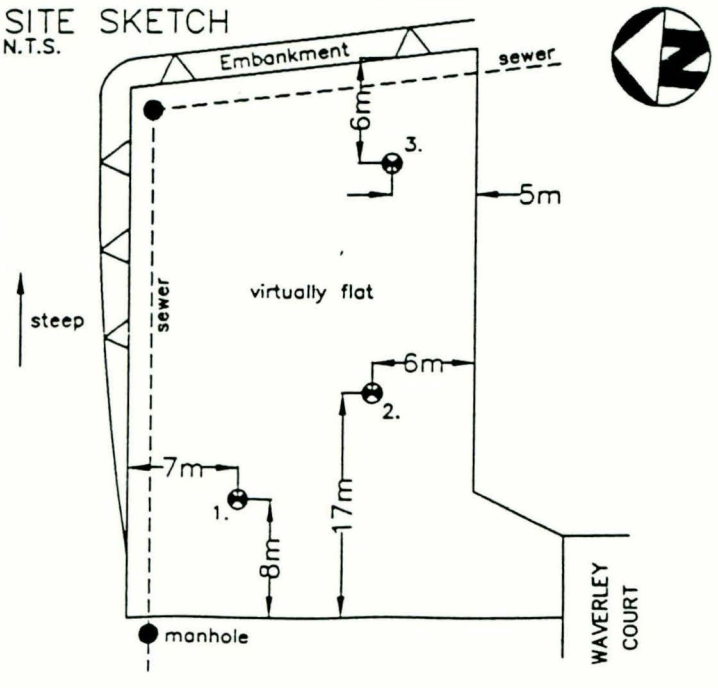
TEST SITE NO. 3 LOCATION: refer to sketch

DEPTH mm	DESCRIPTION soil type/colour/consistency	FILL	DCP	Sample
100	FILL – Uncontrolled Type (rd–br)		2	
200	gravelly clayey silt (br)		5	
300	dry & dense		9	
400			8	
500	silty clay (mott.br–or–rd)		6	
600	moist & stiff/very stiff		5	
700	POSSIBLE FILL–Uncontrolled Type		5	
800	silty clay (mott.rd–br)		4	
900	–minor gravels		7	
1000			11	
1100	moist & stiff/very stiff		13	
1200				
1300				
1400	SILTY CLAY (rd)			
1500				
1600				
1700	moist & very stiff			
1800				
1900				
2000				
3500				
3600	END –with power auger			

LEGEND
l.s.= linear shrinkage sample
d.c.p.= dynamic cone penetrometer u.t.p.= unable to penetrate
bk=black gy=grey or=orange bl=blue
br=brown yell=yellow wh=white rd=red
Some alluvial topsoils are indistinguishable from fill in boreholes. When these have similar bearing capacities as fill, they may be logged as fill. Similarly some fill could be logged as natural soil.

SITE SKETCH

N.T.S.



PORT LIMITATIONS FOR A TE INVESTIGATION

Our commission from our client was to establish test sites as shown and then classify the site in accordance with Section 2 of AS 2870 - 1996. Under normal circumstances the attached log sections should be representative of the soil conditions over this site, however in some cases, soil conditions can change dramatically over short distances and even careful exploration programmes may not locate all the variations. If footing excavations reveal soil conditions differing from those shown on the log sheet in this report, we recommend that we be immediately notified so that further exploration can be carried out and the designer of the footings then notified to consider the influence of the changes to the design.

In this report we have attempted to convey to the designer of the footings as much information about the site and conditions so that an economical and practical footing can be designed.

In writing this report, we have also considered all the information supplied to us by our client. Should the client or his agent have omitted to supply us with relevant information, our report may be irrelevant and/or inappropriate. We do not take responsibility for the consequences in such cases and we will make an additional charge if as a result, more testing or rewriting of this report is necessary.

This report has been signed in blue ink. If the signature on this report is in black ink, you are reading a photocopy.

This report has not taken into consideration the long-term effects of any previous, current or potential subsurface work by mining companies or potential slope instability problems. At the time of writing this report, neither our client (or his agent) nor the local authority had made us aware that these problems may be affecting this allotment. If a mining subsidence or slope stability assessment is required for this allotment to obtain building approval, we can arrange for this to be done, but that type of report is beyond the scope of our commission and fees in this report.

The Predicted Surface Movement calculation in this report has been carried out using the Rapid Calculation Method which is covered under the scope of AS 2870 - 1996. This method uses a depth of soil suction change and a change in suction (Δu) as recommended by AS 2870 and what we believe appropriate for this area.

