**Ref: 24/54720/A**
**Date: March 2024**
**Prepared by: J.McLoughlin**

**CLIENT:-**
**Richard James Hastings Architecture**
**Wortan Park**
**Cassington**
**OX29 4SX**

**PROJECT:-**
**34 Nassau Road**
**Barnes**
**SW13 9QE**

# Structural Engineering Notes Including Construction Method Statement

**Consulting Structural & Civil Engineers**

**16 Upper Woburn Place**
**London**
**WC1H 0AF**

Tel: 0203 741 8042
E-mail: london@dsagroup.co.uk

# Contents

1.0 Introduction ... 1
1.1 Statement of Objectives ... 1
1.2 Overview of Research ... 1
1.3 Structural Appraisal ... 2
2.0 Research/Building Appraisal ... 3
2.1 Site Location ... 3
2.2 Existing Structure Summary ... 4
3.0 Proposed Structure ... 6
3.1 Structural Proposals ... 6
3.2 Loadings ... 8
3.3 Impact of the Proposed Development on Existing Trees ... 8
4.0 Ground Conditions ... 9
4.1 Ground Conditions ... 9
4.2 Heave and Settlement ... 9
4.3 Site Hydrology/Groundwater ... 9
5.0 Movement Assessment ... 10
5.1 Ground Movement Assessment ... 10
5.2 Movement Monitoring Method ... 11
6.0 Construction Method ... 13
6.1 Proposed Demolition and Construction ... 13
6.2 Site Set Up ... 13
6.3 Initial Temporary Works ... 14
6.4 Reinforced Concrete Underpinning/Basement Construction ... 14
6.6 Principal Contractor Responsibilities ... 16
6.7 CDM Regulations 2015 ... 18
7.0 Conclusions ... 20

7.1 Evaluation of Project .......... 20

## 1.0 Introduction

David Smith Associates Consulting Structural & Civil Engineers have been commissioned by Richard James Hastings Architecture on behalf of the property owners to carry out a construction method statement for the redevelopment of 34 Nassau Road, London.

This report has been developed with reference to the London Borough of Richmond Upon Thames basement guidance to ensure that the key structural engineering planning considerations are addressed.

This report forms part of the application for planning permission for the proposed subterranean works to this property.

## 1.1 Statement of Objectives

This study provides research and analysis of the existing structure for the proposed single storey basement and redevelopment of the house. Whilst the study identifies the existing site's capacity for the new construction there are two primary objectives of the study.

- How the proposed basement structure is to be constructed? This includes proposed construction materials, layout of the proposed temporary structural framework and the temporary sequence of works.
- How the proposed superstructure is to be constructed? This includes proposed construction materials, layout of the proposed structural framework, allowable loadings and temporary works.

## 1.2 Overview of Research

DSA have attended site to ascertain the existing structural format of the property, including the existing foundation details and bearing stratum on site. The above site investigations, including the recommendations given in the Geotechnical Report, form the basis of our design proposal.

This documentation focused on the proposed method of construction and method of works for the basement structure including small elements of architectural information. In addition to this, we have reviewed the preliminary geotechnical report and currently base our designs on the data within the document.

This document is based upon the planning drawings produced by the Architect and should be read in conjunction with their current drawings and documentation.

## 1.3 Structural Appraisal

British Standards and relevant Codes of Practice have been used in the preparation of our structural analysis. The codes of practice used within the assessment listed in the below table.

| | |
|---|---|
| Loadings | [BS 6399 - Part 1:1996, Part 2:1997, Part 3:1988] [BS 648:1964] |
| Concrete | [BS 8110 - Part 1:1997, Part 3:1985] [BS 8007 : 1987] |
| Foundations | [BS 8004:1986] [BS 8002 : 1994] |
| Timber | [BS 5268 - Part 2:2002] |
| Masonry | [BS 5628 - Part 1:2005, Part 2:2005, Part 3:2005] |
| Steelwork | [BS 5950 - Part 1:2000, Part 3:1990, Part 5:1987, Part 8:1990] [BS 2853:1957] |
| Temporary Works | [BS 5975 : 2019] |

## 2.0 Research/Building Appraisal

## 2.1 Site Location

34 Nassau Road is located in the centre of Nassau Road close to the junction of Lowther road. The property is arranged as a semi-detached property. The property is a three-storey property. The neighbouring properties on Sutherland Avenue are of comparable footprint and height. The age of the properties and its neighbours date to the early-20th century.

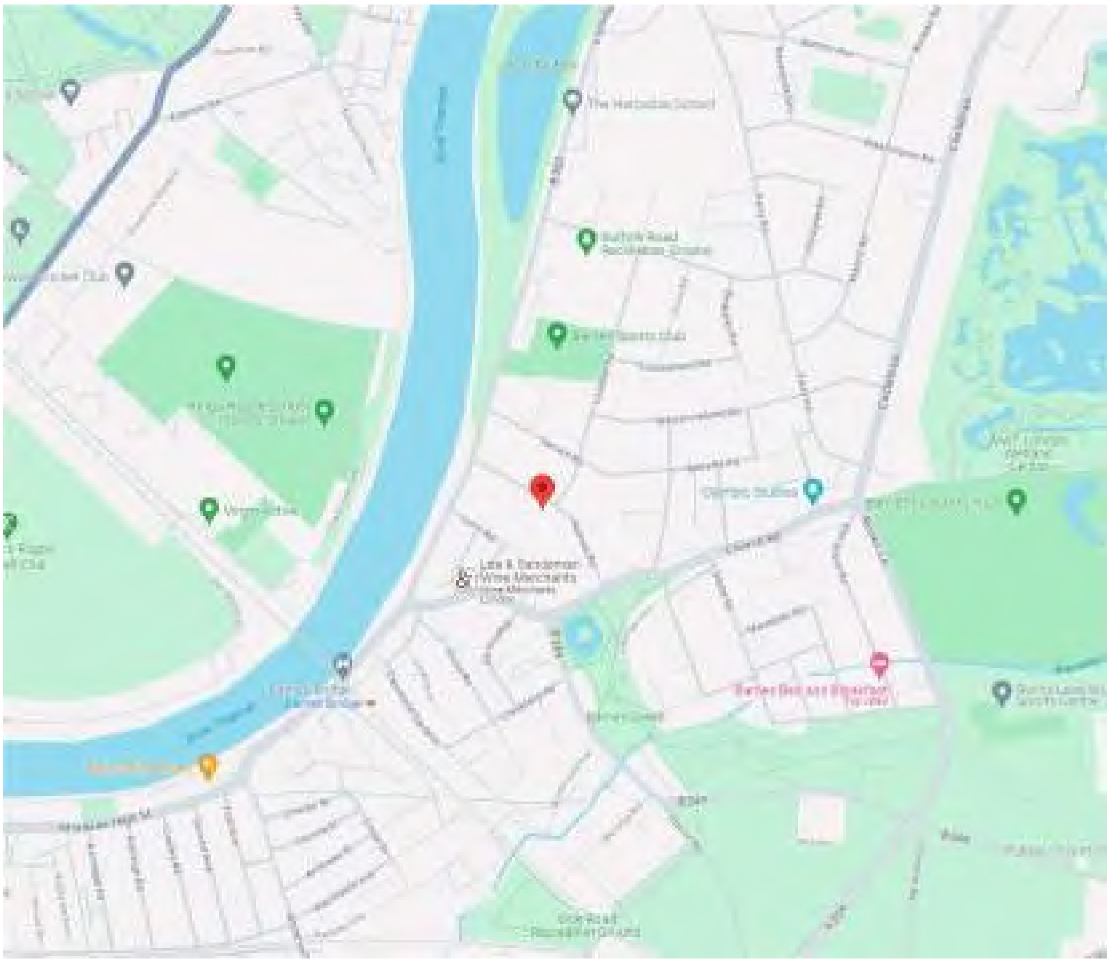


**Figure 1 from Google Maps – 34 Nassau Road**

London Tube maps indicate that the property is approximately 2000m from the district line.

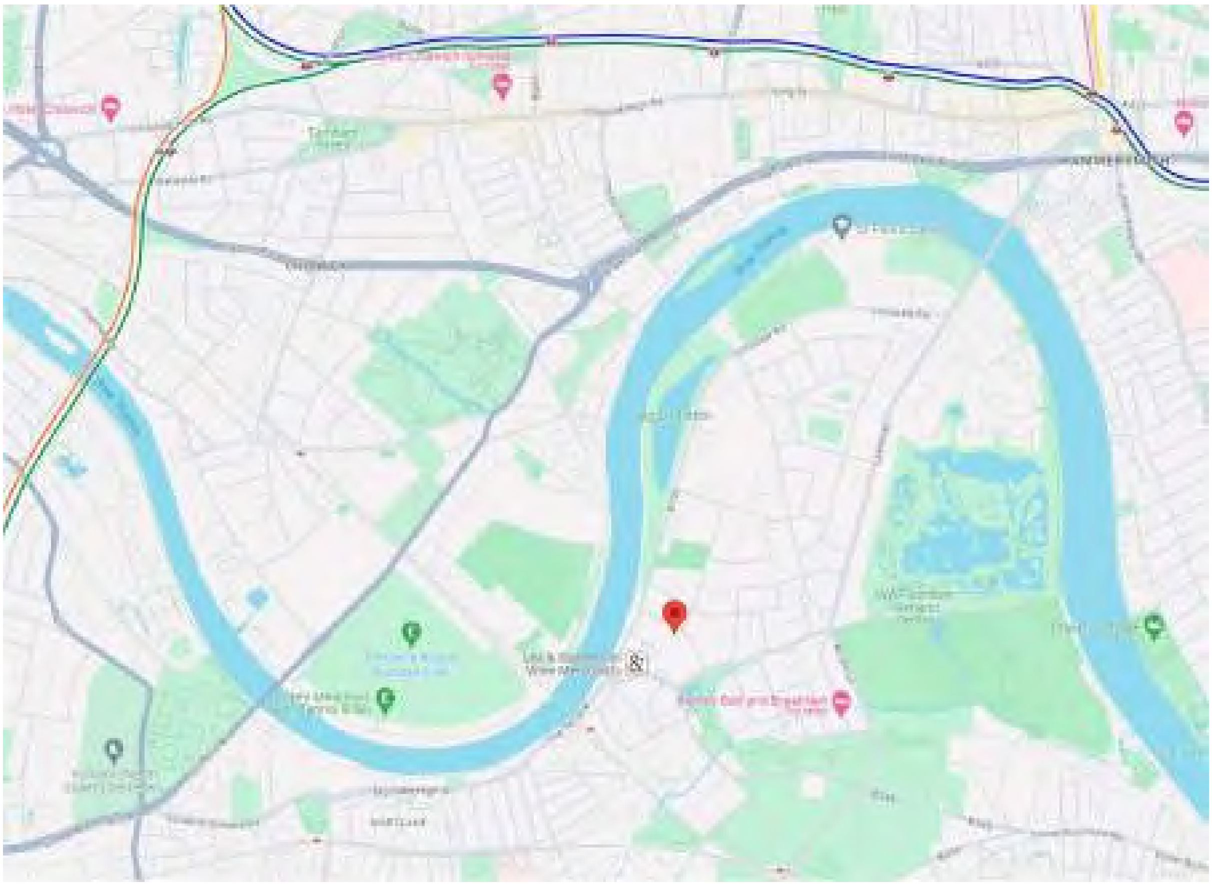


**Figure 2 from Google Maps – Proximity of Tube Lines**

## 2.2 Existing Structure Summary

The properties on Nassau road were constructed during the early 20th Century. It is a semi-detached structure.

Given the age of the redevelopment, it can be reasonably assumed that the structure is of traditional construction with load-bearing masonry walls/steel beams with supporting timber floors and a cut timber butterfly roof structure. The entrance to the property is to the front elevation with access over vault below.

The existing foundations are shallow stepped brick corbels. The original corbel foundations are likely to be founded into the made ground.

The stability of the existing structure is provided by the semi-detached nature, with floors and roofs acting as diaphragms to transfer any horizontal forces into the masonry walls. The roof and floor structure help to laterally restrain the front and rear walls to the property.

Existing architectural drawings indicate the layout of the existing structures, and we also confirm the existing structure is generally in good structural condition. From our research it would appear that there are no basement structures to the surrounding properties. If any additional basements are present DSA are to be informed to revise details accordingly.

The existing structure is generally in adequate structural condition and has been well maintained over its life.

## 3.0 Proposed Structure

### 3.1 Structural Proposals

The main elements to the proposed re-development of the property is the construction of a new single storey basement beneath the property and protruding into the rear garden forming a lightwell area. In addition to the above the internal layouts will be redeveloped.

The basement structure generally reflects the footprint of the existing property and is approximately 210m² in area at basement level and 588$m^3$ in volume. The formation level for the proposed structure is at basement level, which is approximately 4.15m below the existing external levels.

The new basement structure will be constructed using traditional concrete underpinning to the loadbearing masonry walls. This construction will aid in keeping the excavated basement area dry during the construction process.

A reinforced concrete shell will be constructed as the permeant basement structure. The basement structure floor will be constructed using a traditional concrete slab. The slab assists in propping the base of the concrete walls between elevations to assist in the prevention of sliding and overturning.

The basement structure will form a watertight enclosure by using a combination of water-resistant slurry to the face and between sections of retaining wall. Additionally, an internal waterproof drainage system (Delta Membrane Systems) will be used to prevent the ingress of water.

New steel and concrete framework will be provided at floor levels to provide adequate support to the proposed new walls and floor structures during the new construction. These steel frames will be supported from external party walls.

New internal partitions and external walls will be constructed in masonry and lightweight stud to ensure that additional dead loadings are minimised. Structural walls to staircases and service risers will be constructed in traditional blockwork construction.

We confirm that the provision of the reinforced concrete retaining walls and underpin foundations will be suitable for the proposed basement extension. The vertical and horizontal loadings from the structures above will be transferred down the underpinning and the load distributed beneath. This distribution of load will help spread the increased loads from the vertical extension. The construction of the reinforced concrete retaining walls is cast in a sequenced bay formation which will reduce the risk of movement. This is an accepted method of construction, and we see no problems with the structural proposals.

## 3.2 Loadings

The assessment of the existing building has been based on the following proposed Imposed Loadings.

| | |
|---|---|
| Typical Residential | 1.5kN/m² |
| Toilets/stairs/corridors/landings | 1.5kN/m² |
| Lightweight Partitions | 1.0kN/m² |
| Gym | 5.0kN/ m² |
| Car Parking | 2.5 kN/m² |

Proposed Dead Loadings are as specified within BS648 Schedule of weights of Building materials.

## 3.3 Impact of the Proposed Development on Existing Trees

No arboricultural report has been undertaken at this stage.

## 4.0 Ground Conditions

## 4.1 Ground Conditions

The site is generally flat lying and surrounded by residential developments of similar age and style.

The BGS map showed the site to be located directly upon the London Clay Formation with no overlying superficial deposits.

The bole hole investigation revealed that the soil composition consisted of made ground material up to a depth of 1.20 meters below ground level (BGL). From 1.2 to 2.0 meters, there is a layer of Kempton Park gravel member characterized by orange, brown, very sandy clay. Between 2.0 and 4.0 meters, there is light brown, very sandy gravel. It's noteworthy that groundwater was detected at approximately 2.8 meters below ground level from the borehole location, which equates to 4.2 meters below the existing ground floor level and beneath the proposed basement formation level.

An allowable gross bearing value of 200kPa has been taken.

The soil has been found to be contaminated after intrusive investigations in the rear garden at approx location of new swimming pool only (TP2 & TP3). Refer to the G&W remediation strategy in Appendix D for removal / remedy details.

## 4.2 Heave and Settlement

The foundations have been designed to consider the potential heave and settlement. The retaining wall has been designed to limit settlement and we do not expect any heave movement.

## 4.3 Site Hydrology/Groundwater

It is considered that the flow of ground water around the basement will not be affected by the new construction. The relatively small size of the basement's footprint combined with the small extent of depth affected compared with the approximate zone of gravels indicates that the flow of water should not be impeded.

In general, the "natural" trend in groundwater flow directions within the Secondary Upper Aquifer would originally have tended to be towards the old river courses incised in the River

Terrace Deposits which have largely been culverted. This is believed to be the case of the old Westbourne River and surrounding ground water.

# 5.0 Movement Assessment

## 5.1 Ground Movement Assessment

All structural alterations, including excavations and underpinning, alter the way buildings transfer loads to the ground. This can cause minor movements or settlements within the main building and neighbouring properties.

By detailed planning and precautions, movements during the construction process will be minimised. However, it is required to observe such movements as they occur, and it is assumed that a dilapidation and photographic survey of the existing buildings and adjoining buildings will be carried out prior to commencement of construction works.

All materials, workmanship and practice shall comply in general with the requirements of the relevant standards. However, the particular requirements of the engineering drawings and specification, including those related to structural movement and tolerances shall take precedence over other standards.

Following a detailed review of the permanent and temporary works we confirm that the works are generally estimated to fall within damage category 1 or 0. We confirm that this is satisfactory.

Monitoring will need to be carried out to assist in recording any movement. The temporary works design associated with the construction and associated temporary works will assist in minimising the effects of the Works on the existing buildings, but we cannot guarantee that movements will not occur.

## 5.2 Movement Monitoring Method

Fixed monitoring retro reflective targets are to be affixed to the neighbouring party walls.

Targets will be measured two weeks prior to the commencement of building works and at weekly and then fortnightly intervals as the work progresses to assess whether there is movement of the structure.

A report will be supplied after each visit determining any measured movement.

Target Installation

Reflective reference targets will be placed around the worksite outside the zone of influence. The reference & monitoring targets on the buildings will be retro reflective targets affixed with a strong yet ultimately removable adhesive. This is an economical and effective solution for measurement at this level. Where required some targets will be mounted on small plastic brackets to allow tangential observation.

It is assumed that safe access at height will be provided by the client, and that they will arrange all third-party agreements to install the targets on neighbouring properties.

Observation Stations

A site grid will be set up with the referenced retro targets fixed to stable structures outside the area of influence. These reference datum points will be observed prior to each observation session. A minimal total station traverse will be used to observe the internal targets. All the initial observations will be related to OS datum via GPS observations.

Observation Equipment

The observations will be made on each occasion with a Leica TS30 which is capable of sub second and sub millimetre measurement. It is an instrument designed particularly for this type of task.

Accuracy of Measurement

We would expect that the relative accuracy would be +/-1.0mm to the retros. The absolute accuracy between all targets is more likely to be +/-2mm. The accuracy generally depends on the accessibility of the measurement position. Ideally, we would wish to minimise any transferring of control position (traversing) but this depends on the site activity at the time and therefore the sight-lines to targets that are possible.

Trigger Values

Amber - Cumulative movement of more than +/-5mm.

Red - Cumulative movement of more than +/-8mm.

Trigger Actions

Amber - All parties will be information that the amber trigger level has been reached/exceeded. The sequence of works and methodology will be reviewed by interested parties.

Red - All interested parties will be informed that the red trigger level has been reached/exceeded.

Works in the affected area will be made safe and suspended.
A meeting will be held on site with all interested parties to review the sequence of works and the methodology and agree on any revisions to procedures which may be considered necessary.

At code red monitoring should be increased to alternative days (i.e. 3 / 4 times weekly).

The monitoring frequency will be reviewed commensurate with the rate at which movements develop.

# 6.0 Construction Method

## 6.1 Proposed Demolition and Construction

A significant factor affecting the choice of structural solution for the basement works includes preventing movement, settlement and the risk of collapse of existing structures when the current permanent horizontal support provided by the ground is removed.

The permanent works will need to be constructed in a manner that ensures that the existing masonry structures are continuously supported both vertically and horizontally without undue movement both during the construction works and in the final state.

The immediately adjoining properties will be monitored for movement and damage during the initial installation of the underpinning, excavation, construction and initial transfer of loads to the permanent floors and walls. All measures will be subject to agreement with the owners and occupiers of these premises under the Party Wall Act 1996.

To maintain structural integrity to the building and allow works to be carried out, a tried and tested method of underpinning is proposed. This involves the ground being excavated in alternate sections underneath the existing walls and reinforced concrete shuttered and poured under the exposed existing foundations. Once the concrete has achieved sufficient strength the same process is then applied to the adjacent sections ensuring uniform structural support at all times, when this is completed the floor level can be lowered to the base of the basement slab and the basement formed from reinforced waterproof concrete.

## 6.2 Site Set Up

1. Erect site hoarding to the agreed layout and make site boundaries secure.
2. Set up site office, welfare and toilets to the agreed layout
3. Perform a detailed survey of 34 Nassau Road and adjacent properties to confirm the assumed structure and to determine the size and level of the existing neighbouring foundations.

## 6.3 Initial Temporary Works

1. Install external scaffold frame for full height and enclose the existing roof structure.
2. Soft Strip using appropriate plant and hand tools to remove any non-loadbearing elements, suspended ceilings fixtures and fittings, electrical and mechanical systems skirting's door frames etc.
3. Isolate existing services.
4. Install temporary supports to support existing roof structure
5. Install RMD horizontal supports at second floor level
6. Remove internal structure down to second floor level
7. Install RMD horizontal supports at first floor level
8. Remove internal structure down to first floor level
9. Install RMD horizontal supports at ground floor level
10. Remove internal structure down to ground floor level
11. Install pile and needle beams to allow removal of rear and side walls
12. Demolish rear wall and side walls to allow ground floor walls to be completely demolished
13. Remove ground floor structural slab
14. Reduce ground Locally to 500mm below ground floor level or to U/S of footing whichever deeper.
15. All existing internal foundations and drainage to be grubbed out as necessary.
16. Bung existing drainage system at ground floor level within the front drive to prevent backup from existing drainage system

## 6.4 Reinforced Concrete Underpinning/Basement Construction

Due to the extents and depth of underpinning required, it is likely to necessitate a single-phase underpinning arrangement to the basement structure generally.

1. Excavate down to the base of the underpinning in the sequence provided and cast the reinforced concrete wall and underpinning to the existing walls. (Provide vertical sacrificial props as necessary if underside of existing corbeling is in poor condition)

Ensure underpin trench is fully shored using M8 sheet piles and propped horizontally with acrow props. After each section of underpin is cast the working trench should be backfilled with arisings to ground level.

2. Dry pack to be provided between top of underpinning and underside of existing footing. Snap off corbel as necessary. If existing concrete footings are found dowel bar tie into underpin section vertically.
3. It may be necessary to provide ground water control during the construction works. If soils encountered appear to be unstable, loose or saturated consideration should be given in to splitting the vertical height of the underpin.
4. Once all underpins have been cast the existing ground level is to be excavated to 300mm above the base of the first stage of horizontal props. Wailing beam and horizontal props are to be installed as the excavation progresses to provide adequate support.
5. Repeat stages 4 until formation level is reached.
6. Excavate to formation level of basement level.
7. Repeat stages above until pool formation level is reached.
8. At formation level fix reinforcement and cast the new basement reinforced slab, including new drainage and sump/pump points required for the waterproofing and Plant Room.
9. Install scaffold frame to create working platform from basement formation level.
10. Install new padstones to the proposed ground floor steel beams
11. Install new steelwork at ground floor level and lay ground floor metal deck and reinforcement.
12. Cast and cure new concrete ground floor structure.
13. Install new lining walls and fully tie to top of the new retaining structure to ensure retaining structure is fully propped in the permanent case.
14. Remove the previously installed horizontal temporary props to the underpin sections leaving propping to the levels above
15. Remove all temporary propping as construction progresses when concrete is fully cured.
16. Install waterproofing as necessary.

## 6.5 Principal Contractor Responsibilities

The Contractor is entirely responsible for maintaining the stability of all existing buildings and structures, within and adjacent to the works, and of all the works from the date of possession of the site until practical completion of the works.

The contractor shall install and maintain all necessary temporary works and shall produce a Temporary Works Register. The temporary works proposals shall be checked and calculations and signed off by a qualified TWC (Temporary Works Co-Ordinator).

Under no circumstances will any structural alterations be carried out prior to the project structural engineer commenting on the contractor's temporary works proposals.

The contractor is to familiarise himself with the building and its structure so that he is aware of the nature and magnitude of the loads to be supported.

Particular care is to be taken to ensure that temporary props are regularly inspected and remain adequately seated and tightened so that support to the structure above is not allowed to yield during building operations.

The contractor is to ensure that any temporarily propped structure is adequately wedged, pinned or packed off the permanent works using suitably sized and spaced steel shims fixed in position prior to removal of any temporary supports.

In addition, the contractor shall ensure that loads are transferred from temporary supports/props to the permanent structure without resulting in excessive deflection/movement of the temporary or permanent structure. The contractor shall assess the need for jacking or pre-deflection of permanent structural members prior to transferring loads from temporary supports/props to ensure that deflections of the permanent structure, when loaded, does not result in excessive deflection due to slack connections or any damage (including cracking) to any of the permanent structures or buildings, etc.

The contractor shall ensure that any completed or partially completed structural element is not overloaded.  Details of design loads may be obtained from the structural engineer upon request.

All temporary works to support the sides of excavations for new foundations shall be designed in accordance with BS 8000 part 1: 1989 and any other relevant approved documents.

The designated Temporary Works Co-Ordinator (TWC) should be employed to oversee all temporary works elements during all construction stages.  He may be assisted on site by a Temporary Works Supervisor (TWS).  If a variation to any Temporary Works Design is required by on site conditions the installation shall be stopped.  The variation must then be checked or modified by the Temporary Work Designer (TWD) and approved by the Temporary Works Co-Ordinator prior to continuing with the installation.

## 6.6 CDM Regulations 2015

This particular project will require careful consideration by all parties in regards to their roles and responsibilities under to the 2015 CDM (Construction and Design Management) Regulations. The particularly onerous requirements will revolve around the permanent design works and temporary design works and installation for the project. There will therefore need to be a carefully controlled process where the procedures and methodologies are detailed and then followed by the appropriate designers and contractors.

The primary concern with this project is the temporary works processes that will need to be managed initially by the design team and subsequently prior to works commencing on site by the Principal Contractor and his Temporary Works Design Team.

This will entail the production of a Temporary Works Register by the Temporary Works Co-Ordinator for the project who will be appointed by the Principal Contractor. The Temporary Works Co-Ordinator will then need to liaise with the Temporary Works Designers as well as the individual sub-contractors. This is to ensure that at all times the works and adjoining properties are safe from any structural instability or failure. This will then ensure the safety of the site personnel, the adjoining occupiers and the general public. The Principal Designer for the project will also have an obligation to ensure that this is carried through from the design phase through into the construction phase. The Principal Designer will need to liaise with the Temporary Works Designer prior to any temporary works being designed and executed on site. This is to ensue that continuity of any methodologies and understandings of the permanent works are transferred through to the construction phase and any temporary works design requirements.

Therefore, there will be a considerable amount of liaison between the Principal Designer and the Principal Contractor to ensure that this is managed efficiently and accurately and hence significantly reduce the risk of any failures.

The Client themselves will need to be aware of all of these processes going on as part of their project delivery. In addition to this, they will also share the responsibility with the Principal Contractor for all the welfare facilities and accommodation required for the site personnel.

This will be particularly tricky in relation to the significant site constraints with regards to space. However, this is something that can be resolved within the pre-start planning phase and as part of any tender appraisal process.

Above ground level, the project is fairly straightforward and nothing in the preliminary proposals would suggest that the usual construction methodologies for a structure of this size, type and framing are out of the ordinary. Therefore, they should be well within the capabilities of a competent contractor.

There will be the usual requirements for a Pre-Construction Information File to be prepared by the Principal Designer in conjunction with the Client. This will need to include a significant amount of documentation in regards to the adjoining buildings, site geology, services and any other unusual hazards.

Following this and prior to works commencing on site, the Principal Contractor will need to prepare his Construction Phase Plan which should be sufficiently developed to allow works commence on site. Within this document there will be procedures outlined for the works themselves along with the temporary works management processes.

During the construction phase and following the completion of the building the contents and documentation associated with the Health & Safety File will need to be prepared. This is usually carried out by the Principal Designer in conjunction with the Principal Contractor. The file itself will then be presented to the Client shortly after completion of the building. It is normally then made readily available for any users of the building with regards to maintenance and, operations and any alterations / extensions in the future. Ideally a copy should be placed with the Deeds for future buyers and users of the property.

## 7.0 Conclusions

## 7.1 Evaluation of Project

Using current good practice in executing the works, it is considered that the proposed development at 34 Nassau Road can be realised whilst maintaining adequate temporary vertical and horizontal support to the ground and to all the surrounding masonry structures.

The final form of the basement construction will minimise any potential ground movements and will new create a load path for vertical and horizontal loads that does not overload the surface geology.

The proposed development does not increase the area of hard standing impermeable to rain and as such does not adversely impact on the existing site hydrology or increase surface water discharge volume from site.

Detailed site investigation, design calculations, drawings and method statements will be produced prior to commencement onsite for issue to the contractor, building control and party wall surveyors. Any hazards remaining after design statement will be developed as the design progresses to highlight residual design risks outside those expected in standard construction.

## 8.0 Certification

| | |
|---|---|
| Signed: | Title: Designer |
| Name: Joseph McLoughlin | Date: March 2024 |

| | |
|---|---|
| Signed: | Title: Checker |
| Name: David Smith | Date: March 2024 |

I certify that the staff who have prepared the above Design and Check are competent to carry out their duties and that they have used reasonable professional skill and care.

Eur Ing **David Smith** BSc(Hons), CEng, MICE, MIStructE, CMaPS, MFPWS, FCABE, ACIArb

## APPENDIX A

## DRAWINGS

ALL DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO ORDERING / FABRICATION OF MATERIALS AND COMMENCEMENT OF WORKS

CDM 2015 DESIGNER NOTES

IN ADDITION TO THE HAZARDS, AND RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION.

CONSTRUCTION:

1. N/A

FOR INFORMATION RELATING TO END USE, MAINTENANCE, DEMOLITION, SEE THE HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

## Notes

1. IF IN DOUBT - ASK !!! DO NOT SCALE
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS.
3. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND BUILDING PRACTICE.
4. ALL DIMENSIONS TO BE CHECKED PRIOR TO STARTING THE WORKS ON SITE. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
5. CONTRACTOR TO ASCERTAIN THE LOCATION OF SERVICES ON SITE PRIOR TO STARTING THE WORK.
6. ALL DIMENSIONS FOR CONSTRUCTION ARE TO BE OBTAINED FROM SITE MEASUREMENTS OR ARCHITECTS SETTING OUT DRAWINGS PRIOR TO MANUFACTURE/BUILDING.

CONCRETE MIX SPECIFICATIONS

7. SPECIAL FOUNDATION PANELS
CONCRETE MIX TO BE RC50 (C40/50 STRENGTH CLASS) WITH A MINIMUM CEMENT CONTENT OF 340kg/m3 AND A MAXIMUM WATER/CEMENT RATIO OF 0.45.
MAXIMUM AGGREGATE SIZE TO BE 20mm.
8. BASEMENT SLAB
CONCRETE MIX TO BE RC35 (C28/35 STRENGTH CLASS) WITH A MINIMUM CEMENT CONTENT OF 280kg/m3 AND A MAXIMUM WATER/CEMENT RATIO OF 0.60.
MAXIMUM AGGREGATE SIZE TO BE 20mm.
9. CONCRETE TO BE WELL VIBRATED TO ENSURE A SOLID MASS FREE FROM VOIDS
10. ALL WATERPROOFING TO CONTRACTORS DETAILS AND SPECIFICATION.
11. 50mm CONCRETE BLINDING TO BE INCORPORATED BELOW SPECIAL FOUNDATION WALL PANEL BASE AND BASEMENT FLOOR SLAB.

NOTE:

NO GROUND WATER IS EXPECTED FOLLOWING RESULTS OF BOREHOLE INEVSTIGATION HOWEVER, IF GROUND WATER IS BREACHED, WORKS ON SITE TO STOP. DSA TO BE INFORMED AND PROVIDE PROPOSALS

NOTE:

ALL EXISTING PARTY WALL THICKNESSES ARE ASSUMED TO BE 330mm THK. TO BE CONFIRMED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF WORKS.

NOTE:

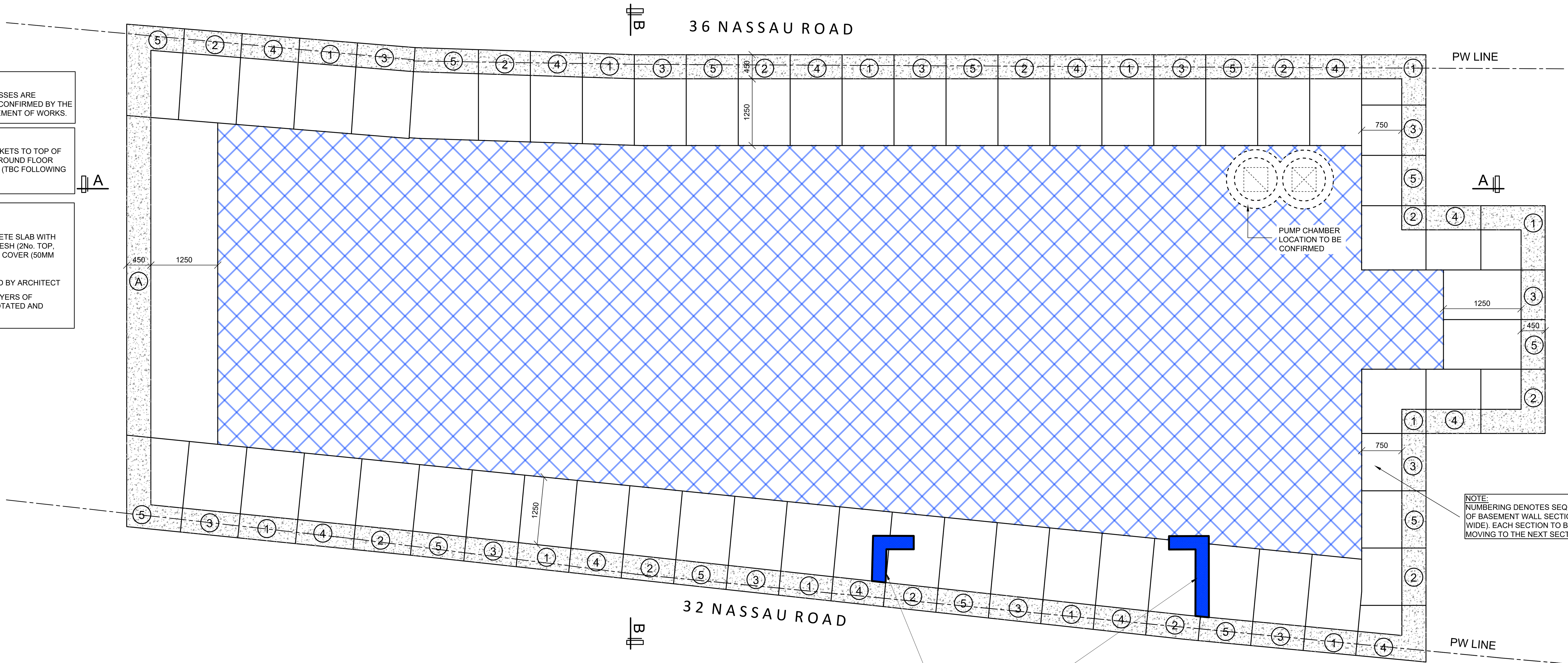
ALLOW FOR LOCALLY FORMING POCKETS TO TOP OF WALLS IN AREAS TO SEAT LOWER GROUND FLOOR SUPPORT BEAMS WHERE REQUIRED (TBC FOLLOWING TRIAL HOLS).

SLAB LEGEND

450mm THICK CONCRETE SLAB WITH 4No. LAYERS B1131 MESH (2No. TOP, 2No. BTM) WITH 40mm COVER (50MM CONCRETE BLINDING

NOTE, FINISHES TO BE CONFIRMED BY ARCHITECT

NOTE, B1131 MESH ALTERNATE LAYERS OF DOUBLE MESH REVERSED AND ROTATED AND LAYERS PLACED TOGETHER




250mm THICK R.C CONCRETE WALL TO AID IN SUPPORTING BEAMS. WALL TO BE INSTALLED PRIOR TO INSTALLING STEELWORK

BASEMENT PLAN
(SHOWING BASEMENT SEQUENCING & SLAB)
1:50

| ISSUE | REVISION | BY | DATE |
|---|---|---|---|
| P1 | FIRST ISSUE | JM | 28.03.24 |



ISSUE
*PRELIMINARY*

CLIENT
RJH ARCHITECTURE

CONTRACT
34 NASSAU ROAD
LONDON

TITLE
PROPOSED BASEMENT LAYOUT

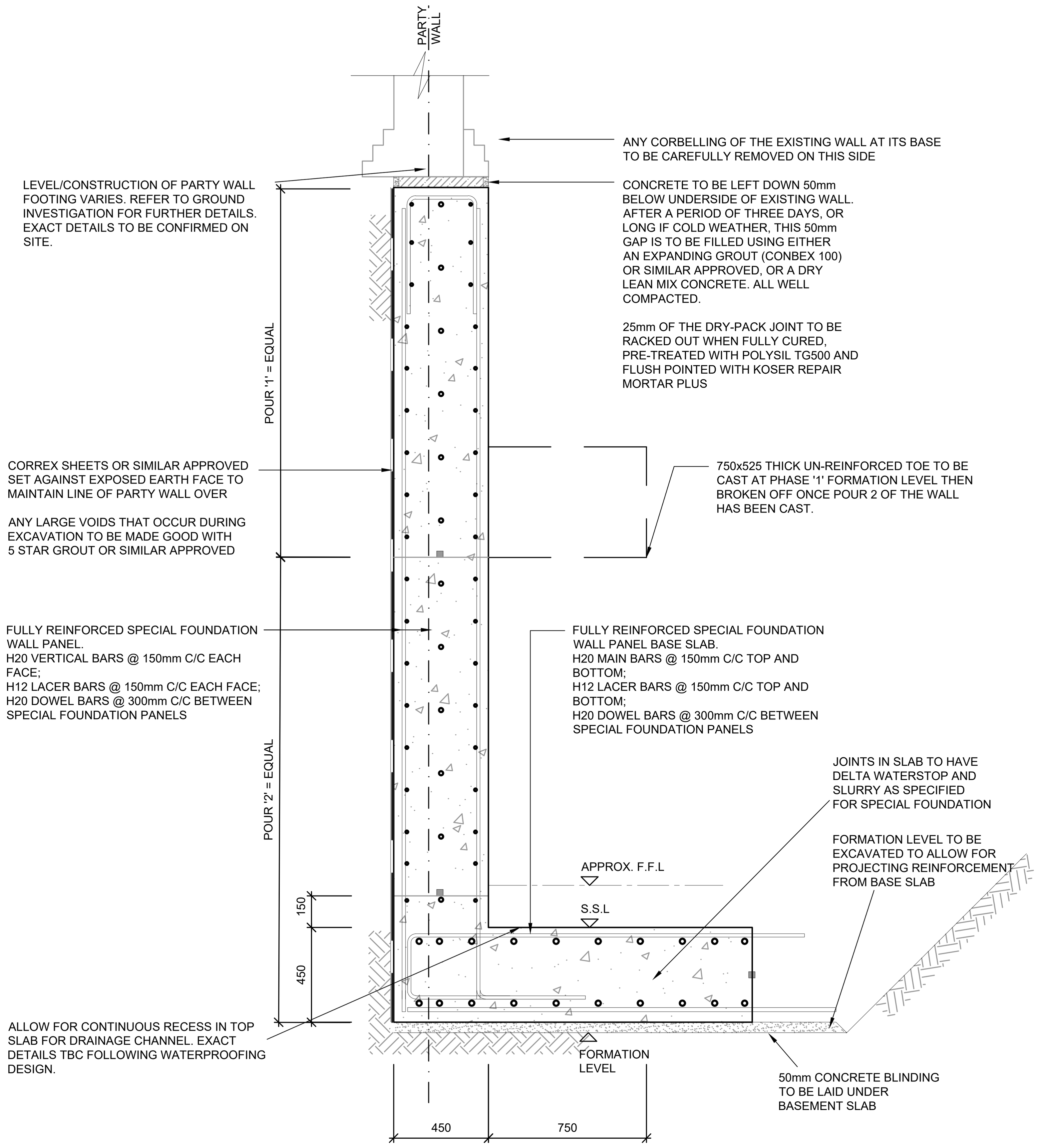
ARCHITECT
RJH ARCHITECTURE

| DRAWN | CHECKED | DATE | SCALE |
|---|---|---|---|
| JM | TG | MAR' 24 | 1:50 @A1 |

David Smith Associates
Consulting Structural & Civil Engineers
Tel: (01604)782620
Email: northampton@dsagroup.co.uk
Website: www.dsagroup.co.uk
8 Duncan Close
Moulton Park
Northampton NN3 6WL

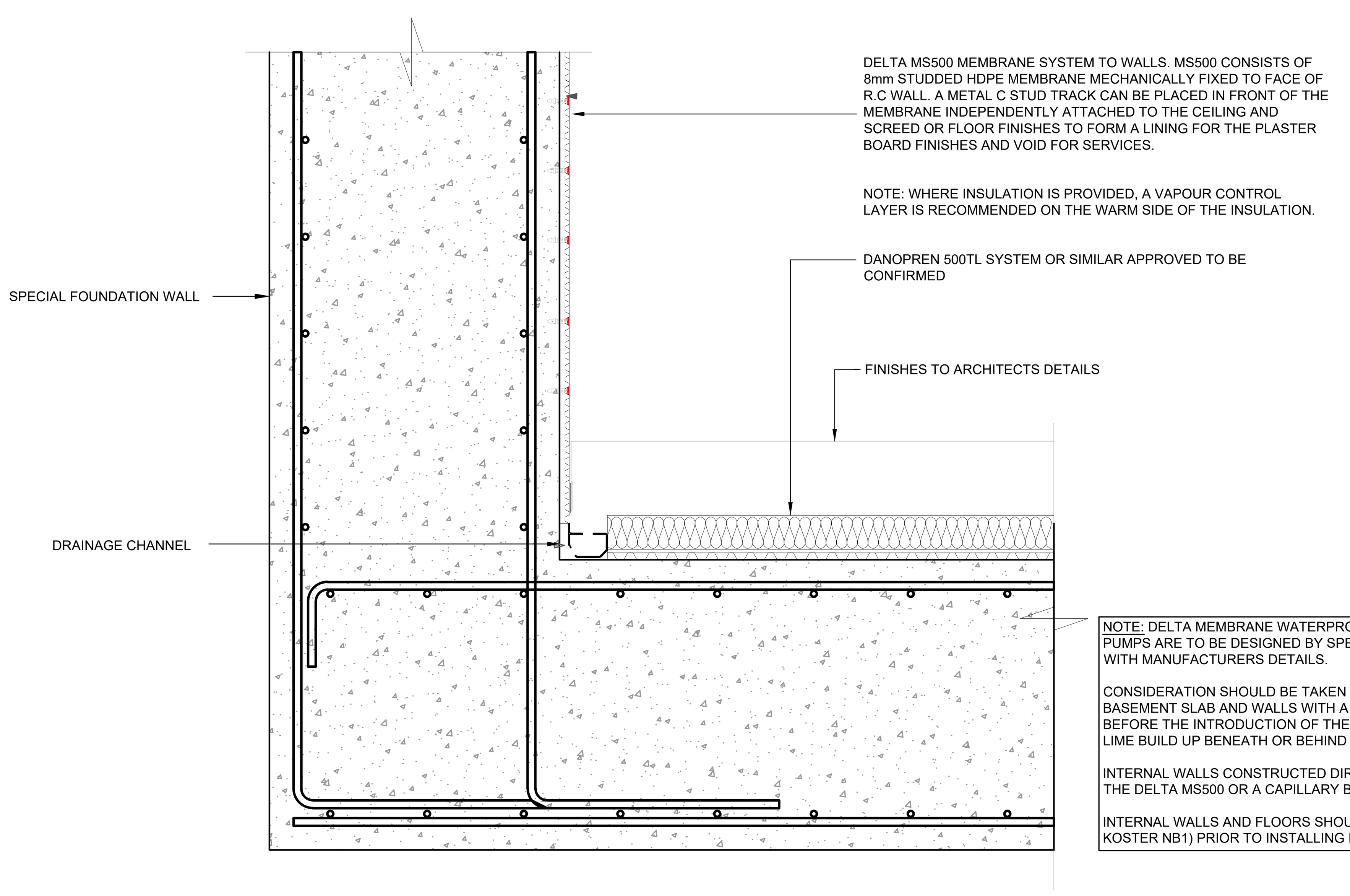
DRAWING NUMBER 24 54720/01 REVISION P1

# ALL DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO ORDERING / FABRICATION OF MATERIALS AND COMMENCEMENT OF WORKS




## TYPICAL SPECIAL FOUNDATION WALL PANEL

1:20




NOTE: DELTA MEMBRANE WATERPROOFING SYSTEM, INCLUDING DRAINAGE SYSTEM, SUMP AND PUMPS ARE TO BE DESIGNED BY SPECIALIST MANUFACTURE AND INSTALLED IN ACCORDANCE WITH MANUFACTURERS DETAILS.

CONSIDERATION SHOULD BE TAKEN TO TREAT ALL NEW CONCRETE WHICH INCLUDES THE BASEMENT SLAB AND WALLS WITH A FREE LIME TREATMENT SUCH AS KOSTER POLYSIL TG500 BEFORE THE INTRODUCTION OF THE DELTA MEMBRANES. THIS IS REQUIRED TO PREVENT FREE LIME BUILD UP BENEATH OR BEHIND THE MEMBRANES, IMPEDING FLOW.

INTERNAL WALLS CONSTRUCTED DIRECTLY OFF THE SLAB SHOULD EITHER BE WRAPPED WITH THE DELTA MS500 OR A CAPILLARY BREAK CAN BE FORMED WITH NB1 SLURRY.

INTERNAL WALLS AND FLOORS SHOULD BE FINISHED WITH A WATERPROOFING SLURRY (DELTA KOSTER NB1) PRIOR TO INSTALLING DELTA MEMBRANE.

## TYPICAL DELTA MEMBRANE SYSTEM DETAILS

TO BE DESIGNED BY SPECIALIST

1:10

### CDM 2015 DESIGNER NOTES

IN ADDITION TO THE HAZARDS, AND RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION.

CONSTRUCTION:

1. N/A

FOR INFORMATION RELATING TO END USE, MAINTENANCE, DEMOLITION, SEE THE HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

### Notes

1. IF IN DOUBT - ASK !!! DO NOT SCALE
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS.
3. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND BUILDING PRACTICE.
4. ALL DIMENSIONS TO BE CHECKED PRIOR TO STARTING THE WORKS ON SITE. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
5. CONTRACTOR TO ASCERTAIN THE LOCATION OF SERVICES ON SITE PRIOR TO STARTING THE WORK.
6. ALL DIMENSIONS FOR CONSTRUCTION ARE TO BE OBTAINED FROM SITE MEASUREMENTS OR ARCHITECTS SETTING OUT DRAWINGS PRIOR TO MANUFACTURE/BUILDING.

| ISSUE | REVISION | BY | DATE |
|---|---|---|---|
| P1 | FIRST ISSUE | JM | 28.03.24 |



ISSUE
*PRELIMINARY*

CLIENT
RJH ARCHITECTURE

CONTRACT
34 NASSAU ROAD
LONDON

TITLE
BASEMENT DETAILS

ARCHITECT
RJH ARCHITECTURE

| DRAWN | CHECKED | DATE | SCALE |
|---|---|---|---|
| JM | TG | MAR' 24 | 1:20 & 1:10 @A1 |


**David Smith Associates**
*Consulting Structural & Civil Engineers*
Tel: (01604)782620
Email: northampton@dsagroup.co.uk
Website: www.dsagroup.co.uk
8 Duncan Close
Moulton Park
Northampton NN3 6WL


| DRAWING NUMBER | 24 | 54720/02 | REVISION P1 |
|---|---|---|---|

# ALL DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO ORDERING / FABRICATION OF MATERIALS AND COMMENCEMENT OF WORKS

**CDM 2015 DESIGNER NOTES**

IN ADDITION TO THE HAZARDS, AND RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION.

CONSTRUCTION:

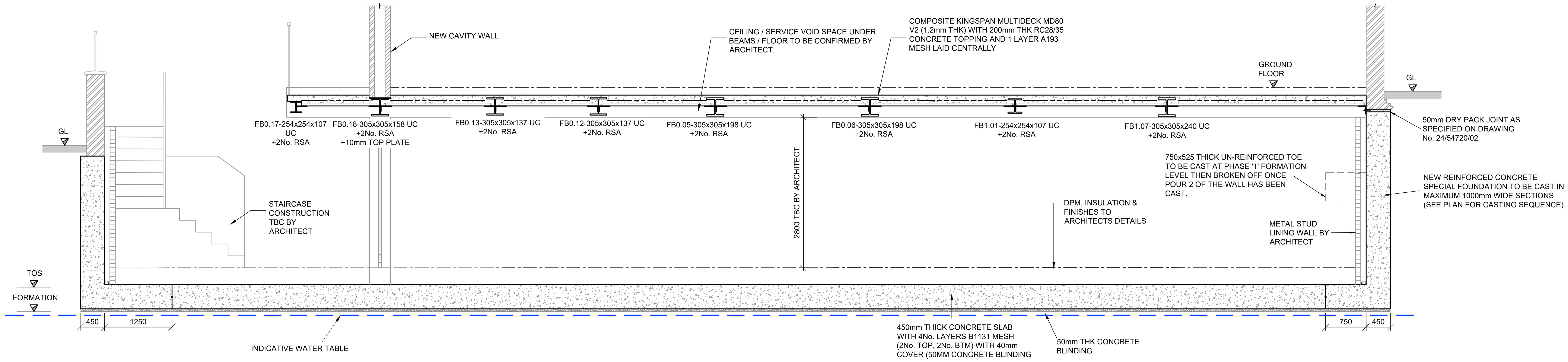
1. N/A

FOR INFORMATION RELATING TO END USE, MAINTENANCE, DEMOLITION, SEE THE HEALTH AND SAFETY FILE.

