



# Napier City Council

## Application for a Building Consent

|                                                                                                                                                             |                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. OWNER</b><br>Name: <u>CNH - JM LAWRENCE</u><br>Postal Address: <u>74 CHURCHILL</u><br><u>DR. TARADALE, NAPIER</u><br>Phone: <u>8450003</u> Fax: ..... | <b>2. CONTACT</b> (Person who will receive the invoice)<br>Contact name: <u>C LAWRENCE</u><br>Postal Address: <u>74 CHURCHILL</u><br><u>DR. TARADALE, NAPIER</u><br>Phone: <u>8450003</u> Fax: ..... |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



BCAPP

|                                                                        |                                   |
|------------------------------------------------------------------------|-----------------------------------|
| <b>3. PROJECT LOCATION</b><br>Address <u>74 CHURCHILL DR, NAPIER</u> ✓ | <b>BC NUMBER</b><br><u>011035</u> |
|------------------------------------------------------------------------|-----------------------------------|

|                                                                                                              |
|--------------------------------------------------------------------------------------------------------------|
| <b>4. LEGAL DESCRIPTION</b><br>Lot(s): <u>41</u> DP(s): <u>17313</u> ✓ Valuation Number: <u>1009015400</u> ✓ |
|--------------------------------------------------------------------------------------------------------------|

One copy of Certificate of Title. The Certificate of Title is to be current within three months of application. (Not required for domestic internal alterations).

|                                                                                                                                                                                     |                                                                                                                                                                                                               |                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>5. PROJECT</b> (Being stage..... of an intended .....stages)                                                                                                                     |                                                                                                                                                                                                               |                                                                                                                               |
| <b>5.1</b><br>New Building <input checked="" type="checkbox"/><br>Alteration <input type="checkbox"/><br>Relocation <input type="checkbox"/><br>Demolition <input type="checkbox"/> | <b>5.2</b><br>Intended Life:<br>Indefinite but not less<br>than 50 yrs: <input checked="" type="checkbox"/><br>or<br>Specified as.....yrs                                                                     | <b>5.3 Description of work:</b> .....<br><u>DECK CONSTRUCTION</u><br>Intended Use(s) (in detail): .....<br><u>OUTSIDE USE</u> |
| <b>5.4 Estimated Value (GST Include):</b><br>\$ <u>5000-</u>                                                                                                                        | <b>5.5 Total floor area of Project:</b> <u>20</u> M <sup>2</sup><br>Do you intend to:-<br>Cross Lease <input type="checkbox"/><br>Subdivide <input type="checkbox"/><br>Rental Flats <input type="checkbox"/> |                                                                                                                               |

Please Note: 1) Work must not commence prior to the issue of the consent.  
 2) Applications not finalised within one month of contact or issue of invoice may be cancelled.  
 Signed for and on behalf of:

Signature: C. Lawrence Name: CNH LAWRENCE Date: 12/10/01

The information which you have provided in this application is placed on the building register which is available for public inspection at Council offices. As a useful service for the building community, the Council provides monthly lists of this information. Tradespeople and manufacturers often use the lists to offer products or services available at the time of construction. They also provide important analysis of market trends and indicators to industry. The information from the building register is required to be supplied by the Council under the Building Act and Local Government Official Information and Meetings Act.

**NOTE:** You are advised to contact the relevant Electric Power Company and Gas Company for any requirements that either utility may have for your intended project.



## 6.0 PERSONNEL INVOLVED IN PROJECT

Designer(s): .....

Building Certifier: .....

Builder(s): F. BREWER .....

Registered Drainlayer: .....

Craftsman Plumber: .....

Registered Electrician (IQP) .....

Registered Engineer: .....

## 7.0 BUILDING DETAILS

- a) Two copies of building plans and specifications, showing all necessary plans, elevations, cross sections and details. ☒
- b) Two copies of the site plan showing dimensions of the proposed building from boundaries of the site and easements within the site. The preferred scale is 1:200. ☒
- c) Two copies of subfloor bracing design and calculations. Detail all pile types and fixings. ☐
- d) Two copies of wall bracing design and calculations. Detail fixing of wall bracing elements. ☐
- e) Two copies of truss layout and one copy of the design certificate ☐
- f) Two copies of all fire and egress details, full specification of fire wall construction, fire doors and windows etc. ☐
- g) Two copies of engineering calculations and drawings. A design certificate could reduce processing time. ☐
- h) One copy of any supervision advice, where supervision is necessary. A report will be required after the engineer has finished his supervision. ☐
- i) Two copies of ground test details and reports. ☐
- j) One copy of the report of the ground nature and any steps to be taken to prevent a danger to the building from such things as falling debris. ☐

**Note: Ground that does not have a ground bearing capacity of 100 kPa will require to have the foundations specifically designed.**

