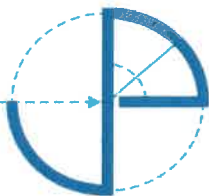


# Calculation Issue Record

JP Chick & Partners Ltd  
Consulting Civil & Structural Engineers

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T 01603 619093 F 01603 619840  
E [norwich@chick.co.uk](mailto:norwich@chick.co.uk) [www.chick.co.uk](http://www.chick.co.uk)



Client: Stowmarket Town Council

Project: Stowmarket Recreation Ground

Job No: NG25/

Sheet 1 of 1

Issue Date

Calculation Sheet Nos.

20.11.25

1 - 9

x

P1 - P7

x

SK001

x

SK002

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SK003

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Distribution

Number of copies

Modece

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File

Information  
Tender Purposes  
Construction  
Preliminary  
As Requested  
Comments  
Initials

SL

QA012B

# PRE-CONSTRUCTION/DESIGN INFORMATION

JOB NO: NG25/

JOB ADDRESS: Stowmarket Recreation Ground

Client: Stowmarket Town Council



JP Chick & Partners Ltd  
Consulting Civil & Structural Engineers

Project Description:

Design of Alteration to Toilet Block and Piers to Support New Sign

JPC Design element description:

Structural Design of Elements of Alteration and Support Piers

Who is Principal Designer? DC/SL

Architect

Name: Helen Su

JPC Engineer: DC/SL

Signed off by:

- Single Contractor: ☐  
Multi Contractor: ☒  
Domestic Client: ☐  
Commercial Client: ☒

|                                                                                                              |                                       |                                     |                                                                  |                          |                                                                                                       |
|--------------------------------------------------------------------------------------------------------------|---------------------------------------|-------------------------------------|------------------------------------------------------------------|--------------------------|-------------------------------------------------------------------------------------------------------|
| <b>Specialist Considerations</b><br>Choose an item.<br>Choose an item.<br>Choose an item.<br>Choose an item. | Is the Party Wall Etc., Act required  | <input type="checkbox"/>            | Has there been a ground investigation if so include with design. | <input type="checkbox"/> | <b>Specialist Design:</b><br>Choose an item.<br>Choose an item.<br>Choose an item.<br>Choose an item. |
|                                                                                                              | Will Building Regulations be required | <input checked="" type="checkbox"/> | Results /comments on ground investigation:                       |                          |                                                                                                       |
|                                                                                                              | Are there any planning conditions     | <input checked="" type="checkbox"/> | n/a                                                              |                          |                                                                                                       |
|                                                                                                              |                                       |                                     |                                                                  |                          |                                                                                                       |

## Relevant British Standards, Codes of Practice and Design Standards referred to in this design

|                                                 |                                     |                                                  |                                     |                                                  |                                     |
|-------------------------------------------------|-------------------------------------|--------------------------------------------------|-------------------------------------|--------------------------------------------------|-------------------------------------|
| EN1990 EC-0 – Basis of Structural Designs       | <input checked="" type="checkbox"/> | EN1991 EC-1/BS6399 - Actions on Structures       | <input checked="" type="checkbox"/> | EN1995 EC-5/BS5268 – Design of timber structures | <input checked="" type="checkbox"/> |
| EN1993 EC-3/BS5950 - Design of Steel Structures | <input checked="" type="checkbox"/> | EN1996 EC-6/BS5628- Design of Masonry Structures | <input checked="" type="checkbox"/> | Choose an item.                                  | <input type="checkbox"/>            |

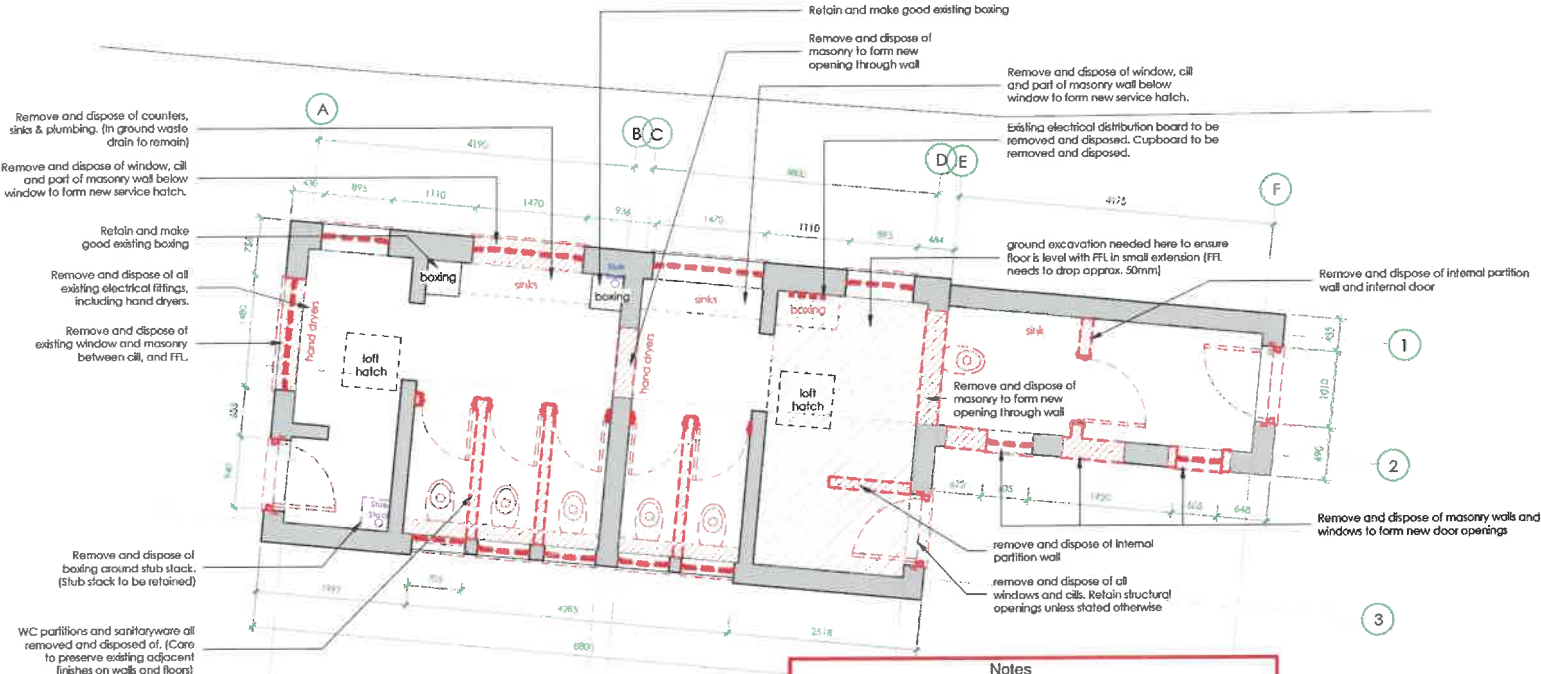
**CDM DESIGN CONSIDERATIONS:** This design has been considered under CDM 2015 - To show how we have eliminated and reduced hazards so far as is reasonably practicable within our design and to provided information regarding residual risk.

| Activity/Design Element affecting your design | Potential Hazards                   | Who is at Risk<br>Contractor C<br>Occupier O<br>Visitors V<br>Public P | Design measures to Eliminate/Mitigate Hazards and reduce risks    | Residual Risk/Information (to pass to Client/contractor) – Are you including a sequence of operation? | Hazard triangle placed on drawings and sketches | Action Date: | Engineer Initials |
|-----------------------------------------------|-------------------------------------|------------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------|--------------|-------------------|
|                                               |                                     |                                                                        |                                                                   |                                                                                                       |                                                 |              |                   |
| Temporary Stability                           | Risk of Collapse of Building        | C, V                                                                   | Inherent Risk of Project                                          | Ensure Adequate Temporary Works are in place when Removing Existing Load Bearing Walls                | <input checked="" type="checkbox"/>             | 20/11/25     | SL                |
| Undermining Potential                         | Risk of Collapse of Building        | C, V                                                                   | Inherent Risk of Project                                          | Do not undermine existing foundations when excavating new lowered floor level                         | <input checked="" type="checkbox"/>             | 20/11/25     | SL                |
| Manual handling                               | Risk of Injury due to Heavy Lifting | C, V                                                                   | Structural Members have designed to be as lightweight as possible | Ensure adequate personnel or appropriate lifting gear when installing heavy structural elements       | <input type="checkbox"/>                        | 20/11/25     | SL                |