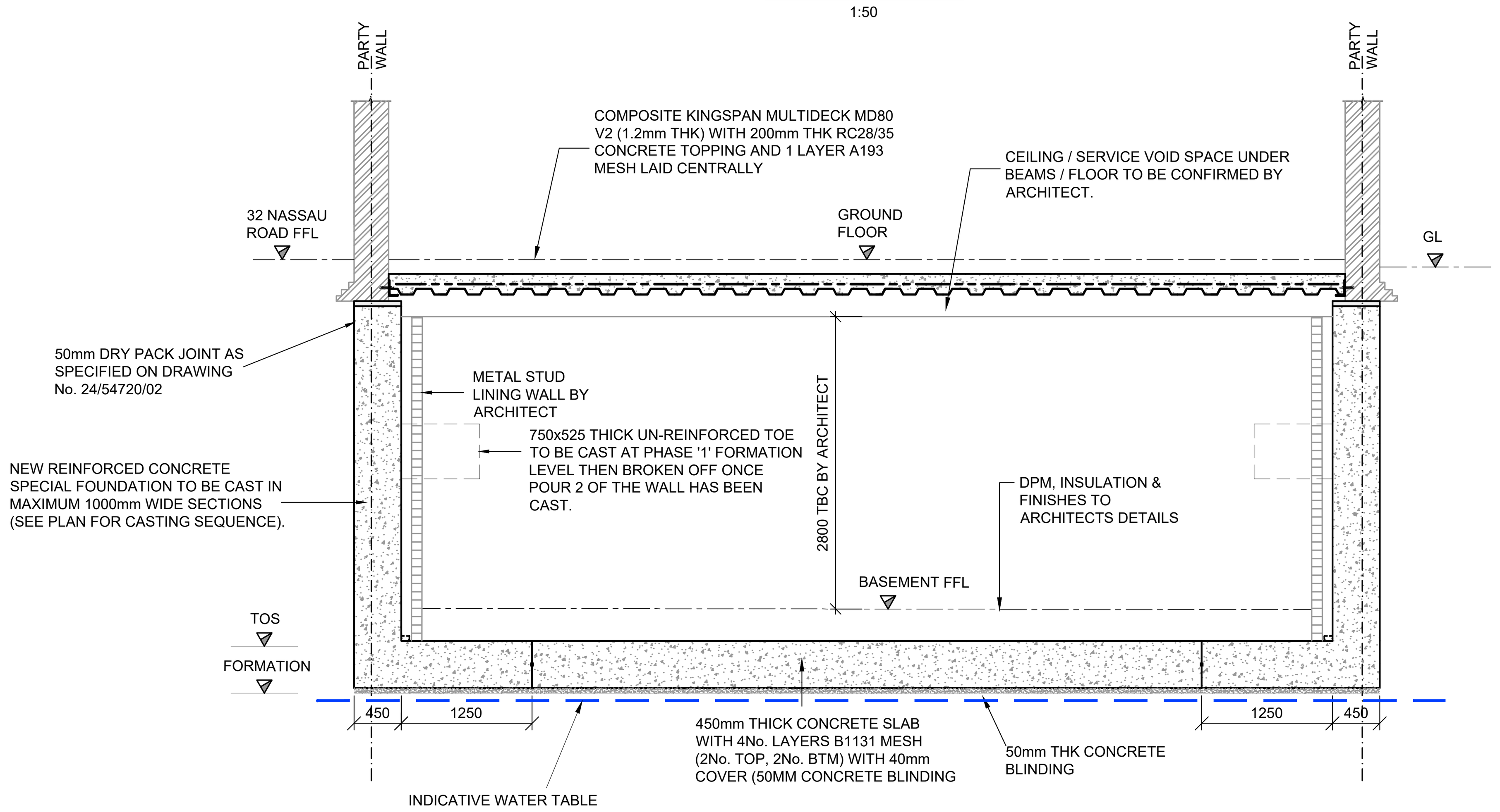
IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

## Notes

1. IF IN DOUBT - ASK !!! DO NOT SCALE
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS.
3. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND BUILDING PRACTICE.
4. ALL DIMENSIONS TO BE CHECKED PRIOR TO STARTING THE WORKS ON SITE. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
5. CONTRACTOR TO ASCERTAIN THE LOCATION OF SERVICES ON SITE PRIOR TO STARTING THE WORK.
6. ALL DIMENSIONS FOR CONSTRUCTION ARE TO BE OBTAINED FROM SITE MEASUREMENTS OR ARCHITECTS SETTING OUT DRAWINGS PRIOR TO MANUFACTURE/BUILDING.




**SECTION 'A-A'**
1:50




**SECTION 'B-B'**
1:50

NOTE:

NO GROUND WATER IS EXPECTED FOLLOWING RESULTS OF BOREHOLE INEVSTIGATION HOWEVER, IF GROUND WATER IS BREACHED, WORKS ON SITE TO STOP, DSA TO BE INFORMED AND PROVIDE PROPOSALS

| ISSUE | REVISION | BY | DATE |
|---|---|---|---|
| P1 | FIRST ISSUE | JM | 28.03.24 |



ISSUE: *PRELIMINARY*

CLIENT: RJH ARCHITECTURE

CONTRACT: 34 NASSAU ROAD LONDON

TITLE: PROPOSED BASEMENT SECTIONS

ARCHITECT: RJH ARCHITECTURE

| DRAWN | CHECKED | DATE | SCALE |
|---|---|---|---|
| JM | TG | MAR' 24 | 1:50 @A1 |

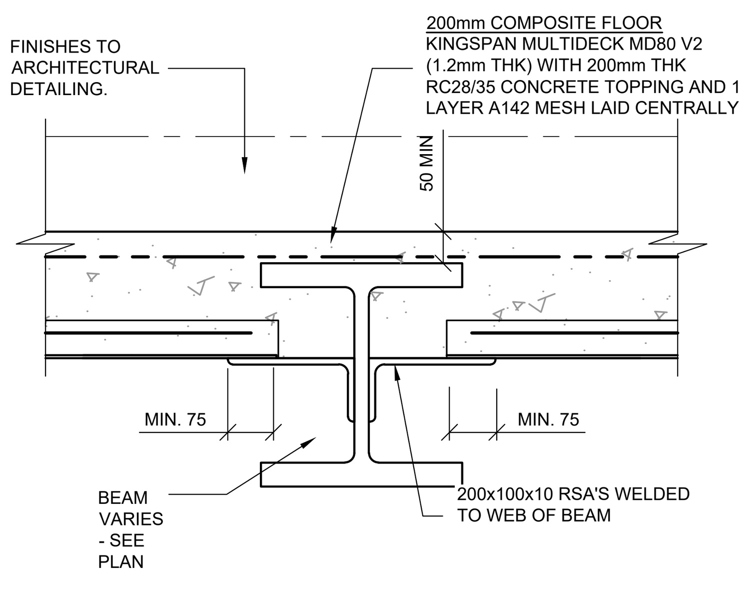

**David Smith Associates**
*Consulting Structural & Civil Engineers*

Tel: (01604)782620
Email: northampton@dsagroup.co.uk
Website: www.dsagroup.co.uk

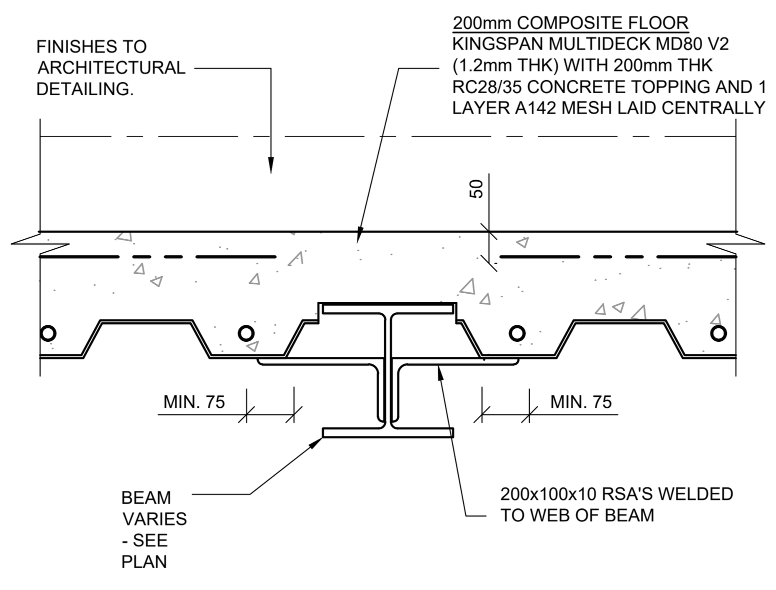
8 Duncan Close
Moulton Park
Northampton NN3 6WL


| DRAWING NUMBER | | | REVISION |
|---|---|---|---|
| | 24 | 54720/03 | P1 |

# ALL DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO ORDERING / FABRICATION OF MATERIALS AND COMMENCEMENT OF WORKS




TYPICAL FLOOR BEAM DETAIL '1'
FOR KINGSPAN MULTI DECK SLAB
1:10




TYPICAL FLOOR BEAM DETAIL FOR
KINGSPAN MULTI DECK SLAB
1:10

CDM 2015 DESIGNER NOTES

IN ADDITION TO THE HAZARDS, AND RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION.

CONSTRUCTION:

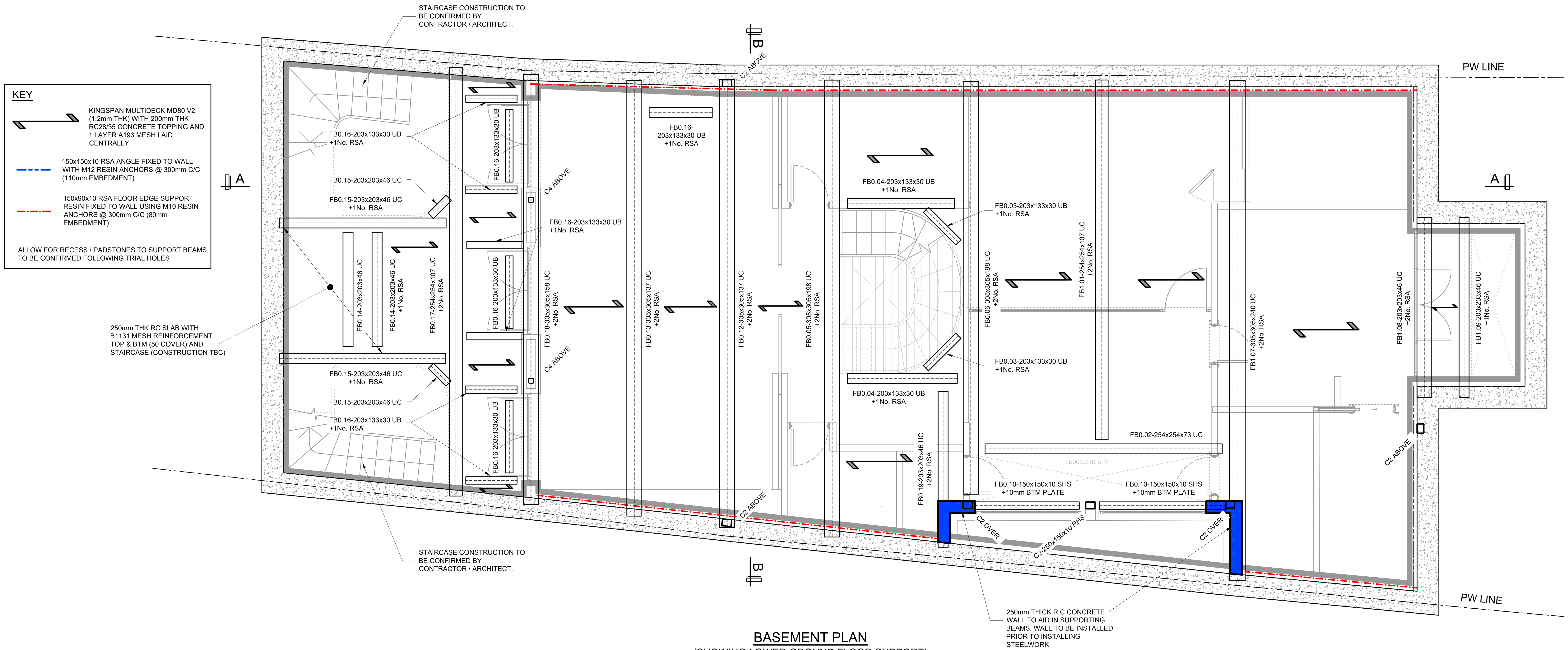
1. N/A

FOR INFORMATION RELATING TO END USE, MAINTENANCE, DEMOLITION, SEE THE HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

## Notes

1. IF IN DOUBT - ASK !!! DO NOT SCALE
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS.
3. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND BUILDING PRACTICE.
4. ALL DIMENSIONS TO BE CHECKED PRIOR TO STARTING THE WORKS ON SITE. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
5. CONTRACTOR TO ASCERTAIN THE LOCATION OF SERVICES ON SITE PRIOR TO STARTING THE WORK.
6. ALL DIMENSIONS FOR CONSTRUCTION ARE TO BE OBTAINED FROM SITE MEASUREMENTS OR ARCHITECTS SETTING OUT DRAWINGS PRIOR TO MANUFACTURE/BUILDING.
7. STEELWORK NOTES
ALL STEELWORK TO BE GRADE S355 TO B.S.5950-2. ALL MATERIALS TO COMPLY WITH B.S. 5950:2000 AND TO B.S.C.A.1/89 - NATIONAL STRUCTURAL STEELWORK SPECIFICATION
8. ALL STEELWORK TO BE SHOT BLASTED TO SA 2.5 OR MECHANICALLY WIRE BRUSHED TO REMOVE ALL SURFACE CONTAMINATION, RUST OR MILLSCALE AND HAVE 2 COATS OF ZINC PHOSPHATE PRIMER APPLIED TO ACHIEVE A MINIMUM DRY FILM THICKNESS OF 75 MICRONS PER COAT, PRIOR TO SITE DELIVERY. AFTER ERECTION OF STEELWORK IS COMPLETE ANY DAMAGED SURFACES TO BE MADE GOOD WITH 2 COATS OF ZINC PHOSPHATE PRIMER TO ACHIEVE A MINIMUM DRY FILM THICKNESS OF 75 MICRONS PER COAT.
9. GRADE 4.6 BOLTS TO B.S.4190 AND GRADE 8.8 BOLTS TO B.S.3692. ALL BOLTS AND NUTS TO BE HOT DIP SPUN GALVANISED TO B.S. 729. A ROUND WASHER, TO B.S. 4320 AND HOT SPUN GALVANISED TO B.S. 729, TO BE PROVIDED UNDER EVERY NUT TO MINIMISE DAMAGE TO COATING. ALL NUTS TO BE CORRECTLY TIGHTENED AND HAVE AT LEAST 2 THREADS PROJECTING BEYOND THE NUT. ALL BOLTS TO HAVE STRUCTURAL THREAD AND ROUND SHANK.
10. FIRE SURROUND TO ALL STEELWORK AS PER ARCHITECTS REQUIREMENTS




BASEMENT PLAN
(SHOWING LOWER GROUND FLOOR SUPPORT)
1:50

| ISSUE | REVISION | BY | DATE |
|---|---|---|---|
| P1 | FIRST ISSUE | JM | 28.03.24 |



ISSUE
*PRELIMINARY*

CLIENT
RJH ARCHITECTURE

CONTRACT
34 NASSAU ROAD
LONDON

TITLE
BASEMENT LAYOUT
SHOWING STRUCTURE ABOVE

ARCHITECT
RJH ARCHITECTURE

| DRAWN | CHECKED | DATE | SCALE |
|---|---|---|---|
| JM | TG | MAR' 24 | 1:50 & 1:10 @A1 |

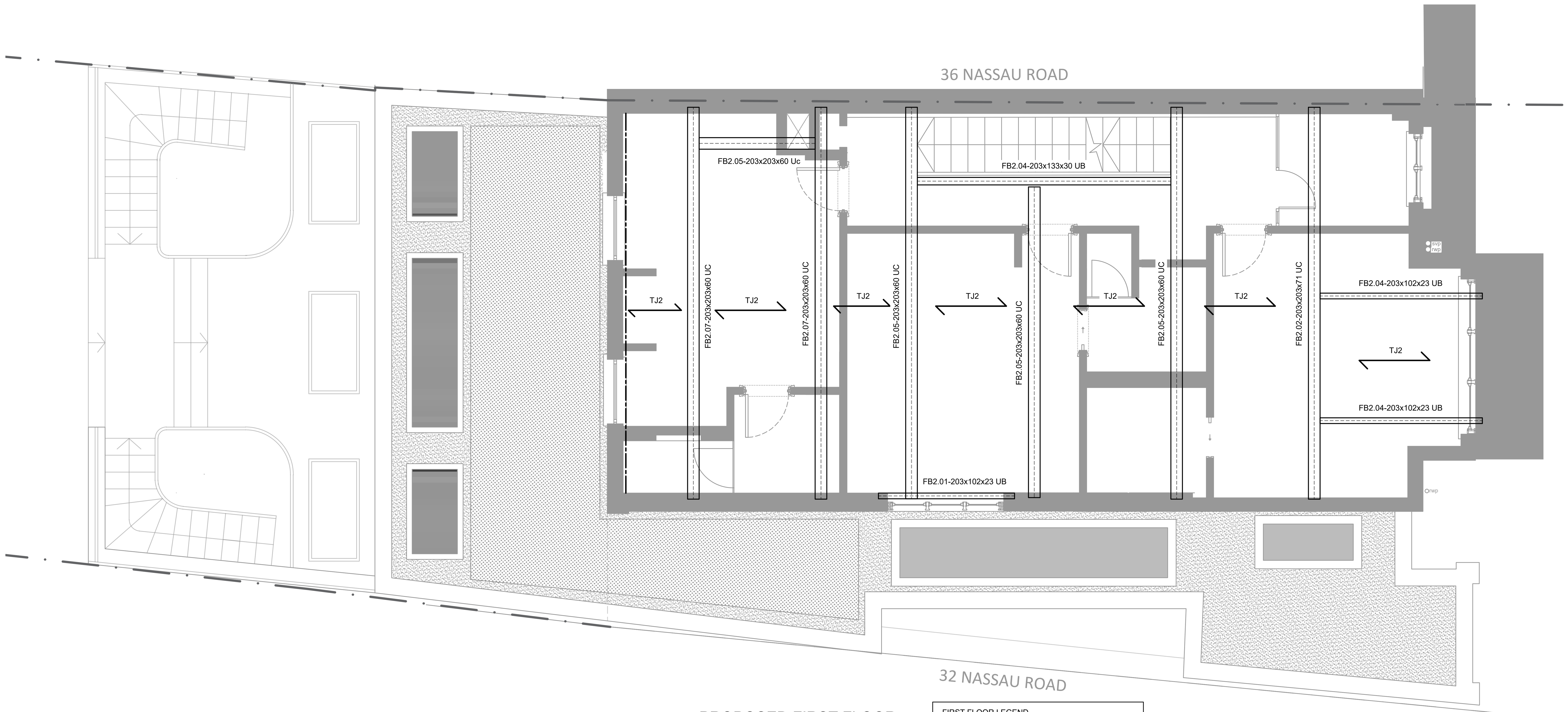

**David Smith Associates**
*Consulting Structural & Civil Engineers*

Tel: (01604)782620
Email: northampton@dsagroup.co.uk
Website: www.dsagroup.co.uk

8 Duncan Close
Moulton Park
Northampton NN3 6WL


| DRAWING NUMBER | | | REVISION |
|---|---|---|---|
| | 24 | 54720/11 | P1 |

# ALL DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO ORDERING / FABRICATION OF MATERIALS AND COMMENCEMENT OF WORKS



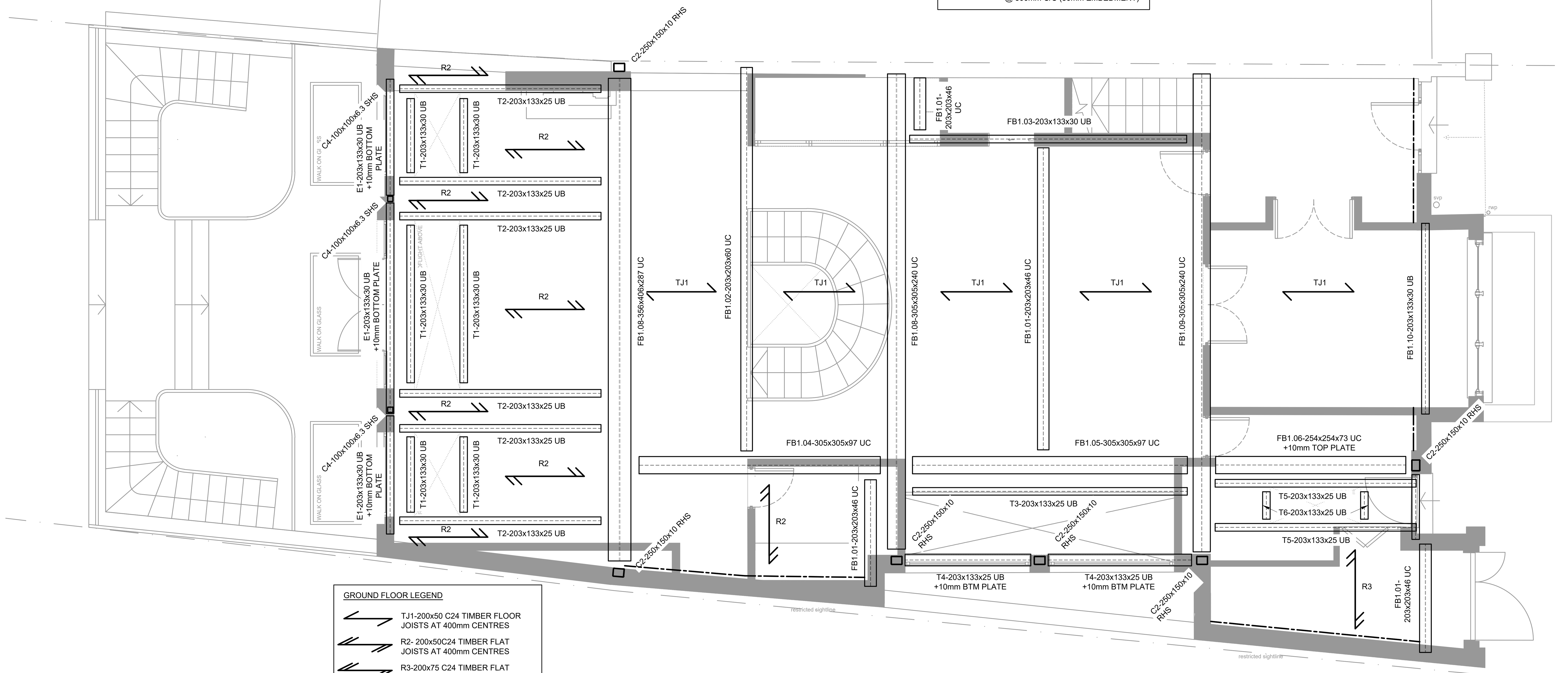

## PROPOSED FIRST FLOOR

(SHOWING STRUCTURE ABOVE)

1:50

FIRST FLOOR LEGEND

- TJ2-200x50 C24 TIMBER FLOOR JOISTS AT 400mm CENTRES
- 200x63 C24 WALL PLATE FIXED TO WALL USING M10 RESIN ANCHORS @ 300mm C/C (80mm EMBEDMENT)




GROUND FLOOR LEGEND

- TJ1-200x50 C24 TIMBER FLOOR JOISTS AT 400mm CENTRES
- R2- 200x50C24 TIMBER FLAT JOISTS AT 400mm CENTRES
- R3-200x75 C24 TIMBER FLAT JOISTS AT 400mm CENTRES
- 200x63 C24 WALL PLATE FIXED TO WALL USING M10 RESIN ANCHORS @ 300mm C/C (80mm EMBEDMENT)

## PROPOSED GROUND FLOOR

(SHOWING STRUCTURE ABOVE)

1:50

CDM 2015 DESIGNER NOTES

IN ADDITION TO THE HAZARDS, AND RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION.

CONSTRUCTION:

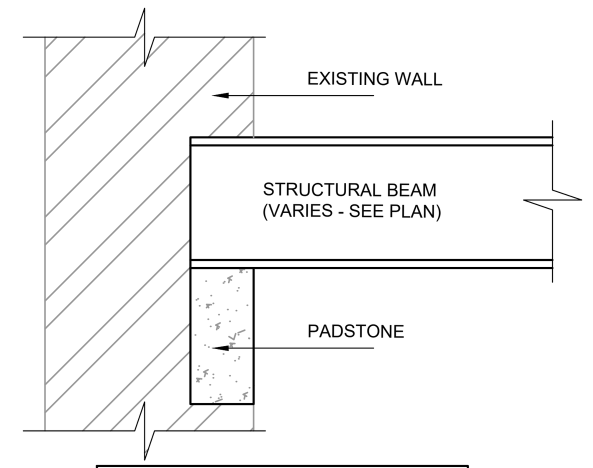
1. N/A

FOR INFORMATION RELATING TO END USE, MAINTENANCE, DEMOLITION, SEE THE HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

## Notes

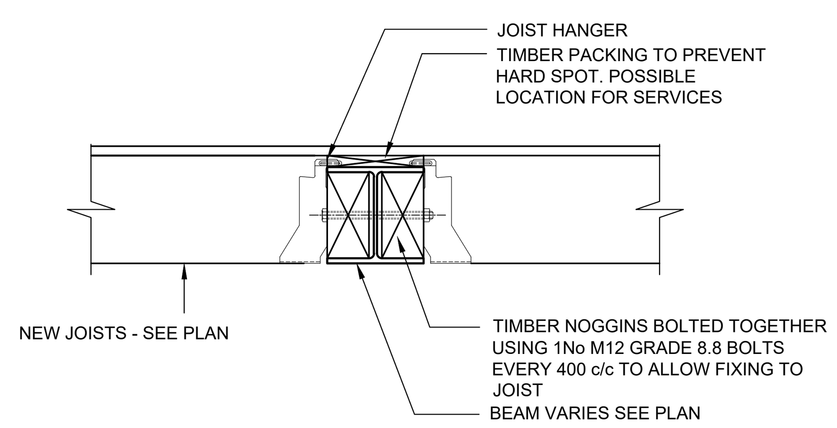
1. IF IN DOUBT - ASK !!! DO NOT SCALE
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS.
3. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND BUILDING PRACTICE.
4. ALL DIMENSIONS TO BE CHECKED PRIOR TO STARTING THE WORKS ON SITE. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
5. CONTRACTOR TO ASCERTAIN THE LOCATION OF SERVICES ON SITE PRIOR TO STARTING THE WORK.
6. ALL DIMENSIONS FOR CONSTRUCTION ARE TO BE OBTAINED FROM SITE MEASUREMENTS OR ARCHITECTS SETTING OUT DRAWINGS PRIOR TO MANUFACTURE/BUILDING.
7. REFER TO DRAWING No. 11 FOR STEELWORK NOTES & DRAWING No. 12 FOR TIMBER NOTES




**ALL PARTY WALL PROJECTION TO BE REMOVED WITH DISC CUTTER, HAMMER AND CHISEL.**

## TYPICAL PADSTONE DETAIL

1:10




## TYPICAL FLOOR JOIST TO BEAM DETAIL

1:10

| ISSUE | REVISION | BY | DATE |
|---|---|---|---|
| P1 | FIRST ISSUE | JM | 28.03.24 |



ISSUE: *PRELIMINARY*

CLIENT: RJH ARCHITECTURE

CONTRACT: 34 NASSAU ROAD LONDON

TITLE: PROPOSED GROUND & FIRST FLOOR PLANS SHOWING ABOVE STRUCTURE

ARCHITECT: RJH ARCHITECTURE

| DRAWN | CHECKED | DATE | SCALE |
|---|---|---|---|
| JM | TG | MAR' 24 | 1:50 @A1 |

**David Smith Associates**
*Consulting Structural & Civil Engineers*
Tel: (01604)782620
Email: northampton@dsagroup.co.uk
Website: www.dsagroup.co.uk
8 Duncan Close
Moulton Park
Northampton NN3 6WL

DRAWING NUMBER: 24 — 54720/12 — REVISION: P1

ALL DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO ORDERING / FABRICATION OF MATERIALS AND COMMENCEMENT OF WORKS

CDM 2015 DESIGNER NOTES

IN ADDITION TO THE HAZARDS, AND RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION.

CONSTRUCTION:

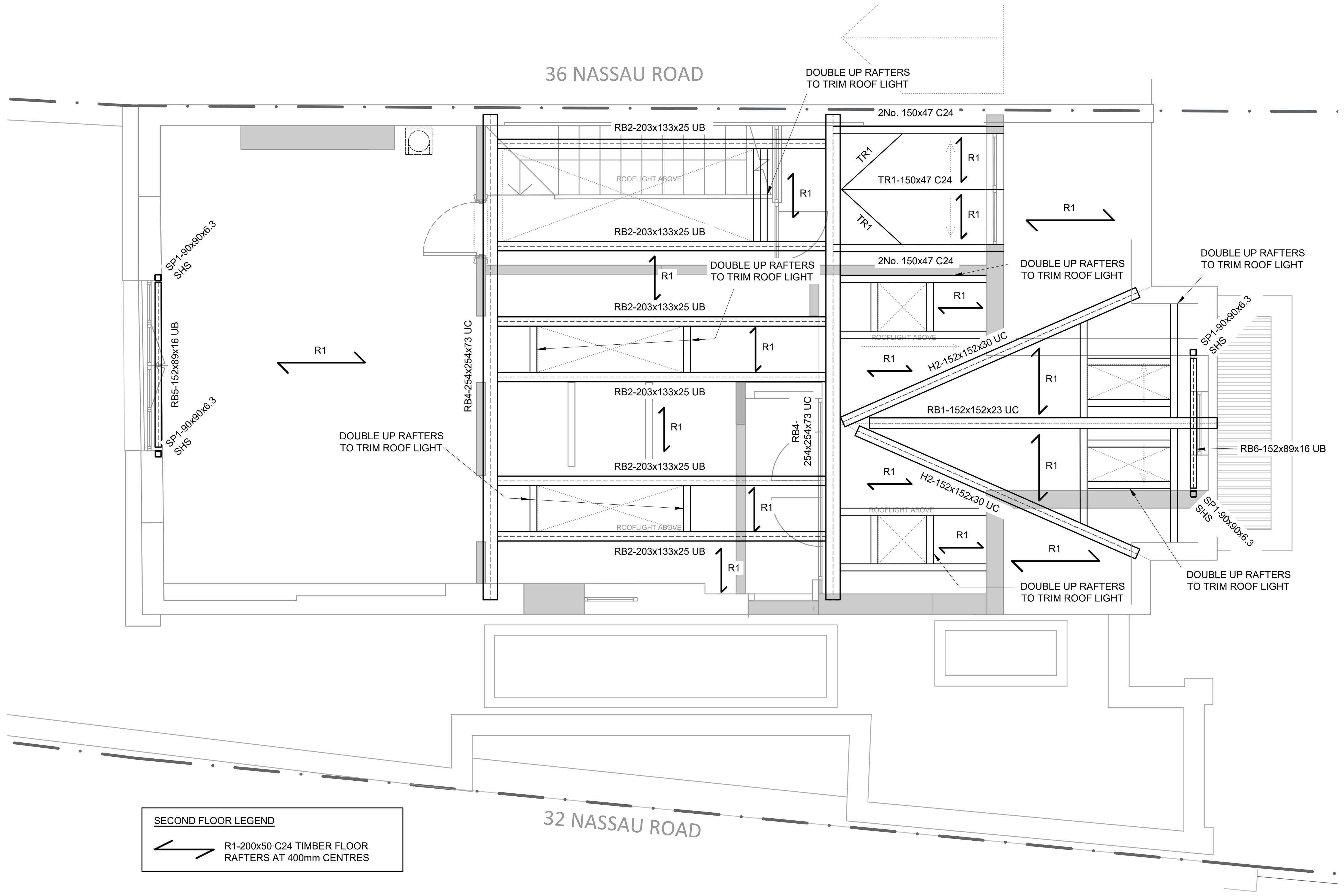
1. N/A

FOR INFORMATION RELATING TO END USE, MAINTENANCE, DEMOLITION, SEE THE HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

## Notes

1. IF IN DOUBT - ASK !!! DO NOT SCALE
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS.
3. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND BUILDING PRACTICE.
4. ALL DIMENSIONS TO BE CHECKED PRIOR TO STARTING THE WORKS ON SITE. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
5. CONTRACTOR TO ASCERTAIN THE LOCATION OF SERVICES ON SITE PRIOR TO STARTING THE WORK.
6. ALL DIMENSIONS FOR CONSTRUCTION ARE TO BE OBTAINED FROM SITE MEASUREMENTS OR ARCHITECTS SETTING OUT DRAWINGS PRIOR TO MANUFACTURE/BUILDING.
7. REFER TO DRAWING No. 11 FOR STEELWORK NOTES & DRAWING No. 12 FOR TIMBER NOTES




PROPOSED SECOND FLOOR
(SHOWING ROOF SUPPORTS)
1:50

| ISSUE | REVISION | BY | DATE |
|---|---|---|---|
| P1 | FIRST ISSUE | JM | 28.03.24 |



ISSUE
*PRELIMINARY*

CLIENT
RJH ARCHITECTURE

CONTRACT
34 NASSAU ROAD
LONDON

TITLE
PROPOSED SECOND FLOOR
SHOWING ROOF SUPPORTS

ARCHITECT
RJH ARCHITECTURE

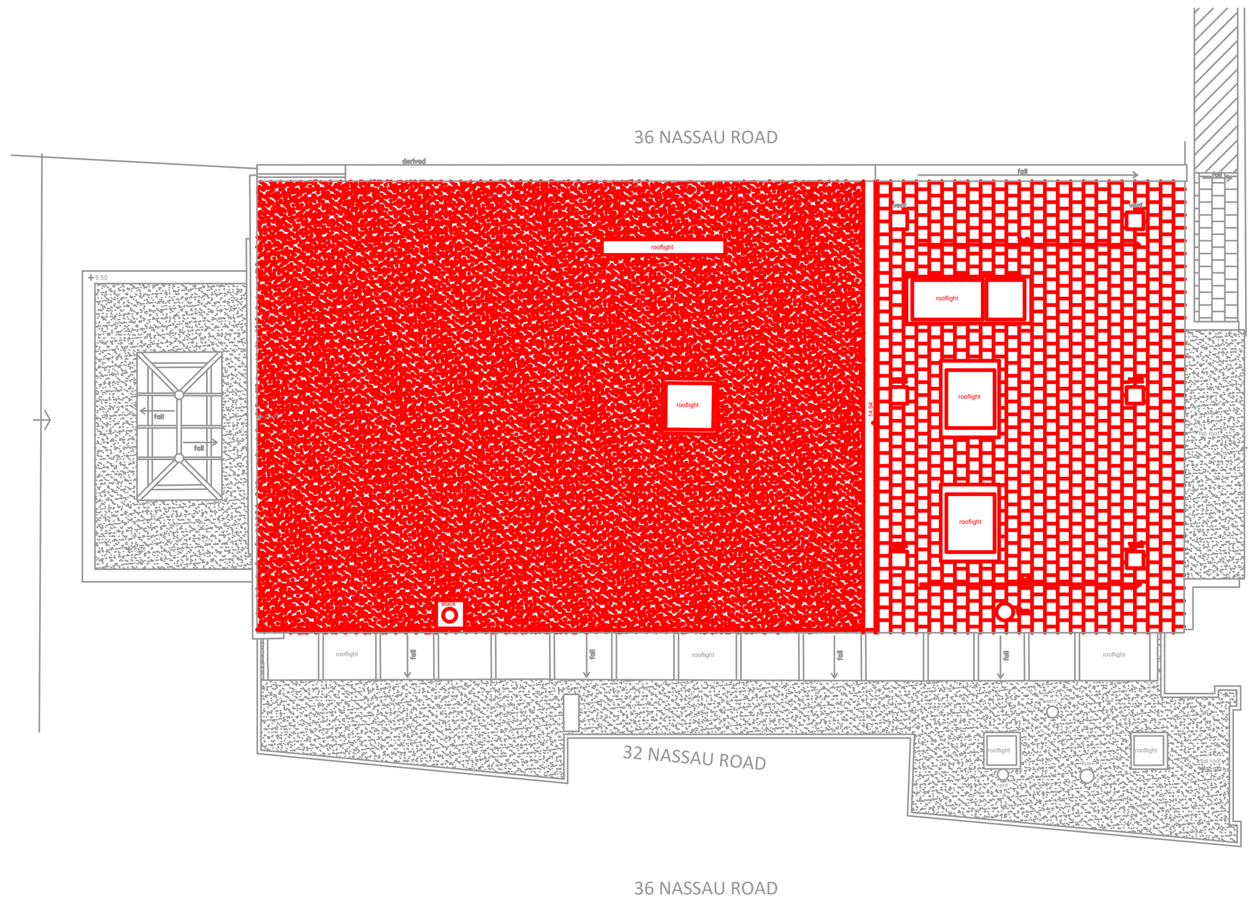
| DRAWN | CHECKED | DATE | SCALE |
|---|---|---|---|
| JM | TG | MAR' 24 | 1:50 @A1 |

**David Smith Associates**
*Consulting Structural & Civil Engineers*

Tel: (01604)782620
Email: northampton@dsagroup.co.uk
Website: www.dsagroup.co.uk
8 Duncan Close
Moulton Park
Northampton NN3 6WL

| DRAWING NUMBER | | | REVISION |
|---|---|---|---|
| | 24 | 54720/13 | P1 |

# ALL DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO ORDERING / FABRICATION OF MATERIALS AND COMMENCEMENT OF WORKS



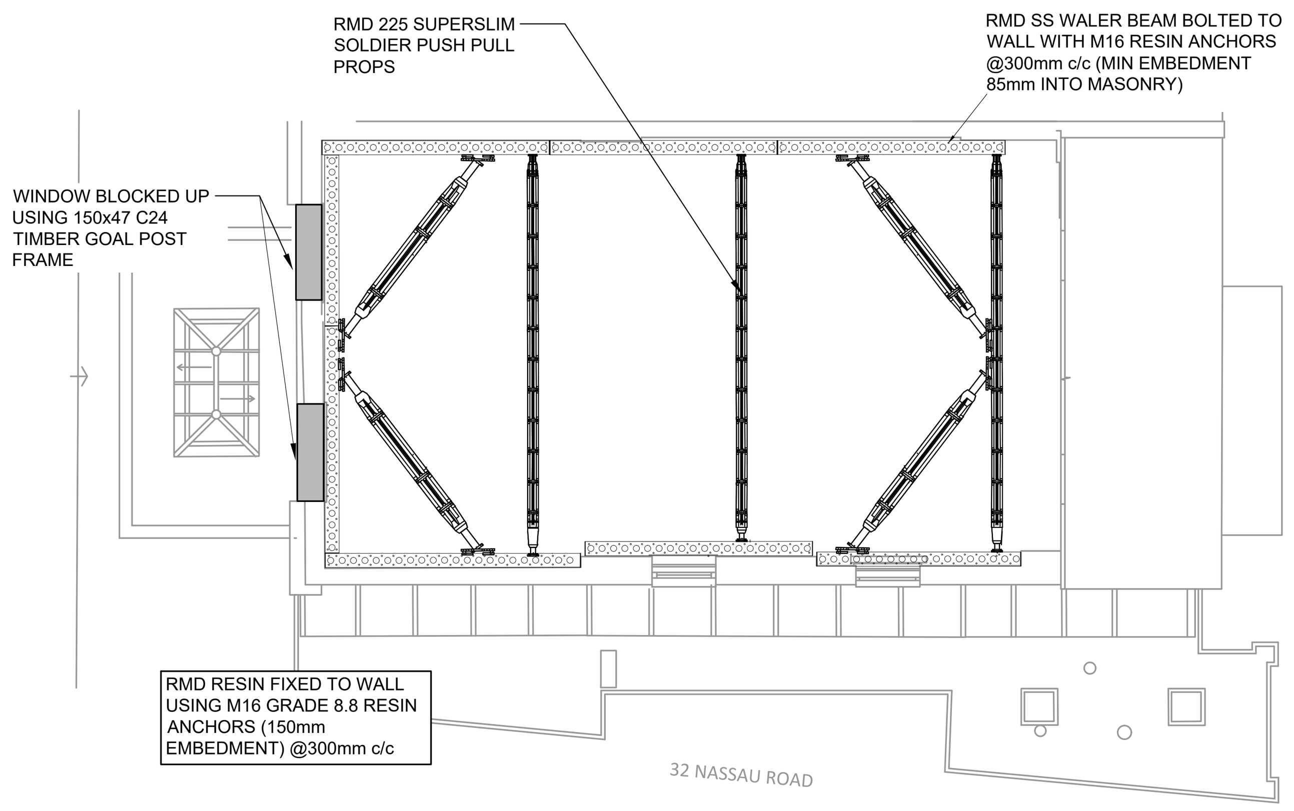

## ROOF PLAN
(PHASE 1, STAGE 1)
1:100

**SEQUENCE OF CONSTRUCTION (PHASE 1 STAGE '1')**

PRELIMINARIES: STRIP AND REMOVE NON-LOAD BEARING ELEMENTS, CEILINGS ETC AND ISOLATE EXISTING SERVICES

STAGES

1. CAREFULLY REMOVE EXISTING ROOF STRUCTURE AND FINISHES



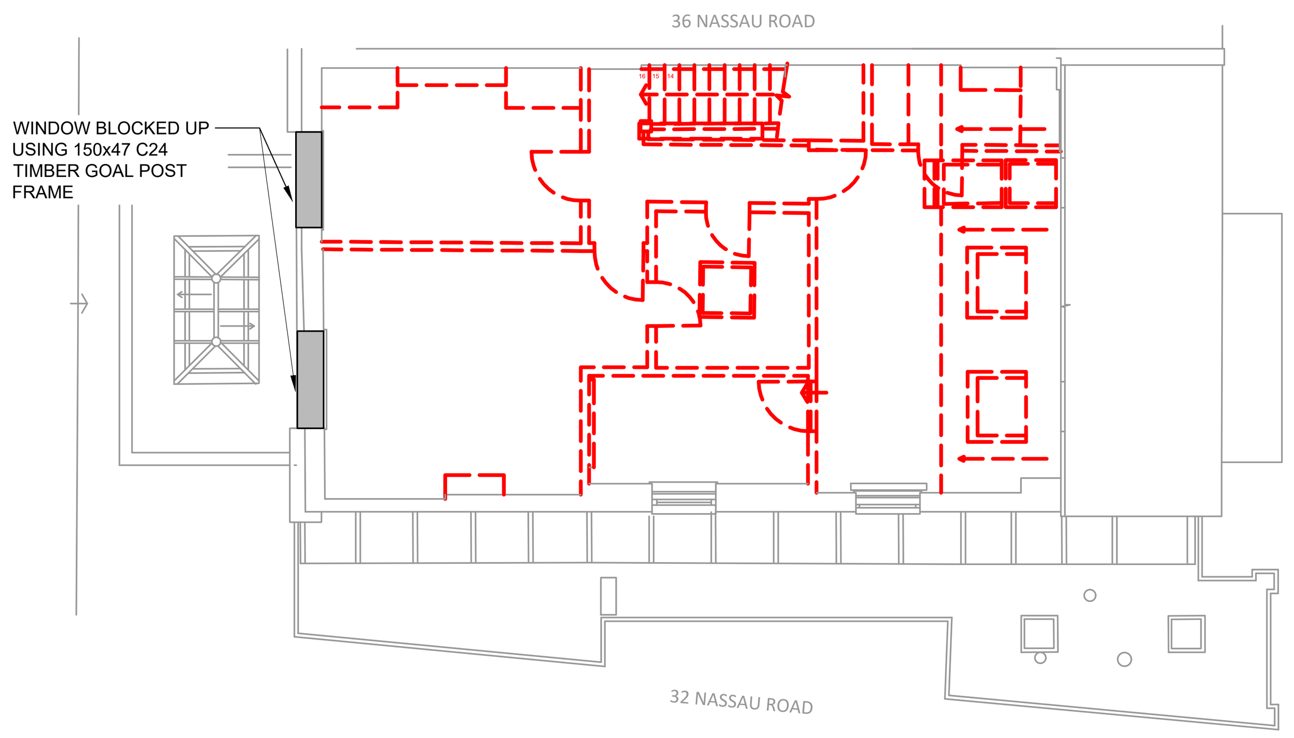

## SECOND FLOOR PLAN
(PHASE 1, STAGE 1 SHOWING RMD LAYOUT)
1:100

**SEQUENCE OF CONSTRUCTION (PHASE 1 STAGE '1')**

PRELIMINARIES: STRIP AND REMOVE NON-LOAD BEARING ELEMENTS, CEILINGS ETC AND ISOLATE EXISTING SERVICES

STAGES

1. INSTALL WAILING AND HORIZONTAL PROPS AS SHOWN ON PLAN 300mm BELOW EXISTING EAVES LEVEL (TO BE DONE AT SAME TIME AS STAGE '1').



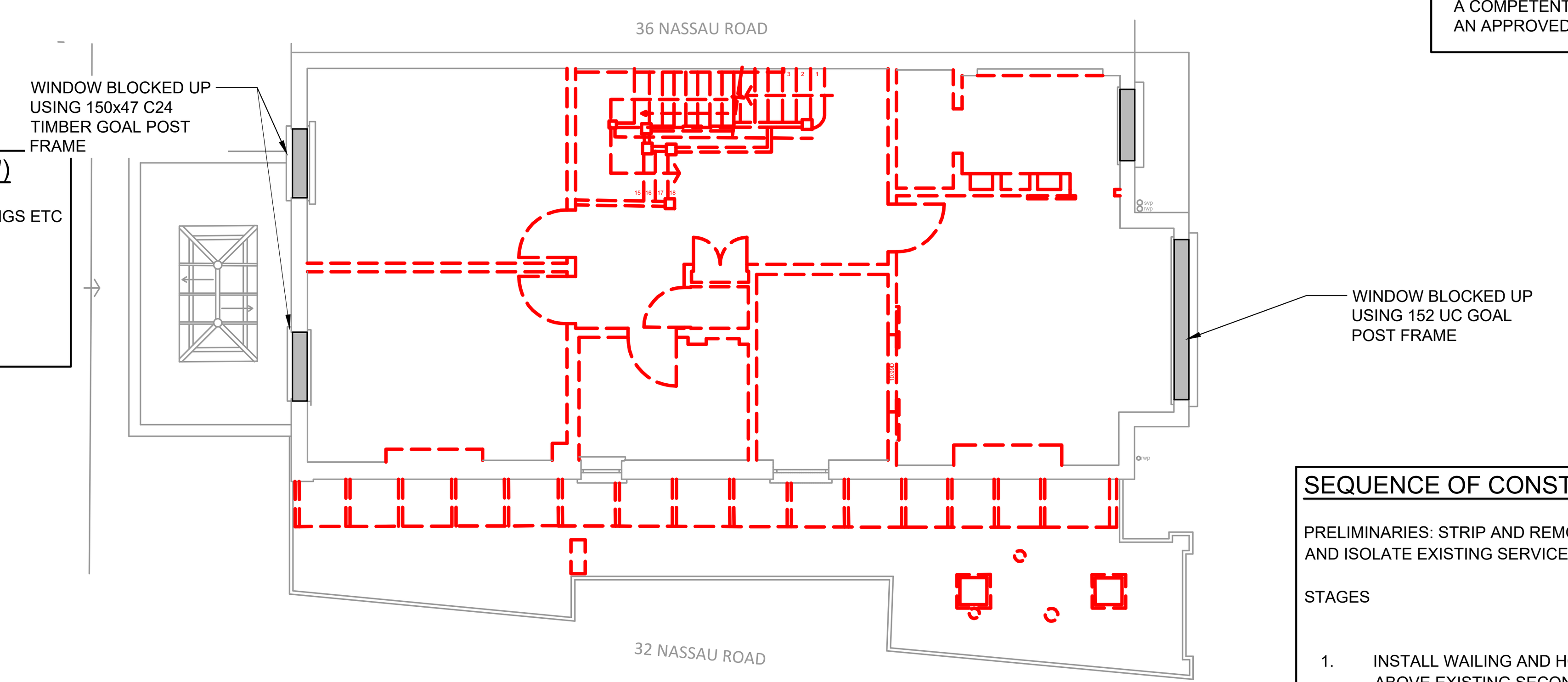

## SECOND FLOOR PLAN
(PHASE 1, STAGE 2)
1:100

**SEQUENCE OF CONSTRUCTION (PHASE 1 STAGE '2')**

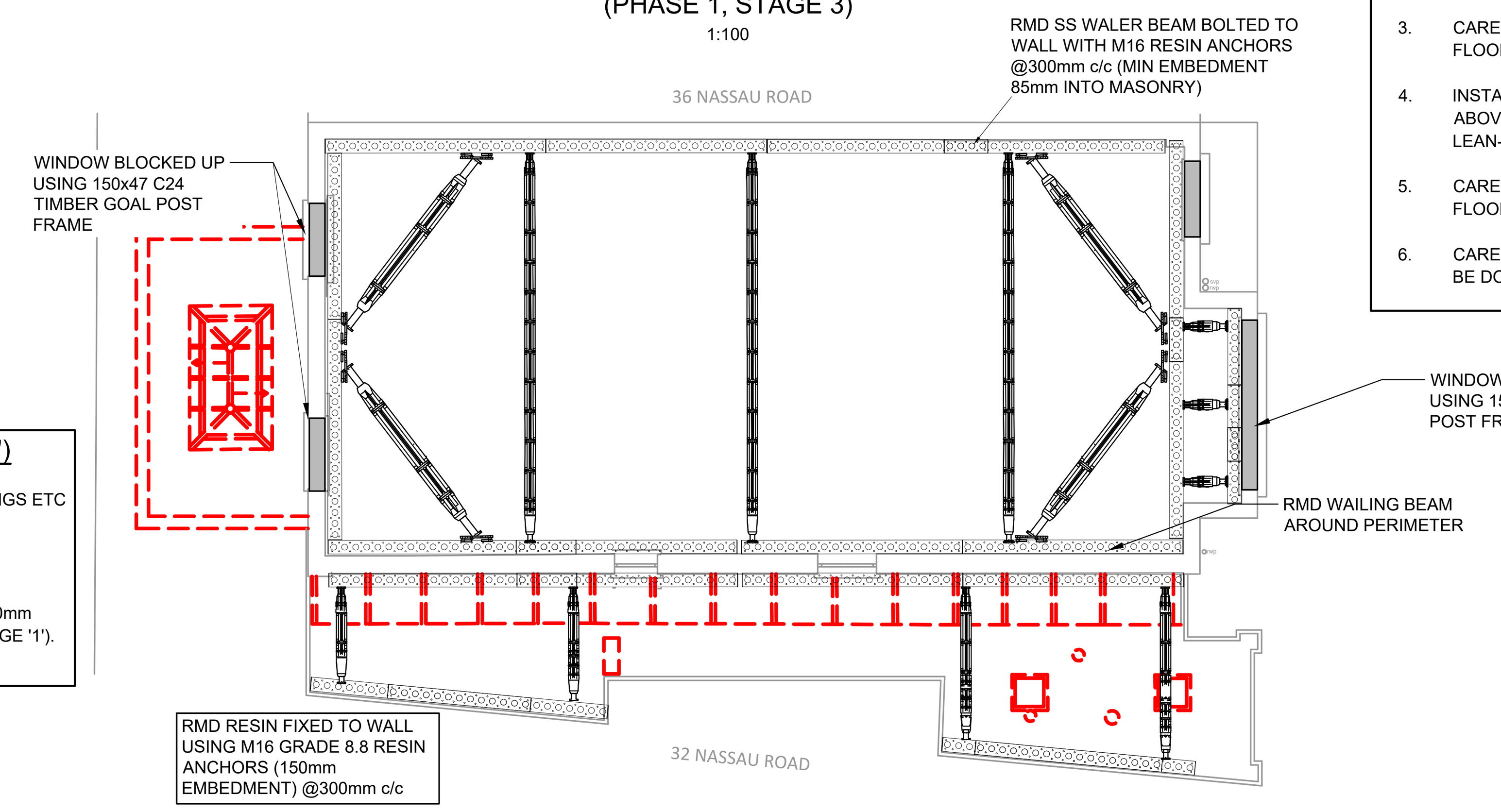
PRELIMINARIES: STRIP AND REMOVE NON-LOAD BEARING ELEMENTS, CEILINGS ETC AND ISOLATE EXISTING SERVICES

STAGES

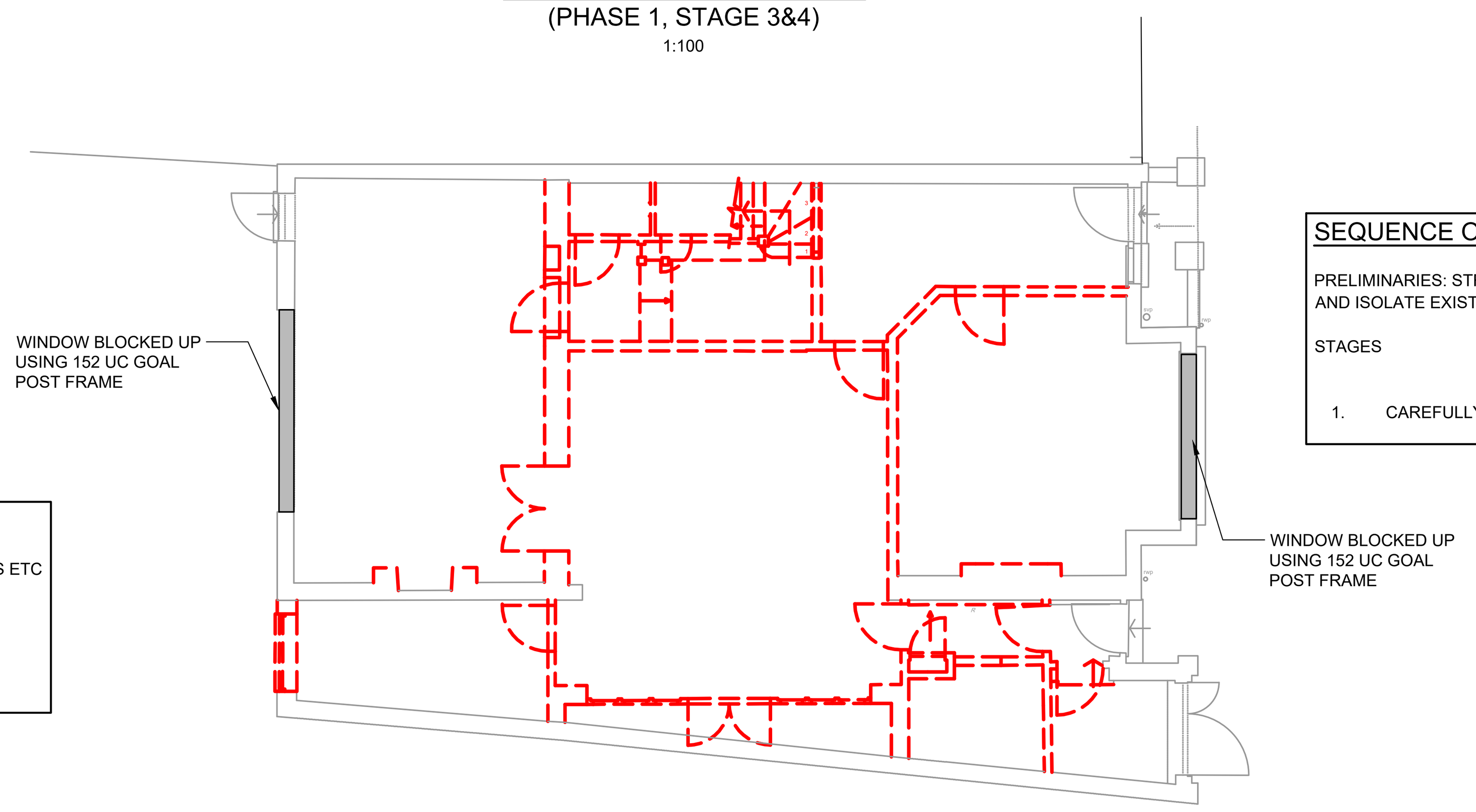
1. CAREFULLY DEMOLISH EXISTING SECOND FLOOR WALLS




## FIRST FLOOR PLAN
(PHASE 1, STAGE 3)
1:100




## SECOND FLOOR PLAN
(PHASE 1, STAGE 3&4)
1:100




## GROUND FLOOR PLAN
(PHASE 1, STAGE 5)
1:100

**CDM 2015 DESIGNER NOTES**

IN ADDITION TO THE HAZARDS, AND RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION.