- k) One copy of a drainage block plan. Show boundary lines and outline of the building at a 1:200 scale. ☐
- l) Two copies of all plumbing, drainage and stormwater details. ☐
- m) Two copies of electrical details where required by the Building Act. ☐
- n) Two copies of all mechanical services details i.e. sprinkler systems, lifts, air conditioning systems etc. ☐
- o) Levels to be shown to establish site drainage ☐
- p) Details of backflow prevention. ☐
- q) One copy of all test results i.e. percolation tests. ☐



**FEES, CHARGES, DEPOSITS**
**OFFICE USE ONLY**

|                                                                                                                                                                                                                          |                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>APPLICATION RECEIPT NUMBER</b><br><div style="text-align: center; font-size: 1.2em; margin: 5px 0;">152244</div> <hr style="border: 0; border-top: 1px dotted black; margin: 5px 0;"/> <b>DATE</b> .....12/10/01..... | <b>FINAL RECEIPT NUMBER</b><br><div style="text-align: center; font-size: 1.2em; margin: 5px 0;">161846</div> <hr style="border: 0; border-top: 1px dotted black; margin: 5px 0;"/> <b>DATE</b> .....8/12/01..... |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Fee                                   | Amount   | Fee                                         | Amount      |
|---------------------------------------|----------|---------------------------------------------|-------------|
| Administration                        | \$ 141 - | Reserves Contribution Commercial/Industrial | \$          |
| Plan Check                            | \$ 87 -  | Financial Contribution Infill Non Standard  | \$          |
| BRANZ Levy                            | \$       | Water Capital Contribution                  | \$          |
| BIA Levy                              | \$       | Sewer Capital Contribution                  | \$          |
| Inspections                           | \$ 96 -  | Stormwater Capital Contribution             | \$          |
| Compliance Schedule                   | \$       | Reserves Contribution Rural/Bay View        | \$          |
| Water Connection                      | \$       | Copy Title Fee                              | \$          |
| Water Meter & Box                     | \$       | Photocopy Fee                               | \$          |
| Bay View Water Capital Contribution   | \$       | Valuation Fee                               | \$          |
| Sewer Connection                      | \$       | Section 36 Certificate                      | \$          |
| Stormwater Connection                 | \$       | Backflow Preventer                          | \$          |
| Vehicle Crossing Bond                 | \$ -     | Water Disconnection                         | \$          |
| Street Damage Deposit                 | \$ -     | Stormwater Disconnection                    | \$          |
| Microfiche Charge                     | \$ 10 -  | Sewer Disconnection                         | \$          |
| Dev Control Engineer                  | \$       | Services Engineer                           | \$ 20-00    |
| Planning Check                        | \$ 36.00 | Roading Engineer                            | \$ 10-00    |
| Resource Consent Fee                  | \$       | Design Engineer                             | \$          |
| Financial Contribution Infill Housing | \$       | Well Sealing                                | \$          |
|                                       |          |                                             |             |
|                                       |          |                                             |             |
|                                       |          | Total                                       | \$ 394-00   |
|                                       |          | Less Deposit Paid                           | \$ 100 - 00 |
|                                       |          | TOTAL AMOUNT DUE                            | \$ 294-00   |



References

Prior C/T J4/904(part).

Transfer No.

N/C. Order No. 416592.10

SEARCH COPY

Land and Deeds 69

12 OCT 2001



REGISTER

No.

KI/381

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate dated the 4th day of February one thousand nine hundred and eighty-three under the seal of the District Land Registrar of the Land Registration District of HAWKE'S BAY

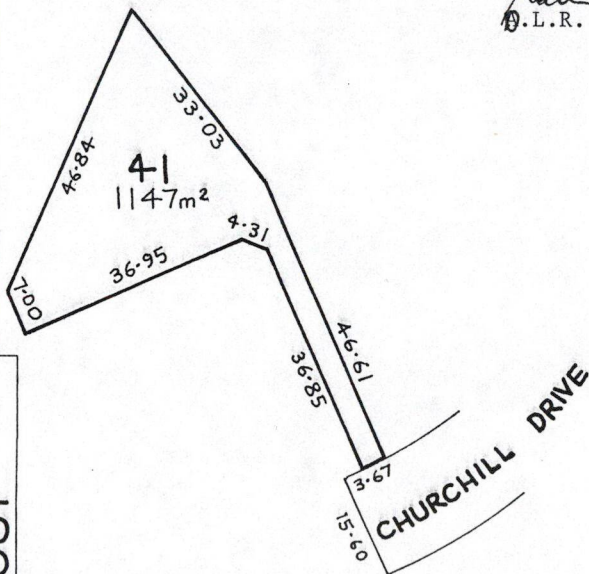
WITNESSETH that CARTER HOLT CENTRAL LIMITED at Napier —

is seized of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, that is to say: All that parcel of land containing 1147 square metres more or less situate in the City of Napier being Lot 41 on Deposited Plan 17313

416592.11 Transfer Grant of a Right to Drain Sewage and Stormwater Easement in Gross over part in favour of The Napier City Council -4.2.1983 at 11.30a.m.(Subject to Section 309 (1)(a) Local Government Act 1974).