The range of classifications in AS 2870 (the most severe is Class E) is as follows:

Predicted Surface Movement	Class
Ys = 0-10 mm	A
Ys = 10-20 mm	S
Ys = 20-40 mm	M
Ys = 40-70 mm	H
Ys = >70 mm	E

AS 2870 also has a Class P for problem sites

DEFINITIONS

Our log section we describe filled ground as stated below. It must be remembered that when sampling boreholes, particularly in alluvial soils, some top soils and other soft natural soils are indistinguishable from fill, therfore can be logged as fill and vica versa.

All sites with fill deeper than the limits prescribed in AS2870 have been classified as Class "P". A "Ys" (predicted surface movement) has also been supplied. The design engineer must make allowances for both possible limited bearing and reactivity affecting the footings.

CONTROLLED FILL

Fill which has been placed under supervision and at the time of writing this report we have received written certification from a Geotechnical Testing Authority that this fill complies with either Level 1 or 2 responsibility as defined in Appendix B of AS 3798-1996. Certification of fill as controlled must not be equated to STABLE conditions for foundation design. This certification is a statement of the quality of the fill and an assurance that it was placed in a professional manner.
There are two other parameters which influence footing design and they are the strength of the strata and the potential for the strata to change volume with changes in seasonal conditions. These two parameters are of equal importance to the AS3798 certification. Where certification at a minimum of 95% standard compaction has been achieved, we recommend adopting a safe bearing pressure for design purposes of 100 kPa. If certification is at a minimum of 98% standard compaction, we recommend increasing this safe bearing to 150 kPa.

UNCONTROLLED FILL

Fill other than controlled fill consists of many forms as follows. In all cases consideration should be given to design by engineering principles.

SUB-DIVISIONAL FILL

In general, sub-divisional fill has all the characteristics of controlled fill, except it has not been tested and documented in such a way to allow it to be certified in accordance with AS3798. In some cases the fill was placed prior to the advent of AS3798, in other instances, insufficient testing was undertaken to allow Level 1 or Level 2 certification. In most cases the fill will be suitable to support a raft slab.

CONSOLIDATED

This fill generally is formed as part of the house construction platform and is in our opinion sufficient to support the proposed slab panels of a residential slab, but inadequate to support loads transmitted by footings or edge beams, which must be piered down to suitable strata.

UNCONSOLIDATED

All slabs and footings in these filled areas must be piered or piled down to suitable levels in the more competant strata. This fill is also more prone to collapse during excavation, and allowances should be made for additional concrete volumes. This fill can also be considered uncontrolled fill.

UNSTABLE FILL

This type of fill has a high void ratio and may undergo significant differential settlement under load and may settle under its own weight. In these areas piers or piles must be considered as the foundation medium and the attached log sections should be studied to see whether the fill contains material which may hinder drilling of piers or driving of piles (i.e. boulders, cobbles, concrete, pieces or other debris.

VIRTUALLY FLAT

Visually assessed as minor levelling only required to form a level construction pad.

GENTLY SLOPING

Visually assessed as having gradients of less than 1:25 across the building area.

MODERATELY SLOPING

Visually assessed as having gradients in the order of 1:12 to 1:25.

STEEPLY SLOPING

Visually assessed as having gradients in the order of 1:5 to 1:12

VERY STEEPLY SLOPING

Visually assessed as having gradients steeper than 1:5

UNEXCAVATABLE ROCK

Any material which is similar to that described in Clause 1.7.47 of A.S.2870-1996" strong material including shaley material and strongly cemented sand or gravel that does not soften in water. Material that cannot readily be excavated by a conventional backhoe with a normal bucket* may be taken to be rock

EXCAVATABLE ROCK

A rock-like material which does not shrink or swell with changes in soil moisture, but is readily excavatable with a conventional backhoe with a normal bucket.*
** A rubber tyred machine similar in power to a Case 580 series using a bucket width similar to the designed trench width.*

GRAVEL

Coarse soil particles, larger than sand size, but less than 60 mm in diameter.

ROCK FLOATERS

Pieces of rock in a soil profile larger than 60 mm, but can range up to well over a metre in diameter. Where these rock floaters form a layer or mat within the soil profile and difficulty is encountered in excavating them, subject to the geotechnical consultant, they may be taken to be the same as unexcavatable rock. For the purpose of this report cobbles and boulders are the same as rock floaters.