CONSTRUCTION:

1. N/A

FOR INFORMATION RELATING TO END USE, MAINTENANCE, DEMOLITION, SEE THE HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

**SEQUENCE OF CONSTRUCTION (PHASE 1 STAGE '3 & 4')**

PRELIMINARIES: STRIP AND REMOVE NON-LOAD BEARING ELEMENTS, CEILINGS ETC AND ISOLATE EXISTING SERVICES

STAGES

1. INSTALL WAILING AND HORIZONTAL PROPS AS SHOWN ON PLAN 300mm ABOVE EXISTING SECOND FLOOR LEVEL
2. CAREFULLY REMOVE SECOND FLOOR JOISTS
3. CAREFULLY DEMOLISH INTERNAL FIRST FLOOR WALLS DOWN TO FIRST FLOOR LEVEL
4. INSTALL WAILING AND HORIZONTAL PROPS AS SHOWN ON PLAN 300mm ABOVE EXISTING FIRST FLOOR LEVEL AND 300mm ABOVE EXISTING LEAN-TO ROOF STRUCTURE
5. CAREFULLY DEMOLISH EXISTING LEAN-TO ROOF STRUCTURE AND FIRST FLOOR JOISTS
6. CAREFULLY DEMOLISH EXISTING REAR SINGLE STORY STRUCTURE (CAN BE DONE AT ANY TIME TO SUIT PROGRAM)

**SEQUENCE OF CONSTRUCTION (PHASE 1 STAGE '5')**

PRELIMINARIES: STRIP AND REMOVE NON-LOAD BEARING ELEMENTS, CEILINGS ETC AND ISOLATE EXISTING SERVICES

STAGES

1. CAREFULLY DEMOLISH EXISTING INTERNAL NON-LOAD BEARING WALLS

## Notes

1. IF IN DOUBT - ASK !!! DO NOT SCALE
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS.
3. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND BUILDING PRACTICE.
4. ALL DIMENSIONS TO BE CHECKED PRIOR TO STARTING THE WORKS ON SITE. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
5. CONTRACTOR TO ASCERTAIN THE LOCATION OF SERVICES ON SITE PRIOR TO STARTING THE WORK.
6. ALL DIMENSIONS FOR CONSTRUCTION ARE TO BE OBTAINED FROM SITE MEASUREMENTS OR ARCHITECTS SETTING OUT DRAWINGS PRIOR TO MANUFACTURE/BUILDING.
7. REFER TO DRAWING No. 11 FOR STEELWORK NOTES & DRAWING No. 12 FOR TIMBER NOTES
8. ALL TEMPORARY WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH BS 5975:2008
9. ALL SCAFFOLDING TO BE DESIGNED IN ACCORDANCE WITH WITH NASC TG20:13
10. PRINCIPAL CONTRACTOR TO APPOINT TEMPORARY WORKS COORDINATOR (TWC) TO OVERSEE ALL AREAS OF TEMPORARY WORK UNTIL COMPLETION OF ASSOCIATED WORKS.
11. TWC TO INFORM TEMPORARY WORKS DESIGNER (TWD) OF ANY CHANGES MADE TO TEMPORARY WORKS ON SITE AND GAIN FORMAL SIGN OFF PRIOR TO INSTALLATION.
12. CONTRACTOR/CLIENT TO ENSURE ALL TEMPORARY WORKS DESIGNS HAVE BEEN CHECKED TO THE RELEVANT CATEGORY OF DESIGN CHECK AS DETAILED WITHIN TABLE 1 IN BS 5975:2008
13. CONTRACTOR TO SUBMIT DETAILED METHOD STATEMENT AND SEQUENCE OF WORKS TO THE TWD AND TWC FOR CHECKING PRIOR TO COMMENCEMENT OF WORKS ON SITE.
14. CONTRACTOR TO CONFIRM ANY BUILDING MATERIAL WEIGHTS TO BE STORED IN THE AREA OF TEMPORARY SUPPORT PRIOR TO THE COMMENCEMENT OF WORKS.

| ISSUE | REVISION | BY | DATE |
|---|---|---|---|
| P1 | FIRST ISSUE | JM | 28.03.24 |



ISSUE
*PRELIMINARY*

CLIENT
RJH ARCHITECTURE

CONTRACT
34 NASSAU ROAD
LONDON

TITLE
ENABLING WORKS
PHASE 1, STAGES 1-5
SHT 1 OF 6

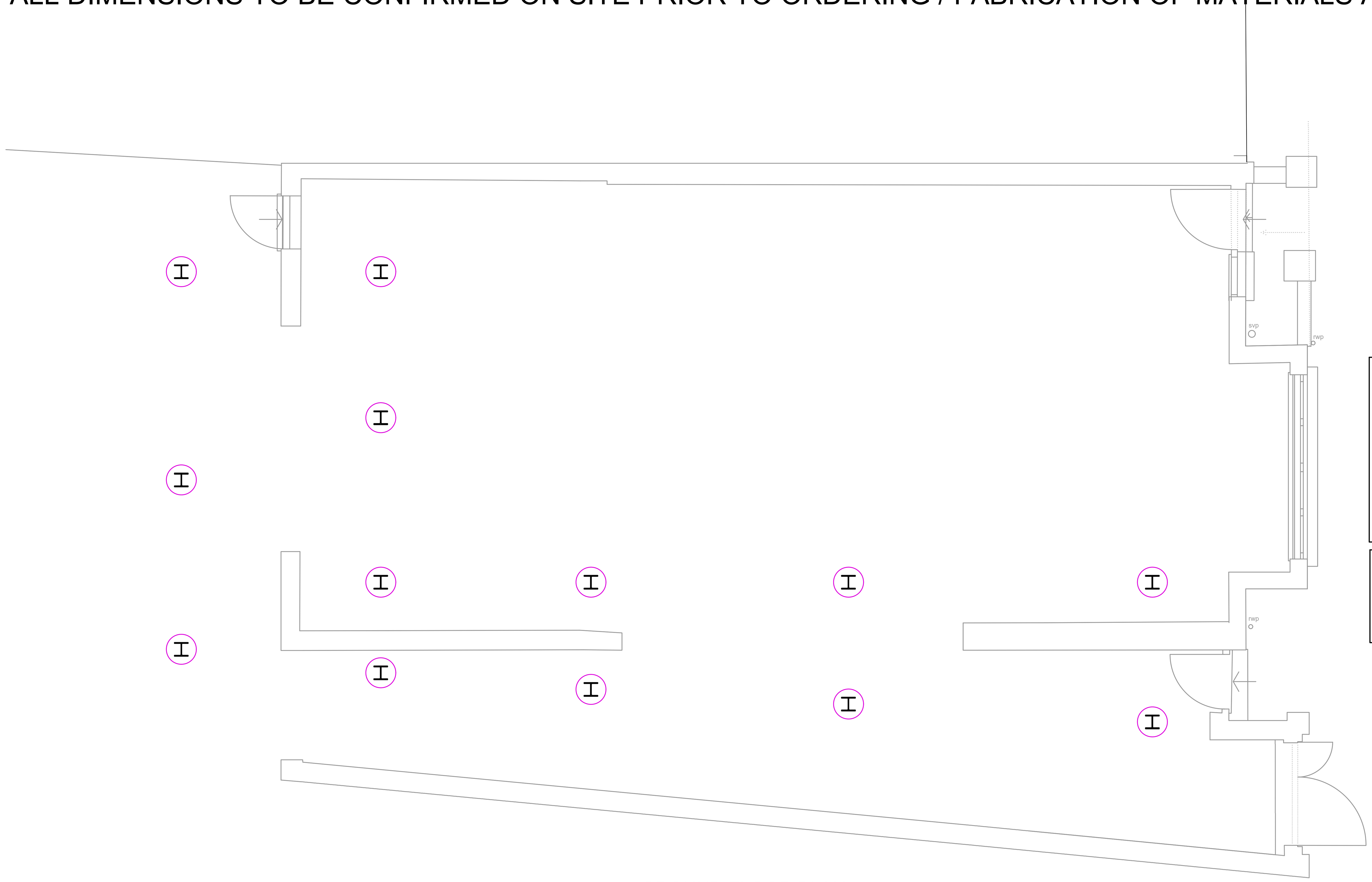
ARCHITECT
RJH ARCHITECTURE

| DRAWN | CHECKED | DATE | SCALE |
|---|---|---|---|
| JM | TG | MAR' 24 | 1:50 @A1 |

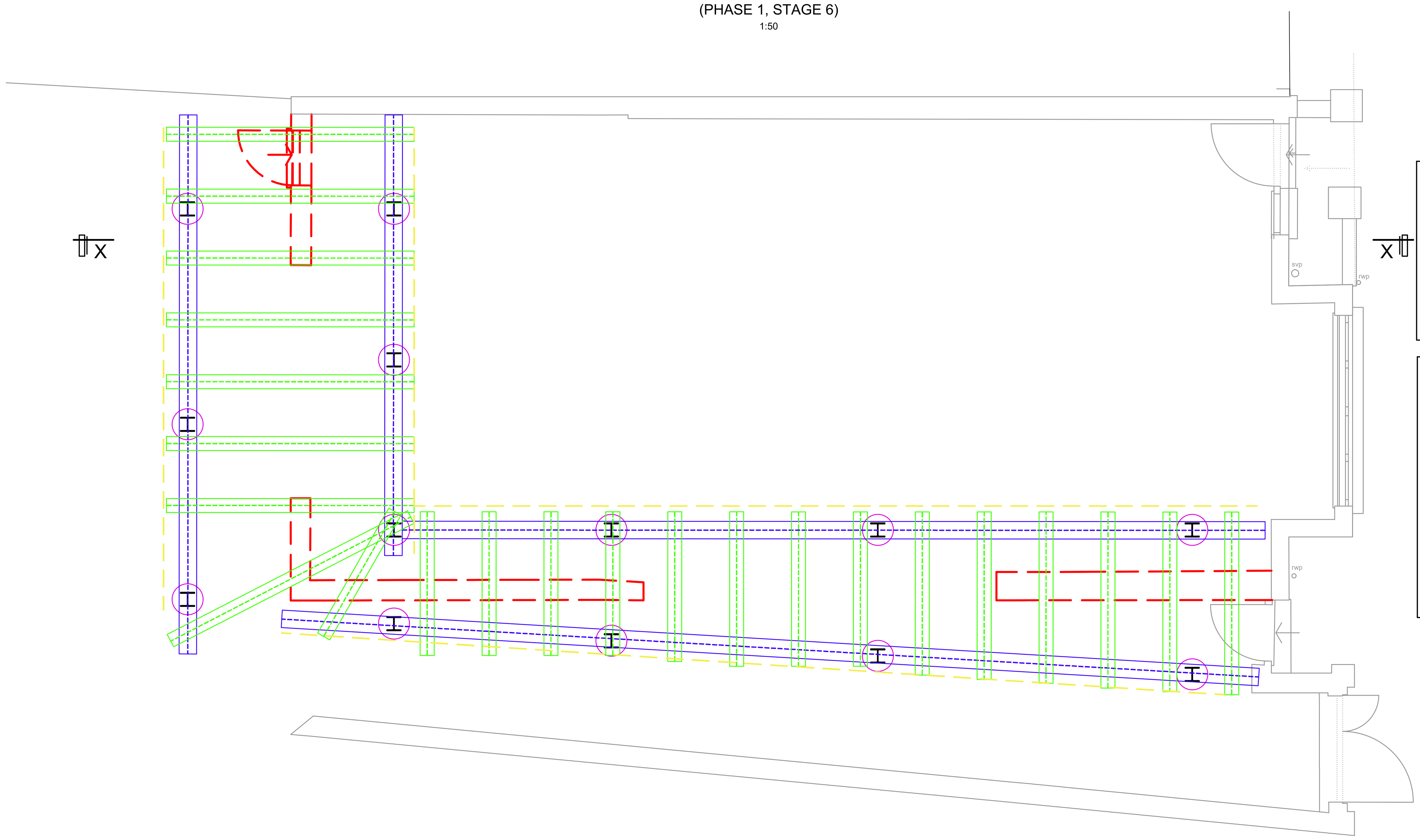

**David Smith Associates**
*Consulting Structural & Civil Engineers*
Tel: (01604)782620
Email: northampton@dsagroup.co.uk
Website: www.dsagroup.co.uk
8 Duncan Close
Moulton Park
Northampton NN3 6WL


| DRAWING NUMBER | | | REVISION |
|---|---|---|---|
| | 24 | 54720/21 | P1 |

ALL DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO ORDERING / FABRICATION OF MATERIALS AND COMMENCEMENT OF WORKS



GROUND FLOOR PLAN
(PHASE 1, STAGE 6)
1:50



GROUND FLOOR PLAN
(PHASE 1, STAGE 7)
1:50

CDM 2015 DESIGNER NOTES

IN ADDITION TO THE HAZARDS, AND RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION.

CONSTRUCTION:

1. N/A

FOR INFORMATION RELATING TO END USE, MAINTENANCE, DEMOLITION, SEE THE HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

SEQUENCE OF CONSTRUCTION (PHASE 1 STAGE '6')

PRELIMINARIES: STRIP AND REMOVE NON-LOAD BEARING ELEMENTS, CEILINGS ETC AND ISOLATE EXISTING SERVICES

STAGES

1. INSTALL PILING MAT FOR TEMPORARY PILES (DESIGNED BY PILING DESIGNER)
2. INSTALL TEMPORARY PILES AND PLUNGE COLUMNS (203x203x60 UC). NOTE PILES TO BE SET OUT TO AVOID CLASHING WITH SPECIAL FOUNDATION BASE.

LEGEND:-

DENOTES 400 DIA TEMPORARY PILES AND 203x203x60 UC PLUNGE COLUMN

MAX LOAD = 300kN

SEQUENCE OF CONSTRUCTION (PHASE 1 STAGE '7')

PRELIMINARIES: STRIP AND REMOVE NON-LOAD BEARING ELEMENTS, CEILINGS ETC AND ISOLATE EXISTING SERVICES

STAGES

1. INSTALL SPREADER BEAMS ON TOP OF 203 UC COLUMN
2. INSTALL 203 UC NEEDLE BEAMS @900mm c/c
3. CAREFULLY DEMOLISH EXISTING GROUND FLOOR WALLS

LEGEND:-

DENOTES 400 DIA TEMPORARY PILES AND 203x203x60 UC PLUNGE COLUMN

MAX LOAD = 300kN

DENOTES 203x203x46 UC NEEDLE BEAMS @800mm c/c

DENOTES 254x254x73 UC SPREADER / NEEDLE BEAMS @800mm c/c

DENOTES WALL TO BE DEMOLISHED

DENOTES 100x100x10 RSA BRACING BETWEEN COLUMNS

## Notes

1. IF IN DOUBT - ASK !!! DO NOT SCALE
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS.
3. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND BUILDING PRACTICE.
4. ALL DIMENSIONS TO BE CHECKED PRIOR TO STARTING THE WORKS ON SITE. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
5. CONTRACTOR TO ASCERTAIN THE LOCATION OF SERVICES ON SITE PRIOR TO STARTING THE WORK.
6. ALL DIMENSIONS FOR CONSTRUCTION ARE TO BE OBTAINED FROM SITE MEASUREMENTS OR ARCHITECTS SETTING OUT DRAWINGS PRIOR TO MANUFACTURE/BUILDING.
7. REFER TO DRAWING No. 11 FOR STEELWORK NOTES & DRAWING No. 12 FOR TIMBER NOTES
8. ALL TEMPORARY WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH BS 5975:2008
9. ALL SCAFFOLDING TO BE DESIGNED IN ACCORDANCE WITH WITH NASC TG20:13
10. PRINCIPAL CONTRACTOR TO APPOINT TEMPORARY WORKS COORDINATOR (TWC) TO OVERSEE ALL AREAS OF TEMPORARY WORK UNTIL COMPLETION OF ASSOCAITED WORKS.
11. TWC TO INFORM TEMPORARY WORKS DESIGNER (TWD) OF ANY CHANGES MADE TO TEMPORARY WORKS ON SITE AND GAIN FORMAL SIGN OFF PRIOR TO INSTALLATION.
12. CONTRACTOR/CLIENT TO ENSURE ALL TEMPORARY WORKS DESIGNS HAVE BEEN CHECKED TO THE RELEVANT CATEGORY OF DESIGN CHECK AS DETAILED WITHIN TABLE 1 IN BS 5975:2008
13. CONTRACTOR TO SUBMIT DETAILED METHOD STATEMENT AND SEQUENCE OF WORKS TO THE TWD AND TWC FOR CHECKING PRIOR TO COMMENCEMENT OF WORKS ON SITE.
14. CONTRACTOR TO CONFIRM ANY BUILDING MATERIAL WEIGHTS TO BE STORED IN THE AREA OF TEMPORARY SUPPORT PRIOR TO THE COMMENCEMENT OF WORKS.

| ISSUE | REVISION | BY | DATE |
|---|---|---|---|
| P1 | FIRST ISSUE | JM | 28.03.24 |



ISSUE
*PRELIMINARY*

CLIENT
RJH ARCHITECTURE

CONTRACT
34 NASSAU ROAD
LONDON

TITLE
ENABLING WORKS
PHASE 1, STAGES 6 & 7
SHT 2 OF 6

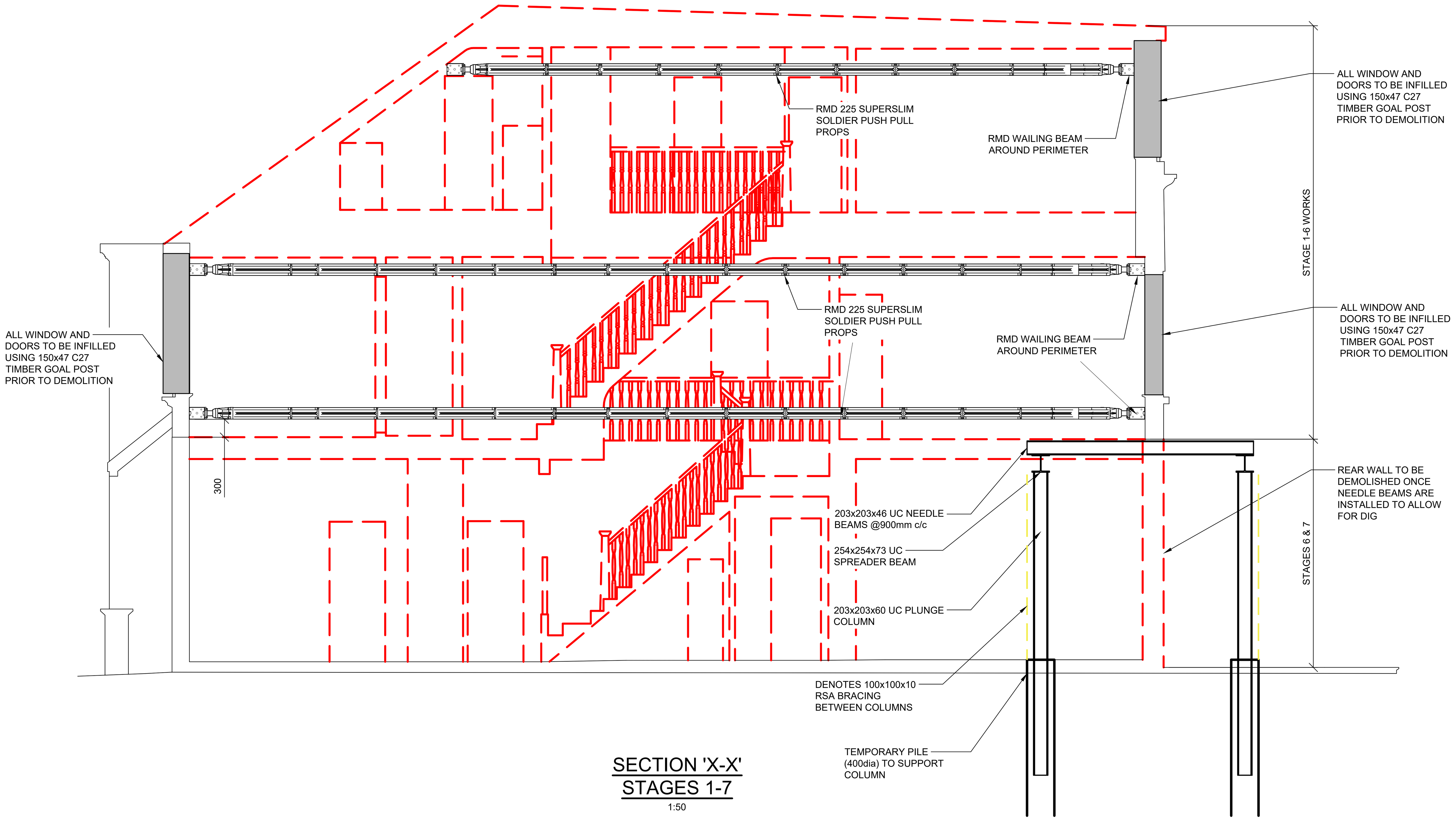
ARCHITECT
RJH ARCHITECTURE

| DRAWN | CHECKED | DATE | SCALE |
|---|---|---|---|
| JM | TG | MAR' 24 | 1:50 @A1 |

**David Smith Associates**
*Consulting Structural & Civil Engineers*
Tel: (01604)782620
Email: northampton@dsagroup.co.uk
Website: www.dsagroup.co.uk
8 Duncan Close
Moulton Park
Northampton NN3 6WL

| DRAWING NUMBER | | | REVISION |
|---|---|---|---|
| | 24 | 54720/22 | P1 |

ALL DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO ORDERING / FABRICATION OF MATERIALS AND COMMENCEMENT OF WORKS




SECTION 'X-X'
STAGES 1-7
1:50

CDM 2015 DESIGNER NOTES

IN ADDITION TO THE HAZARDS, AND RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION.

CONSTRUCTION:

1. N/A

FOR INFORMATION RELATING TO END USE, MAINTENANCE, DEMOLITION, SEE THE HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

## Notes

1. IF IN DOUBT - ASK !!! DO NOT SCALE
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS.
3. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND BUILDING PRACTICE.
4. ALL DIMENSIONS TO BE CHECKED PRIOR TO STARTING THE WORKS ON SITE. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
5. CONTRACTOR TO ASCERTAIN THE LOCATION OF SERVICES ON SITE PRIOR TO STARTING THE WORK.
6. ALL DIMENSIONS FOR CONSTRUCTION ARE TO BE OBTAINED FROM SITE MEASUREMENTS OR ARCHITECTS SETTING OUT DRAWINGS PRIOR TO MANUFACTURE/BUILDING.
7. REFER TO DRAWING No. 11 FOR STEELWORK NOTES & DRAWING No. 12 FOR TIMBER NOTES
8. ALL TEMPORARY WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH BS 5975:2008
9. ALL SCAFFOLDING TO BE DESIGNED IN ACCORDANCE WITH WITH NASC TG20:13
10. PRINCIPAL CONTRACTOR TO APPOINT TEMPORARY WORKS COORDINATOR (TWC) TO OVERSEE ALL AREAS OF TEMPORARY WORK UNTIL COMPLETION OF ASSOCAITED WORKS.
11. TWC TO INFORM TEMPORARY WORKS DESIGNER (TWD) OF ANY CHANGES MADE TO TEMPORARY WORKS ON SITE AND GAIN FORMAL SIGN OFF PRIOR TO INSTALLATION.
12. CONTRACTOR/CLIENT TO ENSURE ALL TEMPORARY WORKS DESIGNS HAVE BEEN CHECKED TO THE RELEVANT CATEGORY OF DESIGN CHECK AS DETAILED WITHIN TABLE 1 IN BS 5975:2008
13. CONTRACTOR TO SUBMIT DETAILED METHOD STATEMENT AND SEQUENCE OF WORKS TO THE TWD AND TWC FOR CHECKING PRIOR TO COMMENCEMENT OF WORKS ON SITE.
14. CONTRACTOR TO CONFIRM ANY BUILDING MATERIAL WEIGHTS TO BE STORED IN THE AREA OF TEMPORARY SUPPORT PRIOR TO THE COMMENCEMENT OF WORKS.

| ISSUE | REVISION | BY | DATE |
|---|---|---|---|
| P1 | FIRST ISSUE | JM | 28.03.24 |



ISSUE
*PRELIMINARY*

CLIENT
RJH ARCHITECTURE

CONTRACT
34 NASSAU ROAD
LONDON

TITLE
PILE + NEEDLE SECTION
STAGE '7'
SHT 3 OF 6

ARCHITECT
RJH ARCHITECTURE

| DRAWN | CHECKED | DATE | SCALE |
|---|---|---|---|
| JM | TG | MAR' 24 | 1:20 @A1 |


**David Smith Associates**
*Consulting Structural & Civil Engineers*

Tel: (01604)782620
Email: northampton@dsagroup.co.uk
Website: www.dsagroup.co.uk

8 Duncan Close
Moulton Park
Northampton NN3 6WL


| DRAWING NUMBER | 24 | 54720/23 | REVISION P1 |
|---|---|---|---|

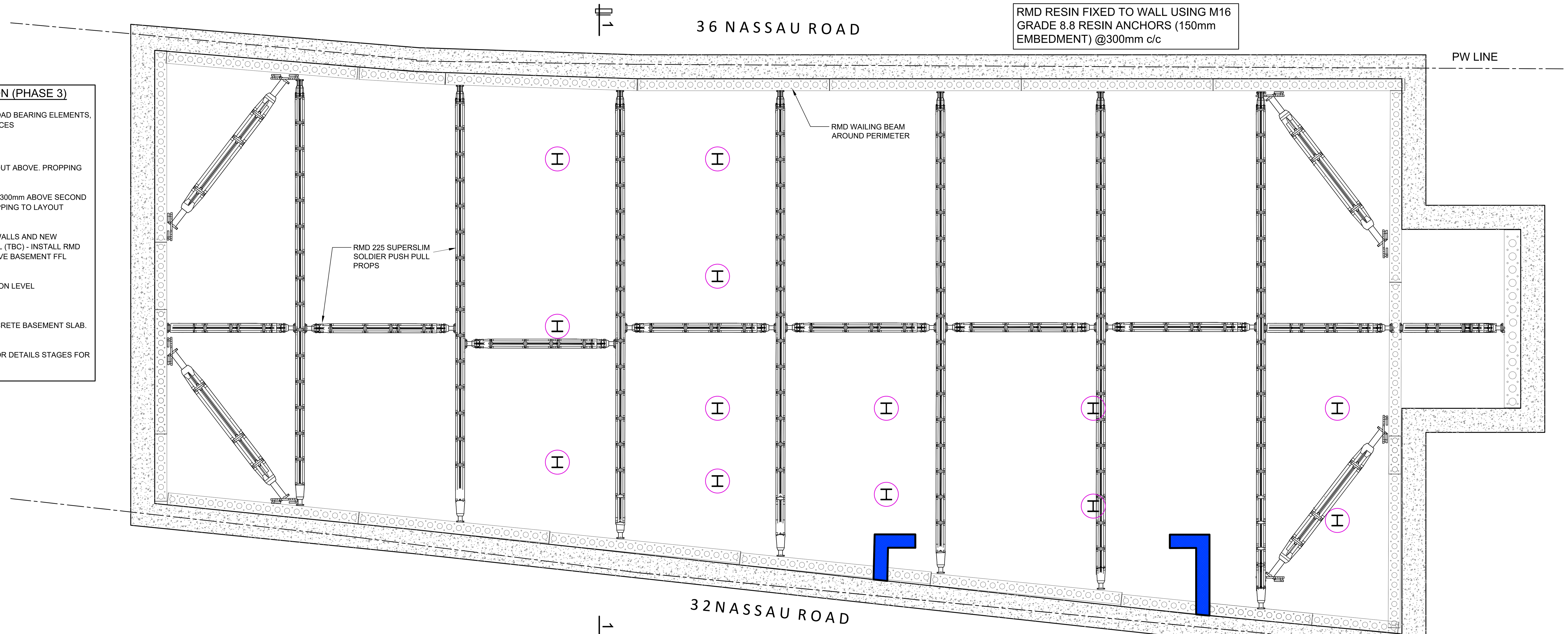
ALL DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO ORDERING / FABRICATION OF MATERIALS AND COMMENCEMENT OF WORKS

SEQUENCE OF CONSTRUCTION (PHASE 3)

PRELIMINARIES: STRIP AND REMOVE NON-LOAD BEARING ELEMENTS, CEILINGS ETC AND ISOLATE EXISTING SERVICES

STAGES

1. INSTALL TOP PROPPING RMD TO LAYOUT ABOVE. PROPPING 300mm ABOVE PROPOSED FFL LEVEL
2. REDUCE GROUND LEVEL TO APPROX. 300mm ABOVE SECOND STAGE PIN AND INSTALL LOWER PROPPING TO LAYOUT SHOWN
3. INSTALL SECOND STAGE RETAINING WALLS AND NEW FOUNDATIONS TO EX BASEMENT WALL (TBC) - INSTALL RMD PROPS AT THIS LEVEL OR 300mm ABOVE BASEMENT FFL WHICHEVER HIGHER
4. REDUCE GROUND LEVEL TO FORMATION LEVEL
5. INSTALL DRAINAGE PUMP CHAMBERS
6. FIX REINFORCEMENT AND CAST CONCRETE BASEMENT SLAB. INSTALL RC WALL
7. (REFER TO SEQUENCING DRAWING FOR DETAILS STAGES FOR PHASES 2-4)



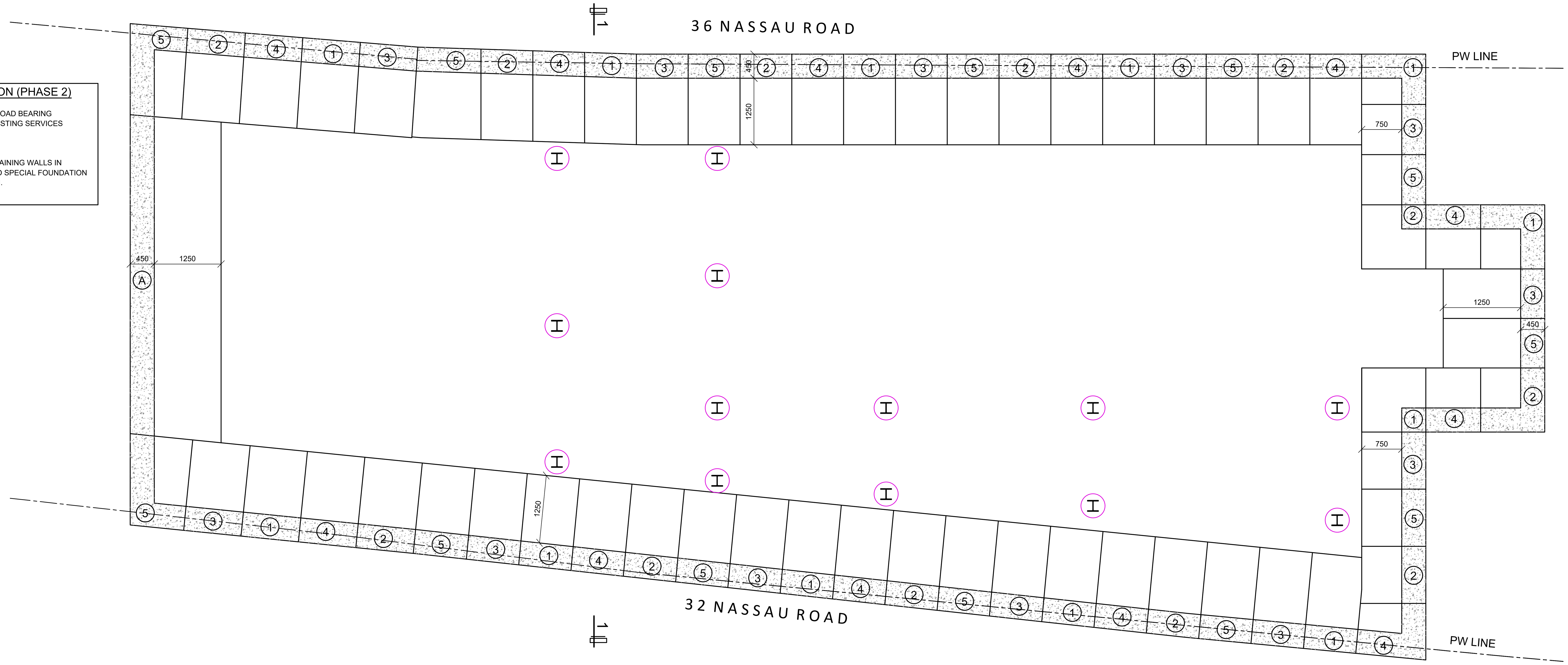

BASEMENT PLAN PHASE '3'
1:50

SEQUENCE OF CONSTRUCTION (PHASE 2)

PRELIMINARIES: STRIP AND REMOVE NON-LOAD BEARING ELEMENTS, CEILINGS ETC AND ISOLATE EXISTING SERVICES

STAGES

1 - INSTALL SPECIAL FOUNDATION AND RETAINING WALLS IN ACCORDANCE TO DSA DRAWING No. 01 AND SPECIAL FOUNDATION SEQUENCE DRAWINGS, TO EXTENT SHOWN.




BASEMENT PLAN PHASE '2'
1:50

Notes

1. IF IN DOUBT - ASK !!! DO NOT SCALE
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS.
3. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND BUILDING PRACTICE.
4. ALL DIMENSIONS TO BE CHECKED PRIOR TO STARTING THE WORKS ON SITE. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
5. CONTRACTOR TO ASCERTAIN THE LOCATION OF SERVICES ON SITE PRIOR TO STARTING THE WORK.
6. ALL DIMENSIONS FOR CONSTRUCTION ARE TO BE OBTAINED FROM SITE MEASUREMENTS OR ARCHITECTS SETTING OUT DRAWINGS PRIOR TO MANUFACTURE/BUILDING.
7. REFER TO DRAWING No. 11 FOR STEELWORK NOTES & DRAWING No. 12 FOR TIMBER NOTES
8. ALL TEMPORARY WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH BS 5975:2008
9. ALL SCAFFOLDING TO BE DESIGNED IN ACCORDANCE WITH WITH NASC TG20:13
10. PRINCIPAL CONTRACTOR TO APPOINT TEMPORARY WORKS COORDINATOR (TWC) TO OVERSEE ALL AREAS OF TEMPORARY WORK UNTIL COMPLETION OF ASSOCAITED WORKS.
11. TWC TO INFORM TEMPORARY WORKS DESIGNER (TWD) OF ANY CHANGES MADE TO TEMPORARY WORKS ON SITE AND GAIN FORMAL SIGN OFF PRIOR TO INSTALLATION.
12. CONTRACTOR/CLIENT TO ENSURE ALL TEMPORARY WORKS DESIGNS HAVE BEEN CHECKED TO THE RELEVANT CATEGORY OF DESIGN CHECK AS DETAILED WITHIN TABLE 1 IN BS 5975:2008
13. CONTRACTOR TO SUBMIT DETAILED METHOD STATEMENT AND SEQUENCE OF WORKS TO THE TWD AND TWC FOR CHECKING PRIOR TO COMMENCEMENT OF WORKS ON SITE.
14. CONTRACTOR TO CONFIRM ANY BUILDING MATERIAL WEIGHTS TO BE STORED IN THE AREA OF TEMPORARY SUPPORT PRIOR TO THE COMMENCEMENT OF WORKS.

CDM 2015 DESIGNER NOTES

IN ADDITION TO THE HAZARDS, AND RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION.

CONSTRUCTION:

1. N/A

FOR INFORMATION RELATING TO END USE, MAINTENANCE, DEMOLITION, SEE THE HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

| ISSUE | REVISION | BY | DATE |
|---|---|---|---|
| P1 | FIRST ISSUE | JM | 28.03.24 |



ISSUE
*PRELIMINARY*

CLIENT
RJH ARCHITECTURE

CONTRACT
34 NASSAU ROAD
LONDON

TITLE
ENABLING WORKS
PHASE '2 & 3'
SHT 4 OF 6

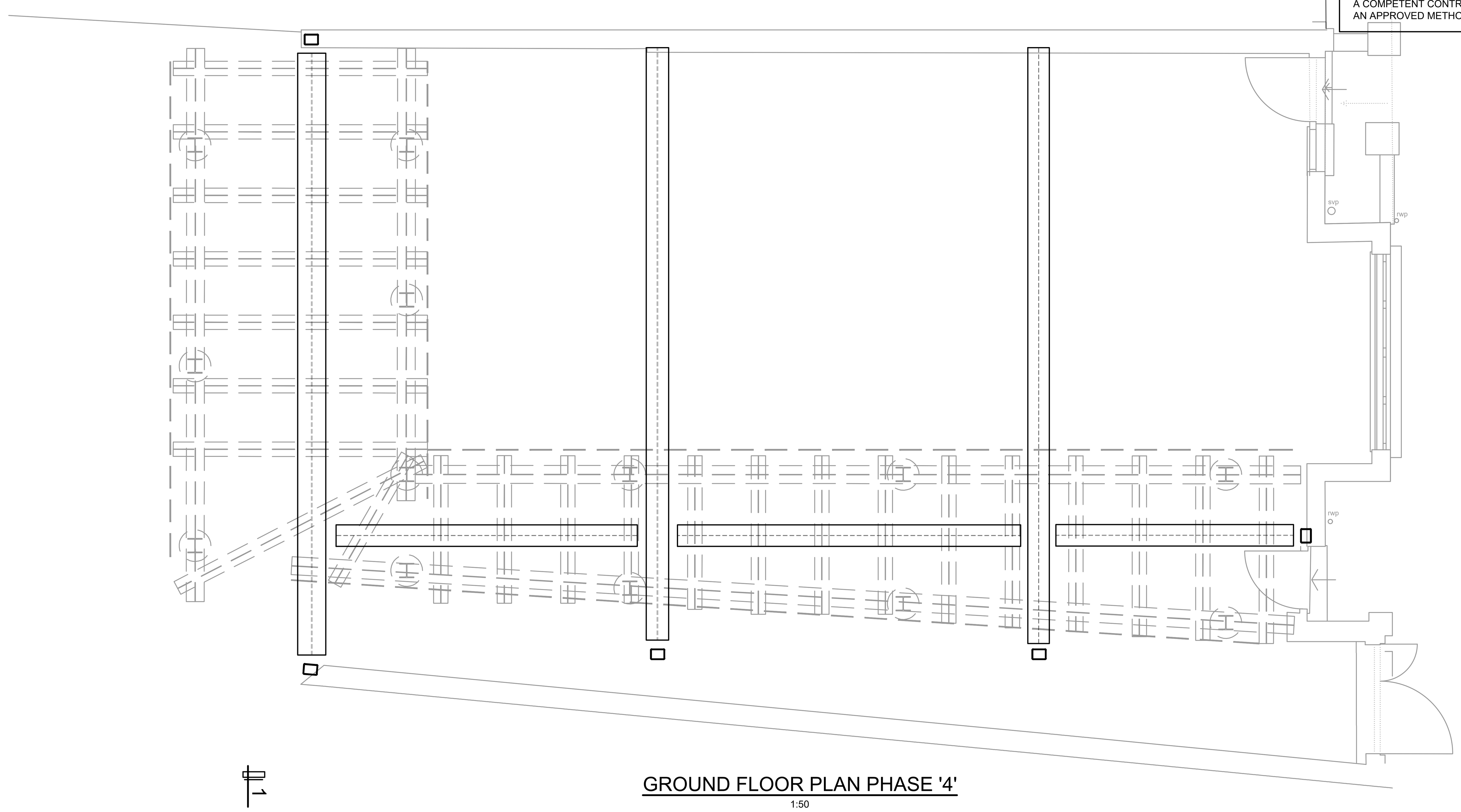
ARCHITECT
RJH ARCHITECTURE

| DRAWN | CHECKED | DATE | SCALE |
|---|---|---|---|
| JM | TG | MAR' 24 | 1:50 @A1 |


David Smith Associates
Consulting Structural & Civil Engineers
Tel: (01604)782620
Email: northampton@dsagroup.co.uk
Website: www.dsagroup.co.uk
8 Duncan Close
Moulton Park
Northampton NN3 6WL

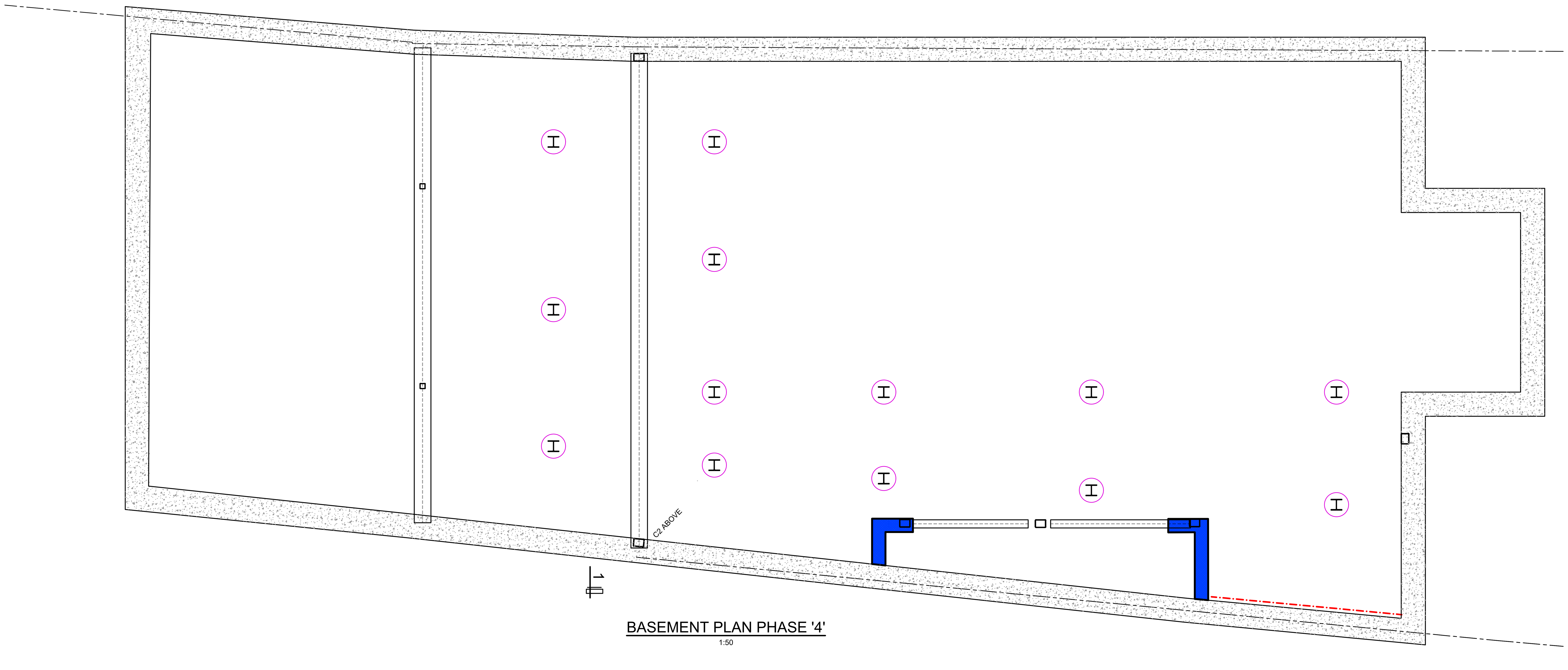

| DRAWING NUMBER | | | REVISION |
|---|---|---|---|
| | 24 | 54720/24 | P1 |

# ALL DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO ORDERING / FABRICATION OF MATERIALS AND COMMENCEMENT OF WORKS



GROUND FLOOR PLAN PHASE '4'

1:50




BASEMENT PLAN PHASE '4'

1:50

## SEQUENCE OF CONSTRUCTION (PHASE 4)

PRELIMINARIES: STRIP AND REMOVE NON-LOAD BEARING ELEMENTS, CEILINGS ETC AND ISOLATE EXISTING SERVICES

STAGES

1. INSTALL PADSTONES AND STEEL BEAMS REQUIRED FOR GROUND FLOOR STEEL SUPPORT ABOVE
2. INSTALL COLUMNS UP TO FIRST FLOOR LEVEL
3. INSTALL BEAMS AT FIRST FLOOR LEVEL REQUIRED TO SUPPORT REAR WALL
4. ONCE REAR WALL IS SUPPORTED, REMOVE EXISTING PILES AND PLUNGE COLUMNS. MAKE GOOD SLAB IN BASEMENT

## CDM 2015 DESIGNER NOTES

IN ADDITION TO THE HAZARDS, AND RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION.