All Dimensions referred to within these calculations are for design purposes only – Contractor to undertake site measurements for fabrication as necessary. These calculations shall be for the private and confidential use of the client for whom they were undertaken and should not be reproduced in whole in part or relied upon by 3<sup>rd</sup> parties for any use without the express written authority of J P Chick & Partners Limited



GA Plans



Toilet Block - Plan - Existing & Demolition  
1:50

**Notes**

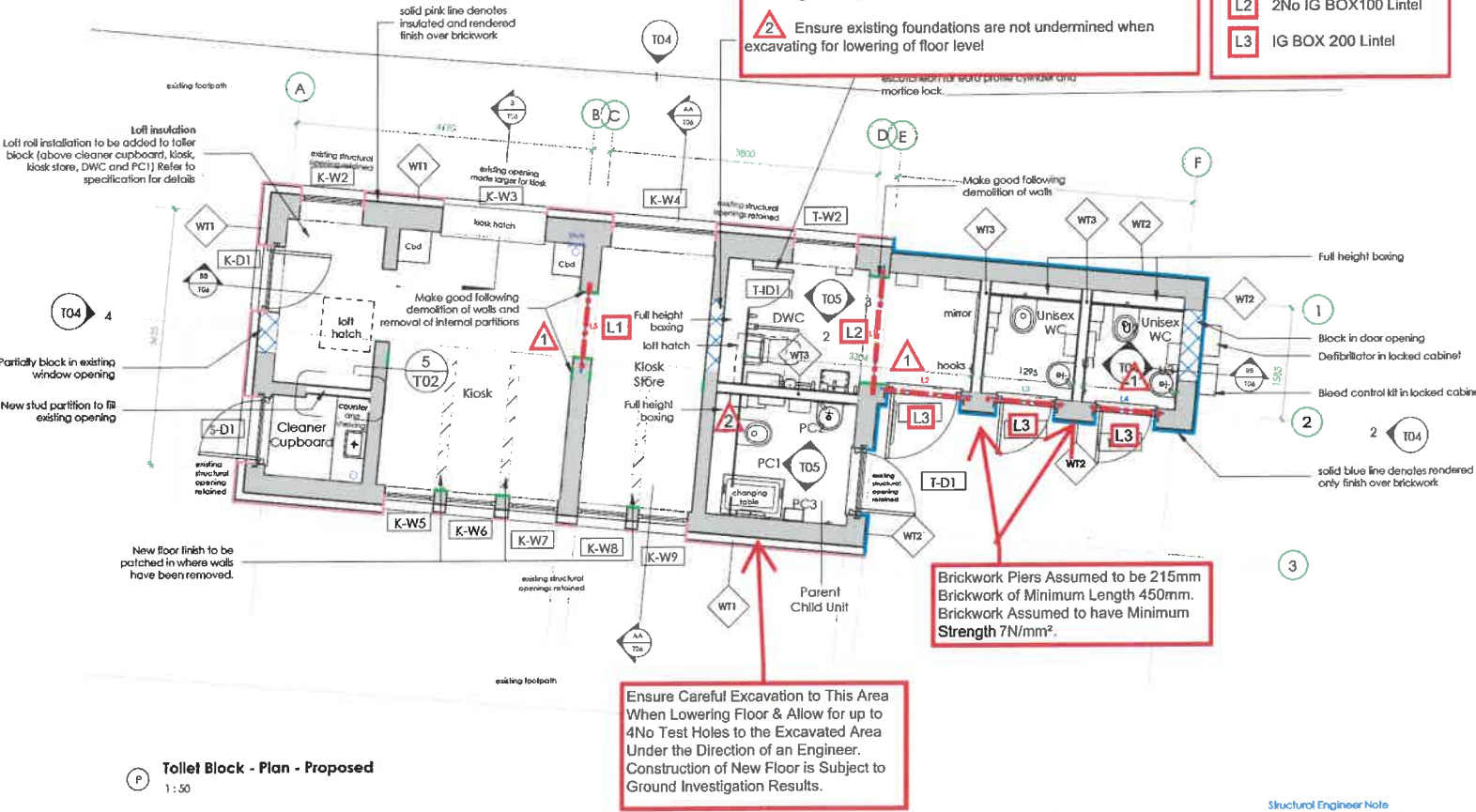
- Do not scale from drawing.
- All Lintels to be installed as per manufacturer's Instructions.
- Install 2No 44x120 C24 Treated Timber Under Each Window as Bearer, Fixed to Existing Wall via Staggered 6mm Diameter Ankerbolts @150mm Centres.
- The design team have highlighted unusual and significant risk only that may not be obvious to a competent contractor. They are to assist with risk reduction only and are not necessarily comprehensive. It is assumed that all works will be carried out by a competent contractor working to an appropriate risk assessment and method statement on site.
- In addition to the risk normally associated with the types of work detailed on this design, note the following significant risks and information.

1 Ensure existing building is adequately propped when removing existing load bearing walls.

2 Ensure existing foundations are not undermined when excavating for lowering of floor level

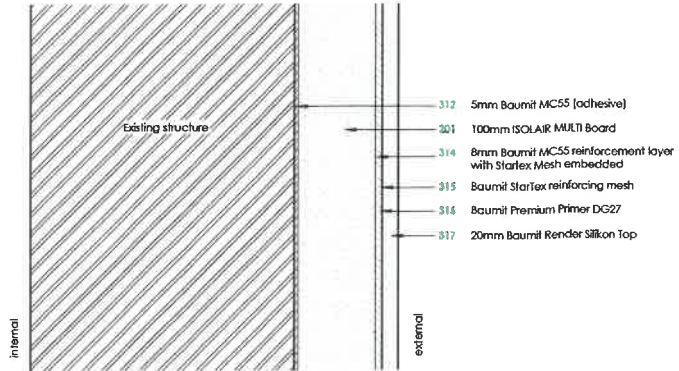
**Key**

|    |                      |
|----|----------------------|
| L1 | IG BOX140 Lintel     |
| L2 | 2No IG BOX100 Lintel |
| L3 | IG BOX 200 Lintel    |

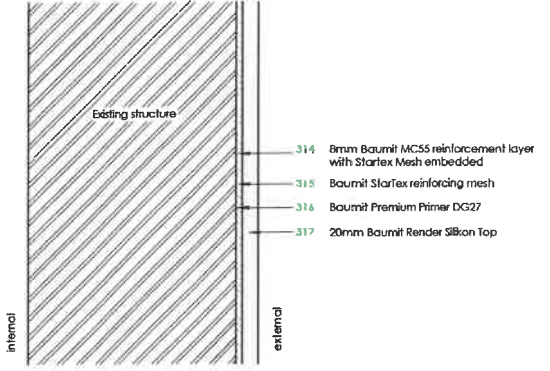


Toilet Block - Plan - Proposed  
1:50

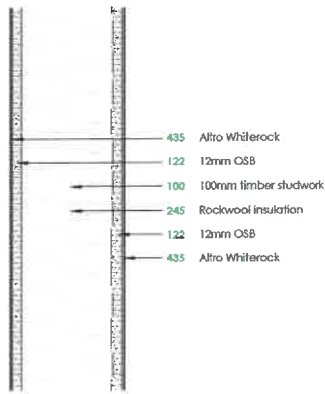
Typical Construction Details



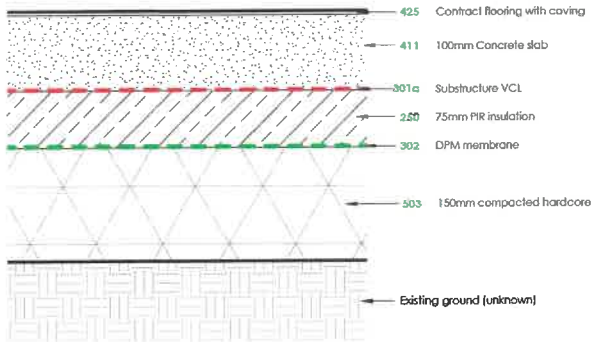
Wall Type 1 (WT1) - Insulated + Rendered  
1:5