455668.1 Transfer to Bruce Robert Berry of Napier, Mechanic and Janice Lorraine Berry his wife 18.11.1985 at 12.25p.m.

Fencing Covenant in Transfer 455668.1



Measurements are Metric



455668.2 Mortgage to The Trustees of the M.U.I.O. of the Napier Friendly Society - 18.11.1985 at 4.46p.m.

501537.1 Change of Name of Mortgagee in Mortgage 455668.2 to Manchester Unity Friendly Society produced 21.11.1988 at 1.56p.m. and entered 22.9.1992

602038.1 Mortgage to Bank of New Zealand - 4.2.1994 at 4.40a.m.

709035.2 Transfer to Charles William Hughes Lawrence and Joanne Maria Lawrence

709035.2 Mortgage to The National Bank of New Zealand Limited

all 6.11.2000 at 9.00

for RGL

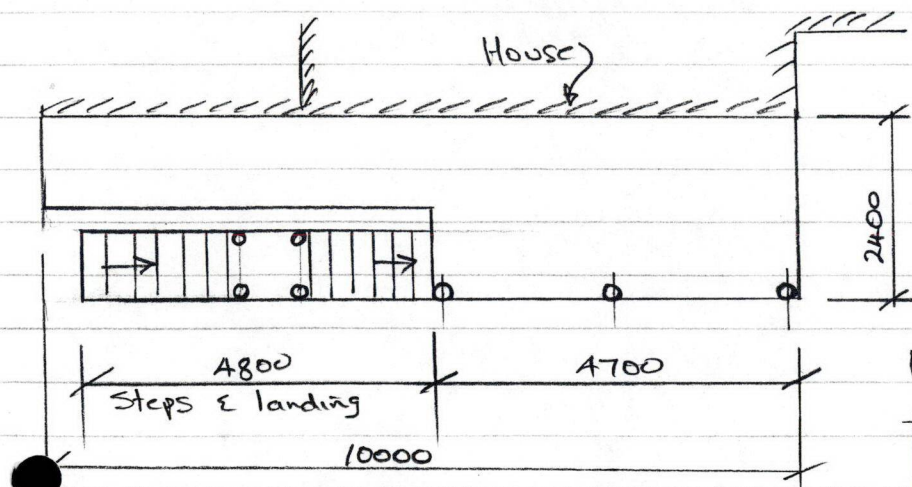
KI/381

No.



J. LAWRENCE : 74 CHURCHILL DRIVE

Brief: Structural aspects of proposed deck system to existing house



Deck :  
 $G = 0.35 \text{ kPa}$   
 $Q = 2.0 \text{ ''}$

Joists:

NZS 3604: table 7.1

150x50 @ 1000cc  
Joists

Outer Support Beam:

Span = 2300,  $b_e = 1200$

Use 194 x 47 N<sup>o</sup>1 FRAMING GRADE  
TANALISED H3

Ref. P2

Beam / Post Connection:

Centre post more critical

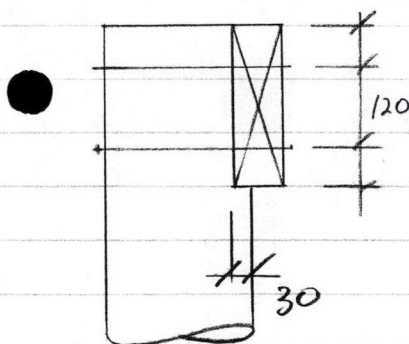
$$\text{Reaction: } G + Q = 2 \{0.48 + 3.66\} = 8.3 \text{ kN}$$

Nominal 20 seating

$$q_b = 8.3 \times 10^3 \div (20 \times 75) = 2.4 \text{ MPa}$$

(OK for comp.  $\perp$  grain @ 3.0 MPa)

2/M12 bolts, through pole



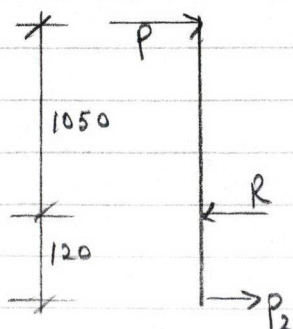
Balustrade Posts:

$b_e = 1500 \text{ cc}$

$$\text{Load to top rail} = 0.36 \text{ kN/m} \times 1.5 = 0.54 \text{ kN}$$

$$P_2 = \frac{1.05}{0.12} \times 0.54 = 4.73 \text{ kN}$$

$$R = 4.73 + 0.54 = 5.27 \text{ ''}$$



M12 through outer beam - dc tension

$$\text{Bearing } q_b = (5.27 \times 10^3) \div (50 \times 50) = 2.1 \text{ MPa} \text{ - OK.}$$