CONSTRUCTION:

1. N/A

FOR INFORMATION RELATING TO END USE, MAINTENANCE, DEMOLITION, SEE THE HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

## Notes

1. IF IN DOUBT - ASK !!! DO NOT SCALE
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS.
3. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND BUILDING PRACTICE.
4. ALL DIMENSIONS TO BE CHECKED PRIOR TO STARTING THE WORKS ON SITE. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
5. CONTRACTOR TO ASCERTAIN THE LOCATION OF SERVICES ON SITE PRIOR TO STARTING THE WORK.
6. ALL DIMENSIONS FOR CONSTRUCTION ARE TO BE OBTAINED FROM SITE MEASUREMENTS OR ARCHITECTS SETTING OUT DRAWINGS PRIOR TO MANUFACTURE/BUILDING.
7. REFER TO DRAWING No. 11 FOR STEELWORK NOTES & DRAWING No. 12 FOR TIMBER NOTES
8. ALL TEMPORARY WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH BS 5975:2008
9. ALL SCAFFOLDING TO BE DESIGNED IN ACCORDANCE WITH WITH NASC TG20:13
10. PRINCIPAL CONTRACTOR TO APPOINT TEMPORARY WORKS COORDINATOR (TWC) TO OVERSEE ALL AREAS OF TEMPORARY WORK UNTIL COMPLETION OF ASSOCAITED WORKS.
11. TWC TO INFORM TEMPORARY WORKS DESIGNER (TWD) OF ANY CHANGES MADE TO TEMPORARY WORKS ON SITE AND GAIN FORMAL SIGN OFF PRIOR TO INSTALLATION.
12. CONTRACTOR/CLIENT TO ENSURE ALL TEMPORARY WORKS DESIGNS HAVE BEEN CHECKED TO THE RELEVANT CATEGORY OF DESIGN CHECK AS DETAILED WITHIN TABLE 1 IN BS 5975:2008
13. CONTRACTOR TO SUBMIT DETAILED METHOD STATEMENT AND SEQUENCE OF WORKS TO THE TWD AND TWC FOR CHECKING PRIOR TO COMMENCEMENT OF WORKS ON SITE.
14. CONTRACTOR TO CONFIRM ANY BUILDING MATERIAL WEIGHTS TO BE STORED IN THE AREA OF TEMPORARY SUPPORT PRIOR TO THE COMMENCEMENT OF WORKS.

| ISSUE | REVISION | BY | DATE |
|---|---|---|---|
| P1 | FIRST ISSUE | JM | 28.03.24 |



ISSUE

*PRELIMINARY*

CLIENT

RJH ARCHITECTURE

CONTRACT

34 NASSAU ROAD
LONDON

TITLE

ENABLING WORKS
PHASES '4'
SHT 5 OF 6

ARCHITECT

RJH ARCHITECTURE

| DRAWN | CHECKED | DATE | SCALE |
|---|---|---|---|
| JM | TG | MAR' 24 | 1:50 @A1 |


**David Smith Associates**
*Consulting Structural & Civil Engineers*

Tel: (01604)782620
Email: northampton@dsagroup.co.uk
Website: www.dsagroup.co.uk

8 Duncan Close
Moulton Park
Northampton NN3 6WL


| DRAWING NUMBER | 24 | 54720/25 | REVISION P1 |
|---|---|---|---|

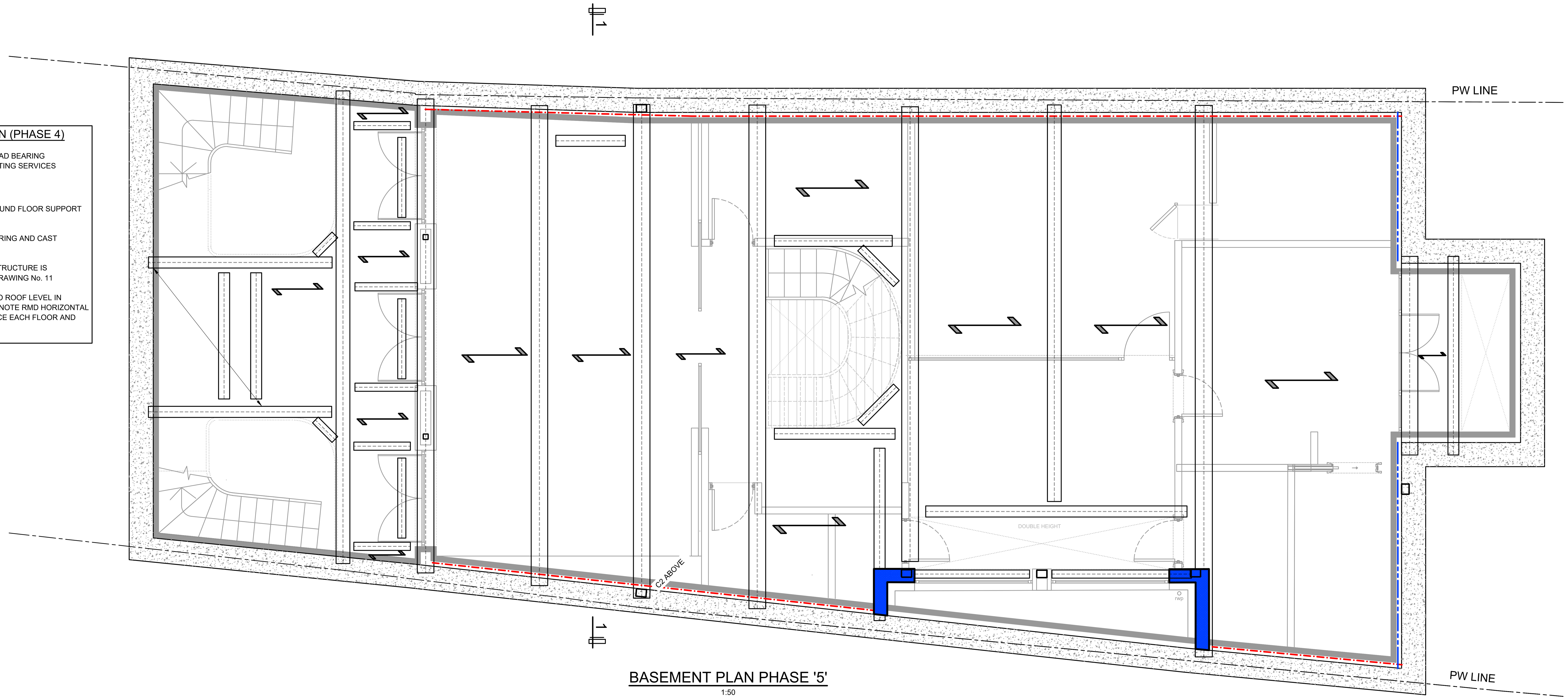
ALL DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO ORDERING / FABRICATION OF MATERIALS AND COMMENCEMENT OF WORKS

## SEQUENCE OF CONSTRUCTION (PHASE 4)

PRELIMINARIES: STRIP AND REMOVE NON-LOAD BEARING ELEMENTS, CEILINGS ETC AND ISOLATE EXISTING SERVICES

STAGES

1. INSTALL REMAINING PADSTONES, GROUND FLOOR SUPPORT BEAMS AND FLOOR ANGLES.
2. INSTALL KINGSPAN METAL DECK FLOORING AND CAST CONCRETE FLOOR
3. REMOVE HORIZONTAL PROPS ONCE STRUCTURE IS INSTALLED IN ACCORDANCE TO DSA DRAWING No. 11
4. CONTINUE BUILDING STRUCTURE UPTO ROOF LEVEL IN ACCORDANCE WITH DRAWINGS 12-13. NOTE RMD HORIZONTAL SUPPORTS ONLY TO BE REMOVED ONCE EACH FLOOR AND ROOF STRUCTURE IS INSTALLED.




BASEMENT PLAN PHASE '5'

1:50

## Notes

1. IF IN DOUBT - ASK !!! DO NOT SCALE
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS.
3. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND BUILDING PRACTICE.
4. ALL DIMENSIONS TO BE CHECKED PRIOR TO STARTING THE WORKS ON SITE. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
5. CONTRACTOR TO ASCERTAIN THE LOCATION OF SERVICES ON SITE PRIOR TO STARTING THE WORK.
6. ALL DIMENSIONS FOR CONSTRUCTION ARE TO BE OBTAINED FROM SITE MEASUREMENTS OR ARCHITECTS SETTING OUT DRAWINGS PRIOR TO MANUFACTURE/BUILDING.
7. REFER TO DRAWING No. 11 FOR STEELWORK NOTES & DRAWING No. 12 FOR TIMBER NOTES
8. ALL TEMPORARY WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH BS 5975:2008
9. ALL SCAFFOLDING TO BE DESIGNED IN ACCORDANCE WITH WITH NASC TG20:13
10. PRINCIPAL CONTRACTOR TO APPOINT TEMPORARY WORKS COORDINATOR (TWC) TO OVERSEE ALL AREAS OF TEMPORARY WORK UNTIL COMPLETION OF ASSOCAITED WORKS.
11. TWC TO INFORM TEMPORARY WORKS DESIGNER (TWD) OF ANY CHANGES MADE TO TEMPORARY WORKS ON SITE AND GAIN FORMAL SIGN OFF PRIOR TO INSTALLATION.
12. CONTRACTOR/CLIENT TO ENSURE ALL TEMPORARY WORKS DESIGNS HAVE BEEN CHECKED TO THE RELEVANT CATEGORY OF DESIGN CHECK AS DETAILED WITHIN TABLE 1 IN BS 5975:2008
13. CONTRACTOR TO SUBMIT DETAILED METHOD STATEMENT AND SEQUENCE OF WORKS TO THE TWD AND TWC FOR CHECKING PRIOR TO COMMENCEMENT OF WORKS ON SITE.
14. CONTRACTOR TO CONFIRM ANY BUILDING MATERIAL WEIGHTS TO BE STORED IN THE AREA OF TEMPORARY SUPPORT PRIOR TO THE COMMENCEMENT OF WORKS.

### CDM 2015 DESIGNER NOTES

IN ADDITION TO THE HAZARDS, AND RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION.

CONSTRUCTION:

1. N/A

FOR INFORMATION RELATING TO END USE, MAINTENANCE, DEMOLITION, SEE THE HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

| ISSUE | REVISION | BY | DATE |
|---|---|---|---|
| P1 | FIRST ISSUE | JM | 28.03.24 |



ISSUE
*PRELIMINARY*

CLIENT
RJH ARCHITECTURE

CONTRACT
34 NASSAU ROAD
LONDON

TITLE
ENABLING WORKS
PHASE '5'
SHT 6 OF 6

ARCHITECT
RJH ARCHITECTURE

| DRAWN | CHECKED | DATE | SCALE |
|---|---|---|---|
| JM | TG | MAR' 24 | 1:50 @A1 |

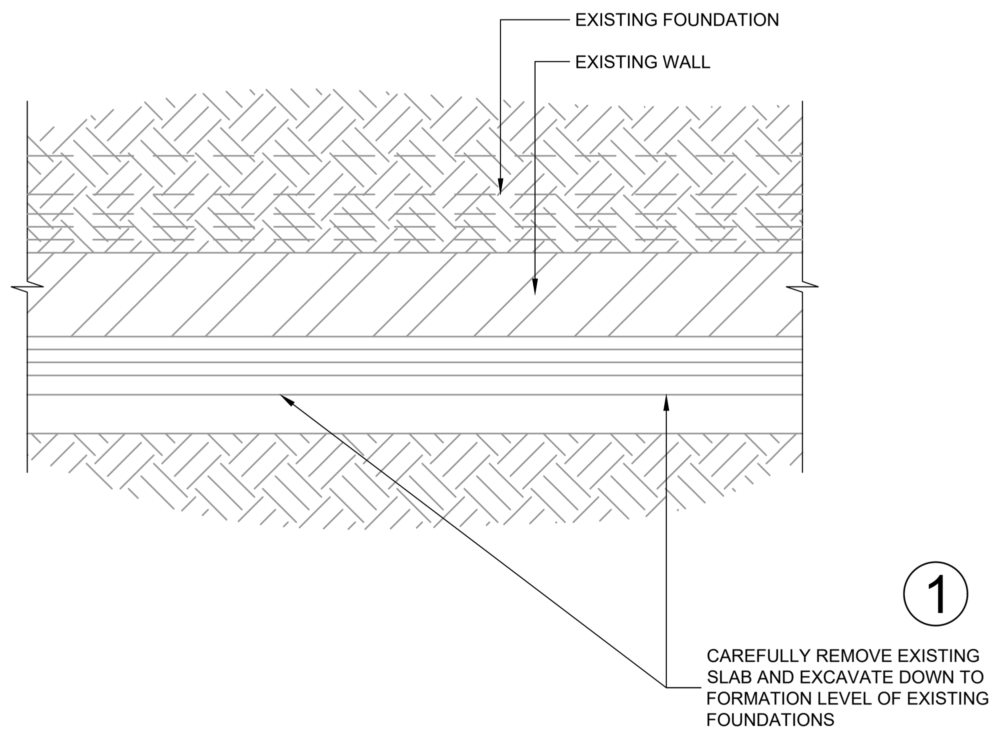
**David Smith Associates**
*Consulting Structural & Civil Engineers*
Tel: (01604)782620
Email: northampton@dsagroup.co.uk
Website: www.dsagroup.co.uk
8 Duncan Close
Moulton Park
Northampton NN3 6WL

| DRAWING NUMBER | | | REVISION |
|---|---|---|---|
| | 24 | 54720/26 | P1 |

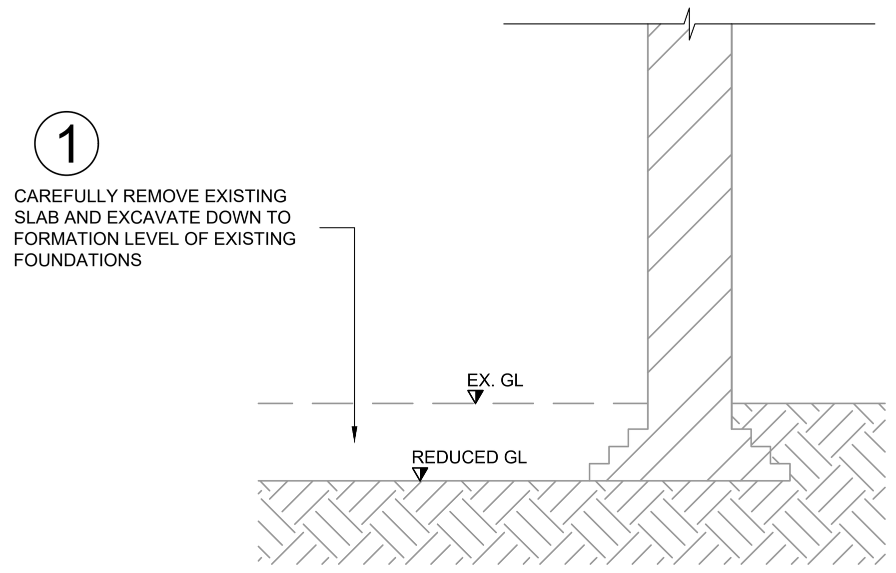
ALL DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO ORDERING / FABRICATION OF MATERIALS AND COMMENCEMENT OF WORKS

PHASE 1

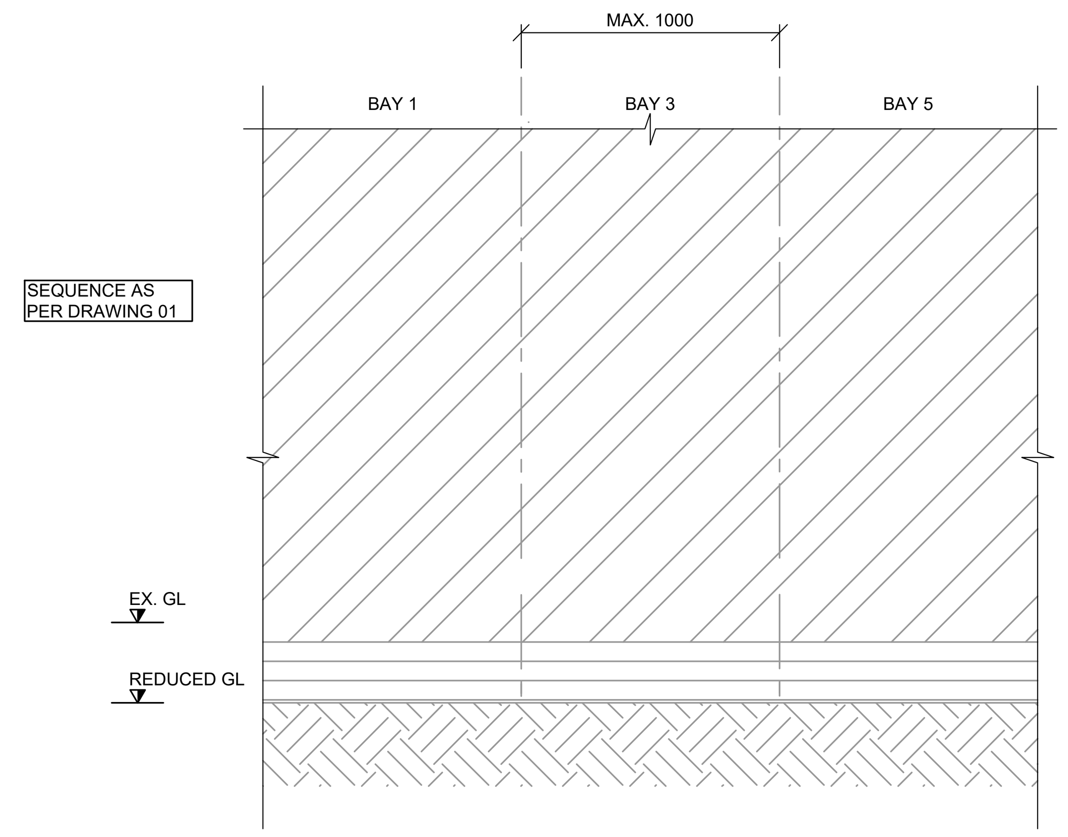
1. THE EXISTING SLAB HAS BEEN REMOVED AND EXCAVATED DOWN TO TOP OF THE FORMATION LEVEL OF THE EXISTING FOUNDATIONS.
2. THE SPECIAL FOUNDATION IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE SEQUENCE HIGHLIGHTED ON PLAN. THE LOCATIONS OF ALL PROPOSED BAYS ARE TO BE MARKED ON THE EXISTING WALLS PRIOR TO COMMENCING WORKS.
3. ALL DRAWINGS, SPECIFICATION AND CONSTRUCTION METHODOLOGY SHOULD BE REFERRED TO PRIOR TO COMMENCING WORKS.
4. A SAFE MEANS OF ACCESS/EGRESS IS TO BE PROVIDED AT ALL TIMES DURING THE CONSTRUCTION WORKS.




PLAN
1:25



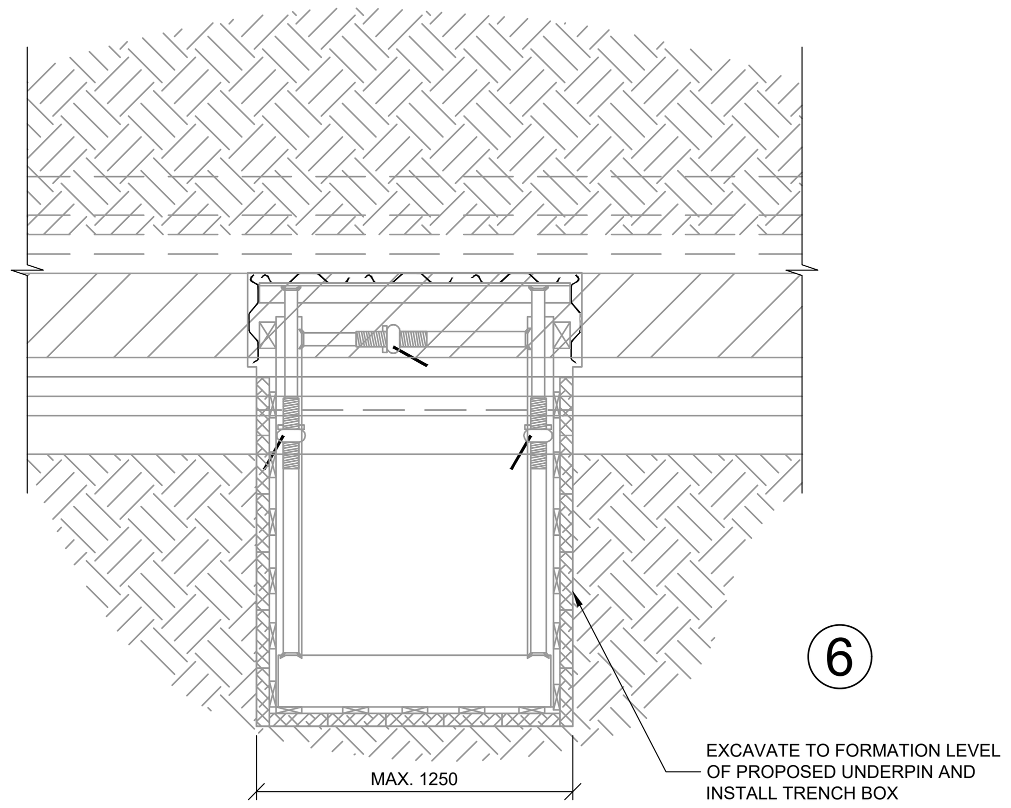

SECTION
1:25



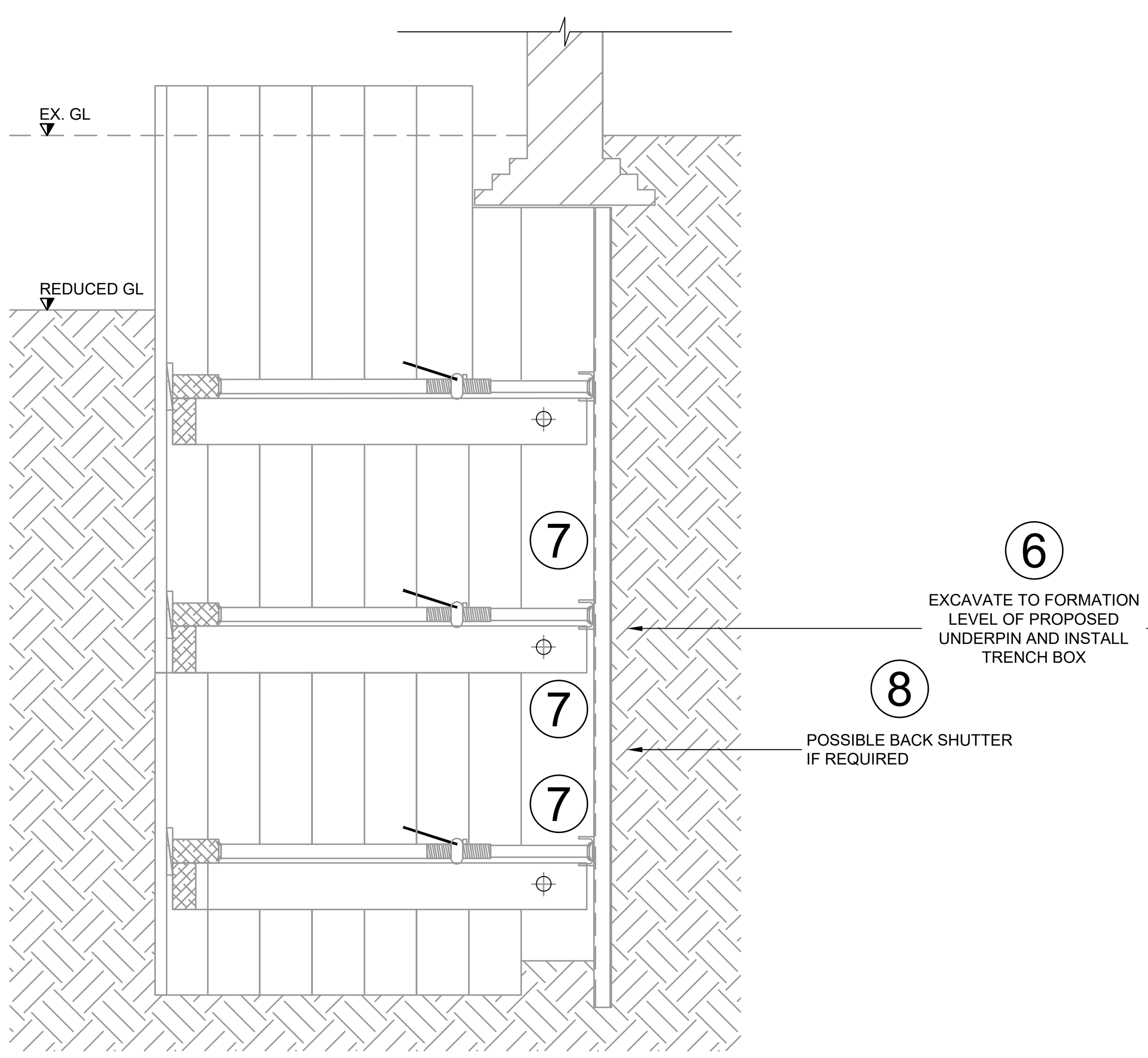

ELEVATION
1:25

PHASE 2

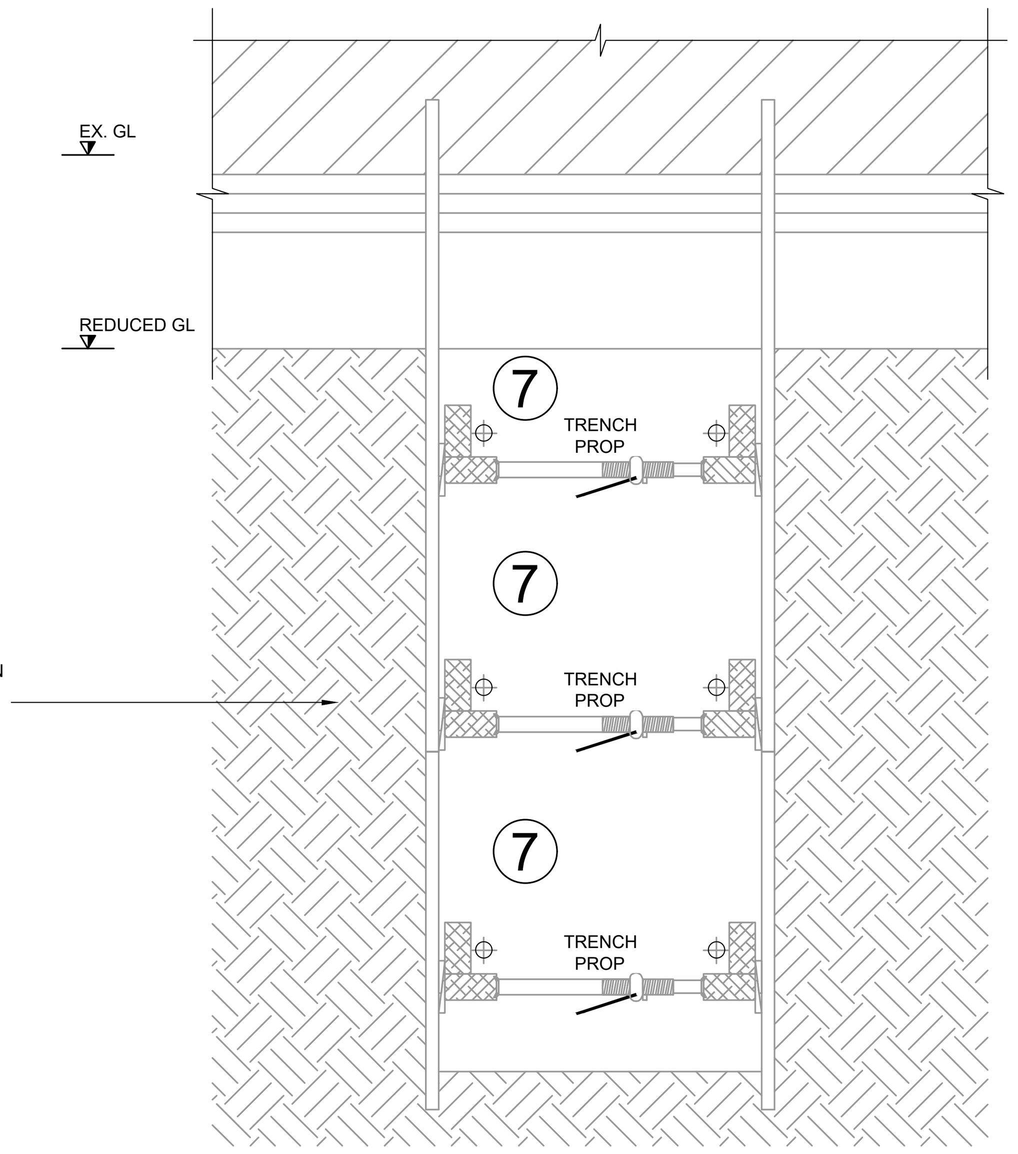
5. EXCAVATE THE PROPOSED SPECIAL FOUNDATION BAYS AT MAXIMUM 1m WIDE STRIPS.
6. PROCEED WITH EXCAVATION TO THE PROPOSED FORMATION LEVEL INDICATED ON PLAN.
7. INSTALL THE TRENCH SUPPORTS AS INDICATED AROUND THE EXCAVATION AS THE EXCAVATION EXTENDS DOWN ENSURING THE SIDES OF THE EXCAVATION ARE SUPPORTED AT ALL TIMES.
8. DEPENDING ON GROUND CONDITIONS ENCOUNTERED AND SOIL PARAMETERS, IT MAY BE A REQUIREMENT TO SUPPORT THE BACK FACE OF THE EXCAVATION. THIS SHALL BE SUPPORTED USING TIMBER BOARDS/TRENCH SHEETS AND BRACED BACK TO THE EXCAVATION FACE IN ORDER TO RESTRAIN THE REAR WALL FACE OF THE EXCAVATION.
9. ONCE IT HAS BEEN EXCAVATED, THE UNDERSIDE OF THE EXISTING FOOTING SHALL BE CLEANED OF ANY LOOSE CRUMPLED MATERIAL TO PROVIDE A SOUND SURFACE TO THE WALL TO BE SUPPORTED.




PLAN
1:25




SECTION
1:25




ELEVATION
1:25

## Notes

1. IF IN DOUBT - ASK !!! DO NOT SCALE
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS.
3. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND BUILDING PRACTICE.
4. ALL DIMENSIONS TO BE CHECKED PRIOR TO STARTING THE WORKS ON SITE. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
5. CONTRACTOR TO ASCERTAIN THE LOCATION OF SERVICES ON SITE PRIOR TO STARTING THE WORK.
6. ALL DIMENSIONS FOR CONSTRUCTION ARE TO BE OBTAINED FROM SITE MEASUREMENTS OR ARCHITECTS SETTING OUT DRAWINGS PRIOR TO MANUFACTURE/BUILDING.
7. REFER TO DRAWING No. 11 FOR STEELWORK NOTES & DRAWING No. 12 FOR TIMBER NOTES
8. ALL TEMPORARY WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH BS 5975:2008
9. ALL SCAFFOLDING TO BE DESIGNED IN ACCORDANCE WITH WITH NASC TG20:13
10. PRINCIPAL CONTRACTOR TO APPOINT TEMPORARY WORKS COORDINATOR (TWC) TO OVERSEE ALL AREAS OF TEMPORARY WORK UNTIL COMPLETION OF ASSOCAITED WORKS.
11. TWC TO INFORM TEMPORARY WORKS DESIGNER (TWD) OF ANY CHANGES MADE TO TEMPORARY WORKS ON SITE AND GAIN FORMAL SIGN OFF PRIOR TO INSTALLATION.
12. CONTRACTOR/CLIENT TO ENSURE ALL TEMPORARY WORKS DESIGNS HAVE BEEN CHECKED TO THE RELEVANT CATEGORY OF DESIGN CHECK AS DETAILED WITHIN TABLE 1 IN BS 5975:2008
13. CONTRACTOR TO SUBMIT DETAILED METHOD STATEMENT AND SEQUENCE OF WORKS TO THE TWD AND TWC FOR CHECKING PRIOR TO COMMENCEMENT OF WORKS ON SITE.
14. CONTRACTOR TO CONFIRM ANY BUILDING MATERIAL WEIGHTS TO BE STORED IN THE AREA OF TEMPORARY SUPPORT PRIOR TO THE COMMENCEMENT OF WORKS.

### CDM 2015 DESIGNER NOTES

IN ADDITION TO THE HAZARDS, AND RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION.

CONSTRUCTION:

1. N/A

FOR INFORMATION RELATING TO END USE, MAINTENANCE, DEMOLITION, SEE THE HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

| ISSUE | REVISION | BY | DATE |
|---|---|---|---|
| P1 | FIRST ISSUE | JM | 28.03.24 |



ISSUE
*P R E L I M I N A R Y*

CLIENT
RJH ARCHITECTURE

CONTRACT
34 NASSAU ROAD
LONDON

TITLE
SPECIAL FOUNDATION SEQUENCING
SHT 1 OF 2

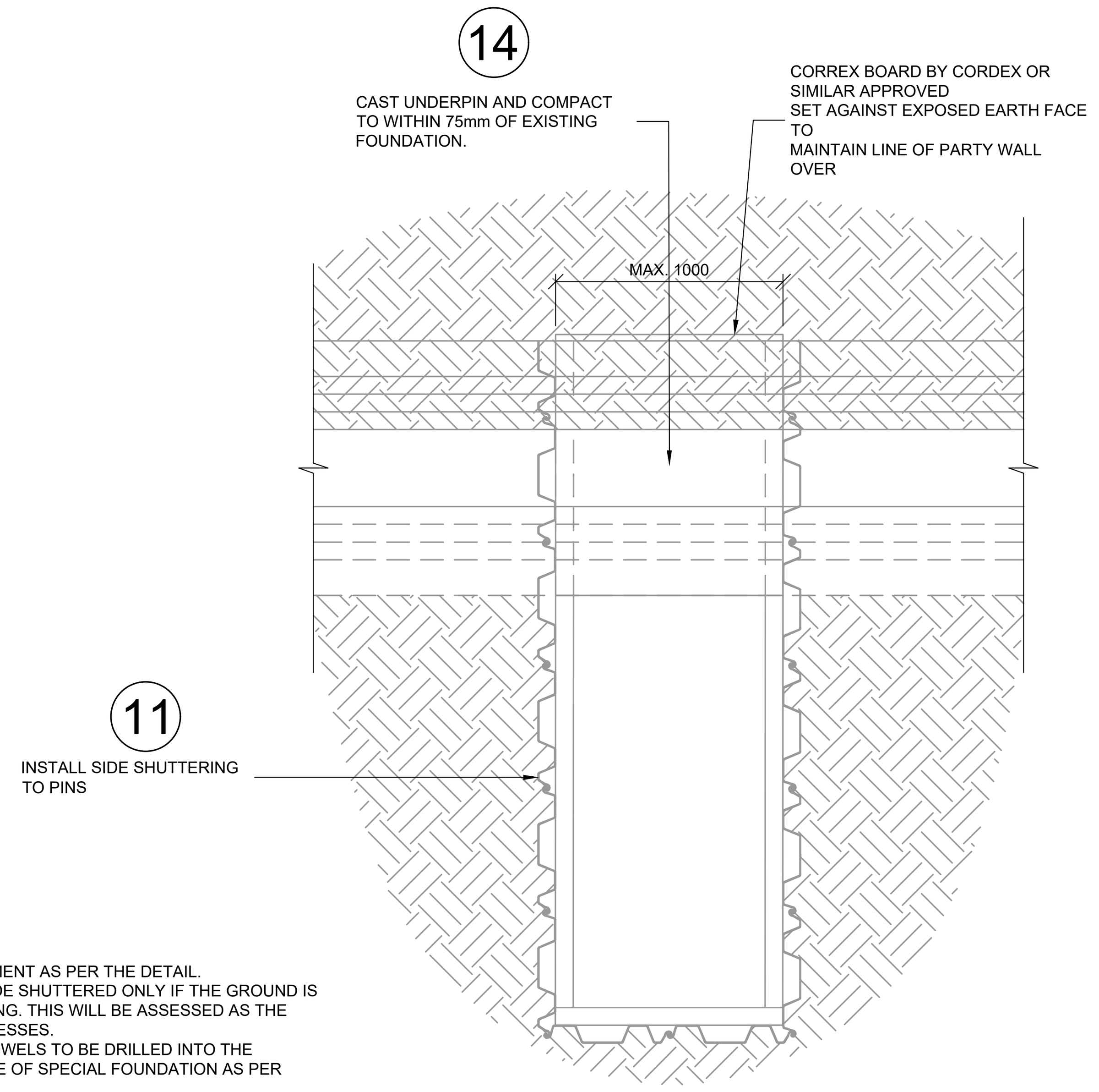
ARCHITECT
RJH ARCHITECTURE

| DRAWN | CHECKED | DATE | SCALE |
|---|---|---|---|
| JM | TG | MAR' 24 | 1:50 @A1 |

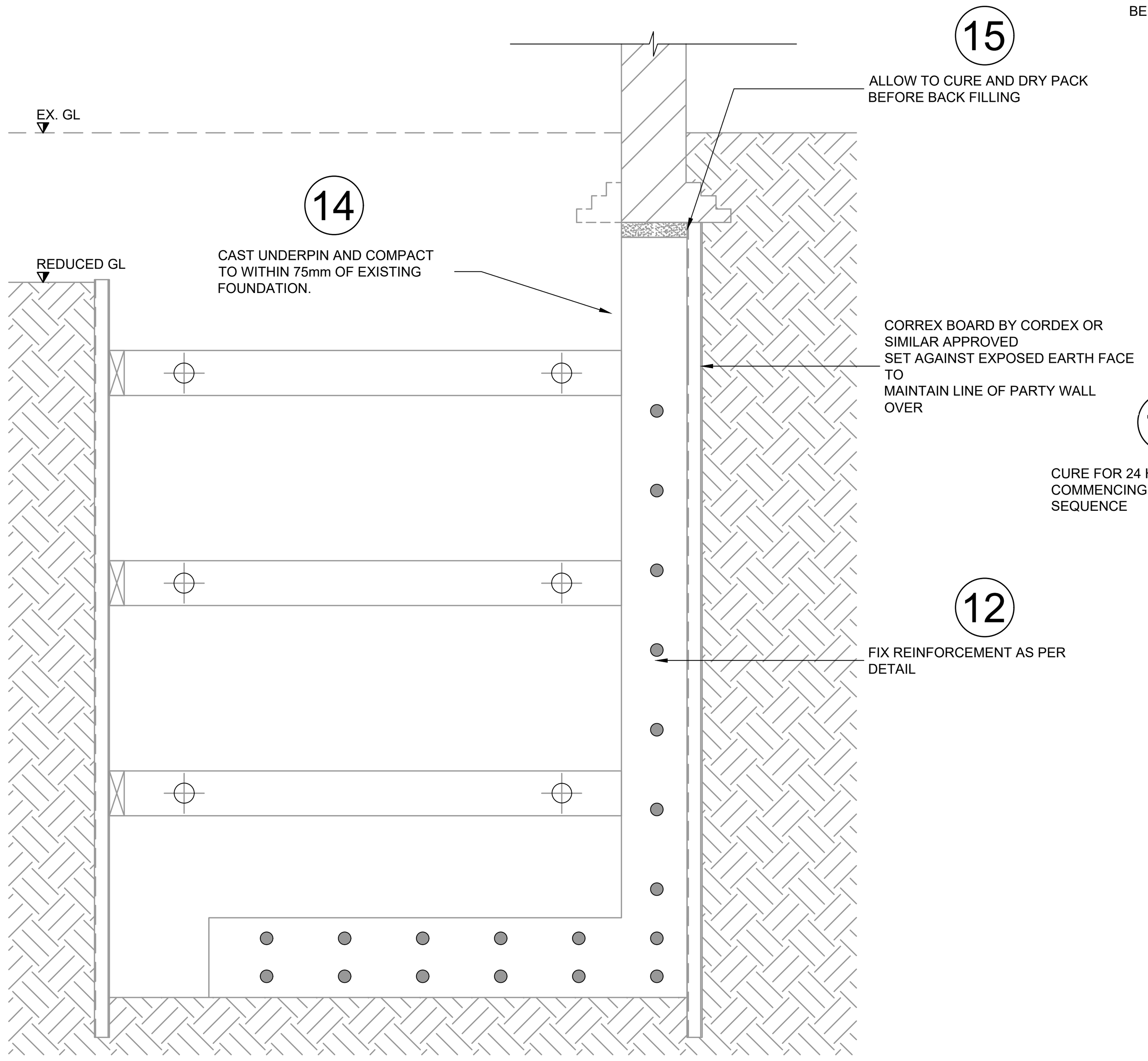

**David Smith Associates**
*Consulting Structural & Civil Engineers*
Tel: (01604)782620
Email: northampton@dsagroup.co.uk
Website: www.dsagroup.co.uk
8 Duncan Close
Moulton Park
Northampton NN3 6WL


| DRAWING NUMBER | 24 | 54720/27 | REVISION P1 |
|---|---|---|---|

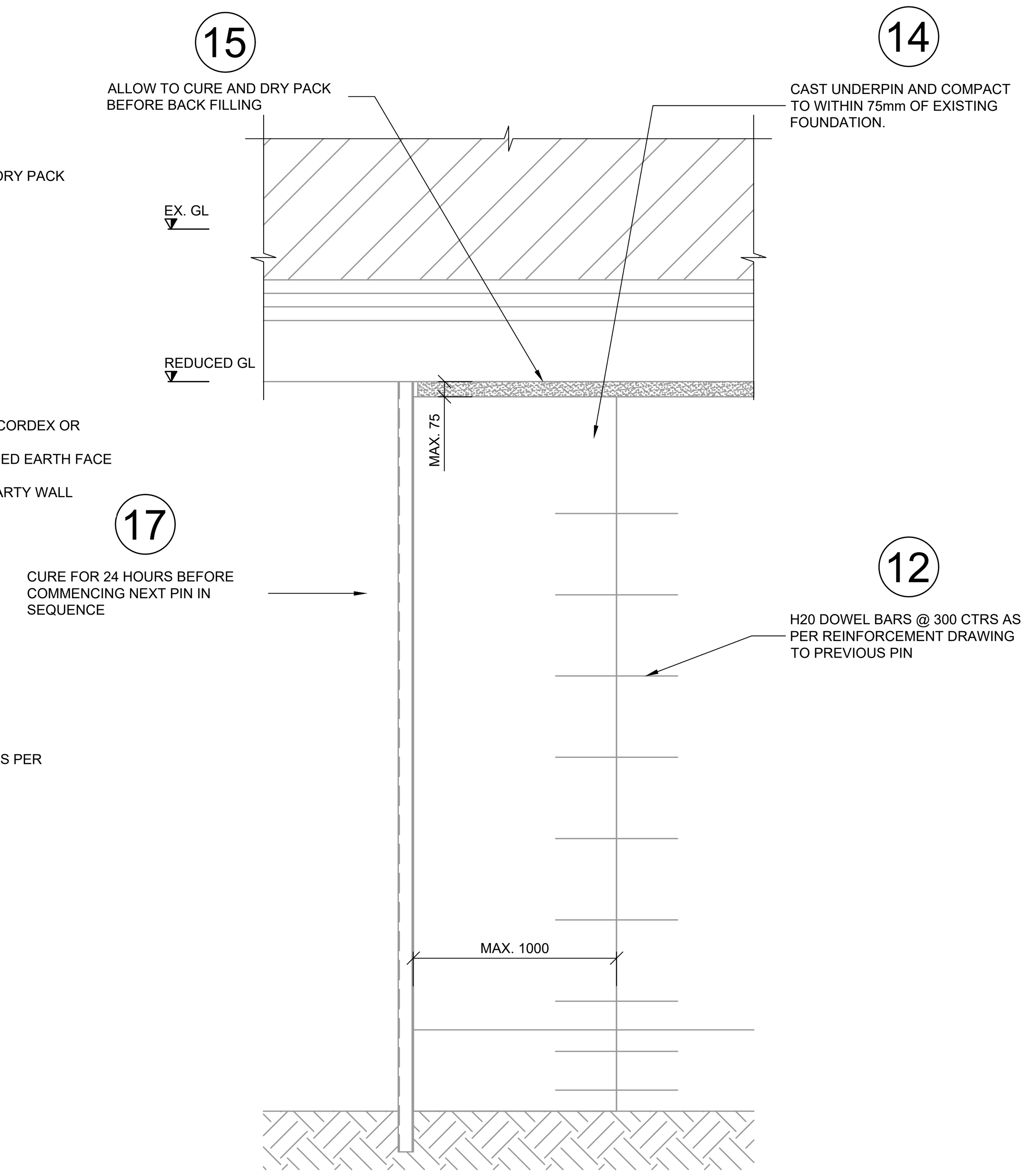
# ALL DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO ORDERING / FABRICATION OF MATERIALS AND COMMENCEMENT OF WORKS




PLAN
1:25



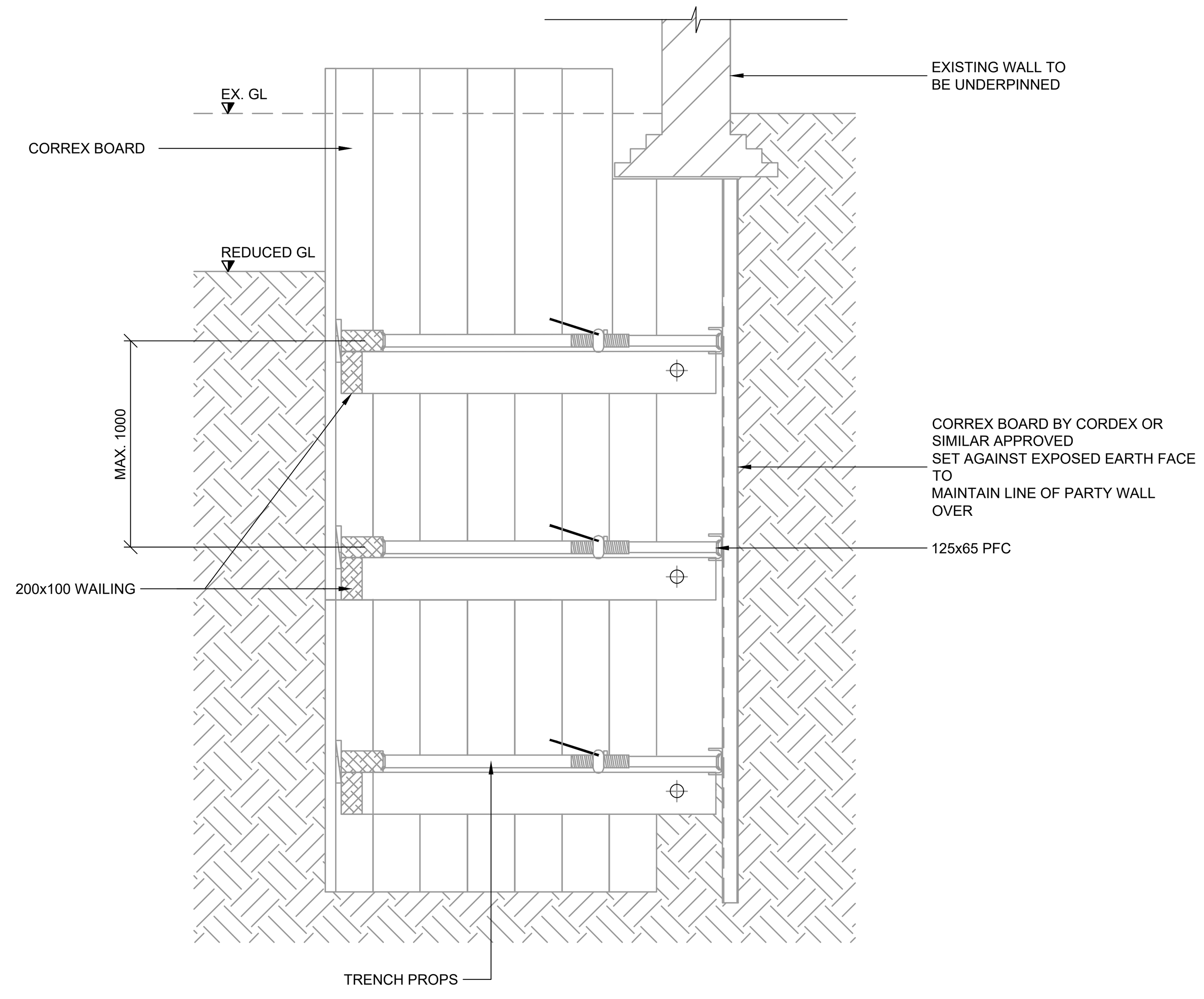

SECTION
1:25




ELEVATION
1:25

PHASE 3

10. FIX THE REINFORCEMENT AS PER THE DETAIL.
11. THE PINS WILL BE SIDE SHUTTERED ONLY IF THE GROUND IS NOT SELF SUPPORTING. THIS WILL BE ASSESSED AS THE EXCAVATION PROGRESSES.
12. INSTALL DOWELS. DOWELS TO BE DRILLED INTO THE PREVIOUS SEQUENCE OF SPECIAL FOUNDATION AS PER DRAWING.
13. CORREX BOARD SHALL THEN BE PLACED TO THE FACE OF THE UNDERPIN AND BRACED BACK AGAINST THE EXCAVATION FACE.
14. THE CONCRETE SHALL THEN BE DISCHARGED INTO THE SHUTTERED UNDERPIN AND WILL BE COMPACTED USING 110v CONCRETE POKER TO WITHIN 75mm OF THE UNDERSIDE OF THE EXISTING FOUNDATION.
15. ALLOW TO CURE FOR 24 HOURS BEFORE DRY PACKING. THE EXCAVATION IS THEN TO BE BACKFILLED AND COMPACTED IN LAYERS NOT EXCEEDING 600mm THICK.
16. DRY PACK MORTAR TO BE RAMMED INTO THE VOID USING HEAVY STEEL RAMMING BAR.
17. ALLOWING THE DRY PACKING TO CURE FOR 24 HOURS PRIOR TO COMMENCING THE EXCAVATION OF THE NEXT PIN IN SEQUENCE.
18. THIS PROCESS SHALL BE REPEATED FOR EACH PIN.




TYPICAL UNDERPINNING TRENCH DETAIL
1:25

## Notes

1. IF IN DOUBT - ASK !!! DO NOT SCALE
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS.
3. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND BUILDING PRACTICE.
4. ALL DIMENSIONS TO BE CHECKED PRIOR TO STARTING THE WORKS ON SITE. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
5. CONTRACTOR TO ASCERTAIN THE LOCATION OF SERVICES ON SITE PRIOR TO STARTING THE WORK.
6. ALL DIMENSIONS FOR CONSTRUCTION ARE TO BE OBTAINED FROM SITE MEASUREMENTS OR ARCHITECTS SETTING OUT DRAWINGS PRIOR TO MANUFACTURE/BUILDING.
7. REFER TO DRAWING No. 11 FOR STEELWORK NOTES & DRAWING No. 12 FOR TIMBER NOTES
8. ALL TEMPORARY WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH BS 5975:2008
9. ALL SCAFFOLDING TO BE DESIGNED IN ACCORDANCE WITH WITH NASC TG20:13
10. PRINCIPAL CONTRACTOR TO APPOINT TEMPORARY WORKS COORDINATOR (TWC) TO OVERSEE ALL AREAS OF TEMPORARY WORK UNTIL COMPLETION OF ASSOCAITED WORKS.
11. TWC TO INFORM TEMPORARY WORKS DESIGNER (TWD) OF ANY CHANGES MADE TO TEMPORARY WORKS ON SITE AND GAIN FORMAL SIGN OFF PRIOR TO INSTALLATION.
12. CONTRACTOR/CLIENT TO ENSURE ALL TEMPORARY WORKS DESIGNS HAVE BEEN CHECKED TO THE RELEVANT CATEGORY OF DESIGN CHECK AS DETAILED WITHIN TABLE 1 IN BS 5975:2008
13. CONTRACTOR TO SUBMIT DETAILED METHOD STATEMENT AND SEQUENCE OF WORKS TO THE TWD AND TWC FOR CHECKING PRIOR TO COMMENCEMENT OF WORKS ON SITE.
14. CONTRACTOR TO CONFIRM ANY BUILDING MATERIAL WEIGHTS TO BE STORED IN THE AREA OF TEMPORARY SUPPORT PRIOR TO THE COMMENCEMENT OF WORKS.

CDM 2015 DESIGNER NOTES

IN ADDITION TO THE HAZARDS, AND RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION.