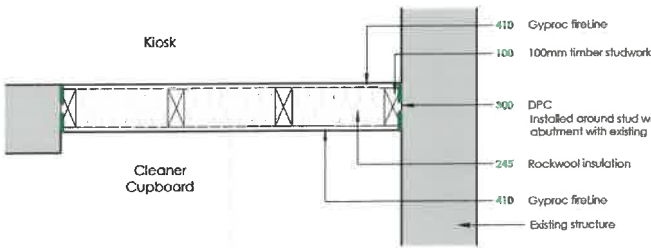
Wall Type 2 (WT2) - Rendered  
1:5



Wall Type 3 (WT3) - Internal Wall  
1:5



Floor Type 1 (FT1) - Ground bearing slab to excavated area  
1:5



Proposed ceiling to UWCs  
1:5

Plan - Callout 1 - Stud partition to fill existing opening  
1:10

| Internal Finishes Schedule |                                                                     |                                                                     |                             |
|----------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------|
| Room                       | Wall Finish                                                         | Floor Finish                                                        | Ceiling Finish              |
| Cleaner Cupboard<br>DWC    | Make good existing<br>Altro Whitelock                               | Make good existing<br>Contract flooring with coving                 | Plasterboard, skim, & point |
| Kiosk                      | Make good existing tiles and patch in where walls have been removed | Make good existing tiles and patch in where walls have been removed | Plasterboard, skim, & point |
| Kiosk Store                | Make good existing tiles and patch in where walls have been removed | Make good existing tiles and patch in where walls have been removed | Plasterboard, skim, & point |
| Parent Child Unit          | Altro Whitelock                                                     | Contract flooring with coving                                       | Plasterboard, skim, & point |
| Unisex WC                  | Altro Whitelock                                                     | Contract flooring with coving                                       | Plasterboard, skim, & point |
| Unisex WC                  | Altro Whitelock                                                     | Contract flooring with coving                                       | Plasterboard, skim, & point |

JP Chick & Partners Ltd.  
Stowmarket Recreation Ground  
NG25/  
Structural Markup to Toilet Block  
SK001  
SL

**Notes**

To be read in conjunction with Structural Engineer drawings.  
\*\*ALL STRUCTURAL FINISHES TO STRUCTURAL ENGINEER'S DESIGN\*\*  
Architect to be consulted if any discrepancy between drawings are observed. All dimensions to be taken from face of structure.

Rev. Date Description

Client: Stowmarket Town Council  
Project: 2420: SMK Recreation Ground  
Address: Recreation Ground, Finborough Road  
Stake:

Drawing Number: 702  
Drawing Title: Toilet Block - Proposed GA Plans  
Revision:  
Date Printed: 22/10/2025 09:28:48  
Scale @ A1: As indicated

**modece**  
architects

Drawn By: NS  
Checked By: MB

# STOWMARKET RECREATION GROUND

PROPOSAL FOR ALTERATION TO TOILET BLOCK + DESIGN OF MASONRY PIERS TO SUPPORT SIGN.

FIRSTLY LOOK AT ALTERATION TO TOILET BLOCK

## LOADS:

ROOF: (DUOPITCH) - PITCHED + LOFT

DEAD LOAD: ON PITCH. CLAY. PANTILES:  
BATTENS + FELT:  
RAFTERS:

$$\begin{array}{r} \text{KN/m}^2 \\ 0.42 \\ 0.03 \\ 0.15 \\ \hline 0.6 \text{ KN/m}^2 \end{array}$$

ON PLAN

CEILING JOISTS  
PI/BOARD:

$$\begin{array}{r} \text{KN/m}^2 \\ 0.15 \\ 0.15 \\ \hline 0.3 \text{ KN/m}^2 \end{array}$$

LIVE LOAD:

ON PITCH SNOW + ACCESS =  $0.75 \text{ KN/m}^2$

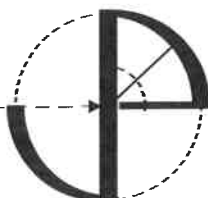
ON PLAN SHORT TERM ACCESS =  $0.25 \text{ KN/m}^2$

ROOF PITCH =  $30^\circ$

$$\begin{aligned} \Rightarrow G_k &= 0.6 / \cos 30 + 0.3 = \frac{1 \text{ KN/m}^2}{\text{KN/m}^2} \\ Q_k &= 0.75 + 0.25 = \frac{1 \text{ KN/m}^2}{\text{KN/m}^2} \end{aligned}$$

## STOWMARKET RECREATION GROUND

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## CALCULATION SHEET

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SHEET NO. 1

# MONOPITCH ROOF

DEAD LOAD: ALLOW

|                  |                                                       |
|------------------|-------------------------------------------------------|
| CLAY PANTILES:   | $\frac{\text{KN}}{\text{m}^2}$<br>0.42                |
| BATTENS & FELT:  | 0.03                                                  |
| RAFTERS:         | 0.15                                                  |
| INSULATION:      | 0.05                                                  |
| TIMBER CLADDING: | 0.2                                                   |
|                  | <u>0.85 <math>\frac{\text{KN}}{\text{m}^2}</math></u> |

LIVE LOAD: SNOW LOAD = 0.75  $\frac{\text{KN}}{\text{m}^2}$

PITCH =  $30^\circ \Rightarrow G_k = 0.85 / \cos 30 = \underline{1 \text{ KN/m}^2}$

## EXTERNAL WALLS:

EXISTING BRICKWORK TO BE RENDERED. PROPOSED SECTION DRAWINGS SHOW CAVITY WALL TO EAST ELEVATION & SOLID TO WEST ELEVATION

$\Rightarrow$  ALTERED WALL LOAD IS:

CAVITY WALL:

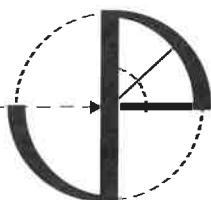
|                   |                                                      |
|-------------------|------------------------------------------------------|
| P/BOARD           | $\frac{\text{KN}}{\text{m}^2}$<br>0.15               |
| BLOCKWORK:        | 1.35                                                 |
| BRICKWORK:        | 2.25                                                 |
| INSULATION BOARD: | 0.05                                                 |
| RENDER:           | 0.5                                                  |
|                   | <u>4.3 <math>\frac{\text{KN}}{\text{m}^2}</math></u> |

SOLID WALL: TAKE:

|                   |                                                       |
|-------------------|-------------------------------------------------------|
| PLASTER:          | $\frac{\text{KN}}{\text{m}^2}$<br>0.25                |
| BRICKWORK:        | 4.85                                                  |
| INSULATION BOARD: | 0.05                                                  |
| RENDER:           | 0.5                                                   |
|                   | <u>5.65 <math>\frac{\text{KN}}{\text{m}^2}</math></u> |

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## CALCULATION SHEET

SHEET NO. 2

INTERNAL WALLS

LOAD BEARING WALL WITHIN MAIN DUPITCH BUILDING:

TAKE AS 140mm  
BLOCK WITH P/BOARD

$$\begin{array}{r} \text{BLOCK WORK.} \\ \text{P/BOARD} \times 2: \end{array} \begin{array}{r} \frac{\text{KN/M}^2}{1.9} \\ 0.3 \\ \hline 2.2 \text{ KN/M}^2 \end{array}$$

FIRSTLY LOOK AT NEW LINTEL WITHIN INTERNAL LOAD BEARING WALL

BEAN TO ROOF APEX MOST LIKELY RIDGE BOARD, HOWEVER THIS CANNOT BE CONFIRMED.

⇒ TAKE PITCHED DUPITCH ROOF FROM RIDGE BEAM DISTRIBUTED OVER 2.4m  
 - ASSUME THIS IS THE ONLY LOAD-BEARING INTERNAL WALL

$$\begin{aligned} \Rightarrow G_R &= \left[ 0.6 / \cos 30^\circ \text{ KN/M}^2 \times 4.2\text{m}/2 \times 8.5\text{m}/2 \right] / 2.4\text{m} = \frac{\text{SLS}}{2.577 \text{ KN/M} \times 1.35} = \frac{\text{ULS}}{3.479 \text{ KN/M}} \\ Q_R &= \left[ 0.75 \text{ KN/M}^2 \times 4.2\text{m}/2 \times 8.5\text{m}/2 \right] / 2.4\text{m} = 2.79 \text{ KN/M} \times 1.5 = 4.184 \text{ KN/M} \end{aligned}$$

BLOCKWORK LOAD ABOVE TRIANGULAR LOAD UP TO 1.4m

ALLOW CONSERVATIVELY 1.5m HIGH UDL

$$G_R = 2.2 \text{ KN/M}^2 \times 1.4\text{m} = \frac{\text{SLS}}{3.08 \text{ KN/M} \times 1.35} = \frac{\text{ULS}}{4.158 \text{ KN/M}}$$

SPAN = 0.9m CLEAR - ALLOW 1.05m DESIGN SPAN

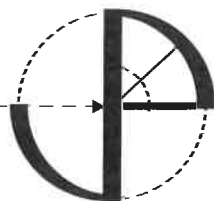
TOTAL SLS = 8.447 KN/M

TOTAL ULS = 11.821 KN/M

TOTAL SLS IN RN = 8.447 KN/M  $\times$  1.05m = 8.87 kN⇒ IG BOXING LINTEL: SWL = 18 kN ∴ OK

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## CALCULATION SHEET

SHEET NO. 3

# LOOK AT LINTEL BETWEEN DUPITCH & MONOPITCH SECTIONS

SPAN=1.5m CLEAR - ALLOW 1.65m DESIGN SPAN.