## DESIGN REPORT

J. Lawrence: Churchill Drive  
Outer support Beam

limit state  
Timberpl

GARY CLODE  
03 November 2001

## CHARACTERISTIC STRESSES

|                           |   |          |     |
|---------------------------|---|----------|-----|
| Youngs Modulus (E)        | = | 8.00E+03 | mPa |
| Char. Bending Stress (fb) | = | 17.7     | mPa |
| Char. Shear Stress (fs)   | = | 3.8      | mPa |
| Char. Axial Stress (fc)   | = | 20.9     | mPa |
| Char. Tens. Stress (ft)   | = | 8.8      | mPa |

|       |    |   |      |
|-------|----|---|------|
| Perm  | K1 | = | 0.60 |
| Med   | K1 | = | 0.80 |
| Brief | K1 | = | 1.00 |
| Parl  | K4 | = | 1.00 |
| Other |    | = | 1.00 |

## MODIFYING FACTORS

## LOADS

|                                      |   |       |     |
|--------------------------------------|---|-------|-----|
| Dead Load, G                         | = | 0.35  | kPa |
| Live Load, Q(P=perm, M=med, B=brief) | = | 2.00  | kPa |
| Wind Load (-ve) W                    | = | -1.00 | kPa |
| Point Load (@ aL, bL) P              | = | 1.80  | kN  |

|          |   |       |      |
|----------|---|-------|------|
| UDL Dead | = | 0.42  | kN/m |
| UDL Live | = | 2.40  | kN/m |
| UDL Wind | = | -1.20 | kN/m |

## UNIFORM LOAD (W)

|                            |   |   |      |
|----------------------------|---|---|------|
| Weight along beam (DEAD)   | = | 0 | kN/m |
| Weight along beam (LIVE)   | = | 0 | kN/m |
| Axial Load (Tension -ve) N | = | 0 | kN   |

For Pt Load DEAD or LIVE (D or L)  
where a max = 0.5  
" b min = 0.5

## BEAM DETAILS

|                               |   |      |    |
|-------------------------------|---|------|----|
| Width (b)                     | = | 47   | mm |
| Depth (d)                     | = | 194  | mm |
| Spacing (s)                   | = | 1200 | mm |
| Span (L)                      | = | 2300 | mm |
| Effect. Length (Lax)          | = | 2300 | mm |
| Effect. Length (Lay)          | = | T    | mm |
| (For tens edge restr Lay = t) |   |      |    |

Dead, Live, Wind, D, L, W  
SHEAR FORCE (kN)

|                     |   |       |       |
|---------------------|---|-------|-------|
| 1.4(G)              | = | 0.68  | kN    |
| 1.2(G) + 1.6(Q + P) | = | 6.44  | kN    |
| 1.2(G) + Qu + W + P | = | 0.66  | kN    |
| 0.9(G) + W          | = | -0.95 | kN    |
| DESIGN $\phi V_n$   | = | 11.1  | Perm  |
|                     | = | 14.8  | Med   |
|                     | = | 18.5  | Brief |

|                               |   |          |                 |
|-------------------------------|---|----------|-----------------|
| SECTION MODULUS               | = | 2.95E+05 | mm <sup>3</sup> |
| MOMENT OF INERTIA             | = | 2.86E+07 | mm <sup>4</sup> |
| Effective length factor (K10) | = | 1.00     |                 |
| B.M. Coefficient (C1)         | = | 0.1250   |                 |
| B.M. Coefficient (C2)         | = | 0.2500   |                 |
| Deflection Coeff (C3)         | = | 0.0130   |                 |
| Deflection Coeff (C4)         | = | 0.0208   |                 |

Slenderness Coeff

|                                  |   |      |
|----------------------------------|---|------|
| Bending S1                       | = | 12.4 |
| Axial S2 =                       | = | 11.9 |
| Axial S3 =                       | = | 14.4 |
| M = C1 * W * L <sup>2</sup>      |   |      |
| M = C2 * P * L                   |   |      |
| D = C3 * W * L <sup>4</sup> / EI |   |      |
| D = C4 * P * L <sup>3</sup> / EI |   |      |

|                               |   |      |
|-------------------------------|---|------|
| Bending Stability Factor (K8) | = | 0.98 |
| LL COMB FACTOR $\psi_s$       | = | 0.4  |
| STR REDUCT FACTOR $\phi$      | = | 0.80 |

|                       |   |     |
|-----------------------|---|-----|
| Creep Factor K2       | = | 2   |
| Defln. Short $\psi_s$ | = | 0.7 |
| Defln. Long $\psi_l$  | = | 0.4 |

## BENDING MOMENT (FACTORED)

|                              |   |       |     |    |
|------------------------------|---|-------|-----|----|
| 1.4(G)                       | = | 0.39  | kNm | OK |
| 1.2(G) + 1.6(Q + P), for P=0 | = | 2.87  | kNm | OK |
| 1.2(G) + 1.6(Q + P), for Q=0 | = | 1.99  | kNm | OK |
| 1.2(G) + Qu + W + P          | = | 0.59  | kNm | OK |
| 0.9(G) + W                   | = | -0.54 | kNm | OK |