CONSTRUCTION:

1. N/A

FOR INFORMATION RELATING TO END USE, MAINTENANCE, DEMOLITION, SEE THE HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

| ISSUE | REVISION | BY | DATE |
|---|---|---|---|
| P1 | FIRST ISSUE | JM | 28.03.24 |



ISSUE
*PRELIMINARY*

CLIENT
RJH ARCHITECTURE

CONTRACT
34 NASSAU ROAD
LONDON

TITLE
SPECIAL FOUNDATION SEQUENCING
SHT 2 OF 2

ARCHITECT
RJH ARCHITECTURE

| DRAWN | CHECKED | DATE | SCALE |
|---|---|---|---|
| JM | TG | MAR' 24 | 1:50 @A1 |

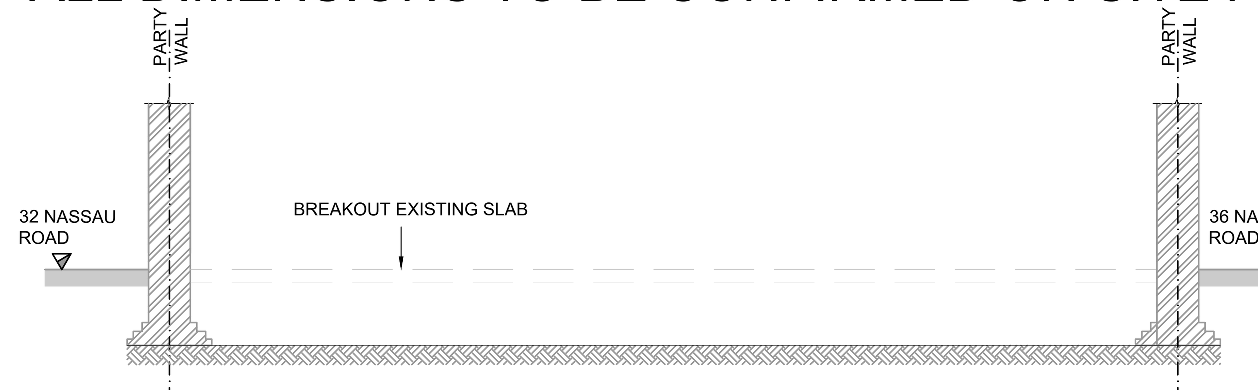

**David Smith Associates**
*Consulting Structural & Civil Engineers*

Tel: (01604)782620
Email: northampton@dsagroup.co.uk
Website: www.dsagroup.co.uk

8 Duncan Close
Moulton Park
Northampton NN3 6WL


| DRAWING NUMBER | 24 | 54720/28 | REVISION P1 |
|---|---|---|---|

# ALL DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO ORDERING / FABRICATION OF MATERIALS AND COMMENCEMENT OF WORKS




PHASE 2 - STAGE 1
(SECTION '1-1')

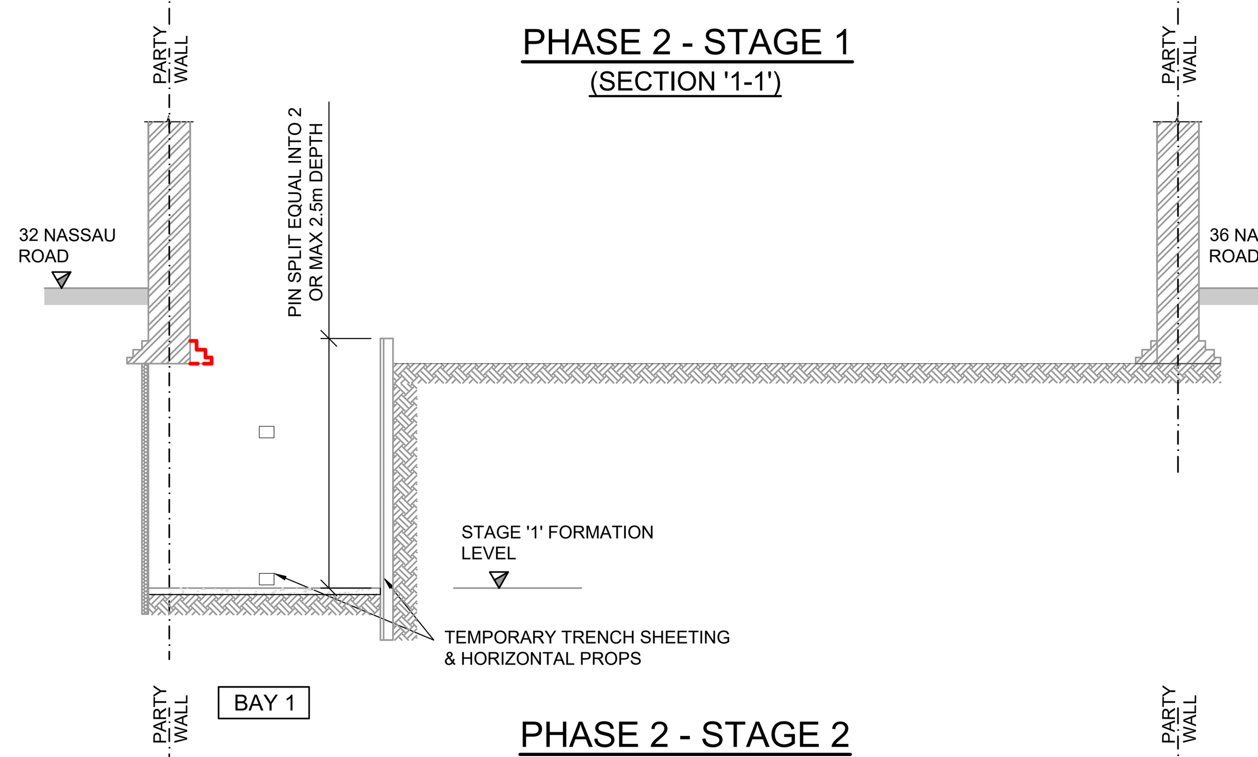
STAGES

1a LOCALLY INSTALL FIRST PIN + TEMPORARY WORKS AS SHOWN ON DRAWING 21 TO REMOVE EXISTING REAR WALL AS PHASE '1' WORKS

1b INSTALL GOAL POST TO SUPPORT REAR WALL

1c BREAK OUT REMAINING EXISTING SLAB

1d REDUCE GROUND LEVEL TO U/S EXISTING FOUNDATIONS

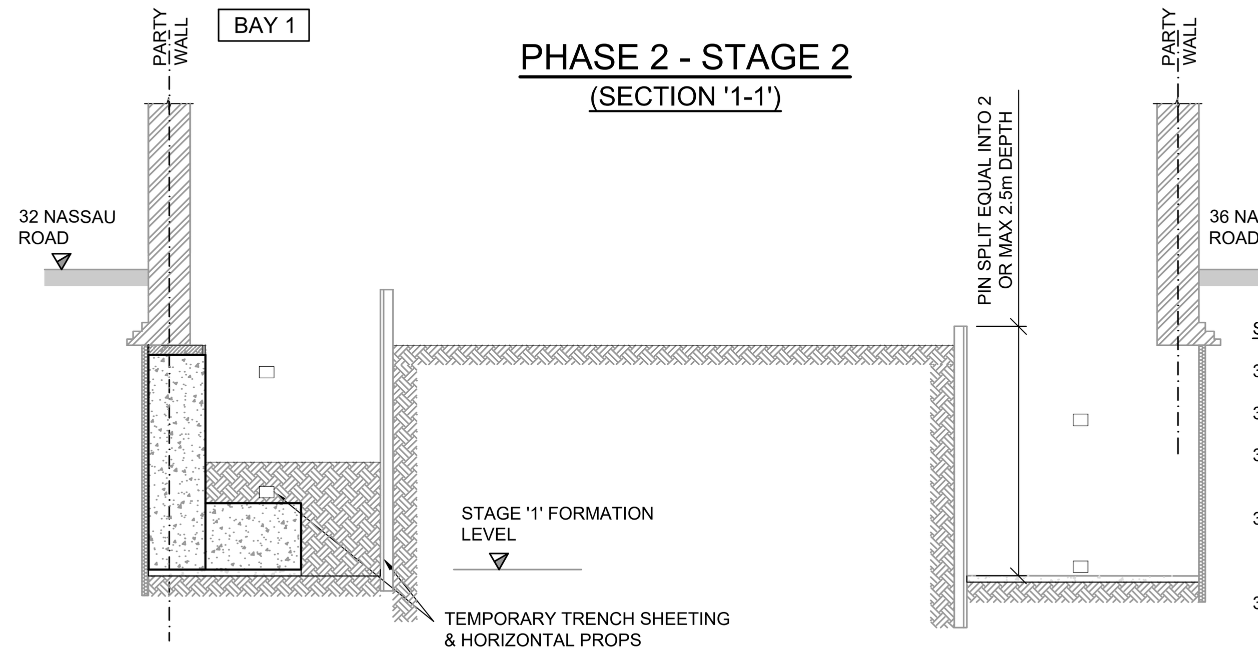



PHASE 2 - STAGE 2
(SECTION '1-1')

STAGE 2

2a EXCAVATE BAY 1 TO FORMATION LEVEL AND INSTALL VERTICAL TRENCH SHEETING AND HORIZONTAL PROPS TO POUR '1' DEPTH

2b LOCALLY BREAK OUT CORBEL




PHASE 2 - STAGE 3
(SECTION '1-1')

STAGE 3

3a PREPARE FORMATION LEVEL AND LAY REINFORCEMENT

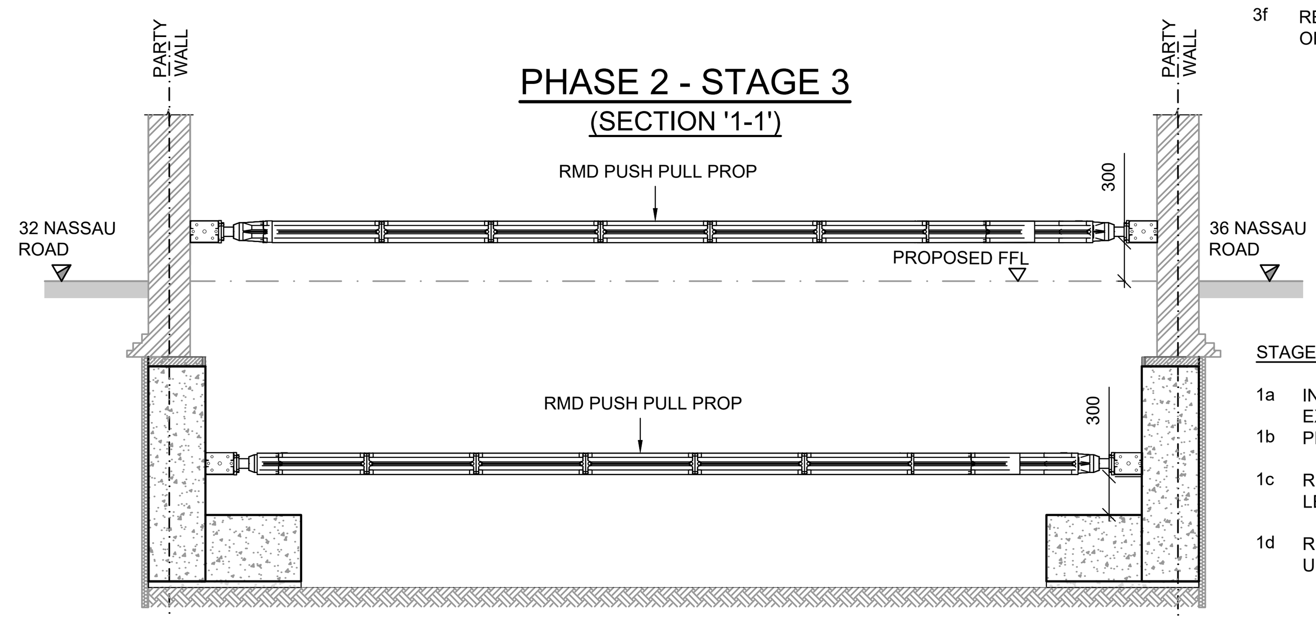
3b CAST WALL AND TOE TO RETAINING WALL

3c REFER TO PERMANENT WORKS FOR WATERPROOFING ETC

3d AFTER A PERIOD OF 48 HOURS, THE 75mm GAP LEFT TO THE UNDERSIDE OF THE EXISTING FOOTING SHOULD BE DRY PACKED

3e BACK FILL BAY 1, REMOVING TRENCH SHEETING AND PROPS AS THE BAY IS BACKFILLED.

3f REPEAT STAGES 2-4, IN NUMERICAL ORDER AS INDICATED ON PLAN FOR 'PHASE 1 FIRST STAGE' POUR



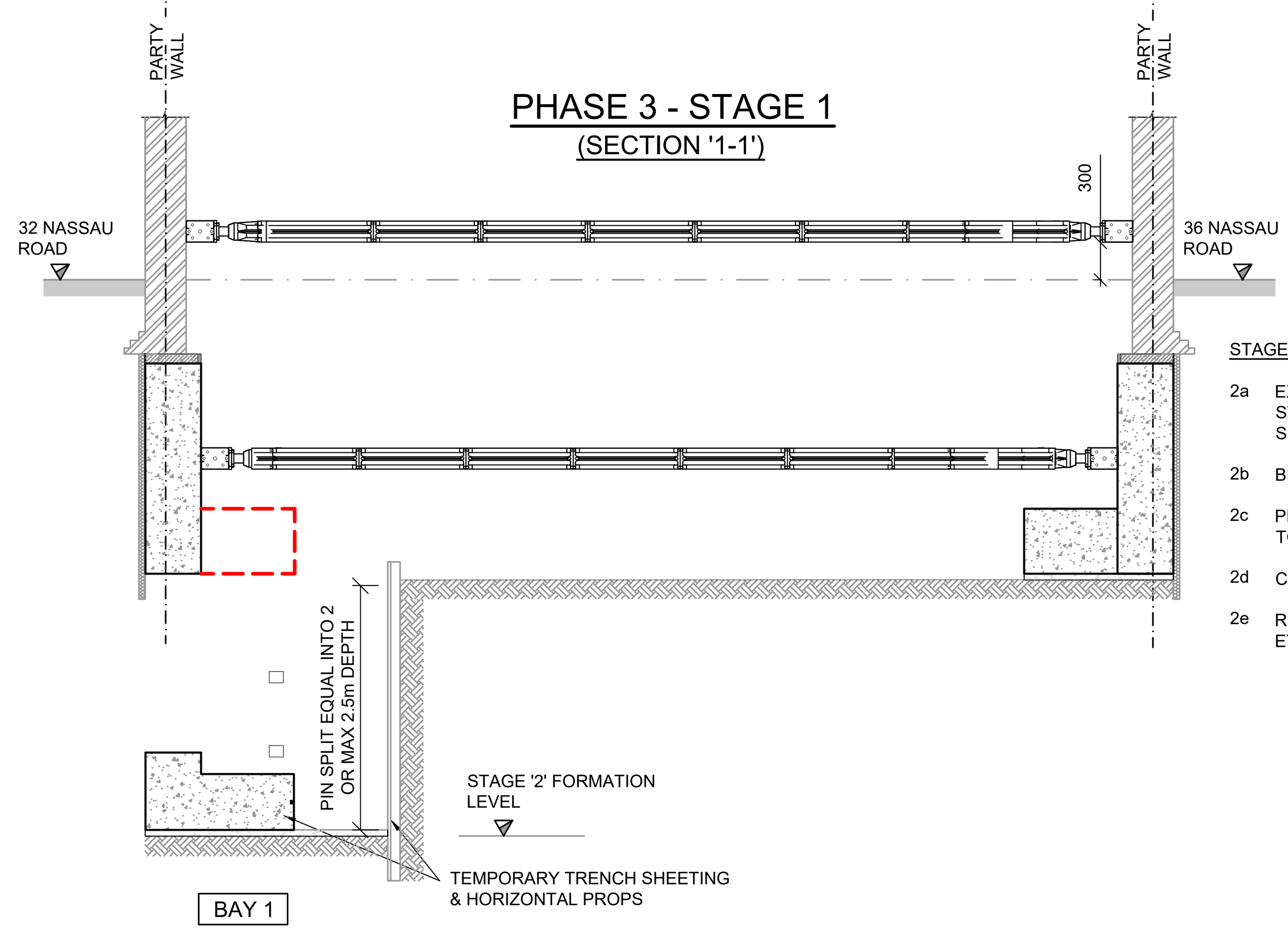

PHASE 3 - STAGE 1
(SECTION '1-1')

STAGE 1

1a INSTALL WAILING BEAMS AND RMD PUSH-PULL PROPS AT EXISTING GF LEVEL, APPROXIMATELY 300mm ABOVE THE
1b PROPOSED FFL

1c REDUCE GROUND TO 100mm ABOVE FIRST STAGE TOF LEVEL AND INSTALL RMD PUSH-PULL PROPS

1d REDUCE GROUND LEVEL TO UNDERSIDE OF FIRST STAGE UNDERPINS




PHASE 3 - STAGE 2
(SECTION '1-1')

STAGE 2

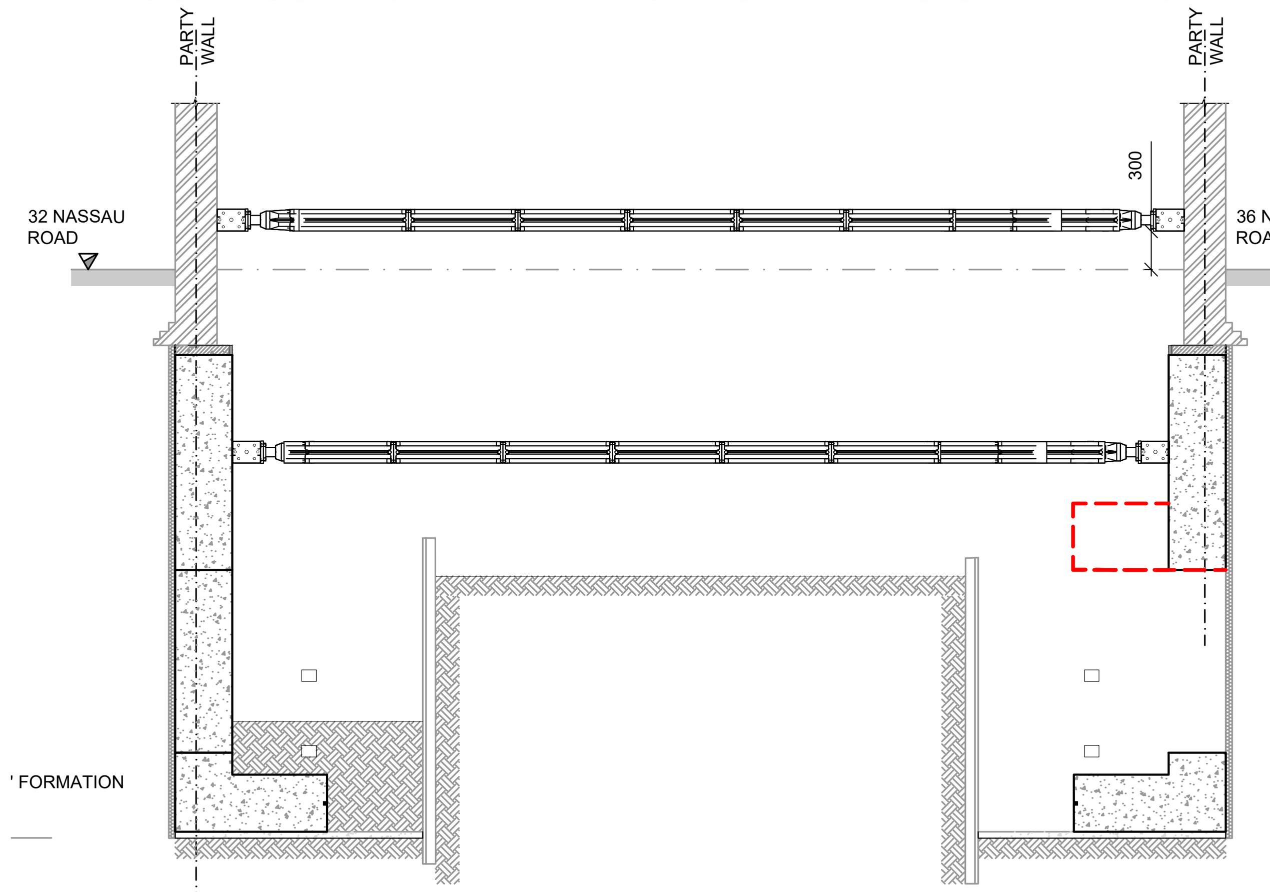
2a EXCAVATE BAY 1 TO FORMATION LEVEL OF SECOND STAGE UNDERPIN AND INSTALL VERTICAL TRENCH SHEETING AND HORIZONTAL PROPS

2b BREAK OUT TOE

2c PREPARE FORMATION LEVEL AND LAY REINFORCEMENT TO BASE SLAB

2d CAST BASE SLAB AND KICKER

2e REFER TO PERMANENT WORKS FOR WATERPROOFING ETC




PHASE 3 - STAGE 3
(SECTION '1-1')

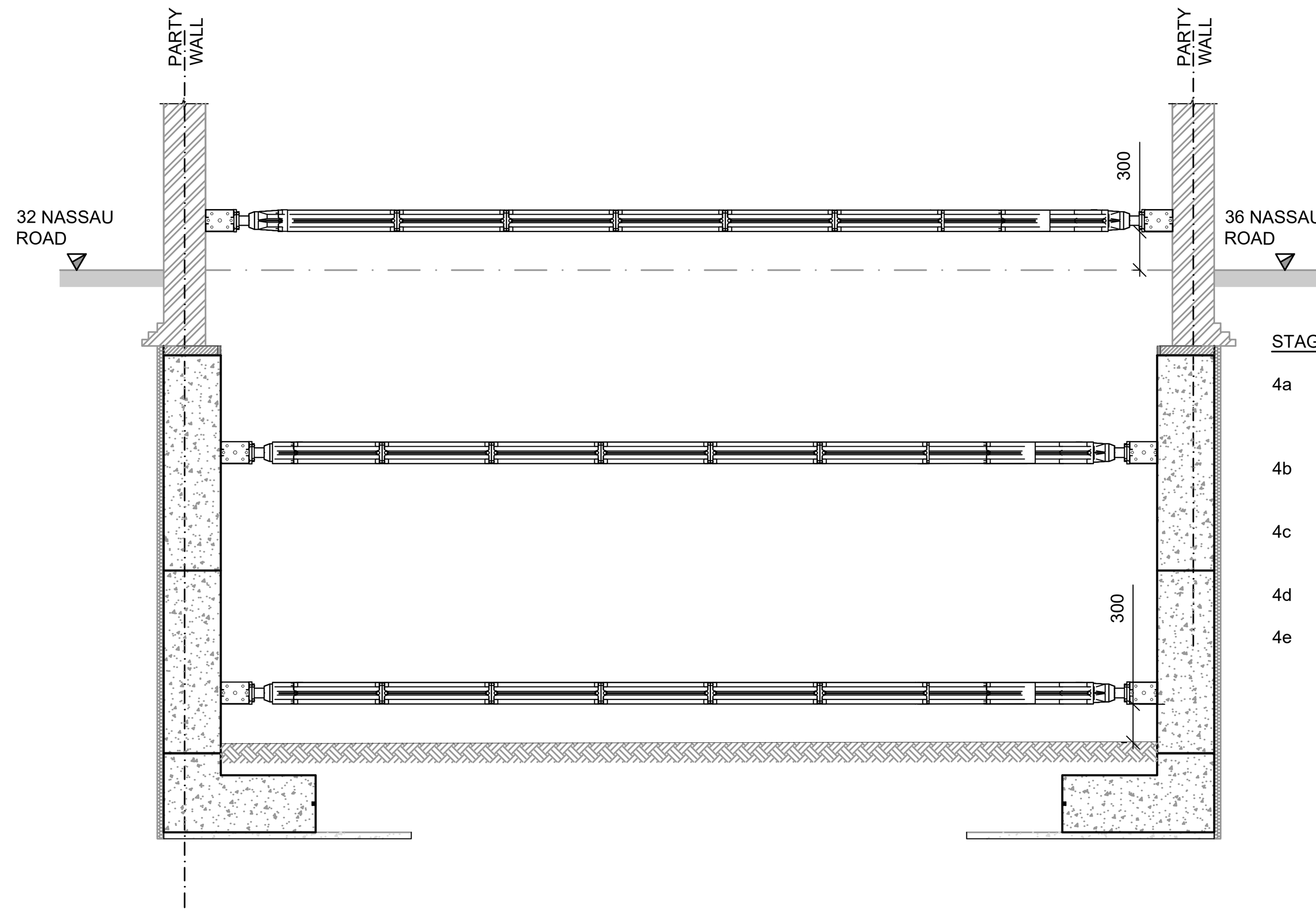
STAGE 3

3a FIX REINFORCEMENT FOR RETAINING WALL FOUNDATION SECTION AND PROVIDE WATER BAR TO KICKER. INSTALL DOWEL BARS IN SOIL TO ADJOINING BAYS

3b INSTALL FORMWORK TO RETAINING WALL SECTION AND CAST REMAINING WALL

3c BACK FILL BAY 1, REMOVING TRENCH SHEETING AND PROPS AS THE BAY IS BACKFILLED.

3d REPEAT STAGES 5-7, IN NUMERICAL ORDER AS INDICATED ON PLAN




PHASE 3 - STAGE 4
(SECTION '1-1')

STAGE 4

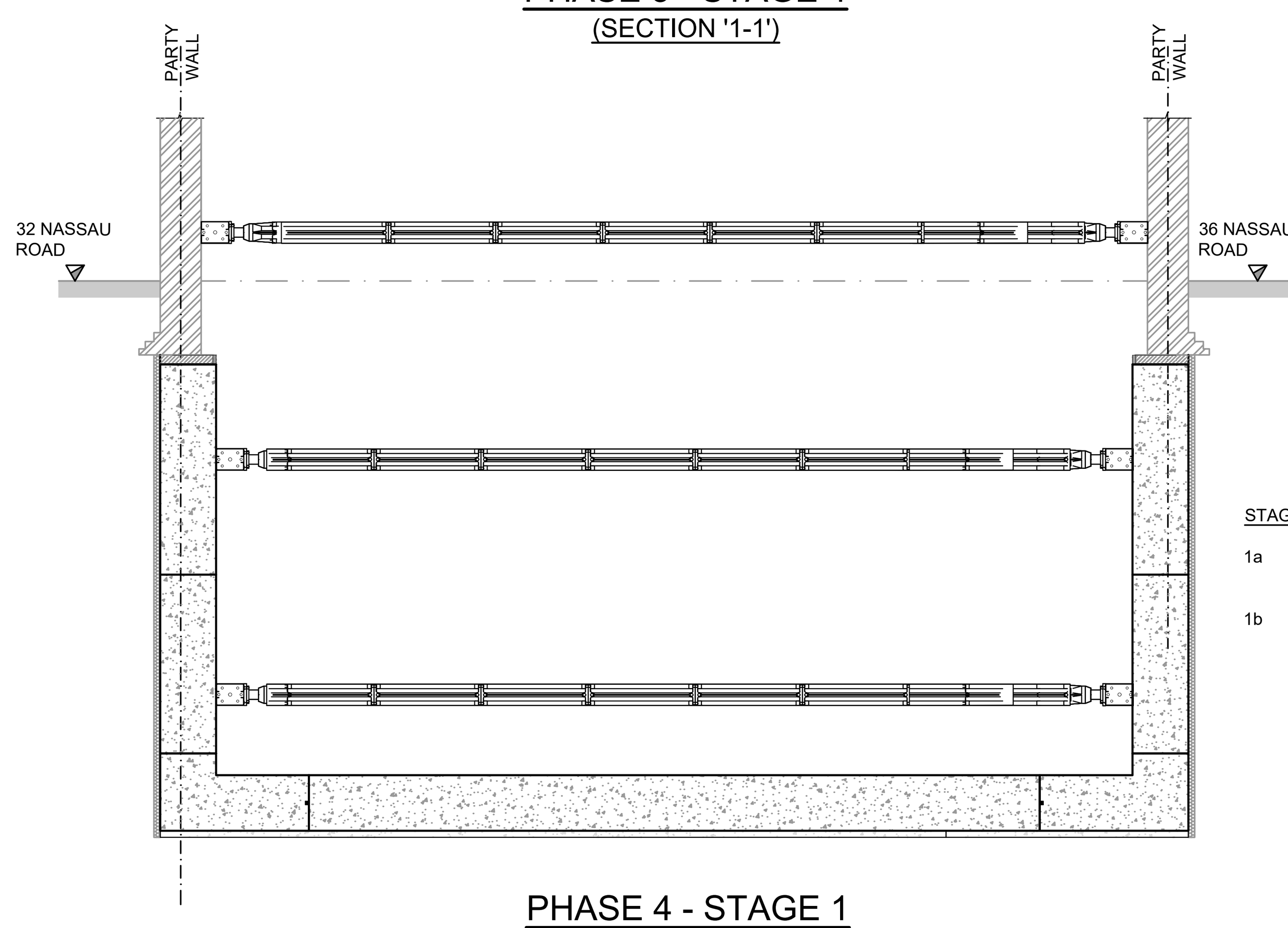
4a REDUCE GROUND LEVEL TO UNDERSIDE OF EXISTING PARTY WALL BASEMENT FOUNDATION (EXACT DETAILS TBC)

4b INSTALL LOCAL FOUDNATIONS TO EXISTING BASEMENT TO ACHIEVE FORMATION LEVEL OF PROPOSED BASEMENT

4c REDUCE FORMATION LEVEL TO 300mm ABOVE PROPOSED FFL

4d INSTALL RMD 300mm ABOVE PROPOSED FFL

4e REDUCE GROUND TO FORMATION LEVEL

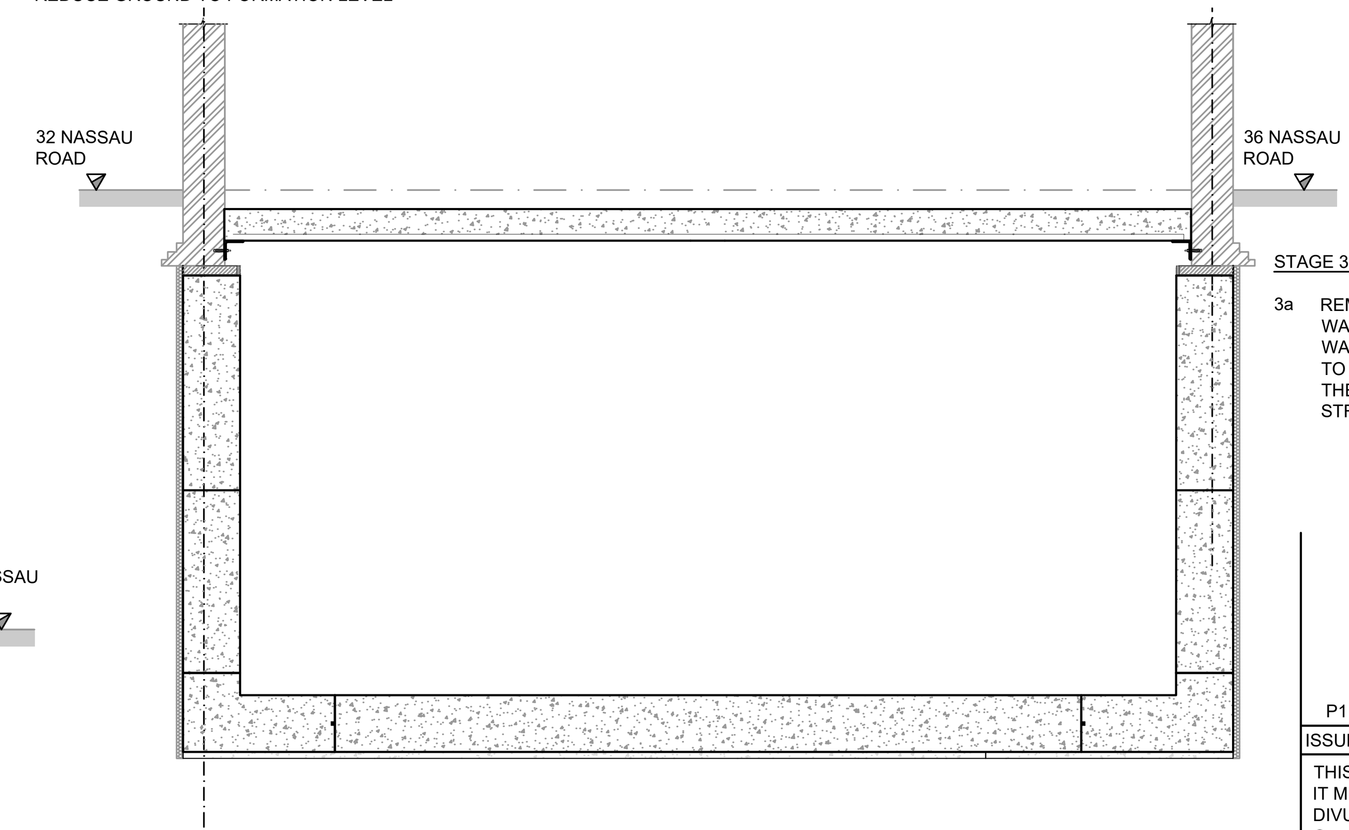



PHASE 4 - STAGE 1
(SECTION '1-1')

STAGE 1

1a PREPARE FORMATION LEVEL AND LAY REINFORCEMENT TO BASE SLAB

1b CAST BASE SLAB AND PUMPS ETC - SEE PERM WORKS




PHASE 4 - STAGE 3
(SECTION '1-1')

STAGE 3

3a REMOVE SCAFFOLD FRAME, INCLUDING WAILING BEAMS AND RMD PROPS. NOTE, WAILING BEAMS AND RMD PROPS ARE ONLY TO BE REMOVED WHEN THE CONCRETE TO THE METAL DECK HAS ACHIEVED ITS FULL STRENGTH

## Notes

1. IF IN DOUBT - ASK !!! DO NOT SCALE
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS.
3. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND BUILDING PRACTICE.
4. ALL DIMENSIONS TO BE CHECKED PRIOR TO STARTING THE WORKS ON SITE. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
5. CONTRACTOR TO ASCERTAIN THE LOCATION OF SERVICES ON SITE PRIOR TO STARTING THE WORK.
6. ALL DIMENSIONS FOR CONSTRUCTION ARE TO BE OBTAINED FROM SITE MEASUREMENTS OR ARCHITECTS SETTING OUT DRAWINGS PRIOR TO MANUFACTURE/BUILDING.
7. REFER TO DRAWING No. 11 FOR STEELWORK NOTES & DRAWING No. 12 FOR TIMBER NOTES
8. ALL TEMPORARY WORKS HAVE BEEN DESIGNED IN ACCORDANCE WITH BS 5975:2008
9. ALL SCAFFOLDING TO BE DESIGNED IN ACCORDANCE WITH WITH NASC TG20:13
10. PRINCIPAL CONTRACTOR TO APPOINT TEMPORARY WORKS COORDINATOR (TWC) TO OVERSEE ALL AREAS OF TEMPORARY WORK UNTIL COMPLETION OF ASSOCAITED WORKS.
11. TWC TO INFORM TEMPORARY WORKS DESIGNER (TWD) OF ANY CHANGES MADE TO TEMPORARY WORKS ON SITE AND GAIN FORMAL SIGN OFF PRIOR TO INSTALLATION.
12. CONTRACTOR/CLIENT TO ENSURE ALL TEMPORARY WORKS DESIGNS HAVE BEEN CHECKED TO THE RELEVANT CATEGORY OF DESIGN CHECK AS DETAILED WITHIN TABLE 1 IN BS 5975:2008
13. CONTRACTOR TO SUBMIT DETAILED METHOD STATEMENT AND SEQUENCE OF WORKS TO THE TWD AND TWC FOR CHECKING PRIOR TO COMMENCEMENT OF WORKS ON SITE.
14. CONTRACTOR TO CONFIRM ANY BUILDING MATERIAL WEIGHTS TO BE STORED IN THE AREA OF TEMPORARY SUPPORT PRIOR TO THE COMMENCEMENT OF WORKS.

CDM 2015 DESIGNER NOTES

IN ADDITION TO THE HAZARDS, AND RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION.

CONSTRUCTION:

1. N/A

FOR INFORMATION RELATING TO END USE, MAINTENANCE, DEMOLITION, SEE THE HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

| ISSUE | REVISION | BY | DATE |
|---|---|---|---|
| P1 | FIRST ISSUE | JM | 28.03.24 |



ISSUE
*PRELIMINARY*

CLIENT
RJH ARCHITECTURE

CONTRACT
34 NASSAU ROAD
LONDON

TITLE
SEQUENCE OF CONSTRUCTION
SECTION '1-1'

ARCHITECT
RJH ARCHITECTURE

| DRAWN | CHECKED | DATE | SCALE |
|---|---|---|---|
| JM | TG | MAR' 24 | 1:50 @A1 |

David Smith Associates
Consulting Structural & Civil Engineers
Tel: (01604)782620
Email: northampton@dsagroup.co.uk
Website: www.dsagroup.co.uk
8 Duncan Close
Moulton Park
Northampton NN3 6WL

| DRAWING NUMBER | | | REVISION |
|---|---|---|---|
| | 24 | 54720/29 | P1 |

## APPENDIX B

## CALCULATIONS

**Design Notes** **Job Ref: 24/54720**

**RE: 34 NASSAU ROAD, LONDON**

The following calculations are in respect of our clients brief relating to **specific structural elements listed on the following page(s).** No responsibility is accepted in respect of other elements of the building. Any assumed bearing stresses must be confirmed on site to the satisfaction of the Building Control Officer.

Dimensions have been obtained from information provided and where no figured dimensions have been provided, scaling has been used. **Dimensions indicated on the following calculations are for design purposes only and must not be used for constructional purposes. All dimensions for construction are to be obtained by site measurements prior to manufacture / building**.

Appended sketches are to demonstrate certain features of the design and are not intended as working drawings. Where shown, details are intended to identify the main structural features. It is assumed that the work will be carried out by experienced and competent personnel, therefore exhaustive detailing is not required.

Where constructional connection details are indicated on these calculations, these shall not be varied. Any proposed changes should be substantiated by calculation, submitted and approved in writing by the Engineer before fabrication is commenced.

Where Building Control approval is required it is essential that this be obtained before the works proceed or materials are ordered. The contractor must ensure the stability of each element, and overall stability of the construction is maintained until all the works are completed.





| London | Northampton | Cheltenham | Birmingham |
|---|---|---|---|
| 16 Upper Woburn Place | 8 Duncan Close | Unit 2, 1 The Hayloft | Central Boulevard, |
| London | Moulton Park | Far Peak | Blythe Valley Business Park |
| WC1H 0AF | Northampton, NN3 6WL | Northleach, GL54 3AP | Solihull, B90 8AG. |
| 0203 741 8042 | 01604 782620 | 01285 657328 | 01564 711008 |
| london@dsagroup.co.uk | northampton@dsagroup.co.uk | cheltenham@dsagroup.co.uk | birmingham@dsagroup.co.uk |

**REFERENCES**

British Standards and Codes of Practice indicated below have been used in the preparation of these calculations - all constructional details must be in accordance with all relevant clauses contained in these same standards, associated standards or manufacturer's recommendations and details and normal good practice.

| | |
|---|---|
| Loadings | [BS 6399 - Part 1:1996, Part 2:1997, Part 3:1988] [BS 648:1964] |
| Concrete | [BS 8110 - Part 1:1997, Part 3:1985] [BS 8007 : 1987] |
| Foundations | [BS 8004:1986] [BS 8002 : 1994] |
| Timber | [BS 5268 - Part 2:2002] |
| Masonry | [BS 5628 - Part 1:2005, Part 2:2005, Part 3:2005] |
| Industrial Floor Slabs | [Concrete Society Technical Report 34 (2nd Edition)] [C & CA Technical Report 550] [BCA Tech Note 11] |
| Steelwork | [BS 5950 - Part 1:2000, Part 3:1990, Part 5:1987, Part 8:1990] [BS 2853:1957] |

**ISSUE RECORD**

| Prep. by | Chkd by | Documents / Sheets / Drawings Issued | Description of Relating Structural Elements | Issue Date |
|---|---|---|---|---|
| OAM | | Structural calculations<br>Pages 1-187 MAIN HOUSE<br>Pages201-230 TEMP.WORK | STEEL BEAMS / STEEL COLUMNS / FOUNDATION. | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## HEALTH & SAFETY

Where appropriate, the Client will be the/or appoint a, Principal Designer to act on his behalf who will ensure that where applicable the "Construction (Design and Management) Regulations 2015" are adhered to.

The Principal Contractor must at all times ensure safe working practices, maintain the integrity of the existing structures and conform to all the appropriate requirements of the Health and Safety Executive including the "Construction (Design and Management) Regulations 2015".

The working methods of any hazardous operations must first be discussed with the Principal Designer and the designer prior to commencement.

Below are identified hazards that are either impractical or uneconomic to eliminate at the design stage. The list is not exhaustive and must be read in conjunction with the main contractors own Health & Safety policy.

| Hazard | Solution/Precaution/Sequence |
|---|---|
| Demolition and creation of new openings | To be carried out in accordance with prepared demolition statement ensuring structural integrity of existing building at all times. Openings should follow published procedure in Building Research Establishment publication GBG20 "Removing internal loadbearing walls in older dwellings". |
| Scaffolds | Scaffolds erected and used in accordance with BS5973. Scaffolds and propping must be inspected by a qualified person before use and at least once per week to ensure they are fit for use. |
| Personnel working at height | Works to be properly supervised with personnel provided with safe working platforms. |
| Lifting | Adequate means for moving and positioning elements to be available. Handling and construction to be carried out in accordance with relevant HSE 7 BS guidelines. Individuals are not to manually lift more than 25kg. |
| Deep excavation | No one shall enter an excavation deeper than 1.2m without adequately designed temporary shoring being in place. Where foundations are deeper than 2.5m they should be constructed in two pours. |
| Open trenched footings | Access to unattended trenches to be protected. |

**Job Ref: 24/54720**

**RE: 34 NASSAU ROAD, LONDON**

**Dimensions**

1. **All dimensions for construction to be obtained by site measurements prior to manufacture / building**

**Steelwork Specifications**

1. Unless noted otherwise, all steelwork to be Grade S275 to BS 5950-2. All materials to comply with BS 5950:2000 and to B.S.C.A. 1/89 - National Structural Steelwork Specification.

2. Unless noted otherwise, all steelwork to be shot blasted to SA 2.5 or mechanically wire brushed to remove all surface contamination, rust or millscale and have 2 coats of zinc phosphate primer applied to achieve a minimum dry film thickness of 75 microns per coat, prior to site delivery.

3. Grade 4.6 bolts to BS4190 and Grade 8.8 bolts to BS3692.

4. Unless stated otherwise, all structural connections to have minimum of 2 bolts. Minimum bolt size for any connection to be M16 Grade 8.8 bolts.

5. Fire surround to all steelwork as per Architects/Local Authority requirements but generally cased in a layer of 12.5mm thick plasterboard and skim.

6. For steel within an external wall cavity (this includes shelf angles and plates supporting external skins that are welded to the bottom flange of beams) the steel should be shot blasted to SA2½ and use 450μm coat of solvent free epoxy applied. Alternatively, the steel may be galvanized to a thickness of 85μm and 200μm of heavy duty bitumen applied in two coats.

## General Notes

## Works to be carried out regarding installation of new beams/lintels

**All works should be carried out by a competent contractor/builder familiar and experienced with the procedures.**

1. All works to comply with current British EN Standards and Building Regulations and to be to good building practice.

2. All new steelwork to be to BS EN 10025 1993: Minimum Grade S275 unless noted otherwise.

3. Any bolts to be Grade 8.8 and zinc plated with washers and nuts.

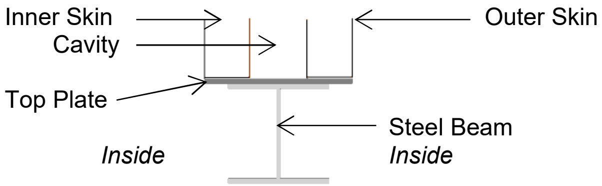
4. All mortar to be 1: 1: 6 (cement: lime: sand) unless noted otherwise.

5. Where new steelwork or other fabricated components are specified, site dimensions must be undertaken by the builder/fabricator to ensure an accurate fit and adequate clearance, etc.

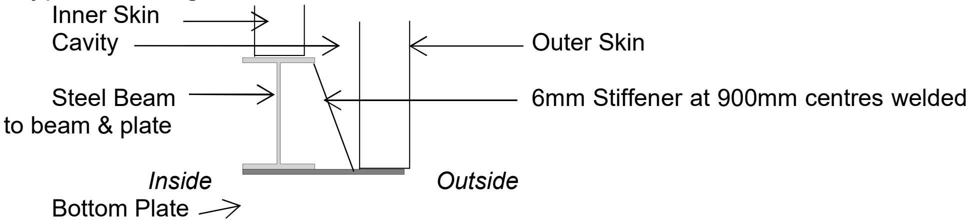
6. Unless noted otherwise, generally steel beam is to be installed so that its centerline coincides with centerline of the wall it is supporting. In case of cavity walls, this will generally be centerline of the overall thickness of the wall including the thickness of the inner skin, cavity and outer-skin (See also Note 8 for variations).

7. Where multiple beams/lintels are indicated to support existing walls, the exact number of beams/lintel is to be determined by the builder on site to suit thickness of wall(s) prior to commencing works in that area and ordering/fabrication of materials. Report immediately to DSA for further advice if site conditions differ to that indicated on the drawings/details.

8. Scenarios for supporting external walls on single beam:
   (a) Typical Arrangement - Beam with Top Plate



(b) Typical Arrangement - Beam with Bottom Plate




9. Where steel beams bear into walls at right angles, fully surround the beam with brickwork to prevent any rotation of the beam.

10. Where steel beams/lintels are required to be concealed within floor/ceiling void, the contractor must take measurements of floor/ceiling void and review the size of beam/lintel specified on the drawings prior to ordering/fabrication of material. Report to DSA for further advice if the specified beam/lintel size cannot be concealed within the floor/ceiling zone due to existing site details.

11. Where walls are to be removed:

    a) Fully support wall over the new beams by needling through the wall and supporting needles on Acrow props. Number of needles and props required will depend on the existing structural format, loading and site conditions. Contractor/Builder to be responsible for the necessary temporary works.
    b) When wall is supported cut out openings and prepare piers and padstones. Ensure padstone size and full bearing lengths as specified are achieved.
    c) Install steel beams and shim / dry pack beams as necessary onto padstones to ensure full load transfer.
    d) To minimize cracking of the walls above, preload the new beams by using machined steel folding wedges rammed home.
       If the beam is not preloaded there is a risk of initial cracking to the walls above as the load is transferred but this will not be progressive.
    e) After preloading the beams dry pack the gap between existing wall and the beam using a minimum thickness of 30mm of sand and cement 3:1 mixed to just bind and then rammed home to ensure a fully packed joint for the full width of the beam/wall.
    f) Leave props in place for at least 7 days until the packing is cured.