LOADS: WALL APPEARS TO BE SOLID OPTION

- ALLOW DISTRIBUTED DUPITCH RIDGE + GABLE LADDER FROM MONOPITCH ROOF
- WALL VOL FROM 0.8m TO 1.5m - CONSERVATIVELY TAKE 1.5m UDL

DUPITCH ROOF LOAD: SAY ALSO DISTRIBUTES OVER 2.4m

$$G_r = [0.6/\cos 30 \text{ kN/m}^2 \times 4.2\text{m}/2 \times 4\text{m}/2]/2.4\text{m} = \overset{\text{SLS}}{1.213 \text{ kN/m}} \times 1.35 = \overset{\text{ULS}}{1.637 \text{ kN/m}}$$
$$Q_r = [0.75 \text{ kN/m}^2 \times 4.2\text{m}/2 \times 4\text{m}/2]/2.4\text{m} = 1.313 \text{ kN/m} \times 1.5 = 1.969 \text{ kN/m}$$

MONOPITCH GABLE LADDER.

$$G_r = 1 \text{ kN/m}^2 \times 0.6\text{m} = \overset{\text{SLS}}{0.6 \text{ kN/m}} \times 1.35 = \overset{\text{ULS}}{0.81 \text{ kN/m}}$$
$$Q_r = 0.75 \text{ kN/m}^2 \times 0.6\text{m} = 0.45 \text{ kN/m} \times 1.5 = 0.675 \text{ kN/m}$$

SOLID BRICK WALL LOAD

$$G_r = 5.65 \text{ kN/m}^2 \times 1.5\text{m} = \overset{\text{SLS}}{8.475 \text{ kN/m}} \times 1.35 = \overset{\text{ULS}}{11.442 \text{ kN/m}}$$

$$\text{TOTAL SLS} = 12.051 \text{ kN/m}$$
$$\text{TOTAL ULS} = 16.533 \text{ kN/m}$$

$$\text{SLS LOAD IN RN} = 12.051 \text{ kN/m} \times 1.65\text{m} = 19.885 \text{ kN}$$

⇒ IF POSSIBLE USE 16 I-BEAM 2C LINTEL: SWL = 30kN ∴ OK

OTHERWISE TRY UB WITH STEEL BOTTOM PLATE

$$I_{req} = \frac{5 \times 12.051 \times 1650^3 \times 500}{384 \times 210,000 \times 10^4} = 168 \text{ cm}^4$$

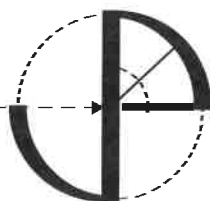
$$M_{ed} = 16.533 \times 1.65^2/8 = 5.627 \text{ kNm}$$

NOTE: CAN ALSO USE  
2ND BOX-100 LINTERS

$$\text{SWL} = 2 \times 15 = 30 \text{ kN} \therefore \text{OK}$$

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CALCULATION SHEET

SHEET NO. 4

$$\Rightarrow .15289 \times 16 \text{ kN} \quad I = 834 \text{ cm}^4 \quad \therefore \text{OK}$$

$$M_{\text{b, Rd}} @ 2\text{m} = 28.9 \text{ kNm} \quad \therefore \text{OK}$$

LOOK AT LINTELS TO MONOPITCH ROOF SECTION

INDIVIDUAL PIERS > 400mm LENGTH  $\Rightarrow$  OK TO SUPPORT LINTELS.

THUS MAX LINTEL SPAN = 1.026m CLEAR i.e. 1.2m DESIGN

NOTE THAT WALLS HERE ARE SOLID BRICK

LOADS:

- MONOPITCH ROOF UDL
- SOLID WALL UDL

ROOF:

$$\begin{aligned} G_r &= 1 \text{ kN/m}^2 \times 2.2 \text{ m} / 2 = \frac{\text{SLS}}{1.1 \text{ kN/m} \times 1.35 = 1.485 \text{ kN/m}} \\ Q_r &= 0.75 \text{ kN/m}^2 \times 2.2 \text{ m} / 2 = \frac{\text{ULS}}{0.825 \text{ kN/m} \times 1.5 = 1.238 \text{ kN/m}} \end{aligned}$$

SOLID WALL:

$$G_w = 5.65 \text{ kN/m}^2 \times 1 \text{ m} = \frac{\text{SLS}}{5.65 \text{ kN/m} \times 1.35 = 7.628 \text{ kN/m}} \quad \frac{\text{ULS}}$$

$$\text{TOTAL SLS UDL} = 7.575 \text{ kN/m}$$

$$\text{TOTAL ULS UDL} = 10.351 \text{ kN/m}$$

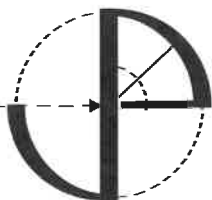
$$\text{SLS LOAD IN kN} = 7.575 \text{ kN/m} \times 1.2 \text{ m} = 9.09 \text{ kN} \quad \Rightarrow \text{CAN USE 1G IBEAM 2C (SWL = 30kN)}$$

HOWEVER INSTALLATION WOULD REQUIRE REMOVAL OF BRICK COURSES.

ALTERNATIVELY 1G BOX 200 LINTEL SWL = 18kN  $\therefore$  OK

STOW MARKET RECREATION GROUND

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SHEET NO. 5



## ANALYSE PIERS BETWEEN LINTELS

WORST CASE WILL BE BETWEEN DOORS 7-D2 & 7-D3

PIER LENGTH = 450mm HEIGHT = 2108mm

LOADS:

- REACTIONS FROM ADJACENT BEAMS
- WALL LOAD DIRECTLY ABOVE
- ROOF LOAD DIRECTLY ABOVE
- $\frac{1}{2}$  S/W

LINTEL REACTIONS:

$$G_L = (1.1 + 5.65) \text{ kN/m} \times (1.2 \text{ m} / 2 + 1 \text{ m} / 2) = \overset{\text{SLS}}{7.425 \text{ kN}} \times 1.35 = \overset{\text{ULS}}{10.024 \text{ kN}}$$
$$Q_R = 0.825 \text{ kN/m} \times (1.2 \text{ m} / 2 + 1 \text{ m} / 2) = 0.908 \text{ kN} \times 1.5 = 1.362 \text{ kN}$$

FROM WALL & ROOF LOAD DIRECTLY ABOVE:

$$G_R = (1.1 + 5.65) \text{ kN/m} \times 0.45 \text{ m} = \overset{\text{SLS}}{3.038 \text{ kN}} \times 1.35 = \overset{\text{ULS}}{4.1 \text{ kN}}$$
$$Q_R = 0.825 \text{ kN/m} \times 0.45 \text{ m} = 0.372 \text{ kN} \times 1.5 = 0.557 \text{ kN}$$

$\frac{1}{2}$  S/W:

$$G_P = 5.65 \text{ kN/m}^2 \times 2.108 \text{ m} / 2 \times 0.45 \text{ m} = \overset{\text{SLS}}{2.68 \text{ kN}} \times 1.35 = \overset{\text{ULS}}{3.618 \text{ kN}}$$

TOTAL ULS LOAD = 19.661 kN

FOR INITIAL ANALYSIS ASSUME WORST CASE BRICKWORK STRENGTH OF 7 N/mm<sup>2</sup>.

$$\Rightarrow S_R = 0.5 \times 7^{0.2} \times 4^{0.3} = 2.96 \text{ N/mm}^2$$

CHECK CROSSSECTION:  $0.45 \text{ m} \times 0.215 \text{ m} = 0.097 \text{ m}^2 < 0.1$

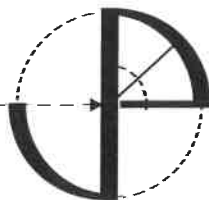
$\therefore$  SMALL AREA FACTOR REQUIRED:  $0.7 + 3A = 0.7 + (3 \times 0.097) = 0.991$

STOWMARKET

RECREATION

GROUND

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Consulting Civil & Structural Engineers



Designed

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Date

13/11/2025

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norwich@chick.co.uk

SHEET NO. 6

$$\Rightarrow 0.99 \times 2.96 = 2.93 \text{ N/mm}^2$$

$$t_{ef} = 215 \text{ mm}$$

$$\text{CHECK SLENDERNESS: } 2108/215 = 9.805 < 27 \Rightarrow \text{OK}$$

$$\text{ASSUME } e_i = 0.16 = 21.5 \text{ mm}$$

DETERMINE CAPACITY REDUCTION FACTORS  $\phi$  &  $\chi_{dm}$  & TAKE LOWER

$$\phi_i = 1 - 2e_i/t = 0.8$$

$$\chi_{dm} = 0.72 \text{ FOR } \lambda = 9.805$$

$$N_{Rd} = \phi_i S_d \quad S_d = S_k / \chi_{dm} = 2.93/3 = 0.976 \text{ N/mm}^2$$

$$\Rightarrow N_{Rd} = 0.72 \times 215 \times 0.976 = 151.08 \text{ N/mm}$$

$$\text{MASONRY RESISTANCE} = N_{Rd} \times L = 151.08 \times 450 = 67,986 \text{ N} \\ = 67.986 \text{ kN} > 19.66 \text{ kN}$$

$\Rightarrow$  PIERS SUFFICE

LOOK AT TIMBER BEARER SUPPORTS TO WINDOWS

WORST CASE WILL BE TO WINDOW K-W3.