DESIGN STRENGTH  $\phi M_n$  Factored / Strength

|      |     |      |
|------|-----|------|
| 2.45 | kNm | 0.16 |
| 3.27 | kNm | 0.88 |
| 4.08 | kNm | 0.49 |
| 4.08 | kNm | 0.14 |
| 4.08 | kNm | 0.13 |

## DEFLECTION

|                       |   |      |    |
|-----------------------|---|------|----|
| 1.0(G)                | = | 0.7  | mm |
| 1.0(G) + 1.0(Qs + Ps) | = | 4.7  | mm |
| 1.0(G) + Qs + Ws + Ps | = | 3.4  | mm |
| 1.0(G) + Ws           | = | -0.7 | mm |

## WITH CREEP

|     |
|-----|
| 1.3 |
| 5.4 |
| 4.0 |

## MAXIMUM DEFLECTION

|                                     |   |      |    |
|-------------------------------------|---|------|----|
| 0.003 * L (floors, live load)       | = | 6.9  | mm |
| 0.004 * L (floors, permanent loads) | = | 9.2  | mm |
| 0.006 * L (wind, no ceiling)        | = | 13.8 | mm |

## REACTIONS (Unfactored)

|             |   |       |    |
|-------------|---|-------|----|
| Dead        | = | 0.48  | kN |
| Live        | = | 3.66  | kN |
| Dead + Wind | = | -0.90 | kN |

## AXIAL

|                                 |   |      |    |
|---------------------------------|---|------|----|
| Design Axial Load N*c           | = | 0.00 | kN |
| Nominal Strength $\phi N_{ncx}$ | = | N/A  | kN |
| Nominal Strength $\phi N_{ncy}$ | = | N/A  | kN |
| Nominal Strength $\phi N_{nt}$  | = | N/A  | kN |

compression

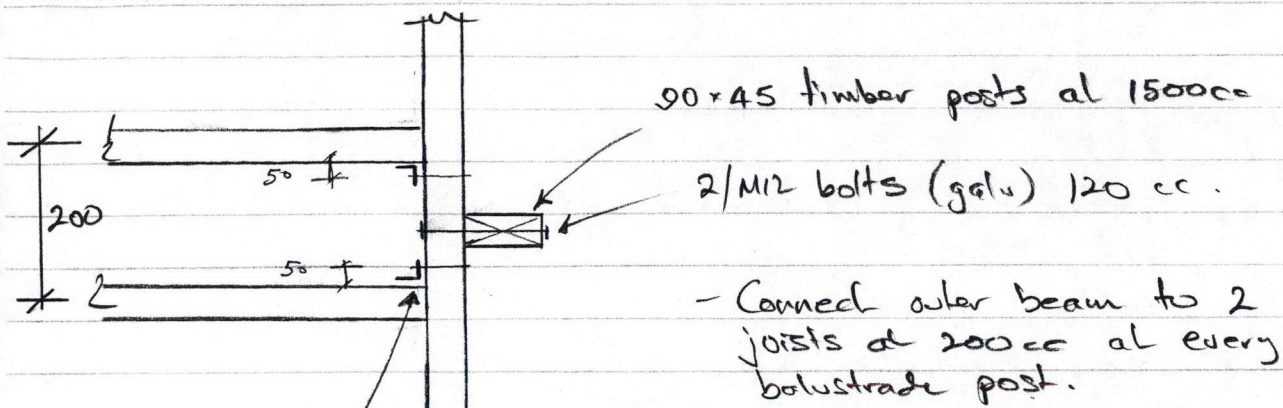
|      |      |
|------|------|
| K8 = | 0.99 |
| K8 = | 0.92 |

Combined bending about XX axis and axial compression

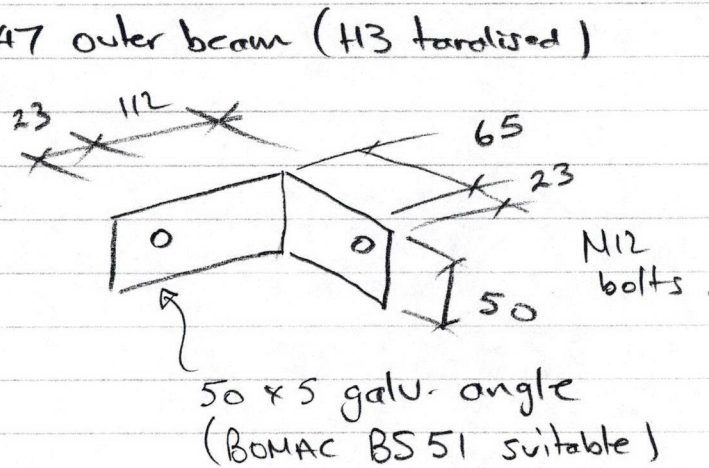
|                             |      |                 |           |
|-----------------------------|------|-----------------|-----------|
| Bending Ratio =             | 0.88 | Combined Ratios |           |
| Compression Axial Ratio x = | N/A  | Equation 3.23   | = 0.88 OK |
| Compression Axial Ratio y = | N/A  | Equation 3.24   | = 0.77 OK |
| Tension Axial ratio =       | N/A  | Equation 3.25   | = 0.88 OK |