<u>Exact arrangement of works to suit site specific conditions; if in doubt, Contractor/Builder to contact DSA for further advice prior to commencing of works and ordering/fabrication of materials.</u>

◆DAVID SMITH ASSOCIATES◆Consulting Structural & Civil Engineers◆

| Job Title | Job No. |
|---|---|
| 34 NASSAU ROAD, LONDON | 24/54720 |

Compliance with BS EN 1090-1:2009 +A1:2011
Execution of steel structures and aluminium structures.
Requirements for conformity assessment of structural components
CE Marking of Fabricated Structural Steelwork

## DERIVATION OF EXECUTION CLASS

**Table A.1 - Categorisation of Consequence Classes**

| Example of categorisation of building type and occupancy | Consequence Class |
|---|---|
| Single occupancy house not exceeding 4 storeys. | **1** |

**Table A.1 - Definition of Consequence Classes**

| Description | Consequence Class |
|---|---|
| Medium consequence for loss of human life; economic, social or environmental consequences considerable Example Residential and office buildings, public buildings where consequences of failure are medium (e.g. an office building) | **CC2** |

**Table B.1 - Suggested Criteria for Service Categories**

| Criteria | Categories |
|---|---|
| Buildings and components designed for quasi static actions only (Example: Buildings) | **SC1** |

**Table B.2 - Suggested Criteria for Production Categories**

| Criteria | Categories |
|---|---|
| Welded components manufactured from steel grade products below S355 | **PC1** |

**Table B.3 - Recommended Matrix for Determination of Execution Classes**

| | |
|---|---|
| Consequence classes | **CC2** |
| Service categories | **SC1** |
| Production categories | **PC1** |
| Execution Class | **EXC2** |

**a EXC4 should be applied to special structures or structures with extreme consequences of a structural failure as required by national provisions**

| | |
|---|---|
| **Execution Class** | **EXC2** |

**LOADING**

| PITCHED ROOF | | | | | SLS | | | | ULS | |
|---|---|---|---|---|---|---|---|---|---|---|
| Roof angle = | 35 | deg | | | | | | | | |
| Roof tiles | 0.560 | /cos | 35 | = | 0.68 | KN/m2 | x | 1.4= | 0.96 | KN/m2 |
| battens & felt | 0.050 | /cos | 35 | = | 0.06 | KN/m2 | x | 1.4= | 0.09 | KN/m2 |
| rafters | 0.120 | /cos | 35 | = | 0.15 | KN/m2 | x | 1.4= | 0.21 | KN/m2 |
| insul. | 0.050 | /cos | 35 | = | 0.06 | KN/m2 | x | 1.4= | 0.09 | KN/m2 |
| **Roof Dead load** | | | | = | 0.95 | KN/m2 | x | 1.4= | 1.33 | KN/m2 |
| ceiling dead load | 0.180 | /cos | 35 | = | 0.22 | KN/m2 | x | 1.4= | 0.31 | KN/m2 |
| | | | | | **1.17** | KN/m2 | | | **1.64** | KN/m2 |
| Roof imposed load | 0.75(60- | | 35 )/30 | = | 0.63 | | | | | |
| | | | | = | **0.75** | KN/m2 | x | 1.6= | **1.20** | KN/m2 |
| Ceiling imposed load | | | | = | **0.25** | KN/m2 | x | 1.6= | **0.40** | KN/m2 |
| **Imposed load** | | | | | **1.00** | KN/m2 | | | **1.60** | KN/m2 |
| | | | TOTAL | = | **2.17** | KN/m2 | | | **3.24** | KN/m2 |
| | | | **DESIGN FOR UDL =** | | **2.17** | KN/m2 | | 1.49 | **3.24** | KN/m2 |

| TIMBER FLOOR | | | | | | | |
|---|---|---|---|---|---|---|---|
| Boarding | = | 0.20 | KN/m2 | x | 1.4= | 0.28 | KN/m2 |
| Joist | = | 0.15 | KN/m2 | x | 1.4= | 0.21 | KN/m2 |
| Plasterboard/ INS. | = | 0.25 | KN/m2 | x | 1.4= | 0.35 | KN/m2 |
| | | **0.60** | KN/m2 | | | 0.84 | KN/m2 |
| Imposed | = | 1.50 | KN/m2 | x | 1.6= | 2.40 | KN/m2 |
| TOTAL | = | **2.10** | KN/m2 | | | **3.24** | KN/m2 |
| **DESIGN FOR UDL =** | | **2.10** | KN/m2 | | 1.54 | **3.24** | KN/m2 |

WIND LOAD SAY wl= **0.7** KN/m2

go to page 2

♦ David Smith Associates ♦
8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL
Tel: (01604) 782620 ♦ Fax: (01604) 782629
E-mail: post@dsagroup.co.uk

| | | | |
|---|---|---|---|
| Project No: | 24/54720 | Sheet No: | 2 |
| Made By: | OAM | Revision: | |
| Date: | Mar-24 | Checked By: | TG |

**Project:** **34 NASSAU ROAD, LONDON**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **LOADING** | | | **SLS** | | | | **ULS** |
| **FLAT ROOF** | | | | | | | |
| FELT and CHIPPINGS | | = | 0.30 | KN/m2 | x | 1.4= | 0.42 KN/m2 |
| TIMBER DECK and FIRRINGS | | = | 0.20 | KN/m2 | x | 1.4= | 0.28 KN/m2 |
| JOISTS and INSULATION | | = | 0.15 | KN/m2 | x | 1.4= | 0.21 KN/m2 |
| PLASTERBOARD | | = | 0.13 | KN/m2 | x | 1.4= | 0.18 KN/m2 |
| **Dead load** | | = | 0.78 | KN/m2 | | | 1.09 KN/m2 |
| Roof imposed load | | = | 0.75 KN/m2 | | x | 1.6= | 1.20 KN/m2 |
| Ceiling imposed load | | = | **0.00** | KN/m2 | x | 1.6= | 0.00 KN/m2 |
| | | | **0.75** | KN/m2 | | | **1.20** KN/m2 |
| | TOTAL | = | 1.53 KN/m2 | | | | 2.29 KN/m2 |
| **GREEN ROOF** | | | | | | | |
| **Dead load** | | = | 2.00 | KN/m2 | | | 3.49 KN/m2 |
| **Imposed** | | = | **0.75** | KN/m2 | x | 1.6= | **1.20** KN/m2 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **GROUND FLOOR** | | | | **SLS** | | | | **ULS** |
| Screed | 75 mm | | = | 1.80 | KN/m2 | x | 1.4= | 2.520 KN/m2 |
| metal deck | 200 mm | | = | 3.84 | KN/m2 | x | 1.4= | 5.376 KN/m2 |
| services | | | = | 0.250 | KN/m2 | x | 1.4= | 0.350 KN/m2 |
| RAISED FLOOR | | | = | 0.000 | KN/m2 | x | 1.4= | 0.000 KN/m2 |
| | **dead load =** | | | **5.89** | KN/m2 | | | **8.246** KN/m2 |
| | **Imposed** | 1.5+1 | = | **2.50** | KN/m2 | x | 1.6= | **4.00** KN/m2 |
| GYM | **Imposed** | | = | **5.00** KN/m2 | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **INTERNAL WALL** | | | | | | | |
| Blocks( | **140** ) | = | 2.00 | KN/m2 | x | 1.4= | 2.80 KN/m2 |
| Plaster | | = | 0.25 | KN/m2 | x | 1.4= | 0.35 KN/m2 |
| | | TOTAL = | **2.25** | KN/m2 | | | **3.15** KN/m2 |

go to page 3



date printed 28/03/24

♦ David Smith Associates LLP ♦
8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL
Tel: (01604) 782620 ♦ Fax: (01604) 782629
E-mail: northampton@dsagroup.co.uk



**DIMENSIONS IN THESE CALCULATIONS ARE ONLY APPROXIMATE AND THE CONTRACTOR MUST CHECK THE LATEST ARCHITECTURAL DRAWINGS AND MEASURE UP ON SITE BEFORE ORDERING ANY MATERIALS.NO WORK SHOULD START BEFORE THE CALCULATIONS HAVE BEEN RECEIVED AND APPROVED BY THE LA BUILDING CONTROL.**

**ROOF LEVEL**

**TIMBER ROOF RAFTERS** R1

Max span = 4.5 m

USE 195X47 C24 AT 400 C/C — SEE PAGE 4 - 6

**TIMBER SLOPE RAFTERS** TR1

Max span = 2.5 m

USE 150X47 C24 AT 400 C/C — SEE PAGE 7 - 11

**STEEL BEAM** H1

Max span = 4.6 m
Cover= 2.8 m

USE 152x152x30 UC S355 SEE PAGE 12 - 14

**STEEL BEAM** RB1

Max span = 4.6 m
Cover= 1.3 m

USE 152x152x23 UC S355 SEE PAGE 15 - 17

**STEEL BEAM** H2

Max span = 4.6 m
Cover= 2.8 m

USE 152x152x30 UC S355 SEE PAGE 18 - 20

**STEEL BEAM** RB2

Max span = 5.1 m
Cover= 1.3 m SAY

USE 203x133x25 UB S355 SEE PAGE 21 - 23

**STEEL BEAM** RB3

Max span = 6.9 m
Cover= 3.6 m SAY

USE 254x254x73 UC S355 SEE PAGE 24 - 26

**STEEL BEAM** RB4

Max span = 6.9 m
Cover= 4.7 m FLAT

USE 254x254x73 UC S355 SEE PAGE 27 - 29

go to page 30

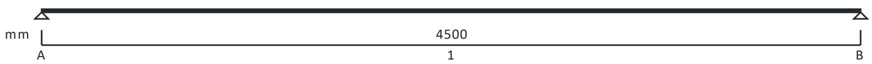
All design calculations have been author reviewed and subject to additional review by the project team, as required by David Smith Associates Quality Assurance procedures.

**TIMBER JOIST DESIGN (BS5268-2:2002)**

Tedds calculation version 1.1.04

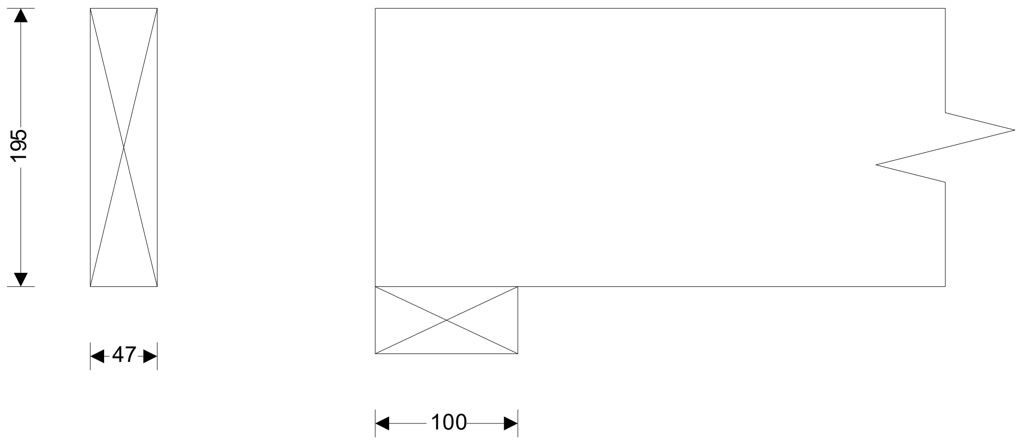
**Joist details**

Joist breadth | b = **47** mm
Joist depth | h = **195** mm
Joist spacing | s = **400** mm
Timber strength class | **C24**
Service class of timber | **1**




**Span details**

Number of spans | $N_{span}$ = **1**
Length of bearing | $L_b$ = **100** mm
Effective length of span | $L_{s1}$ = **4500** mm




**Section properties**

Second moment of area | $I = b \times h^3 / 12$ = **29041594** $mm^4$
Section modulus | $Z = b \times h^2 / 6$ = **297863** $mm^3$

**Loading details**

Joist self weight | $F_{swt} = b \times h \times \rho_{char} \times g_{acc}$ = **0.03** kN/m
Dead load | $F_{d\_udl}$ = **0.80** $kN/m^2$
Imposed UDL(Medium term) | $F_{i\_udl}$ = **0.60** $kN/m^2$
Imposed point load (Short term) | $F_{i\_pt}$ = **0.90** kN

**Modification factors**

Service class for bending parallel to grain | $K_{2m}$ = **1.00**
Service class for compression | $K_{2c}$ = **1.00**

Service class for shear parallel to grain $K_{2s}$ = **1.00**

Service class for modulus of elasticity $K_{2e}$ = **1.00**

Section depth factor $K_7$ = **1.05**

Load sharing factor $K_8$ = **1.10**

**Consider medium term loads**

Load duration factor $K_3$ = **1.25**

Maximum bending moment M = **1.497** kNm

Maximum shear force V = **1.331** kN

Maximum support reaction R = **1.331** kN

Maximum deflection $\delta$ = **10.359** mm

**Check bending stress**

Bending stress $\sigma_m$ = **7.500** N/mm$^2$

Permissible bending stress $\sigma_{m\_adm} = \sigma_m \times K_{2m} \times K_3 \times K_7 \times K_8$ = **10.813** N/mm$^2$

Applied bending stress $\sigma_{m\_max}$ = M / Z = **5.026** N/mm$^2$

***PASS - Applied bending stress within permissible limits***

**Check shear stress**

Shear stress $\tau$ = **0.710** N/mm$^2$

Permissible shear stress $\tau_{adm} = \tau \times K_{2s} \times K_3 \times K_8$ = **0.976** N/mm$^2$

Applied shear stress $\tau_{max} = 3 \times V / (2 \times b \times h)$ = **0.218** N/mm$^2$

***PASS - Applied shear stress within permissible limits***

**Check bearing stress**

Compression perpendicular to grain (no wane) $\sigma_{cp1}$ = **2.400** N/mm$^2$

Permissible bearing stress $\sigma_{c\_adm} = \sigma_{cp1} \times K_{2c} \times K_3 \times K_8$ = **3.300** N/mm$^2$

Applied bearing stress $\sigma_{c\_max} = R / (b \times L_b)$ = **0.283** N/mm$^2$

***PASS - Applied bearing stress within permissible limits***

**Check deflection**

Permissible deflection $\delta_{adm} = \min(L_{s1} \times 0.003, 14\text{ mm})$ = **13.500** mm

Bending deflection (based on $E_{mean}$) $\delta_{bending}$ = **10.069** mm

Shear deflection $\delta_{shear}$ = **0.290** mm

Total deflection $\delta = \delta_{bending} + \delta_{shear}$ = **10.359** mm

***PASS - Actual deflection within permissible limits***

**Consider short term loads**

Load duration factor $K_3$ = **1.50**

Maximum bending moment M = **1.902** kNm

Maximum shear force V = **1.691** kN

Maximum support reaction R = **1.691** kN

Maximum deflection $\delta$ = **11.799** mm

**Check bending stress**

Bending stress $\sigma_m$ = **7.500** N/mm$^2$

Permissible bending stress $\sigma_{m\_adm} = \sigma_m \times K_{2m} \times K_3 \times K_7 \times K_8$ = **12.976** N/mm$^2$

Applied bending stress $\sigma_{m\_max}$ = M / Z = **6.386** N/mm$^2$

***PASS - Applied bending stress within permissible limits***

**Check shear stress**

Shear stress $\tau$ = **0.710** N/mm$^2$

Permissible shear stress $\tau_{adm} = \tau \times K_{2s} \times K_3 \times K_8$ = **1.172** N/mm$^2$

Applied shear stress $\tau_{max} = 3 \times V / (2 \times b \times h)$ = **0.277** N/mm$^2$

***PASS - Applied shear stress within permissible limits***

**Check bearing stress**

Compression perpendicular to grain (no wane) $\sigma_{cp1}$ = **2.400** N/mm$^2$

Permissible bearing stress $\sigma_{c\_adm} = \sigma_{cp1} \times K_{2c} \times K_3 \times K_8$ = **3.960** N/mm$^2$

Applied bearing stress $\sigma_{c\_max} = R / (b \times L_b)$ = **0.360** N/mm$^2$

***PASS - Applied bearing stress within permissible limits***

**Check deflection**

Permissible deflection $\delta_{adm} = \min(L_{s1} \times 0.003, 14\ mm)$ = **13.500** mm

Bending deflection (based on $E_{mean}$) $\delta_{bending}$ = **11.430** mm

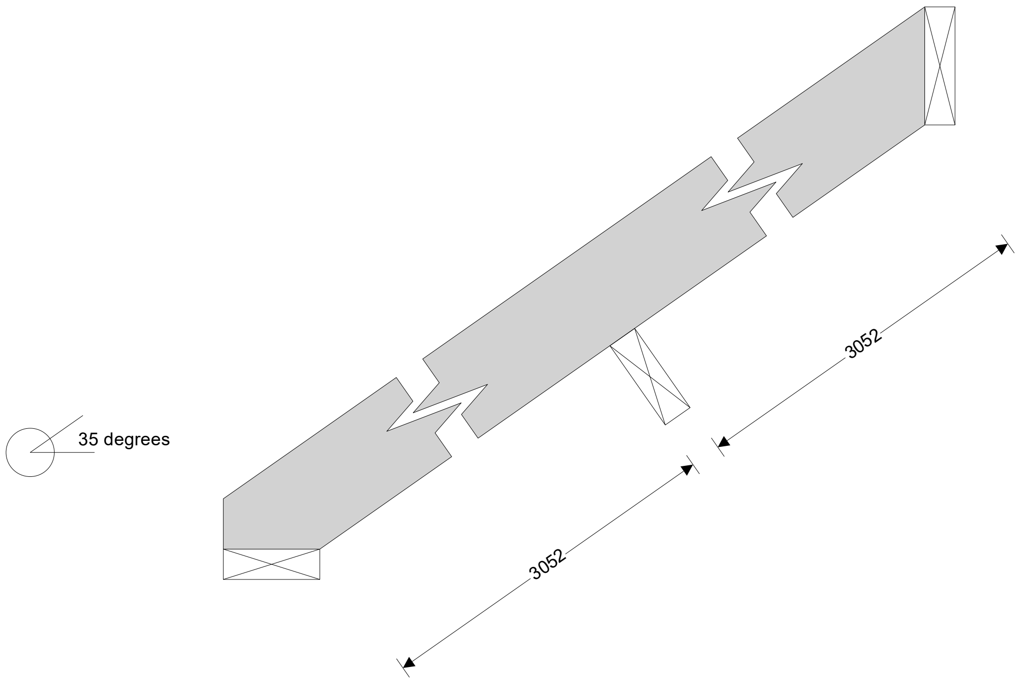
Shear deflection $\delta_{shear}$ = **0.369** mm

Total deflection $\delta = \delta_{bending} + \delta_{shear}$ = **11.799** mm

***PASS - Actual deflection within permissible limits***

**TIMBER RAFTER DESIGN (BS5268-2:2002)**

TEDDS calculation version 1.0.03




**Rafter details**

| | |
|---|---|
| Breadth of timber sections | b = **47** mm |
| Depth of timber sections | h = **150** mm |
| Rafter spacing | s = **400** mm |
| Rafter slope | $\alpha$ = **35.0** deg |
| Clear span of rafter on horizontal | $L_{clh}$ = **2500** mm |
| Clear span of rafter on slope | $L_{cl} = L_{clh} / \cos(\alpha)$ = **3052** mm |
| Rafter span | **Continuous** |
| Timber strength class | **C24** |

**Section properties**

| | |
|---|---|
| Cross sectional area of rafter | $A = b \times h$ = **7050** mm$^2$ |
| Section modulus | $Z = b \times h^2 / 6$ = **176250** mm$^3$ |
| Second moment of area | $I = b \times h^3 / 12$ = **13218750** mm$^4$ |
| Radius of gyration | $r = \sqrt{(I / A)}$ = **43.3** mm |

**Loading details**

| | |
|---|---|
| Rafter self weight | $F_j = b \times h \times \rho_{char} \times g_{acc}$ = **0.02** kN/m |
| Dead load on slope | $F_d$ = **0.95** kN/m$^2$ |
| Imposed load on plan | $F_u$ = **0.75** kN/m$^2$ |
| Imposed point load | $F_p$ = **0.90** kN |

**Modification factors**

| | |
|---|---|
| Section depth factor | $K_7 = (300\text{ mm} / h)^{0.11}$ = **1.08** |
| Load sharing factor | $K_8$ = **1.10** |

**Consider long term load condition**

Load duration factor — $K_3$ = **1.00**

Total UDL perpendicular to rafter — $F = F_d \times \cos(\alpha) \times s + F_j \times \cos(\alpha)$ = **0.331** kN/m

Notional bearing length — $L_b = F \times L_{cl} / [2 \times (b \times \sigma_{cp1} \times K_8 - F)]$ = **4** mm

Effective span — $L_{eff} = L_{cl} + L_b$ = **3056** mm

**Check bending stress at purlin**

Bending stress parallel to grain — $\sigma_m$ = **7.500** N/mm$^2$

Permissible bending stress — $\sigma_{m\_adm} = \sigma_m \times K_3 \times K_7 \times K_8$ = **8.904** N/mm$^2$

Applied bending stress — $\sigma_{m\_max} = F \times L_{eff}^2 / (8 \times Z)$ = **2.193** N/mm$^2$

***PASS - Applied bending stress within permissible limits***

**Check compressive stress parallel to grain at purlin**

Compression stress parallel to grain — $\sigma_c$ = **7.900** N/mm$^2$

Minimum modulus of elasticity — $E_{min}$ = **7200** N/mm$^2$

Compression member factor — $K_{12}$ = **0.59**

Permissible compressive stress — $\sigma_{c\_adm} = \sigma_c \times K_3 \times K_8 \times K_{12}$ = **5.133** N/mm$^2$

Applied compressive stress — $\sigma_{c\_max} = 3 \times F \times L_{eff} \times (\cot(\alpha) + 8 \times \tan(\alpha) / 3) / (8 \times A)$ = **0.177** N/mm$^2$

***PASS - Applied compressive stress within permissible limits***

**Check combined bending and compressive stress parallel to grain at purlin**

Euler stress — $\sigma_e = \pi^2 \times E_{min} / \lambda^2$ = **14.267** N/mm$^2$

Euler coefficient — $K_{eu} = 1 - (1.5 \times \sigma_{c\_max} \times K_{12} / \sigma_e)$ = **0.989**

Combined axial compression and bending check — $\sigma_{m\_max} / (\sigma_{m\_adm} \times K_{eu}) + \sigma_{c\_max} / \sigma_{c\_adm}$ = **0.284 < 1**

***PASS - Combined compressive and bending stresses are within permissible limits***

**Check bending stress in lower portion of rafter**

Bending stress parallel to grain — $\sigma_m$ = **7.500** N/mm$^2$

Permissible bending stress — $\sigma_{m\_adm} = \sigma_m \times K_3 \times K_7 \times K_8$ = **8.904** N/mm$^2$

Applied bending stress — $\sigma_{m\_max} = 9 \times F \times L_{eff}^2 / (128 \times Z)$ = **1.234** N/mm$^2$

***PASS - Applied bending stress within permissible limits***

**Check compressive stress parallel to grain in lower portion of rafter**

Compression stress parallel to grain — $\sigma_c$ = **7.900** N/mm$^2$

Minimum modulus of elasticity — $E_{min}$ = **7200** N/mm$^2$

Compression member factor — $K_{12}$ = **0.59**

Permissible compressive stress — $\sigma_{c\_adm} = \sigma_c \times K_3 \times K_8 \times K_{12}$ = **5.133** N/mm$^2$

Applied compressive stress — $\sigma_{c\_max} = 3 \times F \times L_{eff} \times (\cot(\alpha) + 13 \times \tan(\alpha) / 3) / (8 \times A)$ = **0.240** N/mm$^2$

***PASS - Applied compressive stress within permissible limits***

**Check combined bending and compressive stress parallel to grain in lower portion of rafter**

Euler stress — $\sigma_e = \pi^2 \times E_{min} / \lambda^2$ = **14.267** N/mm$^2$

Euler coefficient — $K_{eu} = 1 - (1.5 \times \sigma_{c\_max} \times K_{12} / \sigma_e)$ = **0.985**

Combined axial compression and bending check — $\sigma_{m\_max} / (\sigma_{m\_adm} \times K_{eu}) + \sigma_{c\_max} / \sigma_{c\_adm}$ = **0.187 < 1**

***PASS - Combined compressive and bending stresses are within permissible limits***

**Check shear stress**

Shear stress parallel to grain — $\tau$ = **0.710** N/mm$^2$

Permissible shear stress — $\tau_{adm} = \tau \times K_3 \times K_8$ = **0.781** N/mm$^2$

Applied shear stress — $\tau_{max} = 15 \times F \times L_{eff} / (16 \times A)$ = **0.135** N/mm$^2$

***PASS - Applied shear stress within permissible limits***

**Check deflection**

Permissible deflection $\delta_{adm} = 0.003 \times L_{eff} = \mathbf{9.168}$ mm

Bending deflection $\delta_b = F \times L_{eff}^4 / (185 \times E_{mean} \times I) = \mathbf{1.093}$ mm

Shear deflection $\delta_s = 12 \times F \times L_{eff}^2 / (5 \times E_{mean} \times A) = \mathbf{0.097}$ mm

Total deflection $\delta_{max} = \delta_b + \delta_s = \mathbf{1.191}$ mm

***PASS - Total deflection within permissible limits***

**Consider medium term load condition**

Load duration factor $K_3 = \mathbf{1.25}$

Total UDL perpendicular to rafter $F = [F_u \times \cos(\alpha)^2 + F_d \times \cos(\alpha)] \times s + F_j \times \cos(\alpha) = \mathbf{0.532}$ kN/m

Notional bearing length $L_b = F \times L_{cl} / [2 \times (b \times \sigma_{cp1} \times K_8 - F)] = \mathbf{7}$ mm

Effective span $L_{eff} = L_{cl} + L_b = \mathbf{3059}$ mm

**Check bending stress at purlin**

Bending stress parallel to grain $\sigma_m = \mathbf{7.500}$ N/mm$^2$

Permissible bending stress $\sigma_{m\_adm} = \sigma_m \times K_3 \times K_7 \times K_8 = \mathbf{11.130}$ N/mm$^2$

Applied bending stress $\sigma_{m\_max} = F \times L_{eff}^2 / (8 \times Z) = \mathbf{3.532}$ N/mm$^2$

***PASS - Applied bending stress within permissible limits***

**Check compressive stress parallel to grain at purlin**

Compression stress parallel to grain $\sigma_c = \mathbf{7.900}$ N/mm$^2$

Minimum modulus of elasticity $E_{min} = \mathbf{7200}$ N/mm$^2$

Compression member factor $K_{12} = \mathbf{0.55}$

Permissible compressive stress $\sigma_{c\_adm} = \sigma_c \times K_3 \times K_8 \times K_{12} = \mathbf{5.960}$ N/mm$^2$

Applied compressive stress $\sigma_{c\_max} = 3 \times F \times L_{eff} \times (\cot(\alpha) + 8 \times \tan(\alpha) / 3) / (8 \times A) = \mathbf{0.285}$ N/mm$^2$

***PASS - Applied compressive stress within permissible limits***

**Check combined bending and compressive stress parallel to grain at purlin**

Euler stress $\sigma_e = \pi^2 \times E_{min} / \lambda^2 = \mathbf{14.243}$ N/mm$^2$

Euler coefficient $K_{eu} = 1 - (1.5 \times \sigma_{c\_max} \times K_{12} / \sigma_e) = \mathbf{0.984}$

Combined axial compression and bending check $\sigma_{m\_max} / (\sigma_{m\_adm} \times K_{eu}) + \sigma_{c\_max} / \sigma_{c\_adm} = \mathbf{0.371} < \mathbf{1}$

***PASS - Combined compressive and bending stresses are within permissible limits***

**Check bending stress in lower portion of rafter**

Bending stress parallel to grain $\sigma_m = \mathbf{7.500}$ N/mm$^2$

Permissible bending stress $\sigma_{m\_adm} = \sigma_m \times K_3 \times K_7 \times K_8 = \mathbf{11.130}$ N/mm$^2$

Applied bending stress $\sigma_{m\_max} = 9 \times F \times L_{eff}^2 / (128 \times Z) = \mathbf{1.987}$ N/mm$^2$

***PASS - Applied bending stress within permissible limits***

**Check compressive stress parallel to grain in lower portion of rafter**

Compression stress parallel to grain $\sigma_c = \mathbf{7.900}$ N/mm$^2$

Minimum modulus of elasticity $E_{min} = \mathbf{7200}$ N/mm$^2$

Compression member factor $K_{12} = \mathbf{0.55}$

Permissible compressive stress $\sigma_{c\_adm} = \sigma_c \times K_3 \times K_8 \times K_{12} = \mathbf{5.960}$ N/mm$^2$

Applied compressive stress $\sigma_{c\_max} = 3 \times F \times L_{eff} \times (\cot(\alpha) + 13 \times \tan(\alpha) / 3) / (8 \times A) = \mathbf{0.387}$ N/mm$^2$

***PASS - Applied compressive stress within permissible limits***

**Check combined bending and compressive stress parallel to grain in lower portion of rafter**

Euler stress $\sigma_e = \pi^2 \times E_{min} / \lambda^2 = \mathbf{14.243}$ N/mm$^2$

Euler coefficient $K_{eu} = 1 – (1.5 \times \sigma_{c\_max} \times K_{12} / \sigma_e) =$ **0.978**

Combined axial compression and bending check $\sigma_{m\_max} / (\sigma_{m\_adm} \times K_{eu}) + \sigma_{c\_max} / \sigma_{c\_adm} =$ **0.247 < 1**

***PASS - Combined compressive and bending stresses are within permissible limits***

**Check shear stress**

Shear stress parallel to grain $\tau =$ **0.710** N/mm$^2$

Permissible shear stress $\tau_{adm} = \tau \times K_3 \times K_8 =$ **0.976** N/mm$^2$

Applied shear stress $\tau_{max} = 15 \times F \times L_{eff} / (16 \times A) =$ **0.217** N/mm$^2$

***PASS - Applied shear stress within permissible limits***

**Check deflection**

Permissible deflection $\delta_{adm} = 0.003 \times L_{eff} =$ **9.176** mm

Bending deflection $\delta_b = F \times L_{eff}^4 / (185 \times E_{mean} \times I) =$ **1.764** mm

Shear deflection $\delta_s = 12 \times F \times L_{eff}^2 / (5 \times E_{mean} \times A) =$ **0.157** mm

Total deflection $\delta_{max} = \delta_b + \delta_s =$ **1.921** mm

***PASS - Total deflection within permissible limits***

**Consider short term load condition**

Load duration factor $K_3 =$ **1.50**

Total UDL perpendicular to rafter $F = F_d \times \cos(\alpha) \times s + F_j \times \cos(\alpha) =$ **0.331** kN/m

Notional bearing length $L_b = [F \times L_{cl} + F_p \times \cos(\alpha)] / [2 \times (b \times \sigma_{cp1} \times K_8 - F)] =$ **7** mm

Effective span $L_{eff} = L_{cl} + L_b =$ **3059** mm

**Check bending stress at purlin**

Bending stress parallel to grain $\sigma_m =$ **7.500** N/mm$^2$

Permissible bending stress $\sigma_{m\_adm} = \sigma_m \times K_3 \times K_7 \times K_8 =$ **13.355** N/mm$^2$

Applied bending stress $\sigma_{m\_max} = F \times L_{eff}^2/(8 \times Z)+3 \times F_p \times \cos(\alpha) \times L_{eff}/(32 \times Z) =$ **3.397** N/mm$^2$

***PASS - Applied bending stress within permissible limits***

**Check compressive stress parallel to grain at purlin**

Compression stress parallel to grain $\sigma_c =$ **7.900** N/mm$^2$

Minimum modulus of elasticity $E_{min} =$ **7200** N/mm$^2$

Compression member factor $K_{12} =$ **0.51**

Permissible compressive stress $\sigma_{c\_adm} = \sigma_c \times K_3 \times K_8 \times K_{12} =$ **6.627** N/mm$^2$

Applied compressive stress $\sigma_{c\_max} = 3 \times F \times L_{eff} \times (\cot(\alpha)+8 \times \tan(\alpha)/3)/(8 \times A)+F_p \times \sin(\alpha)/A =$ **0.251** N/mm$^2$

***PASS - Applied compressive stress within permissible limits***

**Check combined bending and compressive stress parallel to grain at purlin**

Euler stress $\sigma_e = \pi^2 \times E_{min} / \lambda^2 =$ **14.239** N/mm$^2$

Euler coefficient $K_{eu} = 1 – (1.5 \times \sigma_{c\_max} \times K_{12} / \sigma_e) =$ **0.987**

Combined axial compression and bending check $\sigma_{m\_max} / (\sigma_{m\_adm} \times K_{eu}) + \sigma_{c\_max} / \sigma_{c\_adm} =$ **0.296 < 1**

***PASS - Combined compressive and bending stresses are within permissible limits***

**Check bending stress in lower portion of rafter**

Bending stress parallel to grain $\sigma_m =$ **7.500** N/mm$^2$

Permissible bending stress $\sigma_{m\_adm} = \sigma_m \times K_3 \times K_7 \times K_8 =$ **13.355** N/mm$^2$

Applied bending stress $\sigma_{m\_max} = F \times L_{eff}^2/(16 \times Z)+13 \times F_p \times \cos(\alpha) \times L_{eff}/(64 \times Z) =$ **3.698** N/mm$^2$

***PASS - Applied bending stress within permissible limits***

**Check compressive stress parallel to grain in lower portion of rafter**

Compression stress parallel to grain $\sigma_c$ = **7.900** N/mm$^2$

Minimum modulus of elasticity $E_{min}$ = **7200** N/mm$^2$

Compression member factor $K_{12}$ = **0.51**

Permissible compressive stress $\sigma_{c\_adm} = \sigma_c \times K_3 \times K_8 \times K_{12}$ = **6.627** N/mm$^2$

Applied compressive stress $\sigma_{c\_max} = 3 \times F \times L_{eff} \times (\cot(\alpha)+4 \times \tan(\alpha))/(8 \times A)+F_p \times \sin(\alpha)/A$ = **0.301** N/mm$^2$

***PASS - Applied compressive stress within permissible limits***

**Check combined bending and compressive stress parallel to grain in lower portion of rafter**

Euler stress $\sigma_e = \pi^2 \times E_{min} / \lambda^2$ = **14.239** N/mm$^2$

Euler coefficient $K_{eu} = 1 - (1.5 \times \sigma_{c\_max} \times K_{12} / \sigma_e)$ = **0.984**

Combined axial compression and bending check $\sigma_{m\_max} / (\sigma_{m\_adm} \times K_{eu}) + \sigma_{c\_max} / \sigma_{c\_adm}$ = **0.327 < 1**

***PASS - Combined compressive and bending stresses are within permissible limits***

**Check shear stress**

Shear stress parallel to grain $\tau$ = **0.710** N/mm$^2$

Permissible shear stress $\tau_{adm} = \tau \times K_3 \times K_8$ = **1.172** N/mm$^2$

Applied shear stress $\tau_{max} = 15 \times F \times L_{eff} / (16 \times A) + 3 \times F_p \times \cos(\alpha) / (2 \times A)$ = **0.292** N/mm$^2$

***PASS - Applied shear stress within permissible limits***

**Check deflection**

Permissible deflection $\delta_{adm} = 0.003 \times L_{eff}$ = **9.177** mm

Bending deflection $\delta_b = L_{eff}^3 \times (F \times L_{eff} /185 + 0.015 \times F_p \times \cos(\alpha)) / (E_{mean} \times I)$ = **3.315** mm

Shear deflection $\delta_s = 12 \times L_{eff} \times (F \times L_{eff} + 2 \times F_p \times \cos(\alpha))/(5 \times E_{mean} \times A)$ = **0.240** mm

Total deflection $\delta_{max} = \delta_b + \delta_s$ = **3.555** mm

***PASS - Total deflection within permissible limits***

♦ David Smith Associates LLP♦
8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL
Tel: (01604) 782620 ♦ Fax: (01604) 782629
E-mail: post@dsagroup.co.uk

| | | | |
|---|---|---|---|
| Project No: | 24/54720 | Sheet No: | 12 |
| Made By: | OAM | Revision: | |
| Date: | Mar-24 | Checked By: | TG |

**Project:** **34 NASSAU ROAD, LONDON**

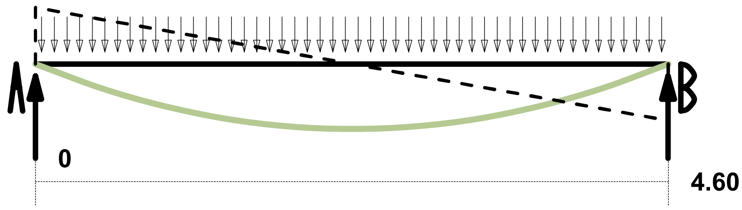
**DESIGN OF STEEL BEAM, SIMPLY SUPPORTED**

**H rolled section** **S355**
**Calculation in accordance**
**with BS 5950: 1: 2000**

LOCATION= **H1**
Loads are unfactored

Wd= **1.20** KN/m2
Wl= **1.00** KN/m2

22 KN




22 KN

Span= **4.60** m
Cover= **2.80** m

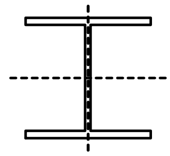
**SPAN**

| Load on beam | unfactored | **factored** |
|---|---|---|
| **Dead+s/w=** | 3.66 KN/m' | 5.12 KN/m' |
| **Live=** | 2.80 KN/m' | 4.48 KN/m' |
| | 6.46 KN/m' | 9.60 KN/m' |

25 KNm
Partial safety factor for load
dead= 1.4
live= 1.6

**Reaction**

| | | | |
|---|---|---|---|
| RA= | 14.9 KN | | **22.1** KN |
| RB= | 14.9 KN | | **22.1** KN |
| Shear zero at | | X= | 2.30 m |
| Maximum Bending Moment | | **Mx =** | **25.4** KNm |



**SECTION**

| | | | | | factor |
|---|---|---|---|---|---|
| Maximum BM for check | M LT= | 23.5 KNm | Local capacity | **PASS** | 0.372 |
| Maximum BM about axis Y | MY= | 2.35 KNm | Overall buckling 1 | **PASS** | 0.519 |
| Axial compressive load | Fc= | 60.0 KN | Overall buckling 2 | **PASS** | 0.699 |
| Shear force in x axis | Fv= | 22.1 KN | Deflection (dead)= | **PASS** | 1/ 769 |
| Beam span | L= | 4.60 m | Deflection(live)= | **PASS** | 1/ 1006 |
| Effective length about axis X | LX eff= | 4.60 m | Deflection (d+l)= | **PASS** | 1/ 436 |
| Effective length about axis Y | LYeff= | 4.60 m | Fully restraint for Ly& LX <1. | | |
| Limiting span/deflection (live) | = | **360.0** or 14 mm | | | |
| | z rep= | 72 cm3 | | | |

**Section properties**

Section size (Ref. No= **101** ) **152x152 30 kg UC S355**

| | | | | | | |
|---|---|---|---|---|---|---|
| Depth of steel section | D= | 157.8 mm | | | | |
| Width of section | B= | 152.9 mm | Pcy= | 403 KN | | |
| Thickness of web | t= | 6.6 mm | Mcx= | 87.72 KNm | | |
| Thickness of flange | T= | 9.4 mm | Mcy= | 39.48 KNm | | 281.42 |
| Root radius | r= | 7.6 mm | Mb L= | 50.66 KNm | | |
| Second moment of area x-x | Ix= | 1742 cm4 | Mlt= | **0.925** | Pcy= | 402.63 KN |
| Second moment of area y-y | Iy= | 558 cm4 | | | | |
| Plastic modulus x-x | Sx= | 247.1 cm3 | Sx eff= | 217.29 cm3 | | |
| Plastic modulus y-y | Sy= | 111.2 cm3 | Sy eff= | 67.30 cm3 | | |
| Area of section | Ag= | 38.2 cm2 | An= | 34.73 cm2 | ke= | 1.1 |

**DEFLECTION**

| | | | | unfactored |
|---|---|---|---|---|
| Unfactored dead load deflection= | 5.98 mm | | E UDL= | 3.66 KN/m' |
| Unfactored live load deflection= | 4.57 mm | | E UDL= | 2.80 KN/m' |
| Unfactored dead+ live load def = | 10.55 mm | | E UDL= | 6.46 KN/m' |
| Span/def. ratio for dead load= | 770 | | | |
| Span/def. ratio for live load= | **1006** | **>360** | | |
| Span/def. ratio fordead+ live load= | 436 | | | |

CONTINUE OF H1

**Strength of steel** Clause 3.1.1

| | | | | | | |
|---|---|---|---|---|---|---|
| Design strength | **(Grade S 355 )** | | | | | |
| for thickness of | 9.4 mm | **py=** | **355** N/mm2 | py= | **355.0** N/mm2 | pyw= py |
| Young's Modulus | | **E=** | 205 KN/mm2 | | | |

**Classification of cross section** (clause 3.5.2) TABLE 11 rolled section

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Constant (table 11 note b) | ε = | 0.880 | | class 1 | class 2 | class 3 |
| Outstand of flange | b= | 76.45 mm | | plastic | compac | semi compact |
| Ratio | b/T= | 8.13 | b/Tlim= | 7.92 | 8.80 | 13.20 |
| The classification is based on the outsatnd element | | | **The section is class2 compact** | | | |
| r1 =min(1.0,max(-0.1,Fc/(dxtxpyw)))= | | 0.21 | r2=Fc/(Agxpyw)= | 0.044 | | |
| Depth between fillets | d= | 123.4 mm | TABLE 11 rolled section | | | |
| ratio | d/t= | 18.70 | | class 1 | class 2 | class 3 |
| 40 ε | = | 35.21 | d/tlim= | 58.31 | 67.12 | 97.03 |
| The classification is based on the general web condition | | | **The section is class1 plastic** | | | |

**Shear capacity** CL 4.2.3

| | | | | |
|---|---|---|---|---|
| Shear area | Av y= | 1041 mm2 | (t x D) | |
| Shear capacity (0.6pyA) | Pvy= | 222 KN | | |
| Shear force | Fvy= | 22.1 KN | Fvy/Pvy= 0.10 | **SHEAR PASS OK** |

**Moment Capacity**

| | | | | |
|---|---|---|---|---|
| Elastic modulus | Zx= | 221.2 cm3 | Mcx1= | 78.53 |
| Plastic modulus | Sx= | 247 cm3 | Mcx2= | 87.72 |
| Moment capacity for section | Mcx= | **88** KNm | | |
| Elastic modulus | Zy= | 73.06 cm3 | Mcy1= | 25.94 |
| Plastic modulus | Sy= | 111 cm3 | mcy2= | 39.48 |
| Moment capacity for section | Mcy= | **39** KNm | | |

**Local capacity check Clause 4.8.3.2**

$$\frac{F}{Ag.\,py} + \frac{Mx}{Mcx} + \frac{My}{Mcy} = \ <=1$$

0.044 + 0.268 + 0.060 = **0.372** **LOCAL CAPACITY IS SATISFIED**

**restraint/effective length Clause 4.31 to 4.3.5** TABLE 13

| | | | |
|---|---|---|---|
| Effective length | Le lt1= | 4600 mm | normal condition |
| Effective length | Lelt2= | 4600 mm | |
| | L e lt= | 4600 mm | |
| Radius of gyration y-y | ry= | 3.82 cm | |
| | rx= | 6.75 cm | |
| | Lam'y= | 120.4 | |
| | La'mx= | 68.1 | |

CONTINUE OF H1

**Buckling resistance Clause 4.8.3.3.1**

**Compressive strength:perry strust formula from Appendex C.1**

| | | | | | | |
|---|---|---|---|---|---|---|
| Limiting slenderness | lam 0= | 15.10 | | py= | 355 | N/mm2 |
| For buckling about y-y | | | | λ L0= | 30.20 | TABLE 16 |
| Robertson constant for section | | | | | | |
| | a= | 5.5 | for table 23 | c | | |
| Perry factor | eta= | 0.58 | | | | |
| Euler strength | pe= | 140 | N/mm2 | | | |
| Factor | phi= | 288 | N/mm2 | | | |
| Compressive strength | pcy= | **105.4** | N/mm2 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Lam'y= | 120.4 | | La'mx= | 68.15 | | Lamy/x= | 7.5262 |
| Slenderness of section | Lamda= | 120.4 | | | | | Lamx/x= | 4.2593 |
| Torsional index | x= | 16 | | | | | | |
| | N= | 0.5 | | | | | | |
| Slenderness factor | v= | 0.71 | from Table 19 | | | | | |
| | β w = | 1.0 | | | | | | |
| Buckling parameter | u= | 0.848 | | | | | | |
| Equivalent slenderness | lamlt= | 73.0 | | | | | | |
| Buckling strength (Table 16) | pb= | 205 | N/mm2 | for lamlt= | 75 | | py= | 355 |
| Buckling resisrance moment | Mb= | 51 | KNm | | | | | |
| | Mb L= | 51 | KNm | | | | | |
| | Mry= | 39 | KNm | | | | | |
| | Pc= | 402.6 | KN | | | | | |
| | Pcy= | 402.6 | KN | | | | | |

$$\frac{Fc}{PC} + W\frac{x\,Mx}{Py\,Zx} + W\frac{y\,My}{py\,Zy} = \leq 1$$

W x= 0.95
W y= 0.95

0.149 + 0.284 + 0.086 = **0.519** **The interaction formula is satisfied**

$$\frac{Fc}{Pcy} + W\frac{LT\,M\,lt}{Mb} + W\frac{y\,My}{py\,Zy} = \leq 1$$

0.149 + 0.464 + 0.086 = **0.699** **The interaction formula is satisfied**

♦ David Smith Associates LLP♦
8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL
Tel: (01604) 782620 ♦ Fax: (01604) 782629
E-mail: post@dsagroup.co.uk

| | | | |
|---|---|---|---|
| Project No: | 24/54720 | Sheet No: | 15 |
| Made By: | OAM | Revision: | |
| Date: | Mar-24 | Checked By: | TG |

**Project:** **34 NASSAU ROAD, LONDON**

**DESIGN OF STEEL BEAM, SIMPLY SUPPORTED**

**H rolled section** **S355**

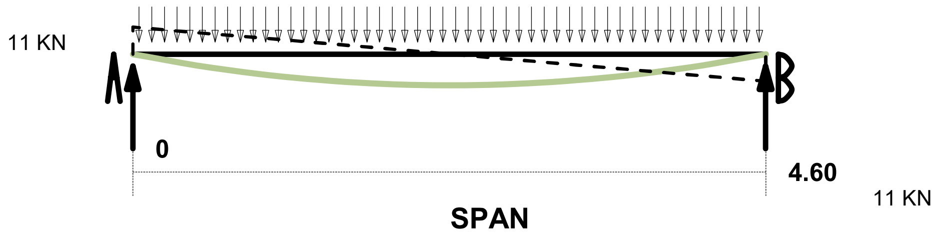
LOCATION= **RB1**

**Calculation in accordance with BS 5950: 1: 2000**

Loads are unfactored

Wd= **1.20** KN/m2
Wl= **1.00** KN/m2

Span= **4.60** m
Cover= **1.30** m

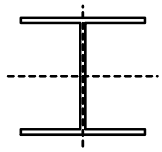



| Load on beam | unfactored | factored |
|---|---|---|
| **Dead+s/w=** | 1.79 KN/m' | 2.51 KN/m' |
| **Live=** | 1.30 KN/m' | 2.08 KN/m' |
| | 3.09 KN/m' | 4.59 KN/m' |

12 KNm
Partial safety factor for load
dead= 1.4
live= 1.6

**Reaction**

| | unfactored | | factored |
|---|---|---|---|
| RA= | 7.1 KN | | **10.5** KN |
| RB= | 7.1 KN | | **10.5** KN |
| Shear zero at | | X= | 2.30 m |
| Maximum Bending Moment | | **Mx =** | **12.1** KNm |



**SECTION**

| | | | | | factor |
|---|---|---|---|---|---|
| Maximum BM for check | M LT= | 11.2 KNm | Local capacity | PASS | 0.267 |
| Maximum BM about axis Y | MY= | 1.12 KNm | Overall buckling 1 | PASS | 0.441 |
| Axial compressive load | Fc= | 60.0 KN | Overall buckling 2 | PASS | 0.608 |
| Shear force in x axis | Fv= | 10.5 KN | Deflection (dead)= | PASS | 1/ 1141 |
| Beam span | L= | 4.60 m | Deflection(live)= | PASS | 1/ 1571 |
| Effective length about axis X | LX eff= | 4.60 m | Deflection (d+l)= | PASS | 1/ 661 |
| Effective length about axis Y | LYeff= | 4.60 m | Fully restraint for Ly& LX <1. | | |
| Limiting span/deflection (live) | = | **360.0** or 14 mm | | | |
| | z rep= | 34 cm3 | | | |

**Section properties**

Section size (Ref. No= **102** ) **152x152 23 kg UC S355**

| | | | | | | |
|---|---|---|---|---|---|---|
| Depth of steel section | D= | 152.5 mm | | | | |
| Width of section | B= | 152.4 mm | Pcy= | 295 KN | | |
| Thickness of web | t= | 6.1 mm | Mcx= | 65.43 KNm | | |
| Thickness of flange | T= | 6.8 mm | Mcy= | 28.71 KNm | | 179.18 |
| Root radius | r= | 7.6 mm | Mb L= | 32.25 KNm | | |
| Second moment of area x-x | Ix= | 1263 cm4 | Mlt= | **0.925** | Pcy= | 295.48 KN |
| Second moment of area y-y | Iy= | 403 cm4 | | | | |
| Plastic modulus x-x | Sx= | 184.3 cm3 | Sx eff= | 162.83 cm3 | | |
| Plastic modulus y-y | Sy= | 80.87 cm3 | Sy eff= | 48.64 cm3 | | |
| Area of section | Ag= | 29.8 cm2 | An= | 27.09 cm2 | ke= | 1.1 |

**DEFLECTION**

| | | | | unfactored |
|---|---|---|---|---|
| Unfactored dead load deflection= | 4.03 mm | | E UDL= | 1.79 KN/m' |
| Unfactored live load deflection= | **2.93** mm | | E UDL= | 1.30 KN/m' |
| Unfactored dead+ live load def = | 6.96 mm | | E UDL= | 3.09 KN/m' |
| Span/def. ratio for dead load= | 1141 | | | |
| Span/def. ratio for live load= | **1571** | **>360** | | |
| Span/def. ratio fordead+ live load= | 661 | | | |

CONTINUE OF RB1

**Strength of steel** Clause 3.1.1
Design strength **(Grade S 355 )**
for thickness of 6.8 mm **py=** **355** N/mm2 py= **355.0** N/mm2 pyw= py
Young's Modulus **E=** 205 KN/mm2

**Classification of cross section** (clause 3.5.2) TABLE 11 rolled section
Constant (table 11 note b) ε = 0.880 class 1 class 2 class 3
Outstand of flange b= 76.2 mm plastic compac semi compact
Ratio b/T= 11.21 b/Tlim= 7.92 8.80 13.20
The classification is based on the outsatnd element **The section is class 3 semi compact**
r1 =min(1.0,max(-0.1,Fc/(dxtxpyw)))= 0.22 r2=Fc/(Agxpyw)= 0.057
Depth between fillets d= 123.4 mm TABLE 11 rolled section
ratio d/t= 20.23 class 1 class 2 class 3
40 ε = 35.21 d/tlim= 57.50 65.84 94.86
The classification is based on the general web condition **The section is class1 plastic**

**Shear capacity** CL 4.2.3
Shear area Av y= 930.3 mm2 (t x D)
Shear capacity (0.6pyA) Pvy= 198 KN
Shear force Fvy= 10.5 KN Fvy/Pvy= 0.05 **SHEAR PASS OK**

**Moment Capacity**
Elastic modulus Zx= 165.7 cm3 Mcx1= 58.82
Plastic modulus Sx= 184 cm3 Mcx2= 65.43
Moment capacity for section Mcx= **65** KNm

Elastic modulus Zy= 52.95 cm3 Mcy1= 18.8
Plastic modulus Sy= 81 cm3 mcy2= 28.71
Moment capacity for section Mcy= **29** KNm

**Local capacity check Clause 4.8.3.2**
F / Ag. py + Mx / Mcx + My / Mcy = <=1

0.057 + 0.171 + 0.039 = **0.267** **LOCAL CAPACITY IS SATISFIED**

**restraint/effective length Clause 4.31 to 4.3.5** TABLE 13
Effective length Le lt1= 4600 mm normal condition
Effective length Lelt2= 4600 mm
L e lt= 4600 mm

Radius of gyration y-y ry= 3.68 cm
rx= 6.51 cm
Lam'y= 125.0
La'mx= 70.7

CONTINUE OF RB1

**Buckling resistance Clause 4.8.3.3.1**

**Compressive strength:perry strust formula from Appendex C.1**

| | | | | | | |
|---|---|---|---|---|---|---|
| Limiting slenderness | lam 0= | 15.10 | | py= | 355 | N/mm2 |
| For buckling about y-y | | | | λ L0= | 30.20 | TABLE 16 |
| Robertson constant for section | | | | | | |
| | a= | 5.5 | for table 23 | c | | |
| Perry factor | eta= | 0.60 | | | | |
| Euler strength | pe= | 129 | N/mm2 | | | |
| Factor | phi= | 281 | N/mm2 | | | |
| Compressive strength | pcy= | **99.2** | N/mm2 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Lam'y= | 125.0 | | La'mx= | 70.66 | | Lamy/x= | 6.1275 |
| Slenderness of section | Lamda= | 125.0 | | | | | Lamx/x= | 3.4638 |
| Torsional index | x= | 20.4 | | | | | | |
| | N= | 0.5 | | | | | | |
| Slenderness factor | v= | 0.77 | from Table 19 | | | | | |
| | β w = | 1.0 | | | | | | |
| Buckling parameter | u= | 0.837 | | | | | | |
| Equivalent slenderness | lamlt= | 80.3 | | | | | | |
| Buckling strength (Table 16) | pb= | 175 | N/mm2 | for lamlt= | 85 | | py= | 355 |
| Buckling resisrance moment | Mb= | 32 | KNm | | | | | |
| | Mb L= | 32 | KNm | | | | | |
| | Mry= | 29 | KNm | | | | | |
| | Pc= | 295.5 | KN | | | | | |
| | Pcy= | 295.5 | KN | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| <u>Fc</u> | | +W <u>x Mx</u> | | +W <u>y My</u> | = | <=1 | | W x= | 0.95 |
| PC | | Py Zx | | py Zy | | | | W y= | 0.95 |
| 0.203 | + | 0.181 | + | 0.057 | = | **0.441** | **<u>The interaction formula is satisfied</u>** | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| <u>Fc</u> | | +W <u>LT M lt</u> | | +W <u>y My</u> | = | <=1 | |
| Pcy | | Mb | | py Zy | | | |
| 0.203 | + | 0.348 | + | 0.057 | = | **0.608** | **<u>The interaction formula is satisfied</u>** |