SPAN = 1470 CLEAR - ALLOW 1.6M DESIGN SPAN

FOR WINDOW SW ALLOW  $0.5 \text{ kN/m}^2$ .

WINDOW HEIGHT = 1.53m HERE.

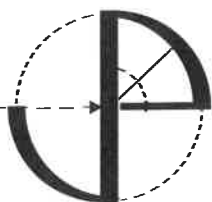
$$\Rightarrow G_R = 0.5 \text{ kN/m}^2 \times 1.53 \text{ m} \stackrel{\text{SLS}}{=} 2.65 \text{ kN/m} \times 1.35 \stackrel{\text{ULS}}{=} 3.58 \text{ kN/m}$$

ALLOW ALSO FOR A PERSON SITTING ON LEDGE, SAY  $0.9 \text{ kN}$  AT CENTRE.

$$Q_R \stackrel{\text{SLS}}{=} 0.9 \text{ kN} \times 1.5 \stackrel{\text{ULS}}{=} 1.35 \text{ kN}$$

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SHEET NO. 7

$$\Rightarrow M_{yd} = 3.58 \times 1.6^2/8 + 1.35 \times 1.6/4 = 1.686 \text{ kNm} \quad \text{TRY } 2\text{N}^0 \text{ 44x97 C24:}$$

$$\sigma_{myd} = \frac{6 \times 1.686 \times 10^6}{2 \times 44 \times 97^2} = 12.215 \text{ N/mm}^2$$

$$\sigma_{myd} = 1.091 \times 0.8 \times 24/1.3 = 16.113 \text{ N/mm}^2 - \text{OK FOR BENDING}$$

$$\text{CHECK DEFLECTION:} \quad \text{LIMIT} = 1600/250 = 6.4 \text{ mm}$$

$$u_{instG} = \frac{5 \times 2.65 \times 1600^4 \times 12}{384 \times 11,000 \times 2 \times 44 \times 97^3} + \frac{1.2 \times 2.65 \times 1600^2}{8 \times 690 \times 2 \times 44 \times 97} = 3.245 \text{ mm}$$

$$u_{s1nG} = u_{instG} \times 1.8 = 5.84 \text{ mm}$$

$$u_{instQ} = \frac{900 \times 1600^3 \times 12}{48 \times 11,000 \times 2 \times 44 \times 97^3} + \frac{1.2 \times 900 \times 800}{2 \times 690 \times 2 \times 44 \times 97} = 1.117 \text{ mm}$$

$$u_{s1nQ} = u_{instQ} \times 1.24 = 1.385 \text{ mm}$$

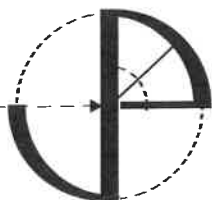
$$\text{TOTAL} = 7.225 \text{ mm} > 6.4 \text{ mm}$$

INCREASE TO 2N<sup>0</sup> 44x120 C24:

$$\delta = 7.225 \times 97^3/120^3 = 3.816 \text{ mm} < 6.4 \text{ mm} \therefore \text{OK}$$

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SHEET NO. 8

LOOK AT FIXINGS OF TIMBER BEARER TO EXISTING WALLS

TRY FIXINGS @ 150%

⇒ LOAD TO EACH FIXING:

$$G_k = 2.65 \text{ kN/m} \times 0.15 \text{ m} = \overset{\text{SLS}}{0.4 \text{ kN}} \times 1.35 = \overset{\text{ULS}}{0.537 \text{ kN}}$$

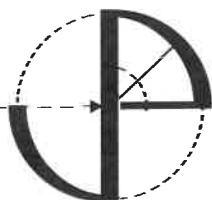
TO BE ABLE TO STAGGER ANKERS SAY  $7d + 4d + 50 = 120 \Rightarrow d = 6.37$

TRY 60 ANKERS

INTO SOLID BRICKWORK EACH ANKERBOLT CAN RESIST  $0.51 \text{ kN} > 0.4 \text{ kN}$   
∴ OK

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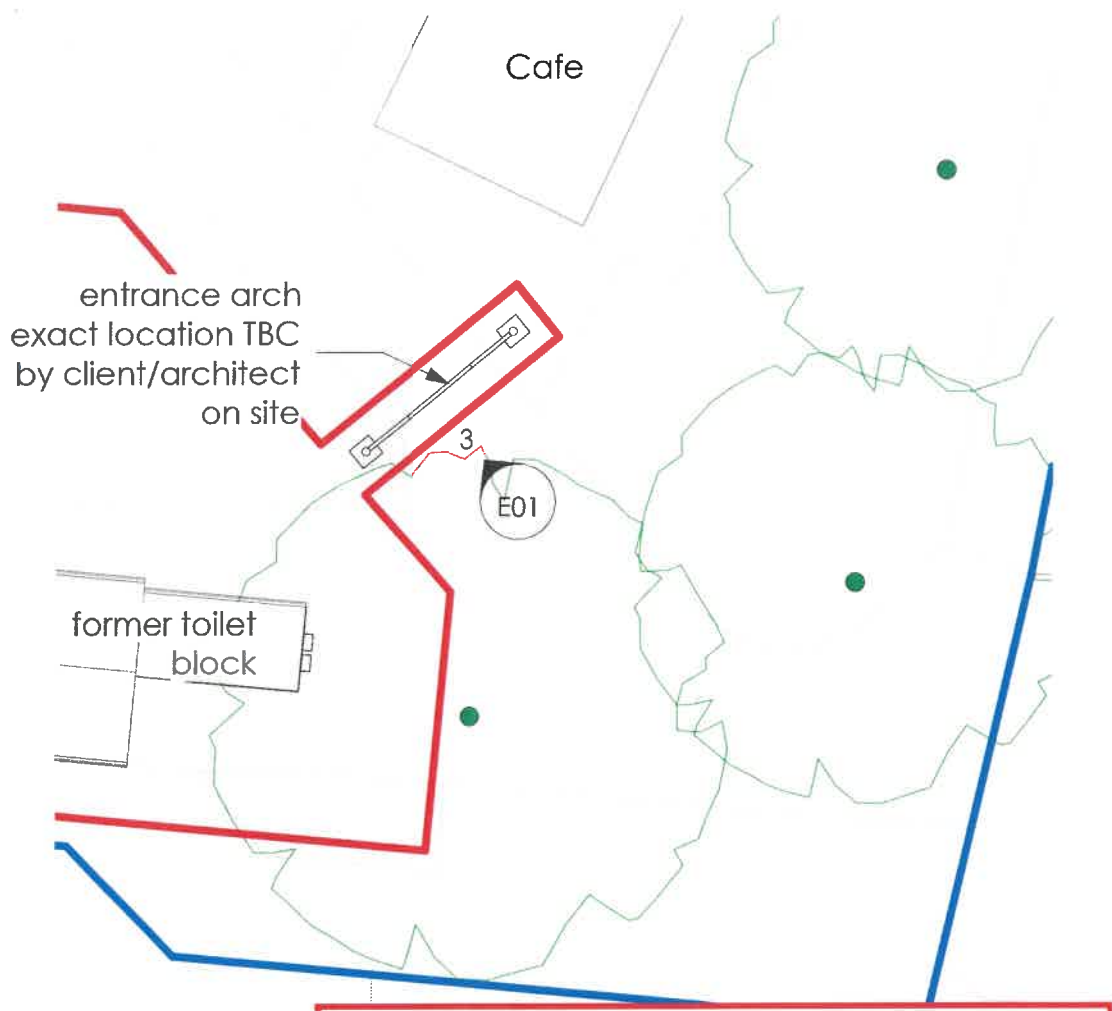
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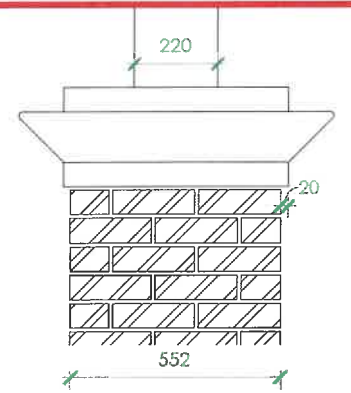
Fax: (01603) 610840  
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SHEET NO. 9



- Notes**
- Do not scale from drawing.
  - Sign details, including connection of posts to pier, to be confirmed by specialist.
  - See SK003 for Concrete Core & Foundation Details.
  - Foundation sizes indicated are tentative. Sizes may change based on results of site investigation.
  - All Brickwork to piers to be of minimum strength 20N/mm<sup>2</sup>.
  - Foundation details to be confirmed upon completion of site investigation.