BEAM SIZE = 194 \* 47 No. 1 Framing grade



BALUSTRADEPLAN

Angle bracket  
(bolts in line with top bolt on h/rail post)



- Load at stringer distributed over greater number of joists due to spreading effect of decking.

|                 |                |                                           |               |
|-----------------|----------------|-------------------------------------------|---------------|
| <u>STRINGER</u> | $b_e = 1200$ , | $G = 0.35 \times 1.2 = 0.36 \text{ kN/m}$ | $1.2G = 0.43$ |
|                 |                | $Q = 2.0 \times 1.2 = 2.4$                | $1.6Q = 3.84$ |
|                 |                | $2.76$                                    | $4.27$        |

|                                                          |          |      |
|----------------------------------------------------------|----------|------|
| M16 coach screw $\perp$ grain                            | at 0.6cc |      |
| $\phi Q_n = 0.7 \times 0.8 \times 9.29 = 5.2 \text{ kN}$ | 8.7 "    | 4.27 |
| M12                                                      | 6.5 kN/m | 4.23 |
|                                                          |          | 9.8  |

M12 bolt at 600 cc  
150 x 50 stringer

(RIBBON BD)

LATERAL LOADS : SEISMIC CRITICAL

$$G + Q_u + E : \psi_e = 0.4, \psi_u = 0.4$$

Internal support, brace line existing house

$$\text{Outer support : Area} \approx 1.2 \times 6.5 = 7.8 \text{ kN}$$

Note: Stair stringer forms brace to gl. by default

$$C_{ph} = 0.5(RZL_u) = 0.5 \times 1 \times 1.2 \times 1 = 0.6$$

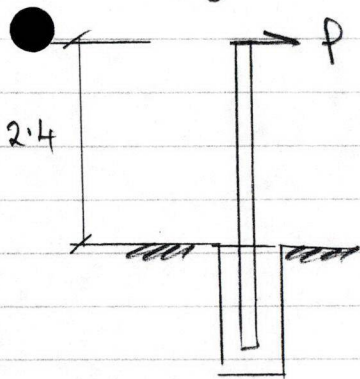
$$F_{ph} = 0.6 \times 7.8 \times 1 = 4.7 \text{ kN}$$

Support: 4 landing posts

3 posts along Outer Support beam

4 posts (2 existing) along inner line.

$$\text{Say load to posts} = \frac{4.7}{3} = 1.6 \text{ kN}$$



Scale vertical bearing (see output)

Some variability, steadily increasing with depth

|                                     |    |
|-------------------------------------|----|
| Use 600 dia concrete<br>x 1200 deep | P5 |
|-------------------------------------|----|

~~POLES~~ FOR LANDING POSTS.

POLES

|                          |    |
|--------------------------|----|
| Use 175 SED Tanapole, H5 | P6 |
|--------------------------|----|



|                                          |  |  |                  |  |
|------------------------------------------|--|--|------------------|--|
| FLEXIBLE PILE (SUBGRADE REACTION METHOD) |  |  | G. CLODE         |  |
| 74 Churchill Road                        |  |  | 03 November 2001 |  |

|                                  |        |         |                            |          |
|----------------------------------|--------|---------|----------------------------|----------|
| BASIC HORIZONTAL FORCE           | 1.600  | Ult     | LOAD FACTOR=               | 1.000    |
| HORIZONTAL FORCE (factored load) | 1.600  | kN      |                            | included |
| HEIGHT TO TOP OF POLE            | 2.400  | m       |                            |          |
| HGT ABOVE GL TO FORCE            | 2.400  | m       | (as ratio of max.pressure) |          |
| DEPTH BELOW GL TO BASE           | 1.200  | m       | DEPTH                      | RATIO    |
| BASE WIDTH                       | 0.6    | m       | 0.06                       | 0.100    |
| NUMBER OF SPRINGS (n)            | 10.000 |         | 0.18                       | 0.570    |
| SPRING SPACING (s)               | 0.120  | m       | 0.3                        | 0.270    |
|                                  |        |         | 0.42                       | 0.270    |
| SOIL WEIGHT                      | 18     | kN/m3   | 0.54                       | 0.570    |
| SOIL FRICTION ANGLE              | 15     | Degrees | 0.66                       | 0.570    |
| SOIL COHESION                    | 20     | kPa     | 0.78                       | 0.790    |
| CONSTANT                         | 1.8153 |         | 0.9                        | 1.000    |
| TERZAGHI FACTOR Nq               | 4.4    |         | 1.02                       | 1.000    |
| TERZAGHI FACTOR Nc               | 12.9   |         | 1.14                       | 1.000    |
| TERZAGHI FACTOR Ng               | 1.3    |         |                            |          |
| STRENGTH REDUCTION               | 0.60   |         | Depth limit on             | N        |
| ULTIMATE BEARING Qu              | 375    | kPa     | Ks (Y or N)                |          |
| RELIABLE ULTIMATE (= Qu*St. red) | 225    | kPa     | at a depth Z =             | 0.45 m   |
| ALLOWABLE BEARING Qa (service)   | 125    | kPa     | Safety factor =            | 3        |