♦ David Smith Associates LLP ♦
8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL
Tel: (01604) 782620 ♦ Fax: (01604) 782629
E-mail: post@dsagroup.co.uk

| | | | |
|---|---|---|---|
| Project No: | 24/54720 | Sheet No: | 18 |
| Made By: | OAM | Revision: | |
| Date: | Mar-24 | Checked By: | TG |

**Project:** **34 NASSAU ROAD, LONDON**

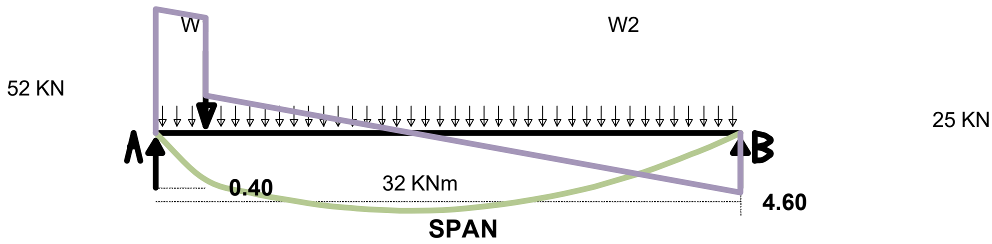
**DESIGN OF STEEL BEAM, SIMPLY SUPPORTED**

**H rolled section** S355
**Calculation in accordance with BS 5950: 1: 2000**

LOCATION= **H2**

Loads are unfactored

| | | |
|---|---|---|
| Wd1= | **1.20** | KN/m2 |
| Wl1= | **1.00** | KN/m2 |
| Wd2= | **1.20** | KN/m2 |
| wl2= | **1.00** | KN/m2 |
| P1= | **22.00** | KN |
| a= | **0.40** | m |
| Span= | **4.60** | m |
| Cover= | **2.80** | m |

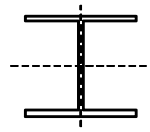



| Load on beam | unfactored | factored |
|---|---|---|
| Point load= | **22.00** KN | **33** KN |
| **AV-Dead+s/w=** | 3.66 KN/m' | 5.124 KN/m' |
| **Live=** | 2.80 KN/m' | 4.48 KN/m' |
| | 6.46 KN/m' | 9.604 KN/m' |

Partial safety factor for load
dead= 1.4
live= 1.6

**Reaction**

| | | | |
|---|---|---|---|
| RA= | 34.9 KN | | **52.2** KN |
| RB= | 16.8 KN | | **25.0** KN |
| Shear zero at | | X= | 2.00 m |
| Maximum Bending Moment | | **Mx =** | **32** KNm |



**SECTION**

| | | | | | factor |
|---|---|---|---|---|---|
| Maximum BM for check | M LT= | 30.2 KNm | Local capacity | **PASS** | 0.421 |
| Maximum BM about axis Y | MY= | 3.02 KNm | Overall buckling 1 | **PASS** | 0.484 |
| Axial compressive load | Fc= | 1.00 KN | Overall buckling 2 | **PASS** | 0.715 |
| Shear force in x axis | Fv= | 52.2 KN | Deflection (dead)= | **PASS** | 1/ 631 |
| Beam span | L= | 4.60 m | Deflection(live)= | **PASS** | 1/ 758 |
| Effective length about axis X | LX eff= | 4.60 m | Deflection (d+l)= | **PASS** | 1/ 344 |
| Effective length about axis Y | LYeff= | 4.78 m | Fully restraint for Ly& LX <1. | | |
| Limiting span/deflection (live) | = | **360.0** or 14 mm | | | |
| | z rep= | 91 cm3 | | | |

**Section properties**

Section size (Ref. No= **101** ) **152x152 30 kg UC S355**

| | | | | |
|---|---|---|---|---|
| Depth of steel section | D= | 157.8 mm | | |
| Width of section | B= | 152.9 mm | | |
| Thickness of web | t= | 6.6 mm | Mcx= | 87.721 KNm |
| Thickness of flange | T= | 9.4 mm | Mcy= | 39.476 KNm |
| Root radius | r= | 9.4 mm | Mb L= | 50.656 KNm |
| Second moment of area x-x | Ix= | 1742 cm4 | Mlt= | **0.931** TABLE 18 |
| Second moment of area y-y | Iy= | 558 cm4 | | |
| Plastic modulus x-x | Sx= | 247.1 cm3 | Sx eff= | 216.56 cm3 |
| Plastic modulus y-y | Sy= | 111.2 cm3 | Sy eff= | 66.23 cm3 |
| Area of section | Ag= | 38.2 cm2 | An= | 34.73 cm2 ke= 1.1 |

**DEFLECTION**

| | | | unfactored | |
|---|---|---|---|---|
| Unfactored dead load deflection= | 7.28 mm | | E UDL= | 4.46 KN/m' |
| Unfactored live load deflection= | 6.07 mm | | E UDL= | 3.72 KN/m' |
| Unfactored dead+ live load def = | 13.34 mm | | E UDL= | 8.17 KN/m' |
| Span/def. ratio for dead load= | 632 | | | |
| Span/def. ratio for live load= | **758** | **>360** | | |
| Span/def. ratio fordead+ live load= | 345 | | | |

CONTINUE OF H2

**Strength of steel** Clause 3.1.1

| | | | | | | |
|---|---|---|---|---|---|---|
| Design strength | **(Grade S 355 )** | | | | | |
| for thickness of | 9.4 mm | **py=** | **355** N/mm2 | py= | **355.0** N/mm2 | pyw= py |
| Young's Modulus | | **E=** | 205 KN/mm2 | | | |

**Classification of cross section** (clause 3.5.2) TABLE 11 rolled section

| | | | | | | |
|---|---|---|---|---|---|---|
| Constant | ε = | 0.880 | | class 1 | class 2 | class 3 |
| Outstand of flange | b= | 76.45 mm | | plastic | compac | semi compact |
| Ratio | b/T= | 8.13 | b/Tlim= | 7.92 | 8.80 | 13.20 |

**The section is class2 compact**

r1 =min(1.0,max(-0.1,Fc/(dxtxpyw)))= 0.35 r2=Fc/(Agxpyw)= 0.0007

Depth between fillets d= 123.4 mm TABLE 11 rolled section

| | | | | | | |
|---|---|---|---|---|---|---|
| ratio | d/t= | 18.70 | | class 1 | class 2 | class 3 |
| 40 ε | = | 35.206 | d/tlim= | 52.32 | 57.95 | 105.46 |

The classification is based on the general web condition **The section is class1 plastic**

**Shear capacity** CL 4.2.3

| | | | | | |
|---|---|---|---|---|---|
| Shear area | | Av y= | 1041.5 mm2 | (t x D) | |
| Shear capacity | (0.6pyA) | Pvy= | 222 KN | | |
| Shear force | | Fvy= | 52.2 KN | Fvy/Pvy= 0.24 | **SHEAR PASS OK** |

**Moment Capacity**

| | | | | |
|---|---|---|---|---|
| Elastic modulus | Zx= | 221.2 cm3 | Mcx1= | 78.526 |
| Plastic modulus | Sx= | 247 cm3 | Mcx2= | 87.721 |
| Moment capacity for section | Mcx= | **87.7** KNm | | |
| Elastic modulus | Zy= | 73.06 cm3 | Mcy1= | 25.936 |
| Plastic modulus | Sy= | 111.2 cm3 | mcy2= | 39.476 |
| Moment capacity for section | Mcy= | **39.5** KNm | | |

**Local capacity check Clause 4.8.3.2**

$$\frac{F}{Ag.\,py} + \frac{Mx}{Mcx} + \frac{My}{Mcy} \le 1$$

0.001 + 0.344 + 0.076 = **0.421** **LOCAL CAPACITY IS SATISFIED**

**restraint/effective length Clause 4.31 to 4.3.5** TABLE 13

| | | | |
|---|---|---|---|
| Effective length | Le lt1= | 4600 mm | normal condition |
| Effective length | Lelt2= | 4777.8 mm | |
| | L e lt= | 4688.9 mm | |
| Radius of gyration y-y | ry= | 3.82 cm | |
| | rx= | 6.75 cm | |
| | Lam'y= | 125.1 | |
| | La'mx= | 68.1 | |

CONTINUE OF H2

**Buckling resistance Clause 4.8.3.3.1**

**Compressive strength:perry strust formula from Appendex C.1**

| | | | | |
|---|---|---|---|---|
| Limiting slenderness | lam 0= | 15.10 | py= | 355 N/mm2 |
| For buckling about y-y | | | λ L0= | 30.20 TABLE 16 |
| Robertson constant for H section | | | | |
| | a= | 5.5 | | |
| Perry factor | eta= | 0.60 | | |
| Euler strength | pe= | 129 N/mm2 | | |
| Factor | phi= | 281 N/mm2 | | |
| Compressive strength | pcy= | **99.1** N/mm2 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Lam'y= | 125.1 | La'mx= | 68.15 | Lamy/x= | 7.81708 |
| Slenderness of section | Lamda= | 125.1 | | | Lamx/x= | 4.25926 |
| Torsional index | x= | 16 | | | | |
| | N= | 0.5 | | | | |
| Slenderness factor | v= | 0.7 from Table 19 | | | | |
| | β w = | 1.0 | | | | |
| Buckling parameter | u= | 0.848 | | | | |
| Equivalent slenderness | lamlt= | 74.2 | | | | |
| Buckling strength (Table 16) | pb= | 205 N/mm2 | for lamlt= | 75 | py= | 355 |
| Buckling resisrance moment | Mb= | 50.7 KNm | | | | |
| | Mb L= | 50.7 KNm | | | | |
| | Mry= | 39.5 KNm | | | | |
| | Pc= | 378.41 KN | | | | |
| | Pcy= | 378.41 KN | | | | |

$$\frac{Fc}{PC} + \frac{W_x Mx}{Py\ Zx} + \frac{W_y My}{py\ Zy} = \le 1$$

W x= 0.95

W y= 1

0.003 + 0.365 + 0.116 = **0.484** **The interaction formula is satisfied**

$$\frac{Fc}{Pcy} + \frac{W_{LT} M_{lt}}{Mb} + \frac{W_y My}{py\ Zy} = \le 1$$

0.003 + 0.596 + 0.116 = **0.715** **The interaction formula is satisfied**

♦ David Smith Associates LLP♦
8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL
Tel: (01604) 782620 ♦ Fax: (01604) 782629
E-mail: post@dsagroup.co.uk

| | | | |
|---|---|---|---|
| Project No: | 24/54720 | Sheet No: | 21 |
| Made By: | OAM | Revision: | |
| Date: | Mar-24 | Checked By: | TG |

**Project:** **34 NASSAU ROAD, LONDON**

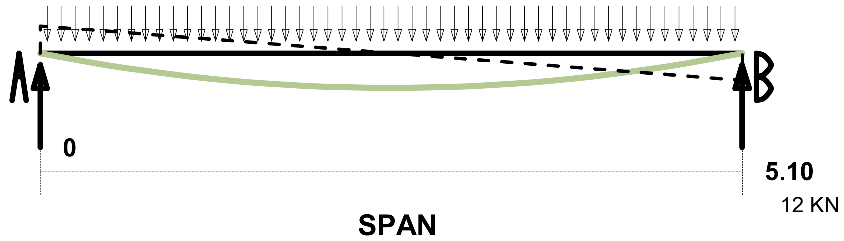
**DESIGN OF STEEL BEAM, SIMPLY SUPPORTED**

**H rolled section** S355
**Calculation in accordance with BS 5950: 1: 2000**

LOCATION= **RB2**
Loads are unfactored

Wd= **1.20** KN/m2
Wl= **1.00** KN/m2

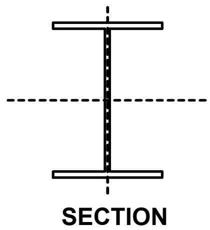
Span= **5.10** m
Cover= **1.30** m




| Load on beam | unfactored | factored | |
|---|---|---|---|
| | | | 15 KNm |
| | | | Partial safety factor for load |
| **Dead+s/w=** | 1.81 KN/m' | 2.53 KN/m' | dead= 1.4 |
| **Live=** | 1.30 KN/m' | 2.08 KN/m' | live= 1.6 |
| | 3.11 KN/m' | 4.61 KN/m' | |

**Reaction**

| | | | |
|---|---|---|---|
| RA= | 7.9 KN | | **11.8** KN |
| RB= | 7.9 KN | | **11.8** KN |
| Shear zero at | | X= | 2.55 m |
| Maximum Bending Moment | | **Mx =** | **15.0** KNm |




| | | | | | factor |
|---|---|---|---|---|---|
| Maximum BM for check | M LT= | 13.9 KNm | Local capacity | PASS | 0.258 |
| Maximum BM about axis Y | MY= | 1.39 KNm | Overall buckling 1 | PASS | 0.523 |
| Axial compressive load | Fc= | 60.0 KN | Overall buckling 2 | PASS | 0.808 |
| Shear force in x axis | Fv= | 11.8 KN | Deflection (dead)= | PASS | 1/ 1544 |
| Beam span | L= | 5.10 m | Deflection(live)= | PASS | 1/ 2150 |
| Effective length about axis X | LX eff= | 5.10 m | Deflection (d+l)= | PASS | 1/ 899 |
| Effective length about axis Y | LYeff= | 5.10 m | Fully restraint for Ly& LX <1. | | |
| Limiting span/deflection (live) | = | **360.0** or 14 mm | | | |
| | z rep= | 42 cm3 | | | |

**Section properties**

Section size (Ref. No= **67** ) **203x133 25 kg UB S355**

| | | | | | | |
|---|---|---|---|---|---|---|
| Depth of steel section | D= | 203.2 mm | | | | |
| Width of section | B= | 133.4 mm | Pcy= | 212 KN | | |
| Thickness of web | t= | 5.8 mm | Mcx= | 92.23 KNm | | |
| Thickness of flange | T= | 7.8 mm | Mcy= | 25.34 KNm | | 173.2 |
| Root radius | r= | 7.6 mm | Mb L= | 31.18 KNm | | |
| Second moment of area x-x | Ix= | 2356 cm4 | Mlt= | **0.925** | Pcy= | 212.04 KN |
| Second moment of area y-y | Iy= | 310 cm4 | | | | |
| Plastic modulus x-x | Sx= | 259.8 cm3 | Sx eff= | 227.90 cm3 | | |
| Plastic modulus y-y | Sy= | 71.39 cm3 | Sy eff= | 42.82 cm3 | | |
| Area of section | Ag= | 32.2 cm2 | An= | 29.27 cm2 | ke= | 1.1 |

**DEFLECTION**

| | | | unfactored | |
|---|---|---|---|---|
| Unfactored dead load deflection= | 3.30 mm | | E UDL= | 1.81 KN/m' |
| Unfactored live load deflection= | 2.37 mm | | E UDL= | 1.30 KN/m' |
| Unfactored dead+ live load def = | 5.67 mm | | E UDL= | 3.11 KN/m' |
| Span/def. ratio for dead load= | 1545 | | | |
| Span/def. ratio for live load= | **2151** | **>360** | | |
| Span/def. ratio fordead+ live load= | 899 | | | |

♦ David Smith Associates LLP ♦
8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL
Tel: (01604) 782620 ♦ Fax: (01604) 782629
E-mail: post@dsagroup.co.uk

| | | | |
|---|---|---|---|
| Project No: | 24/54720 | Sheet No: | 22 |
| Made By: | OAM | Revision: | |
| Date: | Mar-24 | Checked By: | TG |

**Project:** **34 NASSAU ROAD, LONDON**

CONTINUE OF RB2

**Strength of steel** Clause 3.1.1

Design strength **(Grade S 355 )**
for thickness of 7.8 mm **py= 355** N/mm2 py= **355.0** N/mm2 pyw= py
Young's Modulus **E=** 205 KN/mm2

**Classification of cross section** (clause 3.5.2) TABLE 11 rolled section

Constant (table 11 note b) ε = 0.880 class 1 class 2 class 3
Outstand of flange b= 66.7 mm plastic compac semi compact
Ratio b/T= 8.55 b/Tlim= 7.92 8.80 13.20
The classification is based on the outsatnd element **The section is class2 compact**
r1 =min(1.0,max(-0.1,Fc/(dxtxpyw)))= 0.17 r2=Fc/(Agxpyw)= 0.052
Depth between fillets d= 172.3 mm TABLE 11 rolled section
ratio d/t= 29.71 class 1 class 2 class 3
40 ε = 35.21 d/tlim= 60.23 70.20 95.58
The classification is based on the general web condition **The section is class1 plastic**

**Shear capacity** CL 4.2.3

Shear area Av y= 1179 mm2 (t x D)
Shear capacity (0.6pyA) Pvy= 251 KN
Shear force Fvy= 11.8 KN Fvy/Pvy= 0.05 **SHEAR PASS OK**

**Moment Capacity**

Elastic modulus Zx= 231.9 cm3 Mcx1= 82.32
Plastic modulus Sx= 260 cm3 Mcx2= 92.23
Moment capacity for section Mcx= **92** KNm

Elastic modulus Zy= 46.4 cm3 Mcy1= 16.47
Plastic modulus Sy= 71 cm3 mcy2= 25.34
Moment capacity for section Mcy= **25** KNm

**Local capacity check Clause 4.8.3.2**

$$\frac{F}{Ag.\,py} + \frac{Mx}{Mcx} + \frac{My}{Mcy} = \; <=1$$

0.052 + 0.150 + 0.055 = **0.258** **LOCAL CAPACITY IS SATISFIED**

**restraint/effective length Clause 4.31 to 4.3.5** TABLE 13

Effective length Le lt1= 5100 mm normal condition
Effective length Lelt2= 5100 mm
L e lt= 5100 mm

Radius of gyration y-y ry= 3.1 cm
rx= 8.54 cm
Lam'y= 164.5
La'mx= 59.7

CONTINUE OF RB2

**Buckling resistance Clause 4.8.3.3.1**

**Compressive strength:perry strust formula from Appendex C.1**

| | | | | | | |
|---|---|---|---|---|---|---|
| Limiting slenderness | lam 0= | 15.10 | | py= | 355 | N/mm2 |
| For buckling about y-y | | | λ L0= | | 30.20 | TABLE 16 |
| Robertson constant for section | | | | | | |
| | a= | 3.5 | for table 23 | b | | |
| Perry factor | eta= | 0.52 | | | | |
| Euler strength | pe= | 75 | N/mm2 | | | |
| Factor | phi= | 234 | N/mm2 | | | |
| Compressive strength | pcy= | **65.9** | N/mm2 | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Lam'y= | 164.5 | La'mx= | 59.72 | Lamy/x= | 6.477 |
| Slenderness of section | Lamda= | 164.5 | | | Lamx/x= | 2.3511 |
| Torsional index | x= | 25.4 | | | | |
| | N= | 0.5 | | | | |
| Slenderness factor | v= | 0.75 from Table 19 | | | | |
| | β w = | 1.0 | | | | |
| Buckling parameter | u= | 0.876 | | | | |
| Equivalent slenderness | lamlt= | 108.6 | | | | |
| Buckling strength (Table 16) | pb= | 120 N/mm2 | for lamlt= | 110 | py= | 355 |
| Buckling resisrance moment | Mb= | 31 KNm | | | | |
| | Mb L= | 31 KNm | | | | |
| | Mry= | 25 KNm | | | | |
| | Pc= | 212 KN | | | | |
| | Pcy= | 212 KN | | | | |

$\frac{Fc}{PC} + W \frac{x\,Mx}{Py\,Zx} + W \frac{y\,My}{py\,Zy} = \; <=1$ W x= 0.95, W y= 0.95

0.283 + 0.160 + 0.080 = **0.523** **The interaction formula is satisfied**

$\frac{Fc}{Pcy} + W \frac{LT\,M\,lt}{Mb} + W \frac{y\,My}{py\,Zy} = \; <=1$

0.283 + 0.445 + 0.080 = **0.808** **The interaction formula is satisfied**

| ♦ David Smith Associates LLP ♦<br>8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL<br>Tel: (01604) 782620 ♦ Fax: (01604) 782629<br>E-mail: post@dsagroup.co.uk | Project No: | 24/54720 | Sheet No: | 24 |
|---|---|---|---|---|
| | Made By: | OAM | Revision: | |
| | Date: | Mar-24 | Checked By: | TG |

**Project:** **34 NASSAU ROAD, LONDON**

**DESIGN OF STEEL BEAM, SIMPLY SUPPORTED**

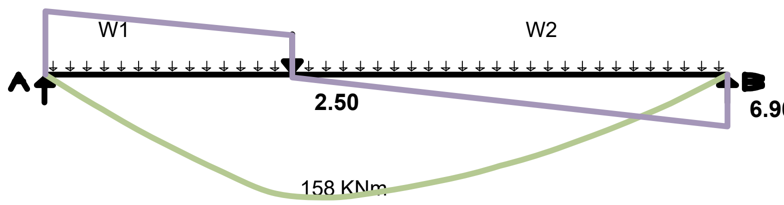
**H rolled section** S355

**Calculation in accordance with BS 5950: 1: 2000**

LOCATION= **RB3**

Loads are unfactored

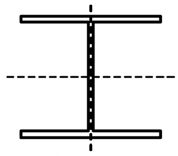
Wd1= **1.20** KN/m2
Wl1= **1.00** KN/m2
Wd2= **1.20** KN/m2
wl2= **1.00** KN/m2
P1= **35.00** KN
a= **2.50** m
Span= **6.90** m
Cover= **3.80** m




**SPAN**

| Load on beam | unfactored | factored |
|---|---|---|
| Point load= | **35.00** KN | **52.5** KN |
| **AV-Dead+s/w=** | 5.29 KN/m' | 7.406 KN/m' |
| **Live=** | 3.80 KN/m' | 6.08 KN/m' |
| | 9.09 KN/m' | 13.486 KN/m' |

Partial safety factor for load
dead= 1.4
live= 1.6



**SECTION**

**Reaction**

| | unfactored | factored |
|---|---|---|
| RA= | 53.7 KN | **80.0** KN |
| RB= | 44.0 KN | **65.5** KN |
| Shear zero at | X= | 2.50 m |
| Maximum Bending Moment | **Mx =** | **158** KNm |

| | | | | | factor |
|---|---|---|---|---|---|
| Maximum BM for check | M LT= | 136.2 KNm | Local capacity | **PASS** | 0.430 |
| Maximum BM about axis Y | MY= | 6.81 KNm | Overall buckling 1 | **PASS** | 0.471 |
| Axial compressive load | Fc= | 1.00 KN | Overall buckling 2 | **PASS** | 0.566 |
| Shear force in x axis | Fv= | 80.0 KN | Deflection (dead)= | **PASS** | 1/ 564 |
| Beam span | L= | 6.90 m | Deflection(live)= | **PASS** | 1/ 677 |
| Effective length about axis X | LX eff= | 6.90 m | Deflection (d+l)= | **PASS** | 1/ 307 |
| Effective length about axis Y | LYeff= | 5.09 m | Fully restraint for Ly& LX <1. | | |
| Limiting span/deflection (live) | = | **360.0** or 14 mm | | | |
| | z rep= | 445 cm3 | | | |

**Section properties**

Section size (Ref. No= **94** ) **254x254 73 kg UC S355**

| | | | | |
|---|---|---|---|---|
| Depth of steel section | D= | 254 mm | | |
| Width of section | B= | 254 mm | | |
| Thickness of web | t= | 8.6 mm | Mcx= | 350.95 KNm |
| Thickness of flange | T= | 14.2 mm | Mcy= | 164.15 KNm |
| Root radius | r= | 14.2 mm | Mb L= | 270.88 KNm |
| Second moment of area x-x | Ix= | 11360 cm4 | Mlt= | **0.862** TABLE 18 |
| Second moment of area y-y | Iy= | 3873 cm4 | | |
| Plastic modulus x-x | Sx= | 988.6 cm3 | Sx eff= | 881.11 cm3 |
| Plastic modulus y-y | Sy= | 462.4 cm3 | Sy eff= | 282.61 cm3 |
| Area of section | Ag= | 92.9 cm2 | An= | 84.45 cm2 ke= 1.1 |

**DEFLECTION**

| | | | unfactored | |
|---|---|---|---|---|
| Unfactored dead load deflection= | 12.23 mm | | E UDL= | 9.65 KN/m' |
| Unfactored live load deflection= | 10.19 mm | | E UDL= | 8.04 KN/m' |
| Unfactored dead+ live load def = | 22.41 mm | | E UDL= | 17.68 KN/m' |
| Span/def. ratio for dead load= | 564 | | | |
| Span/def. ratio for live load= | **677** | **>360** | | |
| Span/def. ratio fordead+ live load= | 308 | | | |

CONTINUE OF RB3

**Strength of steel** Clause 3.1.1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Design strength | (Grade | S 355 | ) | | | | |
| for thickness of | 14.2 mm | **py=** | **355** N/mm2 | py= | **355.0** | N/mm2 | pyw= py |
| Young's Modulus | | **E=** | 205 KN/mm2 | | | | |

**Classification of cross section** (clause 3.5.2) TABLE 11 rolled section

| | | | | | | |
|---|---|---|---|---|---|---|
| Constant | ε = | 0.880 | | class 1 | class 2 | class 3 |
| Outstand of flange | b= | 127 mm | | plastic | compac | semi compact |
| Ratio | b/T= | 8.94 | b/Tlim= | 7.92 | 8.80 | 13.20 |

**The section is class 3 semi compact**

| | | | | | | |
|---|---|---|---|---|---|---|
| r1 =min(1.0,max(-0.1,Fc/(dxtxpyw)))= | | 0.16 | r2=Fc/(Agxpyw)= | 0.0003 | | |
| Depth between fillets | d= | 200.2 mm | | TABLE 11 rolled section | | |
| ratio | d/t= | 23.28 | | class 1 | class 2 | class 3 |
| 40 ε | = | 35.206 | d/tlim= | 60.51 | 70.67 | 105.55 |

The classification is based on the general web condition **The section is class1 plastic**

**Shear capacity** CL 4.2.3

| | | | | | |
|---|---|---|---|---|---|
| Shear area | | Av y= | 2184.4 mm2 | (t x D) | |
| Shear capacity | (0.6pyA) | Pvy= | 465 KN | | |
| Shear force | | Fvy= | 80.0 KN | Fvy/Pvy= 0.17 | **SHEAR PASS OK** |

**Moment Capacity**

| | | | | |
|---|---|---|---|---|
| Elastic modulus | Zx= | 894.5 cm3 | Mcx1= | 317.55 |
| Plastic modulus | Sx= | 989 cm3 | Mcx2= | 350.95 |
| Moment capacity for section | Mcx= | **351.0** KNm | | |
| Elastic modulus | Zy= | 305 cm3 | Mcy1= | 108.28 |
| Plastic modulus | Sy= | 462.4 cm3 | mcy2= | 164.15 |
| Moment capacity for section | Mcy= | **164.2** KNm | | |

**Local capacity check Clause 4.8.3.2**

$$\frac{F}{Ag.\,py} + \frac{Mx}{Mcx} + \frac{My}{Mcy} \le 1$$

0.000 + 0.388 + 0.041 = **0.430** **LOCAL CAPACITY IS SATISFIED**

**restraint/effective length Clause 4.31 to 4.3.5** TABLE 13

| | | | |
|---|---|---|---|
| Effective length | Le lt1= | 6900 mm | normal condition |
| Effective length | Lelt2= | 5094 mm | |
| | L e lt= | 5997 mm | |
| Radius of gyration y-y | ry= | 6.46 cm | |
| | rx= | 11.1 cm | |
| | Lam'y= | 78.9 | |
| | La'mx= | 62.2 | |

8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL
Tel: (01604) 782620 ♦ Fax: (01604) 782629
E-mail: post@dsagroup.co.uk

**Project:** **34 NASSAU ROAD, LONDON**

CONTINUE OF RB3

**Buckling resistance Clause 4.8.3.3.1**

**Compressive strength:perry strust formula from Appendex C.1**

| | | | | |
|---|---|---|---|---|
| Limiting slenderness | lam 0= | 15.10 | py= | 355 N/mm2 |
| For buckling about y-y | | | λ L0= | 30.20 TABLE 16 |
| Robertson constant for H section | | | | |
| | a= | 5.5 | | |
| Perry factor | eta= | 0.35 | | |
| Euler strength | pe= | 325 N/mm2 | | |
| Factor | phi= | 397 N/mm2 | | |
| Compressive strength | pcy= | **191.6** N/mm2 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Lam'y= | 78.9 | La'mx= | 62.16 | Lamy/x= | 4.55806 |
| Slenderness of section | Lamda= | 78.9 | | | Lamx/x= | 3.59319 |
| Torsional index | x= | 17.3 | | | | |
| | N= | 0.5 | | | | |
| Slenderness factor | v= | 0.82 from Table 19 | | | | |
| | β w = | 1.0 | | | | |
| Buckling parameter | u= | 0.849 | | | | |
| Equivalent slenderness | lamlt= | 54.9 | | | | |
| Buckling strength (Table 16) | pb= | 274 N/mm2 | for lamlt= | 55 | py= | 355 |
| Buckling resisrance moment | Mb= | 270.9 KNm | | | | |
| | Mb L= | 270.9 KNm | | | | |
| | Mry= | 164.2 KNm | | | | |
| | Pc= | 1780 KN | | | | |
| | Pcy= | 1780 KN | | | | |

$\frac{Fc}{PC} + W \frac{x\,Mx}{Py\,Zx} + W \frac{y\,My}{py\,Zy} = \;<=1$  W x= 0.95, W y= 1

0.001 + 0.407 + 0.063 = **0.471** **The interaction formula is satisfied**

$\frac{Fc}{Pcy} + W \frac{LT\,M\,lt}{Mb} + W \frac{y\,My}{py\,Zy} = \;<=1$

0.001 + 0.503 + 0.063 = **0.566** **The interaction formula is satisfied**

♦ David Smith Associates LLP♦
8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL
Tel: (01604) 782620 ♦ Fax: (01604) 782629
E-mail: post@dsagroup.co.uk

| | | | |
|---|---|---|---|
| Project No: | 24/54720 | Sheet No: | 27 |
| Made By: | OAM | Revision: | |
| Date: | Mar-24 | Checked By: | TG |

**Project:** **34 NASSAU ROAD, LONDON**

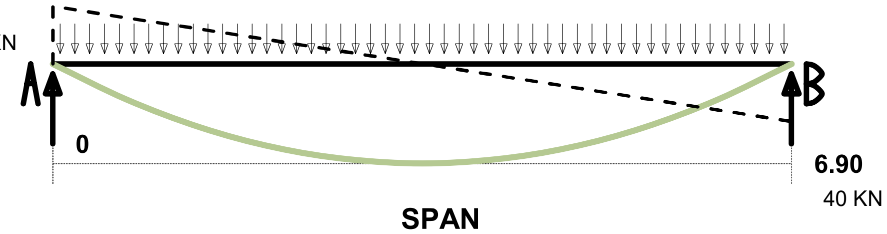
**DESIGN OF STEEL BEAM, SIMPLY SUPPORTED** — **H rolled section** S355

LOCATION= **RB4** — **Calculation in accordance with BS 5950: 1: 2000**

Loads are unfactored

Wd= **0.80** KN/m2
Wl= **0.75** KN/m2

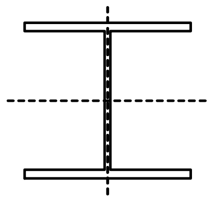
Span= **6.90** m
Cover= **4.70** m




| Load on beam | unfactored | factored | |
|---|---|---|---|
| | | | 69 KNm |
| | | | Partial safety factor for load |
| **Dead+s/w=** | 4.22 KN/m' | 5.91 KN/m' | dead= 1.4 |
| **Live=** | 3.53 KN/m' | 5.64 KN/m' | live= 1.6 |
| | 7.75 KN/m' | 11.55 KN/m' | |

**Reaction**

| | | | |
|---|---|---|---|
| RA= | 26.7 KN | | **39.8** KN |
| RB= | 26.7 KN | | **39.8** KN |
| Shear zero at | | X= | 3.45 m |
| Maximum Bending Moment | | **Mx =** | **68.7** KNm |




| | | | | | factor |
|---|---|---|---|---|---|
| Maximum BM for check | M LT= | 63.6 KNm | Local capacity | PASS | 0.467 |
| Maximum BM about axis Y | MY= | 6.36 KNm | Overall buckling 1 | PASS | 0.544 |
| Axial compressive load | Fc= | 60.0 KN | Overall buckling 2 | PASS | 0.663 |
| Shear force in x axis | Fv= | 39.8 KN | Deflection (dead)= | PASS | 1/ 518 |
| Beam span | L= | 6.90 m | Deflection(live)= | PASS | 1/ 620 |
| Effective length about axis X | LX eff= | 6.90 m | Deflection (d+l)= | PASS | 1/ 282 |
| Effective length about axis Y | LYeff= | 3.45 m | Fully restraint for Ly& LX <1. | | |
| Limiting span/deflection (live) | = | **360.0** or 14 mm | | | |
| | z rep= | 194 cm3 | | | |

**Section properties**

Section size (Ref. No= **99** ) **203x203 46 kg UC S355**

| | | | | | | |
|---|---|---|---|---|---|---|
| Depth of steel section | D= | 203.2 mm | | | | |
| Width of section | B= | 203.2 mm | Pcy= | 1135 KN | | |
| Thickness of web | t= | 7.3 mm | Mcx= | 176.6 KNm | | |
| Thickness of flange | T= | 11 mm | Mcy= | 81.65 KNm | | 710.18 |
| Root radius | r= | 10.2 mm | Mb L= | 127.8 KNm | | |
| Second moment of area x-x | Ix= | 4564 cm4 | Mlt= | **0.925** | Pcy= | 1135.3 KN |
| Second moment of area y-y | Iy= | 1539 cm4 | | | | |
| Plastic modulus x-x | Sx= | 497.4 cm3 | Sx eff= | 442.53 cm3 | | |
| Plastic modulus y-y | Sy= | 230 cm3 | Sy eff= | 140.06 cm3 | | |
| Area of section | Ag= | 58.8 cm2 | An= | 53.45 cm2 | ke= 1.1 | |

**DEFLECTION**

| | | | unfactored | |
|---|---|---|---|---|
| Unfactored dead load deflection= | 13.31 mm | | E UDL= | 4.22 KN/m' |
| Unfactored live load deflection= | 11.12 mm | | E UDL= | 3.53 KN/m' |
| Unfactored dead+ live load def = | 24.43 mm | | E UDL= | 7.75 KN/m' |
| Span/def. ratio for dead load= | 518 | | | |
| Span/def. ratio for live load= | **621** | **>360** | | |
| Span/def. ratio fordead+ live load= | 282 | | | |

CONTINUE OF RB4

**Strength of steel** Clause 3.1.1

Design strength (Grade S 355 )
for thickness of 11 mm **py=** **355** N/mm2 py= **355.0** N/mm2 pyw= py
Young's Modulus **E=** 205 KN/mm2

**Classification of cross section** (clause 3.5.2) TABLE 11 rolled section

| | | | | class 1 | class 2 | class 3 |
|---|---|---|---|---|---|---|
| Constant (table 11 note b) | ε = | 0.880 | | | | |
| Outstand of flange | b= | 101.6 mm | | plastic | compac | semi compact |
| Ratio | b/T= | 9.24 | b/Tlim= | 7.92 | 8.80 | 13.20 |

The classification is based on the outsatnd element — **The section is class 3 semi compact**

r1 =min(1.0,max(-0.1,Fc/(dxtxpyw)))= 0.14 r2=Fc/(Agxpyw)= 0.029

TABLE 11 rolled section

| | | | | class 1 | class 2 | class 3 |
|---|---|---|---|---|---|---|
| Depth between fillets | d= | 160.8 mm | | | | |
| ratio | d/t= | 22.03 | | | | |
| 40 ε | = | 35.21 | d/tlim= | 61.55 | 72.38 | 99.88 |

The classification is based on the general web condition — **The section is class1 plastic**

**Shear capacity** CL 4.2.3

| | | | |
|---|---|---|---|
| Shear area | Av y= | 1483 mm2 | (t x D) |
| Shear capacity (0.6pyA) | Pvy= | 316 KN | |
| Shear force | Fvy= | 39.8 KN | Fvy/Pvy= 0.13 **SHEAR PASS OK** |

**Moment Capacity**

| | | | | |
|---|---|---|---|---|
| Elastic modulus | Zx= | 449.2 cm3 | Mcx1= | 159.5 |
| Plastic modulus | Sx= | 497 cm3 | Mcx2= | 176.6 |
| Moment capacity for section | Mcx= | **177** KNm | | |
| Elastic modulus | Zy= | 151 cm3 | Mcy1= | 53.61 |
| Plastic modulus | Sy= | 230 cm3 | mcy2= | 81.65 |
| Moment capacity for section | Mcy= | **82** KNm | | |

**Local capacity check Clause 4.8.3.2**

$\frac{F}{Ag.\,py} + \frac{Mx}{Mcx} + \frac{My}{Mcy} = \; <=1$

0.029 + 0.360 + 0.078 = **0.467** **LOCAL CAPACITY IS SATISFIED**

**restraint/effective length Clause 4.31 to 4.3.5** TABLE 13

| | | | |
|---|---|---|---|
| Effective length | Le lt1= | 6900 mm | normal condition |
| Effective length | Lelt2= | 3450 mm | |
| | L e lt= | 5175 mm | |
| Radius of gyration y-y | ry= | 5.11 cm | |
| | rx= | 8.81 cm | |
| | Lam'y= | 67.5 | |
| | La'mx= | 78.3 | |

CONTINUE OF RB4

**Buckling resistance Clause 4.8.3.3.1**

**Compressive strength:perry strust formula from Appendex C.1**

| | | | | | |
|---|---|---|---|---|---|
| Limiting slenderness | lam 0= | 15.10 | | py= | 355 N/mm2 |
| For buckling about y-y | | | λ L0= | | 30.20 TABLE 16 |
| Robertson constant for section | | | | | |
| | a= | 5.5 for table 23 | c | | |
| Perry factor | eta= | 0.35 | | | |
| Euler strength | pe= | 330 N/mm2 | | | |
| Factor | phi= | 400 N/mm2 | | | |
| Compressive strength | pcy= | **193.1** N/mm2 | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Lam'y= | 67.5 | La'mx= | 78.32 | Lamy/x= | 3.8144 |
| Slenderness of section | Lamda= | 78.3 | | | Lamx/x= | 4.4249 |
| Torsional index | x= | 17.7 | | | | |
| | N= | 0.5 | | | | |
| Slenderness factor | v= | 0.87 from Table 19 | | | | |
| | β w = | 1.0 | | | | |
| Buckling parameter | u= | 0.846 | | | | |
| Equivalent slenderness | lamlt= | 57.8 | | | | |
| Buckling strength (Table 16) | pb= | 257 N/mm2 | for lamlt= | 60 | py= | 355 |
| Buckling resisrance moment | Mb= | 128 KNm | | | | |
| | Mb L= | 128 KNm | | | | |
| | Mry= | 82 KNm | | | | |
| | Pc= | 1135 KN | | | | |
| | Pcy= | 1135 KN | | | | |

Fc / PC +W x Mx / Py Zx +W y My / py Zy = <=1  W x= 0.95  W y= 0.95

0.053 + 0.379 + 0.113 = **0.544** **The interaction formula is satisfied**

Fc / Pcy +W LT M lt / Mb +W y My / py Zy = <=1

0.053 + 0.497 + 0.113 = **0.663** **The interaction formula is satisfied**

♦ David Smith Associates LLP ♦
8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL
Tel: (01604) 782620 ♦ Fax: (01604) 782629
E-mail: northampton@dsagroup.co.uk



**DIMENSIONS IN THESE CALCULATIONS ARE ONLY APPROXIMATE AND THE CONTRACTOR MUST CHECK THE LATEST ARCHITECTURAL DRAWINGS AND MEASURE UP ON SITE BEFORE ORDERING ANY MATERIALS.NO WORK SHOULD START BEFORE THE CALCULATIONS HAVE BEEN RECEIVED AND APPROVED BY THE LA BUILDING CONTROL.**

**ROOF LEVEL**

**STEEL BEAM** **RB5**

Max span = 2.6 m

Cover= 2.3 m FLAT

**USE 152x89x16 UB** **S355** SEE PAGE 31 - 33

**STEEL BEAM** **RB6**

Max span = 2 m

Cover= 1 m

**USE 152x89x16 UB** **S355** SEE PAGE 34 - 36

**STEEL COLUMNS** **SP1**

Max HIGH = 2.4 m

**USE 90x90x6.3 SHS** **S355** SEE PAGE 37 - 38

go to page 39

| ♦ David Smith Associates LLP♦ 8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL Tel: (01604) 782620 ♦ Fax: (01604) 782629 E-mail: post@dsagroup.co.uk | Project No: | 24/54720 | Sheet No: | 31 |
|---|---|---|---|---|
| | Made By: | OAM | Revision: | |
| | Date: | Mar-24 | Checked By: | TG |

**Project:** **34 NASSAU ROAD, LONDON**

**DESIGN OF STEEL BEAM, SIMPLY SUPPORTED**

**H rolled section** S355
**Calculation in accordance with BS 5950: 1: 2000**

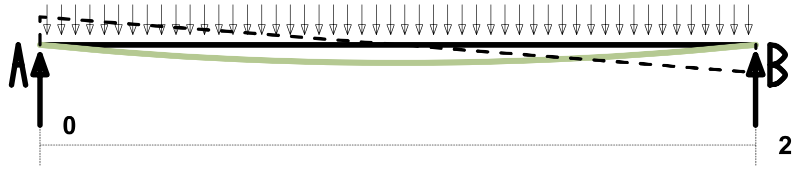
LOCATION= **RB5**

Loads are unfactored

Wd= **0.80** KN/m2
Wl= **0.75** KN/m2

Span= **2.60** m
Cover= **2.30** m

7 KN




7 KN

## SPAN

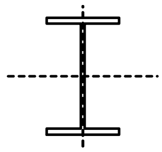
5 KNm

Partial safety factor for load
dead= 1.4
live= 1.6

| Load on beam | unfactored | factored |
|---|---|---|
| **Dead+s/w=** | 2 KN/m' | 2.80 KN/m' |
| **Live=** | 1.73 KN/m' | 2.76 KN/m' |
| | 3.73 KN/m' | 5.56 KN/m' |

**Reaction**

| | unfactored | | factored |
|---|---|---|---|
| RA= | 4.8 KN | | **7.2** KN |
| RB= | 4.8 KN | | **7.2** KN |
| Shear zero at | | X= | 1.30 m |
| Maximum Bending Moment | | **Mx =** | **4.7** KNm |



**SECTION**

| | | | | | factor |
|---|---|---|---|---|---|
| Maximum BM for check | M LT= | 4.3 KNm | Local capacity | PASS | 0.220 |
| Maximum BM about axis Y | MY= | 0.43 KNm | Overall buckling 1 | PASS | 0.430 |
| Axial compressive load | Fc= | 60.0 KN | Overall buckling 2 | PASS | 0.525 |
| Shear force in x axis | Fv= | 7.2 KN | Deflection (dead)= | PASS | 1/ 3753 |
| Beam span | L= | 2.60 m | Deflection(live)= | PASS | 1/ 4351 |
| Effective length about axis X | LX eff= | 2.60 m | Deflection (d+l)= | PASS | 1/ 2015 |
| Effective length about axis Y | LYeff= | 2.60 m | Fully restraint for Ly& LX <1. | | |
| Limiting span/deflection (live) | = | **360.0** or 14 mm | | | |
| | z rep= | 13 cm3 | | | |

**Section properties**

Section size (Ref. No= **70** ) **152x89 16 kg UB S355**

| | | | | | | |
|---|---|---|---|---|---|---|
| Depth of steel section | D= | 152.4 mm | | | | |
| Width of section | B= | 88.9 mm | Pcy= | 225 KN | | |
| Thickness of web | t= | 4.6 mm | Mcx= | 44.02 KNm | | |
| Thickness of flange | T= | 7.7 mm | Mcy= | 11.15 KNm | | 120.56 |
| Root radius | r= | 7.6 mm | Mb L= | 21.7 KNm | | |
| Second moment of area x-x | Ix= | 838 cm4 | Mlt= | **0.925** | Pcy= | 224.62 KN |
| Second moment of area y-y | Iy= | 90.4 cm4 | | | | |
| Plastic modulus x-x | Sx= | 124 cm3 | Sx eff= | 107.62 cm3 | | |
| Plastic modulus y-y | Sy= | 31.4 cm3 | Sy eff= | 18.41 cm3 | | |
| Area of section | Ag= | 20.5 cm2 | An= | 18.64 cm2 | ke= | 1.1 |

**DEFLECTION**

| | | | | unfactored |
|---|---|---|---|---|
| Unfactored dead load deflection= | 0.69 mm | | E UDL= | 2.00 KN/m' |
| Unfactored live load deflection= | **0.60** mm | | E UDL= | 1.73 KN/m' |
| Unfactored dead+ live load def = | 1.29 mm | | E UDL= | 3.73 KN/m' |
| Span/def. ratio for dead load= | 3753 | | | |
| Span/def. ratio for live load= | **4352** | **>360** | | |
| Span/def. ratio fordead+ live load= | 2015 | | | |

CONTINUE OF RB5

**Strength of steel** Clause 3.1.1

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Design strength | **(Grade** | **S 355** | **)** | | | | | |
| for thickness of | 7.7 | mm | **py=** | **355** N/mm2 | py= | **355.0** | N/mm2 | pyw= py |
| Young's Modulus | | | **E=** | 205 KN/mm2 | | | | |

**Classification of cross section** (clause 3.5.2)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | TABLE 11 rolled section | | | |
| Constant (table 11 note b) | ε = | 0.880 | | class 1 | class 2 | class 3 | |
| Outstand of flange | b= | 44.45 mm | | plastic | compac | semi compact | |
| Ratio | b/T= | 5.77 | b/Tlim= | 7.92 | 8.80 | 13.20 | |
| The classification is based on the outsatnd element | | | | **The section is class1 plastic** | | | |
| r1 =min(1.0,max(-0.1,Fc/(dxtxpyw)))= | | 0.30 | r2=Fc/(Agxpyw)= | 0.082 | | | |
| Depth between fillets | d= | 121.8 mm | | TABLE 11 rolled section | | | |
| ratio | d/t= | 26.48 | | class 1 | class 2 | class 3 | |
| 40 ε | = | 35.21 | d/tlim= | 54.09 | 60.60 | 90.67 | |
| The classification is based on the general web condition | | | | **The section is class1 plastic** | | | |

**Shear capacity** CL 4.2.3

| | | | | | | |
|---|---|---|---|---|---|---|
| Shear area | | Av y= | 701 mm2 | (t x D) | | |
| Shear capacity | (0.6pyA) | Pvy= | 149 KN | | | |
| Shear force | | Fvy= | 7.2 KN | Fvy/Pvy= | 0.05 | **SHEAR PASS OK** |

**Moment Capacity**

| | | | | |
|---|---|---|---|---|
| Elastic modulus | Zx= | 110 cm3 | Mcx1= | 39.05 |
| Plastic modulus | Sx= | 124 cm3 | Mcx2= | 44.02 |
| Moment capacity for section | Mcx= | **44** KNm | | |
| Elastic modulus | Zy= | 20.3 cm3 | Mcy1= | 7.207 |
| Plastic modulus | Sy= | 31 cm3 | mcy2= | 11.15 |
| Moment capacity for section | Mcy= | **11** KNm | | |

**Local capacity check Clause 4.8.3.2**

$\frac{F}{Ag.\,py} + \frac{Mx}{Mcx} + \frac{My}{Mcy} = \; <=1$

0.082 + 0.099 + 0.039 = **0.220** **LOCAL CAPACITY IS SATISFIED**

**restraint/effective length Clause 4.31 to 4.3.5** TABLE 13

| | | | |
|---|---|---|---|
| Effective length | Le lt1= | 2600 mm | normal condition |
| Effective length | Lelt2= | 2600 mm | |
| | L e lt= | 2600 mm | |
| Radius of gyration y-y | ry= | 2.1 cm | |
| | rx= | 6.4 cm | |
| | Lam'y= | 123.8 | |
| | La'mx= | 40.6 | |

CONTINUE OF RB5

**Buckling resistance Clause 4.8.3.3.1**

**Compressive strength:perry strust formula from Appendex C.1**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Limiting slenderness | lam 0= | 15.10 | | | py= | 355 | N/mm2 |
| For buckling about y-y | | | | λ L0= | | 30.20 | TABLE 16 |
| Robertson constant for section | | | | | | | |
| | a= | 3.5 | for table 23 | b | | | |
| Perry factor | eta= | 0.38 | | | | | |
| Euler strength | pe= | 132 | N/mm2 | | | | |
| Factor | phi= | 269 | N/mm2 | | | | |
| Compressive strength | pcy= | **109.6** | N/mm2 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Lam'y= | 123.8 | La'mx= | 40.63 | Lamy/x= | 6.3492 |
| Slenderness of section | Lamda= | 123.8 | | | Lamx/x= | 2.0833 |
| Torsional index | x= | 19.5 | | | | |
| | N= | 0.5 | | | | |
| Slenderness factor | v= | 0.76 | from Table 19 | | | |
| | β w = | 1.0 | | | | |
| Buckling parameter | u= | 0.889 | | | | |
| Equivalent slenderness | lamlt= | 83.5 | | | | |
| Buckling strength (Table 16) | pb= | 175 | N/mm2 | for lamlt= 85 | py= | 355 |
| Buckling resisrance moment | Mb= | 22 | KNm | | | |
| | Mb L= | 22 | KNm | | | |
| | Mry= | 11 | KNm | | | |
| | Pc= | 224.6 | KN | | | |
| | Pcy= | 224.6 | KN | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Fc / PC | +W | x Mx / Py Zx | +W | y My / py Zy | = | <=1 | W x= 0.95, W y= 0.95 |
| 0.267 | + | 0.106 | + | 0.057 | = | **0.430** | **The interaction formula is satisfied** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Fc / Pcy | +W | LT M lt / Mb | +W | y My / py Zy | = | <=1 | |
| 0.267 | + | 0.200 | + | 0.057 | = | **0.525** | **The interaction formula is satisfied** |

♦ David Smith Associates LLP ♦
8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL
Tel: (01604) 782620 ♦ Fax: (01604) 782629
E-mail: post@dsagroup.co.uk

| | | | |
|---|---|---|---|
| Project No: | 24/54720 | Sheet No: | 34 |
| Made By: | OAM | Revision: | |
| Date: | Mar-24 | Checked By: | TG |

**Project:** **34 NASSAU ROAD, LONDON**

**DESIGN OF STEEL BEAM, SIMPLY SUPPORTED**

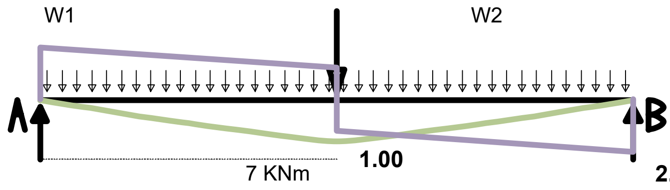
**H rolled section** **S355**

**Calculation in accordance with BS 5950: 1: 2000**

LOCATION= **RB6**

Loads are unfactored

| | | |
|---|---|---|
| Wd1= | **1.20** | KN/m2 |
| Wl1= | **1.00** | KN/m2 |
| Wd2= | **1.20** | KN/m2 |
| wl2= | **1.00** | KN/m2 |
| P1= | **7.10** | KN |
| a= | **1.00** | m |
| Span= | **2.00** | m |
| Cover= | **1.00** | m |