1  
1 : 200  
0



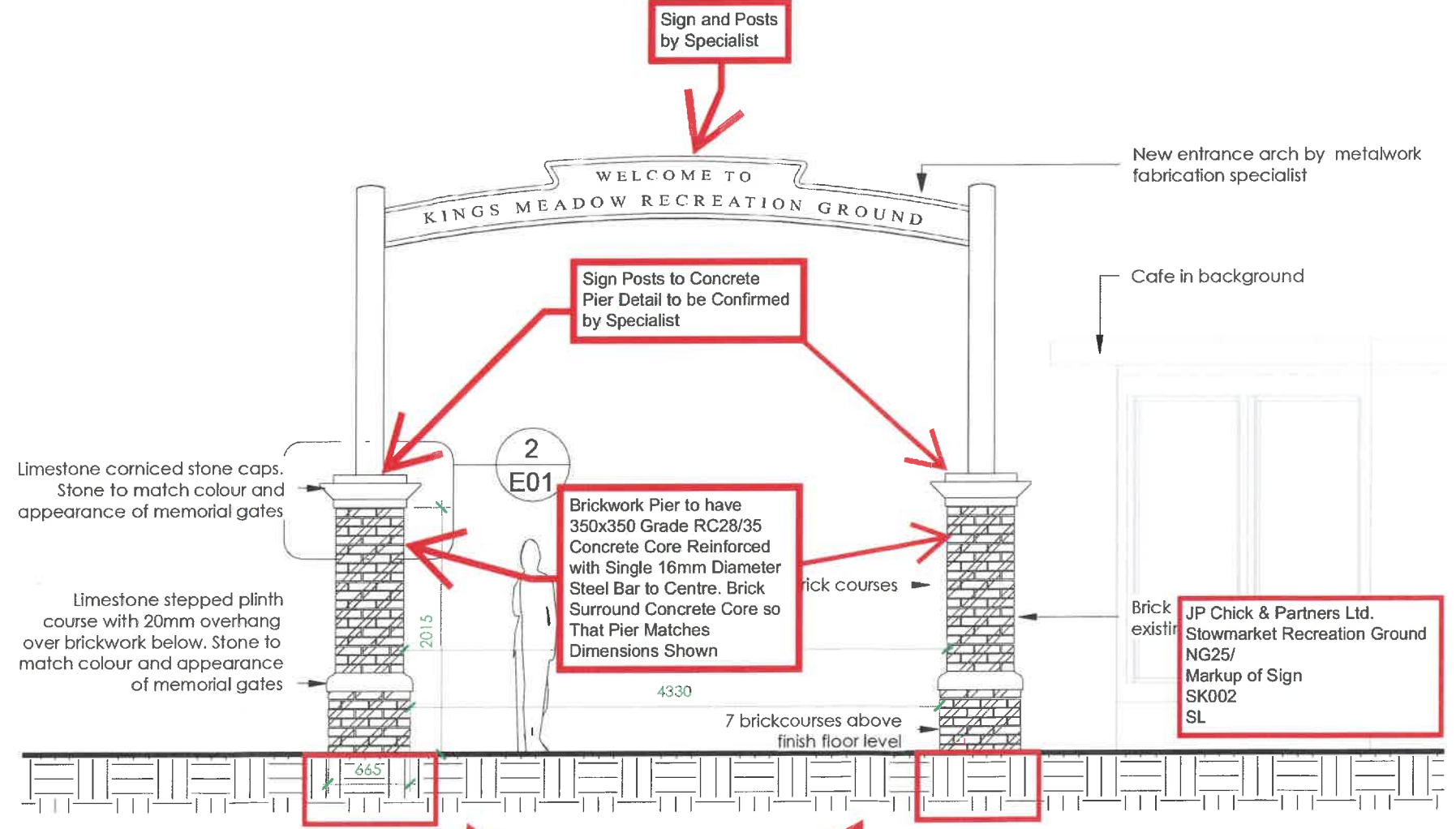
2  
**Entrance Arch - Callout 1**  
1 : 20  
0 200 400 600 1000 mm



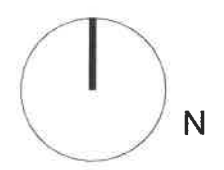
Entrance arch concept visualisation of general appearance



Existing memorial gates



3  
**Entrance Arch - Proposed South Elevation**  
1 : 50  
0 0.5 1 1.5 3 m



As indicated

| Rev | Date | Description |
|-----|------|-------------|
|     |      |             |
|     |      |             |

Client: Stowmarket Town Council  
 Project: **2420: SMK Recreation Ground**  
 Address: Recreation Ground, Finborough Road  
 Status:  
 Date Printed: 17/10/2025 17:11:36  
 Drawn By: HS  
 Checked By: MB

Drawing Title: **E01**  
 Revision:  
 Drawing Title: Entrance Arch  
 Scale @ A3: As indicated

**m o d e c e**  
 architects

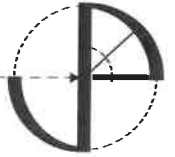
4 The Old Fox Yard, Ipswich Street,  
 Stowmarket, Suffolk IP11 1AB  
 01794 830005  
 stowmarket@modce.com  
 www.modce.com