| SPRING DEPTH | COEFF. SUBGR REACT | UNIT SPRING DISPLACE | UNIT SPRING FORCE | MOMENTS ABOUT BOT SPRING | FINAL SPRING FORCE | SOIL PRESS | BENDING MOMENTS |
|--------------|--------------------|----------------------|-------------------|--------------------------|--------------------|------------|-----------------|
| m            | MN/m3              | mm                   | kN                |                          | kN                 | kPa        | kNm             |
| 0.060        | 3                  | 1.000                | 0.237             | 0.256                    | 0.57               | 8          | 3.9             |
| 0.180        | 19                 | 0.840                | 1.168             | 1.121                    | 2.83               | 39         | 4.1             |
| 0.300        | 9                  | 0.679                | 0.460             | 0.386                    | 1.11               | 15         | 3.8             |
| 0.420        | 10                 | 0.519                | 0.360             | 0.259                    | 0.87               | 12         | 3.5             |
| 0.540        | 21                 | 0.358                | 0.539             | 0.323                    | 1.30               | 18         | 3.0             |
| 0.660        | 21                 | 0.198                | 0.305             | 0.147                    | 0.74               | 10         | 2.4             |
| 0.780        | 30                 | 0.037                | 0.082             | 0.030                    | 0.20               | 3          | 1.7             |
| 0.900        | 39                 | -0.123               | -0.349            | -0.084                   | -0.84              | -12        | 1.0             |
| 1.020        | 40                 | -0.283               | -0.823            | -0.099                   | -1.99              | -28        | 0.4             |
| 1.140        | 41                 | -0.444               | F10               | 0.000                    | -3.19              | -44        | 0.0             |

1.980 2.340 1.60  
-0.661 0.661 FORCE FOR UNIT DISPLACEMENT

F10=

-1.319

Calc

TRIAL ROTATION mm/M

=

1.337

0.000

SPRING DISPLACEMENT (TABLE)

Y1=

-0.444

Stop trial rotations when

F10/STIFFNESS=DISPLACEMENT

Y2=

-0.444

displacements Y1=Y2

GROUND LINE LATERAL DISPLACEMENT

2.6 mm

CENTRE ROTATION BELOW GL

0.808 m

pile rotation= m/m

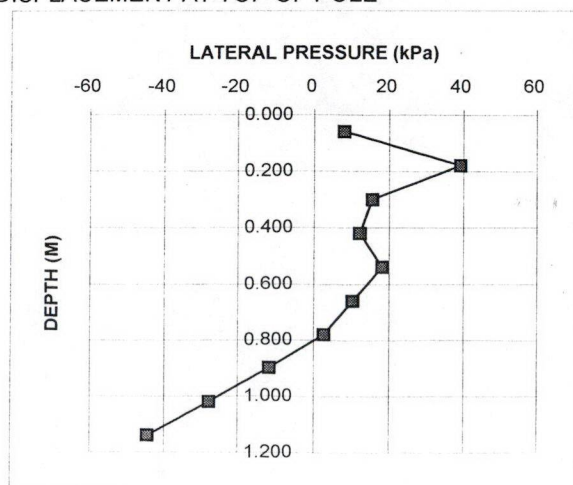
DISPLACEMENT AT HORIZONTAL FORCE

10.4 mm

3.24E-03

DISPLACEMENT AT TOP OF POLE

10.4 mm



# RANGE OF LATERAL SUBGRADE REACTION

| SOIL                       | Qa kPa | Ks MN/m3  |
|----------------------------|--------|-----------|
| Compact gravel             | 320    | 220 - 400 |
| Loose gravel               | 160    | 20 - 80   |
| Medium dense coarse sand   | 215    | 160 - 300 |
| Medium sand                |        | 20 - 160  |
| Fine sand or silty sand    |        | 40 - 100  |
| Clay soft (Qu < 200 kPa)   | 70     | 2 - 20    |
| Clay med. (200 < Qu < 400) | 150    | 40 - 140  |
| Clay stiff (Qu > 800 )     | 300    | 60 - 220  |

(halve clay values if saturated)



## DESIGN REPORT

TITLE : 74 Churchill Drive  
 DESCRIPTION Timber pole

timbpole

GARY CLODE  
 03 November 2001

## MATERIAL PROPERTIES

Youngs Modulus (E) = 8.70E+03 mPa  
 Char. Bending Stress (Fb) = 38.00 mPa  
 Char. Shear Stress (Fs) = 3.1 mPa  
 Char. Axial Stress (Fc) = 21 mPa  
 Char. Tensile Stress (Ft) = 23 mPa