# SKETCH SHEET

LOCATION: STOWMARKET RECREATION GROUND

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Eng: SL

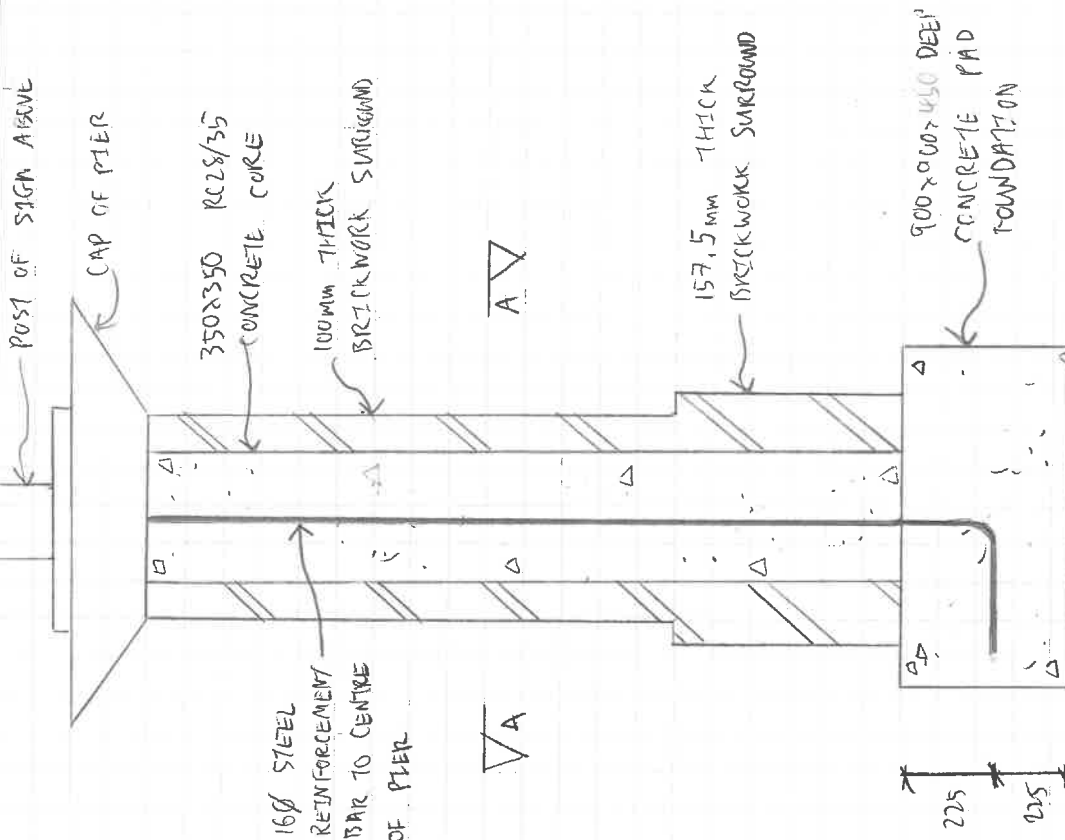
Date: 19/4/2025

Job No.: \_\_\_\_\_

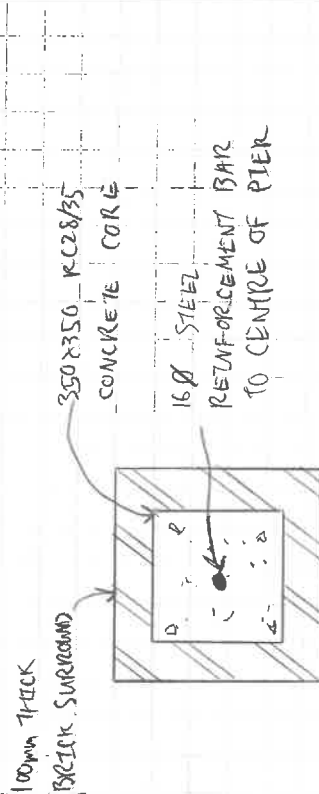
Sheet SK003 of ....

## NOTES

- DO NOT SCALE FROM DRAWING
- CONCRETE CORE TO BE MINIMUM GRADE RC28/35, UNLESS NOTED OTHERWISE
- ALL BRICKWORK TO HAVE MINIMUM STRENGTH 20N/mm<sup>2</sup> UNLESS NOTED OTHERWISE
- FOUNDATION DETAILS ARE TENTATIVE AND ARE SUBJECT TO CHANGE BASED ON GROUND INVESTIGATION RESULTS



SECTION IN ELEVATION 1:20



SECTION A-A 1:20

CONCRETE FILLED BRICKWORK  
PIER TO SUPPORT SIGN

## LOOK AT BRICKWORK PIERS SUPPORTING ENTRANCE SIGN

FOR LOADING TO PIERS CONSIDER LOAD FROM WIND ON PIER & WIND ON SIGN. CONSIDER ALSO WEIGHT OF A PERSON HANGING FROM SIGN + SW OF SIGN.

FOR SIGN SW ALLOW 220 $\phi$  CHS POSTS WITH SAY 20mm THICK STEEL SIGN

$\Rightarrow$  TAKE POSTS AS 219.1 x 12.5 CHS SAY

$\Rightarrow$  POST SW = 63.7 kg/m = 0.625 kN/m

POST HEIGHT ABOVE PIER = 2.35m

SIGN ITSELF IS APPROX 4.8m LONG x 0.2m DEEP, 0.5m DEEP FOR MIDDLE 2m.

HOWEVER DUE TO ARCH OF SIGN TAKE LENGTH AS 5m

$\Rightarrow$  5m x 0.2m + 2m x 0.3m AS SECTIONS. SAY

$$77 \text{ kN/m}^3 \times [(5 \text{ m} \times 0.2 \text{ m}) + (2 \text{ m} \times 0.3 \text{ m})] \times 0.02 \text{ m} = 2.464 \text{ kN (SLS)}$$

$$\begin{aligned} \Rightarrow \text{TOTAL WEIGHT OF SIGN} &= 2.464 + (2 \text{ m} \times 0.625 \text{ kN/m} \times 2.35 \text{ m}) \\ &= 5.41 \text{ kN} \end{aligned}$$

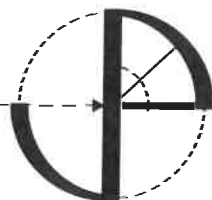
BRICK SW: 552mm SQUARE TO TOP 1.4m, 665mm WIDE TO BOTTOM 0.615m

$$\Rightarrow 22.5 \text{ kN/m}^3 \times [(0.552 \text{ m}^2 \times 1.4 \text{ m}) + (0.665 \text{ m}^2 \times 0.615 \text{ m})] = 15.72 \text{ kN (SLS)}$$

- ASSUMING SOLID BRICKWORK

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SHEET NO. P1

CALCULATE ALSO WIND LOAD ONTO SIGN.

SEE PAGE P3 FOR CHARACTERISTIC WIND LOADS.

FOR SIGNBOARDS  $C_s = 1.8$  WITH WIND AS PL AT CENTRE OF SIGN

VALUE FOR  $C_{p,net}$  WILL BE SAME AS FOR FREE STANDING WALLS & PARAPETS

$U/h > 10 \Rightarrow$  WORST CASE  $C_{p,net} = 3.4$

WIND LOADS AT  $310^\circ$  &  $130^\circ$ , MAX LOAD ONTO SIGN IS

$$0.513 \text{ kN/m}^2 \times 3.4 = 1.745 \text{ kN/m}^2$$

TAKE SIGN AREA AS ON PAGE P1

$$\Rightarrow Q_R = 1.745 \text{ kN/m}^2 \times [(5\text{m} \times 0.2\text{m}) + (2\text{m} \times 0.3\text{m})] = \overset{\text{SLS}}{2.792 \text{ kN}} \times 1.5 = \overset{\text{ULS}}{4.188 \text{ kN}}$$

ALLOW A 2kN PL FOR PERSON HANGING ON SIGN & ALLOW 2-3% ECCENTRICITY FROM WIND VERTICALLY

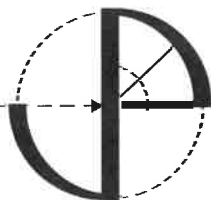
$$\Rightarrow \text{MOMENT FROM WIND} = 4.188 \text{ kN} \times 2.35\text{m} = 9.85 \text{ kNm}$$

$$\text{TOTAL WIND VERTICAL LOAD} = (5.41 \text{ kN} \times 1.35) + (2 \text{ kN} \times 1.5) = 11.12 \text{ kN}$$

ANALYSE VERTICAL LOAD & LATERAL MOMENT SEPARATELY.

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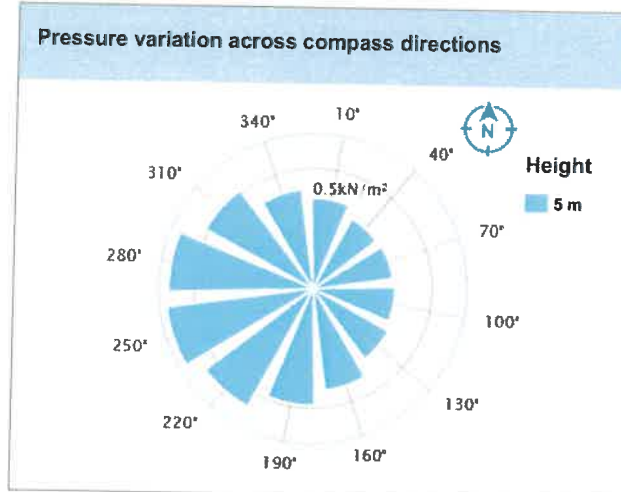
SHEET NO. P2

## Notes

Peak velocity pressure calculation to BS EN 1991-1-4:2005+A1:2010 and UK national annex  
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| Description                                        | Value                     |               |
|----------------------------------------------------|---------------------------|---------------|
| Site location                                      | 52.188618°N<br>0.989996°E |               |
| Fundamental basic wind velocity, $V_{b,map}$ (m/s) | 22.1                      | (Figure NA.1) |
| Site altitude, A (m)                               | 38                        |               |
| Seasonal factor is based on all year.              |                           |               |
| Probability factor, $C_{prob}$                     | 1.00                      | (NA.2.8)      |
| Altitude factor, $C_{alt}$                         | 1.038                     | (NA.2.5)      |
| Orography                                          | Not significant           |               |
| Distance to shoreline (km)                         | 233.16                    |               |
| Zone for size factor, $C_s$                        | B                         | (NA.8)        |
| Peak velocity pressure, $q_p$ (kN/m <sup>2</sup> ) | 0.616                     | (NA.2.17)     |

| Description                           | Value             |               |
|---------------------------------------|-------------------|---------------|
| OS grid reference                     | TM 04481<br>58700 |               |
| Structure height, h (m)               | 5.00              |               |
| Structure orientation from North (°N) | 40                |               |
| Seasonal factor, $C_{season}$         | 1.00              | (Table NA.2)  |
| Directional factor, $C_{dir}$         | 1.00              | (Table NA.1)  |
| Local effects factor, $K_f$           | 1.00              | (A.3(4))      |
| Orography factor, $C_o$               | 1.000             | (A.3)         |
| Exposure factor, $C_e$                | 1.90              | (Figure NA.7) |
| Peak velocity, $V_p$ (m/s)            | 31.7              |               |



Peak velocity pressure variation with height across all wind directions

| Structure height/Direction | Peak velocity pressure (kN/m <sup>2</sup> ) |       |       |       |       |       |       |       |       |       |       |       |
|----------------------------|---------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                            | S1                                          | S2    | S3    | S4    | S5    | S6    | S7    | S8    | S9    | S10   | S11   | S12   |
|                            | 40°                                         | 70°   | 100°  | 130°  | 160°  | 190°  | 220°  | 250°  | 280°  | 310°  | 340°  | 10°   |
| 5.0 m                      | 0.332                                       | 0.339 | 0.347 | 0.365 | 0.426 | 0.486 | 0.560 | 0.616 | 0.604 | 0.513 | 0.417 | 0.377 |

# FIRSTLY CHECK PIER FOR VERTICAL LOAD

ALLOW 1/2 SW OF PIER IN CALCULATION ALSO

$$\Rightarrow TGTAL = \frac{11.12}{2} + (15.72/2 \times 1.35) = 16.17 \text{ MN}$$

NEW BRICKWORK =  $f_b = 20 \text{ N/mm}^2$ , CHECK FOR 552 SQUARE PIER CONSERVATIVELY

$$S_k = 0.5 \times 20^{0.7} \times 4^{0.3} = 6.17 \text{ N/mm}^2$$

CHECK CROSS-SECTION:  $0.552 \times 0.552 \geq 0.305 \times 0.1$   $\therefore$  NO SMALL AREA FACTOR REQUIRED

CHECK SLENDerness:  $2015/552 = 3.65 < 27 \therefore \text{OK}$

$$e_i = \frac{M_{id}}{N_{id}} + e_{ne} + e_{init}$$

WHERE  $e_{ne} = 0$   
 $e_{init} = 2015/456 = 4.48 \text{ mm}$

$$\Rightarrow e_i = \frac{9.85 \times 10^6}{16.17 \times 10^3} + 4.48 = 613.6 = 1.1t$$

HOWEVER THIS IS ILLOGICAL & DOES NOT HOLD AS MOMENT IS NOT FROM ECCENTRICITY OF FLOOR

THUS INSTEAD ASSUME  $e_i = 0.1t$

DETERMINE CAPACITY REDUCTION FACTORS

$$\phi_i = 1 - 2e_i/t = 0.8$$

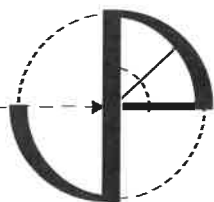
$$\phi_m = 0.78 \text{ FOR } \lambda = 3.65 \quad - \text{USE THIS}$$

$$N_{rd} = \phi_t S_d \quad \text{WHERE } S_d = f_k / \gamma_m = 6.17/3 = 2.056 \text{ N/mm}^2$$

$$\Rightarrow N_{rd} = 0.78 \times 552 \times 2.056 = 885.2 \text{ N/mm}$$

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$$\text{MASONRY RESISTANCE} = N_{rd} \times L = 885.2 \times 552 = 488630.4 \text{ N}$$

$$= 488.63 \text{ kN} > 16.17 \text{ kN}$$

∴ OK FOR VERTICAL LOAD.

CHECK BENDING IN PIER

(FOR 552mm SQUARE)

$$M = 9.85 \text{ kNm}$$

$$\Rightarrow \sigma_{mxd} = \frac{6 \times 13.09 \times 10^6}{552 \times 552^2} = 0.467 \text{ N/mm}^2$$

$$\text{TOTAL LOAD ON PIER INC SW} = 21.73 \text{ kN}$$

$$M_{rd} = \left( \frac{S_{xe}}{\sigma_m} + \sigma_d \right) z = \left( \frac{0.4}{3} + \frac{21.73 \times 10^3}{552 \times 552} \right) \times \frac{552 \times 552^2}{6} = 5.74 \text{ kNm}$$

$$< 9.85 \text{ kNm}$$

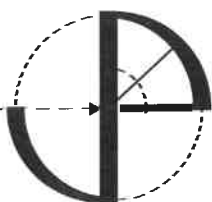
RE-ANALYSE & INCLUDE THICKER PORTION TO BOTTOM OF PIER;

HOWEVER NOTE THAT FOR 665 x 665  $M_{rd} = 8.94 \text{ kNm} < 9.85 \text{ kNm}$

!∴  
THUS CONSIDER INSTEAD A CONCRETE CORE

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CONSIDER A 350x350 CONCRETE CORE WITH 10mm BRICK SURROUND

STRENGTH OF BRICK SURROUND  $S_d = 0.5 \times 20^{0.7} \times 4^{0.3} / 3 = 2.057 \text{ N/mm}^2$

$M_d = Qb d^2$ . ASSUMING SINGLE BAR OF REINFORCEMENT,  $d = 276 \text{ mm}$ ,  $b = 552 \text{ mm}$

$$M_d = \frac{9.85 \times 10^6}{552 \times 276^2} = 0.235 = Q.$$

THUS  $C = 0.9$ .

$z = cd$ , THUS:

$$A_{s, req} = \frac{9.85 \times 10^6 \times 1.15}{460 \times 276 \times 0.9} = 99.14 \text{ mm}^2 < 12 \phi \text{ BAR} = 113 \text{ mm}^2/m \therefore \text{OK}$$

LOOK ALSO AT REINFORCEMENT IN BENDING FOR RC28/35 CONCRETE & WITH  $d = 175 \text{ mm}$  TO CONSIDER AS CONCRETE BEAM.

$$K = \frac{9.85 \times 10^6}{350 \times 175^2 \times 28} = 0.033 < 0.168$$

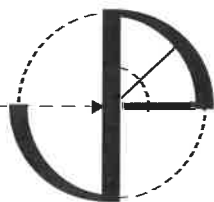
$$z = 175/2 \times \left( 1 + \sqrt{1 - (3.53 \times 0.033)} \right) = 169.7 < 0.95 \times 175 = 166.25$$

$$A_s = \frac{9.85 \times 10^6}{500 \times 166.25} = 118.5 \text{ mm}^2 > 113 \text{ mm}^2 \Rightarrow 16 \phi \text{ BAR } A = 201 \text{ mm}^2 \therefore \text{OK}$$

$\Rightarrow$  350x350 RC28/35 CONCRETE CORE WITHIN PIER WITH SINGLE 16  $\phi$  BAR TO CENTRE

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## LOCK A7 FOUNDATIONS

CONSIDER PIERS TO CENTRE OF FOUNDATIONS AS MOMENT CAN OCCUR FROM EITHER SIDE.

SLS LOAD FROM PIER & SIGN IS  $15.72 + 5.41 + 2 = 23.13 \text{ kN}$

SLS MOMENT FROM WIND =  $2.792 \text{ kN} \times 2.35 \text{ m} = 6.562 \text{ kNm}$

TRY 900mm SQUARE ~~USED~~ & NOTE THAT FOUNDATION DESIGN WILL BE SUBJECT TO GROUND INVESTIGATION

FOUNDATION  $q_n = 24 \text{ kN/m}^3 \times 0.9 \text{ m}^2 \times 0.45 \text{ m} = 9.72 \text{ kN} \Rightarrow \text{TOTAL} = 31.88 \text{ kN}$

$e = M/N = 6.562 / 31.88 = 0.206 > 0.15 = 0.9/6 \Rightarrow \text{OUTSIDE MIDDLE THIRD}$

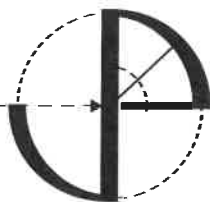
$\gamma = 3 \times (0.45 - 0.206) = 0.732$

$p = \frac{31.88 \times 2}{0.9 \times 0.732} = 96.8 \text{ kN/m}^2 < 100 \text{ kN/m}^2$

KEEP AS TENTATIVE DESIGN - MAY CHANGE BASED ON GROUND INVESTIGATION.

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