## MODIFYING FACTORS

Load K1 = 0.60  
 Parl K4 = 1.00  
 Other = 0.85  
 $\phi$  = 0.8

## BEAM DETAILS (Circular Sections)

Pole Diameter (d) = 175 mm  
 Effect. Length (Lay) = 2400 mm  
 Span (L) = 2400 mm  
 Restraint Factor K10 = 2

Eq. rect= 155.1  
 Tension edge restr  
 put Lay = T or t

SECTION MODULUS = 5.26E+05 mm<sup>3</sup>  
 MOMENT OF INERTIA = 4.60E+07 mm<sup>4</sup>  
 SECTION AREA = 2.41E+04 mm<sup>2</sup>

Slenderness  
 Coefficient  
 S2 = 30.9

## STRUCTURAL ANALYSIS

Bending Moment from BMD = 4.10 kNm  
 Shear Force from SFD = 1.60 kN  
 Axial Force (Tension -ve) = 9.80 kN

## MEMBER STRENGTHS

$\phi$  Mn = 8.16  
 $\phi$  Vn = 20.28  
 $\phi$  Nn = 84.06

Stability Factor Axial (K8) = 0.35  
 Stability Factor Bending (K8) = 1.00  
 Allow. Bending Stress (K\*Fb) = 19.38 mPa  
 Allow. Shear Stress (K\*Fs) = 1.58 mPa  
 Allow. Axial Stress (K\*Fc) = 4.37 mPa

## STRENGTH RATIOS

0.50  
 0.08  
 0.12

Combined Bending and Axial ratios = 0.62  
 NZS 3603 cl 3.5

POLE SIZE = 175 SED RADIATA PINE TANAPOLE, H5



TITLE : Lawrence: 74 Churchill Drive

G CLODE

DESCRIPTION: BEARING CAPACITIES kPa

03 November 2001

| TEST No.     | 1.00           |                  |         |                                  |                   |  |
|--------------|----------------|------------------|---------|----------------------------------|-------------------|--|
| DEPTH<br>(m) | No OF<br>BLOWS | REDUCED<br>LEVEL | mm/BLOW | INDICATED<br>BEARING<br>CAPACITY | BLOWS<br>PER 75mm |  |
| 0.00         | 0.00           | 20.00            | 0       | 20                               |                   |  |
| 0.05         | 1.00           | 19.95            | 50      | 70                               |                   |  |
| 0.10         | 1.00           | 19.90            | 50      | 70                               |                   |  |
| 0.15         | 1.00           | 19.85            | 50      | 70                               | 1.50              |  |
| 0.20         | 1.00           | 19.80            | 50      | 70                               |                   |  |
| 0.25         | 0.50           | 19.75            | 100     | 33                               |                   |  |
| 0.30         | 0.50           | 19.70            | 100     | 33                               | 1.00              |  |
| 0.35         | 0.50           | 19.65            | 100     | 33                               |                   |  |
| 0.40         | 0.50           | 19.60            | 100     | 33                               |                   |  |
| 0.45         | 2.00           | 19.55            | 25      | 123                              | 1.50              |  |
| 0.50         | 2.00           | 19.50            | 25      | 123                              |                   |  |
| 0.55         | 1.00           | 19.45            | 50      | 70                               |                   |  |
| 0.60         | 1.00           | 19.40            | 50      | 70                               | 2.00              |  |
| 0.65         | 1.00           | 19.35            | 50      | 70                               |                   |  |
| 0.70         | 1.00           | 19.30            | 50      | 70                               |                   |  |
| 0.75         | 2.00           | 19.25            | 25      | 123                              | 2.00              |  |
| 0.80         | 1.00           | 19.20            | 50      | 70                               |                   |  |
| 0.85         | 2.00           | 19.15            | 25      | 123                              |                   |  |
| 0.90         | 2.00           | 19.10            | 25      | 123                              | 2.50              |  |
| 0.95         | 3.00           | 19.05            | 17      | 167                              |                   |  |
| 1.00         | 2.00           | 19.00            | 25      | 123                              |                   |  |
| 1.05         | 2.00           | 18.95            | 25      | 123                              | 3.50              |  |
| 1.10         | 3.00           | 18.90            | 17      | 167                              |                   |  |
| 1.15         | 2.00           | 18.85            | 25      | 123                              |                   |  |
| 1.20         | 2.00           | 18.80            | 25      | 123                              | 3.50              |  |
| 1.25         | 3.00           | 18.75            | 17      | 167                              |                   |  |
| 1.30         | 4.00           | 18.70            | 13      | 206                              |                   |  |
| 1.35         | 4.00           | 18.65            | 13      | 206                              | 5.50              |  |
| 1.40         | 5.00           | 18.60            | 10      | 243                              |                   |  |