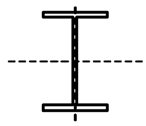



| Load on beam | unfactored | factored |
|---|---|---|
| Point load= | **7.10** KN | **10.65** KN |
| **AV-Dead+s/w=** | 1.36 KN/m' | 1.904 KN/m' |
| **Live=** | 1.00 KN/m' | 1.6 KN/m' |
| | 2.36 KN/m' | 3.504 KN/m' |

Partial safety factor for load
dead= 1.4
live= 1.6

**Reaction**

| | | |
|---|---|---|
| RA= | 5.9 KN | **8.8** KN |
| RB= | 5.9 KN | **8.8** KN |
| Shear zero at | X= | 1.00 m |
| Maximum Bending Moment | **Mx =** | **7** KNm |



**SECTION**

| | | | | | factor |
|---|---|---|---|---|---|
| Maximum BM for check | M LT= | 6.1 KNm | Local capacity | **PASS** | 0.169 |
| Maximum BM about axis Y | MY= | 0.31 KNm | Overall buckling 1 | **PASS** | 0.194 |
| Axial compressive load | Fc= | 1.00 KN | Overall buckling 2 | **PASS** | 0.214 |
| Shear force in x axis | Fv= | 8.8 KN | Deflection (dead)= | **PASS** | 1/ 3204 |
| Beam span | L= | 2.00 m | Deflection(live)= | **PASS** | 1/ 3845 |
| Effective length about axis X | LX eff= | 2.00 m | Deflection (d+l)= | **PASS** | 1/ 1747 |
| Effective length about axis Y | LYeff= | 1.25 m | Fully restraint for Ly& LX <1. | | |
| Limiting span/deflection (live) | = | **360.0** or 14 mm | | | |
| | z rep= | 20 cm3 | | | |

**Section properties**

Section size (Ref. No= **70** ) **152x89 16 kg UB S355**

| | | | | |
|---|---|---|---|---|
| Depth of steel section | D= | 152.4 mm | | |
| Width of section | B= | 88.9 mm | | |
| Thickness of web | t= | 4.6 mm | Mcx= | 44.02 KNm |
| Thickness of flange | T= | 7.7 mm | Mcy= | 11.147 KNm |
| Root radius | r= | 7.7 mm | Mb L= | 36.208 KNm |
| Second moment of area x-x | Ix= | 838 cm4 | Mlt= | **0.869** TABLE 18 |
| Second moment of area y-y | Iy= | 90.4 cm4 | | |
| Plastic modulus x-x | Sx= | 124 cm3 | Sx eff= | 107.02 cm3 |
| Plastic modulus y-y | Sy= | 31.4 cm3 | Sy eff= | 17.94 cm3 |
| Area of section | Ag= | 20.5 cm2 | An= | 18.64 cm2 ke= 1.1 |

**DEFLECTION**

| | | | | unfactored |
|---|---|---|---|---|
| Unfactored dead load deflection= | 0.62 mm | | E UDL= | 5.15 KN/m' |
| Unfactored live load deflection= | **0.52** mm | | E UDL= | 4.29 KN/m' |
| Unfactored dead+ live load def = | 1.14 mm | | E UDL= | 9.44 KN/m' |
| Span/def. ratio for dead load= | 3204 | | | |
| Span/def. ratio for live load= | **3845** | **>360** | | |
| Span/def. ratio fordead+ live load= | 1748 | | | |

CONTINUE OF RB6

**Strength of steel** Clause 3.1.1

| | | | | | | |
|---|---|---|---|---|---|---|
| Design strength | **(Grade S 355 )** | | | | | |
| for thickness of | 7.7 mm | **py=** | **355** N/mm2 | py= | **355.0** N/mm2 | pyw= py |
| Young's Modulus | | **E=** | 205 KN/mm2 | | | |

**Classification of cross section** (clause 3.5.2)

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | TABLE 11 rolled section | | |
| Constant | ε = | 0.880 | | class 1 | class 2 | class 3 |
| Outstand of flange | b= | 44.45 mm | | plastic | compac | semi compact |
| Ratio | b/T= | 5.77 | b/Tlim= | 7.92 | 8.80 | 13.20 |
| | | | | **The section is class1 plastic** | | |
| r1 =min(1.0,max(-0.1,Fc/(dxtxpyw)))= | | 0.50 | r2=Fc/(Agxpyw)= | 0.0014 | | |
| Depth between fillets | d= | 121.8 mm | | TABLE 11 rolled section | | |
| ratio | d/t= | 26.48 | | class 1 | class 2 | class 3 |
| 40 ε | = | 35.206 | d/tlim= | 46.85 | 50.17 | 105.33 |
| The classification is based on the general web condition | | | | **The section is class1 plastic** | | |

**Shear capacity** CL 4.2.3

| | | | | | | |
|---|---|---|---|---|---|---|
| Shear area | | Av y= | 701.04 mm2 | (t x D) | | |
| Shear capacity | (0.6pyA) | Pvy= | 149 KN | | | |
| Shear force | | Fvy= | 8.8 KN | Fvy/Pvy= | 0.06 | **SHEAR PASS OK** |

**Moment Capacity**

| | | | | |
|---|---|---|---|---|
| Elastic modulus | Zx= | 110 cm3 | Mcx1= | 39.05 |
| Plastic modulus | Sx= | 124 cm3 | Mcx2= | 44.02 |
| Moment capacity for section | Mcx= | **44.0** KNm | | |
| Elastic modulus | Zy= | 20.3 cm3 | Mcy1= | 7.2065 |
| Plastic modulus | Sy= | 31.4 cm3 | mcy2= | 11.147 |
| Moment capacity for section | Mcy= | **11.1** KNm | | |

**Local capacity check Clause 4.8.3.2**

$$\frac{F}{Ag.\ py} + \frac{Mx}{Mcx} + \frac{My}{Mcy} \le 1$$

0.001 + 0.140 + 0.028 = **0.169** **LOCAL CAPACITY IS SATISFIED**

**restraint/effective length Clause 4.31 to 4.3.5** TABLE 13

| | | | |
|---|---|---|---|
| Effective length | Le lt1= | 2000 mm | normal condition |
| Effective length | Lelt2= | 1252.4 mm | |
| | L e lt= | 1626.2 mm | |
| Radius of gyration y-y | ry= | 2.1 cm | |
| | rx= | 6.4 cm | |
| | Lam'y= | 59.6 | |
| | La'mx= | 31.3 | |

CONTINUE OF RB6

**Buckling resistance Clause 4.8.3.3.1**

**Compressive strength:perry strust formula from Appendex C.1**

| | | | | |
|---|---|---|---|---|
| Limiting slenderness | lam 0= | 15.10 | py= | 355 N/mm2 |
| For buckling about y-y | | | λ L0= | 30.20 TABLE 16 |
| Robertson constant for H section | | | | |
| | a= | 5.5 | | |
| Perry factor | eta= | 0.24 | | |
| Euler strength | pe= | 569 N/mm2 | | |
| Factor | phi= | 532 N/mm2 | | |
| Compressive strength | pcy= | **247.6** N/mm2 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Lam'y= | 59.6 | La'mx= | 31.25 | Lamy/x= | 3.05836 |
| Slenderness of section | Lamda= | 59.6 | | | Lamx/x= | 1.60256 |
| Torsional index | x= | 19.5 | | | | |
| | N= | 0.5 | | | | |
| Slenderness factor | v= | 0.91 from Table 19 | | | | |
| | β w = | 1.0 | | | | |
| Buckling parameter | u= | 0.889 | | | | |
| Equivalent slenderness | lamlt= | 48.2 | | | | |
| Buckling strength (Table 16) | pb= | 292 N/mm2 | for lamlt= | 50 | py= | 355 |
| Buckling resisrance moment | Mb= | 36.2 KNm | | | | |
| | Mb L= | 36.2 KNm | | | | |
| | Mry= | 11.1 KNm | | | | |
| | Pc= | 507.58 KN | | | | |
| | Pcy= | 507.58 KN | | | | |

$\frac{Fc}{PC} + \frac{W_x Mx}{Py\,Zx} + \frac{W_y My}{py\,Zy} = \; <=1$  W x= 0.95, W y= 1

0.002 + 0.150 + 0.043 = **0.194**  **The interaction formula is satisfied**

$\frac{Fc}{Pcy} + \frac{W_{LT} M_{lt}}{Mb} + \frac{W_y My}{py\,Zy} = \; <=1$

0.002 + 0.170 + 0.043 = **0.214**  **The interaction formula is satisfied**

♦ David Smith Associates ♦
8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL
Tel: (01604) 782620 ♦ Fax: (01604) 782629
E-mail: post@dsagroup.co.uk

| | | | |
|---|---|---|---|
| **Project No:** | **24/54720** | **Sheet No:** | **37** |
| **Made By:** | **OAM** | **Revision:** | |
| **Date:** | **Mar-24** | **Checked By:** | **TG** |

**Project: 34 NASSAU ROAD, LONDON**

**1.0 DESIGN OF STEEL COLUMN**

LOCATION= **SP1** — **S355**

Clause 2.4.2.3
For sway stability a notional horizontal force of 0.5 % of the dead and imposed vertical loads are considered in the design of the columns.

**H rolled section**
**Calculation in accordance with BS 5950: 1: 2000**

FACTORED LOAD = **10** KN
notional force = 0.05 KN

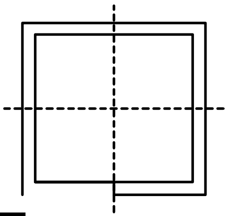
Partial safety factor for load
dead= 1.4
live= 1.6

**1.1 All applied loads and moment are factored**

| | | | |
|---|---|---|---|
| Maximum BM about axis X | MX= | 3.27 | KNm |
| Maximum BM about axis Y | MY= | 0.12 | KNm |
| Axial compressive load | F= | 10.0 | KN |
| Shear force in x axis | Fv= | 10.00 | KN |
| Length of column | L= | 2.40 | m |
| Effective length about axis X | LX= | 2.40 | m |
| Effective length about axis Y | LY= | 4.80 | m |

Fully restraint for Ly& LX <1.

| | | factor |
|---|---|---|
| Local capacity | **PASS** | 0.161 |
| Overall buckling | **PASS** | 0.639 |



**SECTION**

**1.2 Section properties**

Section size (Ref. No= **141** ) **90x90 6.3 SHS S355**

| | | | |
|---|---|---|---|
| Depth of steel section | D= | 90 | mm |
| Width of section | B= | 90 | mm |
| | T= | 6.3 | mm |
| Second moment of area x-x | Ix= | 242 | cm4 |
| Second moment of area y-y | Iy= | 242 | cm4 |
| Plastic modulus x-x | Sx= | 65.3 | cm3 |
| Plastic modulus y-y | Sy= | 65.3 | cm3 |
| Area of section | A= | 20.9 | cm2 |

Mcx= 22.96 KNm
Mcy= 23.18 KNm
Mbs= 5 KNm
Pc = **194** KN
Mlt= **0.925**

**1.3 Strength of steel** Clause 3.1.1

Design strength **(Grade S 355 )**
for thickness of 6.3 mm **py= 355** N/mm2
Young's Modulus **E=** 205 KN/mm2

**1.4 Classification of cross section** (clause 3.5.2)

Constant (table 11 note b) ε = 0.88
Outstand of flange b= 45 mm
Ratio b/T= 7.143 mm

TABLE 11 rolled section

| | class 1 | class 2 | class 3 |
|---|---|---|---|
| | plastic | compac | semi compact |
| b/Tlim= | 7.92 | 8.80 | 13.20 |

The classification is based on the outsatnd element — **The section is class1 plastic**

r1 =min(1.0,max(-0.1,Fc/(dxtxpyw)))= 0.06 — r2=Fc/(Agxpyw)= 0.013
Depth between fillets d= 71.1 mm
ratio d/t= 11.29
40 ε = 35.206

TABLE 11 rolled section

| | class 1 | class 2 | class 3 |
|---|---|---|---|
| d/tlim= | 66.25 | 80.43 | 102.84 |

The classification is based on the general web condition — **The section is class1 plastic**

**1.5 Shear capacity** CL 4.2.3

| | | | | |
|---|---|---|---|---|
| Shear area | | Av= | 1134 | mm2 |
| Shear capacity | (0.6pyA) | Pv= | 241.5 | KN |
| Shear force | | Fv= | 10.00 | KN |

**LOW SHEAR LOAD**

CONTINUE OF SP1

**1.6 Moment Capacity**

| | | | | | | |
|---|---|---|---|---|---|---|
| Elastic modulus | Zx= | 53.9 | cm3 | Mcx1= | 22.96 | (1.2 py Zx) |
| Plastic modulus | Sx= | 65.3 | cm3 | Mcx2= | 23.18 | |
| Moment capacity for section | Mcx= | **23.0** | KNm | | | |
| Elastic modulus | Zy= | 53.9 | cm3 | Mcy1= | 28.7 | (1.5 py Zy) |
| Plastic modulus | Sy= | 65.3 | cm3 | mcy2= | 23.18 | |
| Moment capacity for section | Mcy= | **23.18** | KNm | | | |

**Local capacity check** CL 4.8.3.2

F / Ag. py + Mx / Mcx + My / Mcy = <=1

0.013 + 0.143 + 0.005 = **0.161** **LOCAL CAPACITY IS SATISFIED**

**1.7 Compressive Resistnace section 4.7**

**1.7 Slenderness Clause 4.7.3**

| | | | |
|---|---|---|---|
| Effective length x-x | Lex= | 2400 | mm |
| Effective length y-y | Ley= | 4800 | mm |
| Radius of gyration y-y | ry= | 3.41 | cm |
| | rx= | 3.41 | cm |
| | Lam'y= | 140.8 | |
| | La'mx= | 70.4 | |

**1.8 Compressive strength:perry strust formula from Appendex C.1**

| | | | | |
|---|---|---|---|---|
| Limiting slenderness | lam 0= | 15.10 | | |
| For buckling about y-y | | | | |
| Robertson constant for section | a= | 2 | for table 23 | a |
| Perry factor | eta= | 0.25 | | |
| Euler strength | pe= | 102 | N/mm2 | |
| Factor | phi= | 241 | N/mm2 | |
| Compressive strength | pcy= | **93.0** | N/mm2 | |
| | Pc = | 194.4 | KN | |

**1.9 Resistance to Lteral-Buckling resistance SECTION 4.3**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Limiting slenderness | lam 0= | 30.20 | | Lamy/x= | 0.37 | | |
| Slenderness of section | Lamda= | 140.8 | | Torsional index x= | 381.00 | | |
| Slenderness factor | v= | 0.9983 | from Table 19 | N= | 0.5 | | |
| Buckling parameter | u= | 1 | | β w = | 1.0 | | 0.1 |
| Equivalent slenderness | lamlt= | 140.5 | | | | | 0.9983 |
| Perry coefficient | eta lt= | 0.7723 | | | | | |
| Elastic strength | pe= | 102 | N/mm2 | | | | |
| Factor | phi lt= | 268 | N/mm2 | Mb L= | 5.2 | KNm | |
| Factor | pey= | 36374 | | Mry= | 23.2 | KNm | |
| Buckling strength (Table 16) | pb= | 79.593 | N/mm2 | Pc= | 194.4 | KN | |
| Buckling resisrance moment | Mb= | **5.2** | KNm | Pcy= | 194.4 | KN | |

Overall buckling check

For member with moment about both axes 355

for lateral torsional buckling

Fc / Pcy +W LT M lt / Mb +W y My / py Zy (1+FC/FCY) = <=1    W x= 0.93

W y= 0.93

0.051 + 0.582 + 0.005 = **0.639** **The interaction formula is satisfied**

**DIMENSIONS IN THESE CALCULATIONS ARE ONLY APPROXIMATE AND THE CONTRACTOR MUST CHECK THE LATEST ARCHITECTURAL DRAWINGS AND MEASURE UP ON SITE BEFORE ORDERING ANY MATERIALS.NO WORK SHOULD START BEFORE THE CALCULATIONS HAVE BEEN RECEIVED AND APPROVED BY THE LA BUILDING CONTROL.**

**SECOND FLOOR LEVEL**

**TIMBER SLOPE RAFTERS** **TJ2**

Max span = 3.1 m

**USE 195X47 C24 AT 400 C/C** SEE PAGE 40 - 42

**STEEL BEAM** **FB2.01**

Max span = 3.2 m

| BEAM LOADING | | D LOAD | I LOAD | cover y | | dead load | live load |
|---|---|---|---|---|---|---|---|
| | | KN/m2 | KN/m2 | m | | KN/m' | KN/m' |
| ROOF | dead | **1.2** | | **2.2** | => 2.2* 1.2= | 2.64 | |
| | live | | **1.00** | **2.2** | => 2.2*1.00= | | 2.2 |
| 1ST floor | dead | **0.6** | | **0.6** | => .6* .6= | 0.36 | |
| | live | | **1.50** | **0.6** | => .6*1.50= | | 0.9 |
| wall | dead | **0.75** | | **2** | => 2* .75= | 1.5 | |
| | | | | | **UDL** | **4.5 KN/m'** | **3.1 KN/m'** |

**USE 203x102x23 UB** **S355** SEE PAGE 43 - 45

**STEEL BEAM** **FB2.02**

Max span = 6.9 m

| BEAM LOADING | | D LOAD | I LOAD | cover y | | dead load | live load |
|---|---|---|---|---|---|---|---|
| | | KN/m2 | KN/m2 | m | | KN/m' | KN/m' |
| ROOF | dead | **1.2** | | **2.2** | => 2.2* 1.2= | 2.64 | |
| | live | | **1.00** | **2.2** | => 2.2*1.00= | | 2.2 |
| 1ST floor | dead | **0.6** | | **2.2** | => 2.2* .6= | 1.32 | |
| | live | | **1.50** | **2.2** | => 2.2*1.50= | | 3.3 |
| wall | dead | **0.75** | | **2** | => 2* .75= | 1.5 | |
| | | | | | **UDL** | **5.46 KN/m'** | **5.5 KN/m'** |

**USE 203x203x71 UC** **S355** SEE PAGE 46 - 48

**STEEL BEAM** **FB2.03**

Max span = 5.7 m

Cover= 2.4 m

**USE 203x203x46 UC** **S355** SEE PAGE 49 - 51

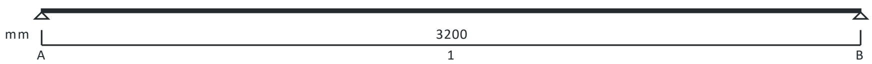
go to page 52

**TIMBER JOIST DESIGN (BS5268-2:2002)**

Tedds calculation version 1.1.04

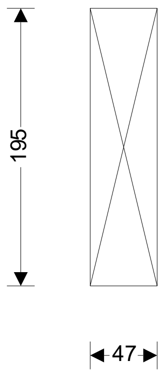
**Joist details**

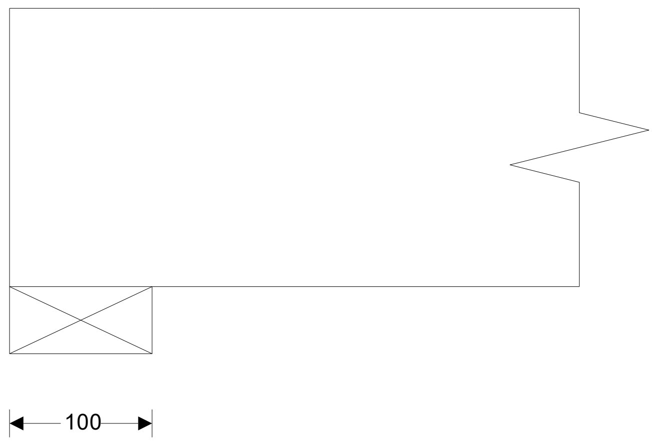
| | |
|---|---|
| Joist breadth | b = **47** mm |
| Joist depth | h = **195** mm |
| Joist spacing | s = **400** mm |
| Timber strength class | **C24** |
| Service class of timber | **1** |




**Span details**

| | |
|---|---|
| Number of spans | $N_{span}$ = **1** |
| Length of bearing | $L_b$ = **100** mm |
| Effective length of span | $L_{s1}$ = **3200** mm |




**Section properties**

| | |
|---|---|
| Second moment of area | $I = b \times h^3 / 12$ = **29041594** $mm^4$ |
| Section modulus | $Z = b \times h^2 / 6$ = **297863** $mm^3$ |

**Loading details**

| | |
|---|---|
| Joist self weight | $F_{swt} = b \times h \times \rho_{char} \times g_{acc}$ = **0.03** kN/m |
| Dead load | $F_{d\_udl}$ = **0.75** $kN/m^2$ |
| Imposed UDL(Long term) | $F_{i\_udl}$ = **1.50** $kN/m^2$ |
| Imposed point load (Medium term) | $F_{i\_pt}$ = **1.40** kN |

**Modification factors**

| | |
|---|---|
| Service class for bending parallel to grain | $K_{2m}$ = **1.00** |
| Service class for compression | $K_{2c}$ = **1.00** |

Service class for shear parallel to grain $K_{2s}$ = **1.00**
Service class for modulus of elasticity $K_{2e}$ = **1.00**
Section depth factor $K_7$ = **1.05**
Load sharing factor $K_8$ = **1.10**

**Consider long term loads**

Load duration factor $K_3$ = **1.00**
Maximum bending moment M = **1.192** kNm
Maximum shear force V = **1.490** kN
Maximum support reaction R = **1.490** kN
Maximum deflection $\delta$ = **4.286** mm

**Check bending stress**

Bending stress $\sigma_m$ = **7.500** N/mm$^2$
Permissible bending stress $\sigma_{m\_adm} = \sigma_m \times K_{2m} \times K_3 \times K_7 \times K_8$ = **8.650** N/mm$^2$
Applied bending stress $\sigma_{m\_max}$ = M / Z = **4.003** N/mm$^2$

***PASS - Applied bending stress within permissible limits***

**Check shear stress**

Shear stress $\tau$ = **0.710** N/mm$^2$
Permissible shear stress $\tau_{adm} = \tau \times K_{2s} \times K_3 \times K_8$ = **0.781** N/mm$^2$
Applied shear stress $\tau_{max} = 3 \times V / (2 \times b \times h)$ = **0.244** N/mm$^2$

***PASS - Applied shear stress within permissible limits***

**Check bearing stress**

Compression perpendicular to grain (no wane) $\sigma_{cp1}$ = **2.400** N/mm$^2$
Permissible bearing stress $\sigma_{c\_adm} = \sigma_{cp1} \times K_{2c} \times K_3 \times K_8$ = **2.640** N/mm$^2$
Applied bearing stress $\sigma_{c\_max} = R / (b \times L_b)$ = **0.317** N/mm$^2$

***PASS - Applied bearing stress within permissible limits***

**Check deflection**

Permissible deflection $\delta_{adm} = \min(L_{s1} \times 0.003, 14\text{ mm})$ = **9.600** mm
Bending deflection (based on $E_{mean}$) $\delta_{bending}$ = **4.055** mm
Shear deflection $\delta_{shear}$ = **0.231** mm
Total deflection $\delta = \delta_{bending} + \delta_{shear}$ = **4.286** mm

***PASS - Actual deflection within permissible limits***

**Consider medium term loads**

Load duration factor $K_3$ = **1.25**
Maximum bending moment M = **1.544** kNm
Maximum shear force V = **1.930** kN
Maximum support reaction R = **1.930** kN
Maximum deflection $\delta$ = **4.790** mm

**Check bending stress**

Bending stress $\sigma_m$ = **7.500** N/mm$^2$
Permissible bending stress $\sigma_{m\_adm} = \sigma_m \times K_{2m} \times K_3 \times K_7 \times K_8$ = **10.813** N/mm$^2$
Applied bending stress $\sigma_{m\_max}$ = M / Z = **5.185** N/mm$^2$

***PASS - Applied bending stress within permissible limits***

**Check shear stress**

Shear stress $\tau$ = **0.710** $N/mm^2$

Permissible shear stress $\tau_{adm} = \tau \times K_{2s} \times K_3 \times K_8$ = **0.976** $N/mm^2$

Applied shear stress $\tau_{max} = 3 \times V / (2 \times b \times h)$ = **0.316** $N/mm^2$

***PASS - Applied shear stress within permissible limits***

**Check bearing stress**

Compression perpendicular to grain (no wane) $\sigma_{cp1}$ = **2.400** $N/mm^2$

Permissible bearing stress $\sigma_{c\_adm} = \sigma_{cp1} \times K_{2c} \times K_3 \times K_8$ = **3.300** $N/mm^2$

Applied bearing stress $\sigma_{c\_max} = R / (b \times L_b)$ = **0.411** $N/mm^2$

***PASS - Applied bearing stress within permissible limits***

**Check deflection**

Permissible deflection $\delta_{adm} = \min(L_{s1} \times 0.003, 14\ mm)$ = **9.600** mm

Bending deflection (based on $E_{mean}$) $\delta_{bending}$ = **4.490** mm

Shear deflection $\delta_{shear}$ = **0.300** mm

Total deflection $\delta = \delta_{bending} + \delta_{shear}$ = **4.790** mm

***PASS - Actual deflection within permissible limits***

♦ David Smith Associates LLP♦
8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL
Tel: (01604) 782620 ♦ Fax: (01604) 782629
E-mail: post@dsagroup.co.uk

| | | | |
|---|---|---|---|
| **Project No:** | **24/54720** | **Sheet No:** | **43** |
| **Made By:** | ***OAM*** | **Revision:** | |
| **Date:** | **Mar-24** | **Checked By:** | **TG** |

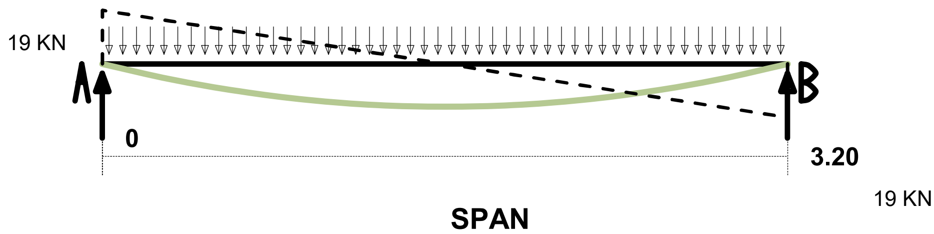
**Project:** **34 NASSAU ROAD, LONDON**

**DESIGN OF STEEL BEAM, SIMPLY SUPPORTED**

**H rolled section** **S355**
**Calculation in accordance with BS 5950: 1: 2000**

LOCATION= **FB2.01**
Loads are unfactored
Wd= **4.50** KN/m2
Wl= **3.10** KN/m2

Span= **3.20** m
Cover= **1.00** m



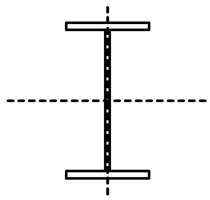

**SPAN**
15 KNm

| Load on beam | unfactored | factored |
|---|---|---|
| **Dead+s/w=** | 4.73 KN/m' | 6.62 KN/m' |
| **Live=** | 3.10 KN/m' | 4.96 KN/m' |
| | 7.83 KN/m' | 11.58 KN/m' |

Partial safety factor for load
dead= 1.4
live= 1.6

**Reaction**

| | | unfactored | factored |
|---|---|---|---|
| RA= | | 12.5 KN | **18.5** KN |
| RB= | | 12.5 KN | **18.5** KN |
| Shear zero at | X= | | 1.60 m |
| Maximum Bending Moment | **Mx =** | | **14.8** KNm |



**SECTION**

| | | | | | factor |
|---|---|---|---|---|---|
| Maximum BM for check | M LT= | 13.7 KNm | Local capacity | PASS | 0.303 |
| Maximum BM about axis Y | MY= | 1.37 KNm | Overall buckling 1 | PASS | 0.512 |
| Axial compressive load | Fc= | 60.0 KN | Overall buckling 2 | PASS | 0.728 |
| Shear force in x axis | Fv= | 18.5 KN | Deflection (dead)= | PASS | 1/ 2123 |
| Beam span | L= | 3.20 m | Deflection(live)= | PASS | 1/ 3239 |
| Effective length about axis X | LX eff= | 3.20 m | Deflection (d+l)= | PASS | 1/ 1282 |
| Effective length about axis Y | LYeff= | 3.20 m | Fully restraint for Ly& LX <1. | | |
| Limiting span/deflection (live) | = | **360.0** or 14 mm | | | |
| | z rep= | 42 cm3 | | | |

**Section properties**

Section size (Ref. No= **68** ) **203x102 23 kg UB S355**

| | | | | | |
|---|---|---|---|---|---|
| Depth of steel section | D= | 203.2 mm | | | |
| Width of section | B= | 101.6 mm | Pcy= | 273 KN | |
| Thickness of web | t= | 5.2 mm | Mcx= | 82.36 KNm | |
| Thickness of flange | T= | 9.3 mm | Mcy= | 17.57 KNm | 193.33 |
| Root radius | r= | 7.6 mm | Mb L= | 34.8 KNm | |
| Second moment of area x-x | Ix= | 2090 cm4 | Mlt= | **0.925** | Pcy= 273.08 KN |
| Second moment of area y-y | Iy= | 163 cm4 | | | |
| Plastic modulus x-x | Sx= | 232 cm3 | Sx eff= | 202.16 cm3 | |
| Plastic modulus y-y | Sy= | 49.5 cm3 | Sy eff= | 29.53 cm3 | |
| Area of section | Ag= | 29 cm2 | An= | 26.36 cm2 | ke= 1.1 |

**DEFLECTION**

| | | | unfactored | |
|---|---|---|---|---|
| Unfactored dead load deflection= | 1.51 mm | | E UDL= | 4.73 KN/m' |
| Unfactored live load deflection= | **0.99** mm | | E UDL= | 3.10 KN/m' |
| Unfactored dead+ live load def = | 2.50 mm | | E UDL= | 7.83 KN/m' |
| Span/def. ratio for dead load= | 2123 | | | |
| Span/def. ratio for live load= | **3239** | **>360** | | |
| Span/def. ratio fordead+ live load= | 1282 | | | |

CONTINUE OF FB2.01

**Strength of steel** Clause 3.1.1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Design strength | **(Grade** | **S 355** | **)** | | | | |
| for thickness of | 9.3 | mm | **py=** | **355** N/mm2 | py= | **355.0** N/mm2 | pyw= py |
| Young's Modulus | | | **E=** | 205 KN/mm2 | | | |

**Classification of cross section** (clause 3.5.2)

| | | | | | | |
|---|---|---|---|---|---|---|
| Constant (table 11 note b) | ε = | 0.880 | | TABLE 11 rolled section | | |
| | | | | class 1 | class 2 | class 3 |
| Outstand of flange | b= | 50.8 mm | | plastic | compac | semi compact |
| Ratio | b/T= | 5.46 | b/Tlim= | 7.92 | 8.80 | 13.20 |
| The classification is based on the outsatnd element | | | | **The section is class1 plastic** | | |
| r1 =min(1.0,max(-0.1,Fc/(dxtxpyw)))= | | 0.19 | r2=Fc/(Agxpyw)= | 0.058 | | |
| Depth between fillets | d= | 169.4 mm | | TABLE 11 rolled section | | |
| ratio | d/t= | 32.58 | | class 1 | class 2 | class 3 |
| 40 ε | = | 35.21 | d/tlim= | 59.08 | 68.34 | 94.59 |
| The classification is based on the general web condition | | | | **The section is class1 plastic** | | |

**Shear capacity** CL 4.2.3

| | | | | | | |
|---|---|---|---|---|---|---|
| Shear area | | Av y= | 1057 mm2 | (t x D) | | |
| Shear capacity | (0.6pyA) | Pvy= | 225 KN | | | |
| Shear force | | Fvy= | 18.5 KN | Fvy/Pvy= | 0.08 | **SHEAR PASS OK** |

**Moment Capacity**

| | | | | |
|---|---|---|---|---|
| Elastic modulus | Zx= | 206 cm3 | Mcx1= | 73.13 |
| Plastic modulus | Sx= | 232 cm3 | Mcx2= | 82.36 |
| Moment capacity for section | Mcx= | **82** KNm | | |
| Elastic modulus | Zy= | 32.1 cm3 | Mcy1= | 11.4 |
| Plastic modulus | Sy= | 50 cm3 | mcy2= | 17.57 |
| Moment capacity for section | Mcy= | **18** KNm | | |

**Local capacity check Clause 4.8.3.2**

$$\frac{F}{Ag.\,py} + \frac{Mx}{Mcx} + \frac{My}{Mcy} = \; <=1$$

0.058 + 0.167 + 0.078 = **0.303** **LOCAL CAPACITY IS SATISFIED**

**restraint/effective length Clause 4.31 to 4.3.5** TABLE 13

| | | | |
|---|---|---|---|
| Effective length | Le lt1= | 3200 mm | normal condition |
| Effective length | Lelt2= | 3200 mm | |
| | L e lt= | 3200 mm | |
| Radius of gyration y-y | ry= | 2.37 cm | |
| | rx= | 8.49 cm | |
| | Lam'y= | 135.0 | |
| | La'mx= | 37.7 | |

CONTINUE OF FB2.01

**Buckling resistance Clause 4.8.3.3.1**

**Compressive strength:perry strust formula from Appendex C.1**

| | | | | | | |
|---|---|---|---|---|---|---|
| Limiting slenderness | lam 0= | 15.10 | | py= | 355 | N/mm2 |
| For buckling about y-y | | | | λ L0= | 30.20 | TABLE 16 |
| Robertson constant for section | | | | | | |
| | a= | 3.5 | for table 23 | b | | |
| Perry factor | eta= | 0.42 | | | | |
| Euler strength | pe= | 111 | N/mm2 | | | |
| Factor | phi= | 256 | N/mm2 | | | |
| Compressive strength | pcy= | **94.2** | N/mm2 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Lam'y= | 135.0 | | La'mx= | 37.69 | | Lamy/x= | 5.9744 |
| Slenderness of section | Lamda= | 135.0 | | | | | Lamx/x= | 1.6678 |
| Torsional index | x= | 22.6 | | | | | | |
| | N= | 0.5 | | | | | | |
| Slenderness factor | v= | 0.77 | from Table 19 | | | | | |
| | β w = | 1.0 | | | | | | |
| Buckling parameter | u= | 0.89 | | | | | | |
| Equivalent slenderness | lamlt= | 93.0 | | | | | | |
| Buckling strength (Table 16) | pb= | 150 | N/mm2 | for lamlt= | 95 | | py= | 355 |
| Buckling resisrance moment | Mb= | 35 | KNm | | | | | |
| | Mb L= | 35 | KNm | | | | | |
| | Mry= | 18 | KNm | | | | | |
| | Pc= | 273.1 | KN | | | | | |
| | Pcy= | 273.1 | KN | | | | | |

Fc / PC +W x Mx / Py Zx +W y My / py Zy = <=1 W x= 0.95 W y= 0.95

0.220 + 0.178 + 0.114 = **0.512** **The interaction formula is satisfied**

Fc / Pcy +W LT M lt / Mb +W y My / py Zy = <=1

0.220 + 0.394 + 0.114 = **0.728** **The interaction formula is satisfied**

♦ David Smith Associates LLP♦
8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL
Tel: (01604) 782620 ♦ Fax: (01604) 782629
E-mail: post@dsagroup.co.uk

| | | | |
|---|---|---|---|
| Project No: | 24/54720 | Sheet No: | 46 |
| Made By: | OAM | Revision: | |
| Date: | Mar-24 | Checked By: | TG |

**Project:** **34 NASSAU ROAD, LONDON**

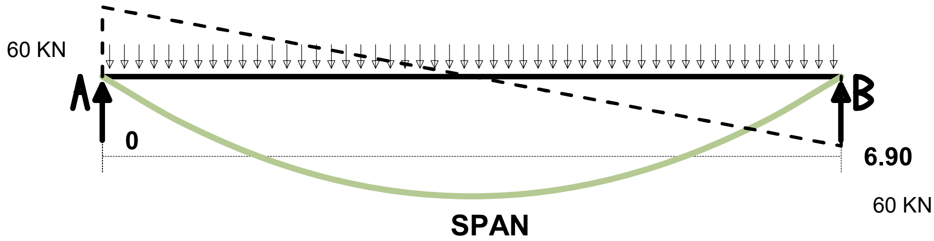
**DESIGN OF STEEL BEAM, SIMPLY SUPPORTED** — **H rolled section** **S355**

LOCATION= **FB2.02** — **Calculation in accordance with BS 5950: 1: 2000**

Loads are unfactored

Wd= **5.46** KN/m2
Wl= **5.50** KN/m2

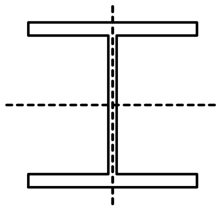
Span= **6.90** m
Cover= **1.00** m




| Load on beam | unfactored | factored | |
|---|---|---|---|
| | | | 104 KNm |
| | | | Partial safety factor for load |
| **Dead+s/w=** | 6.17 KN/m' | 8.64 KN/m' | dead= 1.4 |
| **Live=** | 5.50 KN/m' | 8.80 KN/m' | live= 1.6 |
| | 11.67 KN/m' | 17.44 KN/m' | |

**Reaction**

| | | | |
|---|---|---|---|
| RA= | 40.3 KN | | **60.2** KN |
| RB= | 40.3 KN | | **60.2** KN |
| Shear zero at | | X= | 3.45 m |
| Maximum Bending Moment | | **Mx =** | **103.8** KNm |



**SECTION**

| | | | | | factor |
|---|---|---|---|---|---|
| Maximum BM for check | M LT= | 96.0 KNm | Local capacity | **PASS** | 0.440 |
| Maximum BM about axis Y | MY= | 9.60 KNm | Overall buckling 1 | **PASS** | 0.553 |
| Axial compressive load | Fc= | 60.0 KN | Overall buckling 2 | **PASS** | 0.728 |
| Shear force in x axis | Fv= | 60.2 KN | Deflection (dead)= | **PASS** | 1/ 593 |
| Beam span | L= | 6.90 m | Deflection(live)= | **PASS** | 1/ 666 |
| Effective length about axis X | LX eff= | 6.90 m | Deflection (d+l)= | **PASS** | 1/ 314 |
| Effective length about axis Y | LYeff= | 6.90 m | Fully restraint for Ly& LX <1. | | |
| Limiting span/deflection (live) | = | **360.0** or 14 mm | | | |
| | z rep= | 301 cm3 | | | |

**Section properties**

Section size (Ref. No= **96** ) **203x203 71 kg UC S355**

| | | | | | | |
|---|---|---|---|---|---|---|
| Depth of steel section | D= | 215.9 mm | | | | |
| Width of section | B= | 206.2 mm | Pcy= | 833 KN | | |
| Thickness of web | t= | 10.3 mm | Mcx= | 276.8 KNm | | |
| Thickness of flange | T= | 17.3 mm | Mcy= | 129.1 KNm | | 971.8 |
| Root radius | r= | 10.2 mm | Mb L= | 174.9 KNm | | |
| Second moment of area x-x | Ix= | 7647 cm4 | Mlt= | **0.925** | Pcy= | 832.53 KN |
| Second moment of area y-y | Iy= | 2536 cm4 | | | | |
| Plastic modulus x-x | Sx= | 802.4 cm3 | Sx eff= | 696.10 cm3 | | |
| Plastic modulus y-y | Sy= | 374.2 cm3 | Sy eff= | 229.22 cm3 | | |
| Area of section | Ag= | 91.1 cm2 | An= | 82.82 cm2 | ke= | 1.1 |

**DEFLECTION**

| | | | | unfactored |
|---|---|---|---|---|
| Unfactored dead load deflection= | 11.62 mm | | E UDL= | 6.17 KN/m' |
| Unfactored live load deflection= | 10.36 mm | | E UDL= | 5.50 KN/m' |
| Unfactored dead+ live load def = | 21.97 mm | | E UDL= | 11.67 KN/m' |
| Span/def. ratio for dead load= | 594 | | | |
| Span/def. ratio for live load= | **666** | **>360** | | |
| Span/def. ratio fordead+ live load= | 314 | | | |

CONTINUE OF FB2.02

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Strength of steel** | Clause 3.1.1 | | | | | | | |
| Design strength | **(Grade** | **S 355** | **)** | | | | | |
| for thickness of | 17.3 mm | **py=** | **345** N/mm2 | py= | **345.0** | N/mm2 | pyw= py | |
| Young's Modulus | | **E=** | 205 KN/mm2 | | | | | |
| **Classification of cross section** | (clause 3.5.2) | | | | TABLE 11 rolled section | | | |
| Constant (table 11 note b) | ε = | | 0.893 | | class 1 | class 2 | class 3 | |
| Outstand of flange | | b= | 103.1 mm | | plastic | compac | semi compact | |
| Ratio | | b/T= | 5.96 | b/Tlim= | 8.04 | 8.93 | 13.39 | |
| The classification is based on the outsatnd element | | | | | **The section is class1 plastic** | | | |
| r1 =min(1.0,max(-0.1,Fc/(dxtxpyw)))= | | | 0.11 | r2=Fc/(Agxpyw)= | 0.019 | | | |
| Depth between fillets | | d= | 160.8 mm | | TABLE 11 rolled section | | | |
| ratio | | d/t= | 15.61 | | class 1 | class 2 | class 3 | |
| | 40 ε | = | 35.71 | d/tlim= | 64.64 | 77.13 | 103.20 | |
| The classification is based on the general web condition | | | | | **The section is class1 plastic** | | | |
| **Shear capacity** | CL 4.2.3 | | | | | | | |
| Shear area | | Av y= | 2224 mm2 | (t x D) | | | | |
| Shear capacity | (0.6pyA) | Pvy= | 460 KN | | | | | |
| Shear force | | Fvy= | 60.2 KN | | Fvy/Pvy= | 0.13 | **SHEAR PASS OK** | |
| **Moment Capacity** | | | | | | | | |
| Elastic modulus | | Zx= | 708.4 cm3 | | Mcx1= | 244.4 | | |
| Plastic modulus | | Sx= | 802 cm3 | | Mcx2= | 276.8 | | |
| Moment capacity for section | | Mcx= | **277** KNm | | | | | |
| Elastic modulus | | Zy= | 246 cm3 | | Mcy1= | 84.87 | | |
| Plastic modulus | | Sy= | 374 cm3 | | mcy2= | 129.1 | | |
| Moment capacity for section | | Mcy= | **129** KNm | | | | | |

**Local capacity check Clause 4.8.3.2**

F / Ag. py + Mx / Mcx + My / Mcy = <=1

0.019 + 0.347 + 0.074 = **0.440** **LOCAL CAPACITY IS SATISFIED**

| | | | | |
|---|---|---|---|---|
| **restraint/effective length Clause 4.31 to 4.3.5** | | | TABLE 13 | |
| Effective length | Le lt1= | 6900 mm | normal condition | |
| Effective length | Lelt2= | 6900 mm | | |
| | L e lt= | 6900 mm | | |
| Radius of gyration y-y | ry= | 5.28 cm | | |
| | rx= | 9.16 cm | | |
| | Lam'y= | 130.7 | | |
| | La'mx= | 75.3 | | |

CONTINUE OF FB2.02

**Buckling resistance Clause 4.8.3.3.1**

**Compressive strength:perry strust formula from Appendex C.1**

| | | | | | |
|---|---|---|---|---|---|
| Limiting slenderness | lam 0= | 15.32 | | py= | 345 N/mm2 |
| For buckling about y-y | | | λ L0= | | 30.60 TABLE 16 |
| Robertson constant for section | | | | | |
| | a= | 5.5 | for table 23 | c | |
| Perry factor | eta= | 0.63 | | | |
| Euler strength | pe= | 118 | N/mm2 | | |
| Factor | phi= | 269 | N/mm2 | | |
| Compressive strength | pcy= | **91.4** | N/mm2 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Lam'y= | 130.7 | La'mx= | 75.33 | Lamy/x= | 10.982 |
| Slenderness of section | Lamda= | 130.7 | | | Lamx/x= | 6.33 |
| Torsional index | x= | 11.9 | | | | |
| | N= | 0.5 | | | | |
| Slenderness factor | v= | 0.61 | from Table 19 | | | |
| | β w = | 1.0 | | | | |
| Buckling parameter | u= | 0.852 | | | | |
| Equivalent slenderness | lamlt= | 68.4 | | | | |
| Buckling strength (Table 16) | pb= | 218 N/mm2 | for lamlt= | 70 | py= | 345 |
| Buckling resisrance moment | Mb= | 175 KNm | | | | |
| | Mb L= | 175 KNm | | | | |
| | Mry= | 129 KNm | | | | |
| | Pc= | 832.5 KN | | | | |
| | Pcy= | 832.5 KN | | | | |

Fc/PC +W x Mx/Py Zx +W y My/py Zy = <=1     W x= 0.95     W y= 0.95

0.072 + 0.373 + 0.107 = **0.553**     **The interaction formula is satisfied**

Fc/Pcy +W LT M lt/Mb +W y My/py Zy = <=1

0.072 + 0.549 + 0.107 = **0.728**     **The interaction formula is satisfied**

♦ David Smith Associates LLP♦
8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL
Tel: (01604) 782620 ♦ Fax: (01604) 782629
E-mail: post@dsagroup.co.uk

| | | | |
|---|---|---|---|
| Project No: | 24/54720 | Sheet No: | 49 |
| Made By: | OAM | Revision: | |
| Date: | Mar-24 | Checked By: | TG |

**Project:** **34 NASSAU ROAD, LONDON**

**DESIGN OF STEEL BEAM, SIMPLY SUPPORTED**

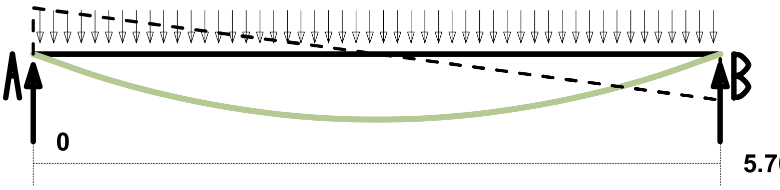
**H rolled section** S355
**Calculation in accordance with BS 5950: 1: 2000**

LOCATION= **FB2.03**

Loads are unfactored

Wd= **0.60** KN/m2
Wl= **1.50** KN/m2

Span= **5.70** m
Cover= **2.40** m




**SPAN**

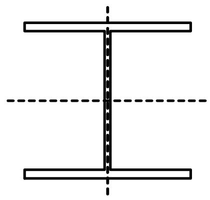
34 KNm

| Load on beam | unfactored | **factored** |
|---|---|---|
| **Dead+s/w=** | 1.9 KN/m' | 2.66 KN/m' |
| **Live=** | 3.60 KN/m' | 5.76 KN/m' |
| | 5.50 KN/m' | 8.42 KN/m' |

Partial safety factor for load
dead= 1.4
live= 1.6

**Reaction**

| | unfactored | factored |
|---|---|---|
| RA= | 15.7 KN | **24.0** KN |
| RB= | 15.7 KN | **24.0** KN |
| Shear zero at | X= | 2.85 m |
| Maximum Bending Moment | **Mx =** | **34.2** KNm |



**SECTION**

| | | | | | factor |
|---|---|---|---|---|---|
| Maximum BM for check | M LT= | 31.6 KNm | Local capacity | PASS | 0.247 |
| Maximum BM about axis Y | MY= | 3.16 KNm | Overall buckling 1 | PASS | 0.330 |
| Axial compressive load | Fc= | 60.0 KN | Overall buckling 2 | PASS | 0.452 |
| Shear force in x axis | Fv= | 24.0 KN | Deflection (dead)= | PASS | 1/ 2042 |
| Beam span | L= | 5.70 m | Deflection(live)= | PASS | 1/ 1077 |
| Effective length about axis X | LX eff= | 5.70 m | Deflection (d+l)= | PASS | 1/ 705 |
| Effective length about axis Y | LYeff= | 5.70 m | Fully restraint for Ly& LX <1. | | |
| Limiting span/deflection (live) | = | **360.0** or 14 mm | | | |
| | z rep= | 96 cm3 | | | |

**Section properties**

Section size (Ref. No= **99** ) **203x203 46 kg UC S355**

| | | | | | | |
|---|---|---|---|---|---|---|
| Depth of steel section | D= | 203.2 mm | | | | |
| Width of section | B= | 203.2 mm | Pcy= | 700 KN | | |
| Thickness of web | t= | 7.3 mm | Mcx= | 176.6 KNm | | |
| Thickness of flange | T= | 11 mm | Mcy= | 81.65 KNm | | 566.48 |
| Root radius | r= | 10.2 mm | Mb L= | 102 KNm | | |
| Second moment of area x-x | Ix= | 4564 cm4 | Mlt= | **0.925** | Pcy= | 700.16 KN |
| Second moment of area y-y | Iy= | 1539 cm4 | | | | |
| Plastic modulus x-x | Sx= | 497.4 cm3 | Sx eff= | 442.53 cm3 | | |
| Plastic modulus y-y | Sy= | 230 cm3 | Sy eff= | 140.06 cm3 | | |
| Area of section | Ag= | 58.8 cm2 | An= | 53.45 cm2 | ke= | 1.1 |

**DEFLECTION**

| | | | unfactored | |
|---|---|---|---|---|
| Unfactored dead load deflection= | 2.79 mm | | E UDL= | 1.90 KN/m' |
| Unfactored live load deflection= | 5.29 mm | | E UDL= | 3.60 KN/m' |
| Unfactored dead+ live load def = | 8.08 mm | | E UDL= | 5.50 KN/m' |
| Span/def. ratio for dead load= | 2042 | | | |
| Span/def. ratio for live load= | **1078** | **>360** | | |
| Span/def. ratio fordead+ live load= | 705 | | | |

CONTINUE OF FB2.03

**Strength of steel** Clause 3.1.1

| | | | | | | |
|---|---|---|---|---|---|---|
| Design strength | **(Grade S 355 )** | | | | | |
| for thickness of 11 mm | **py=** | **355** N/mm2 | py= | **355.0** | N/mm2 | pyw= py |
| Young's Modulus | **E=** | 205 KN/mm2 | | | | |

**Classification of cross section** (clause 3.5.2) TABLE 11 rolled section

| | | | | | | |
|---|---|---|---|---|---|---|
| Constant (table 11 note b) ε = | | 0.880 | | class 1 | class 2 | class 3 |
| Outstand of flange | b= | 101.6 mm | | plastic | compac | semi compact |
| Ratio | b/T= | 9.24 | b/Tlim= | 7.92 | 8.80 | 13.20 |

The classification is based on the outsatnd element — **The section is class 3 semi compact**

r1 =min(1.0,max(-0.1,Fc/(dxtxpyw)))= 0.14 r2=Fc/(Agxpyw)= 0.029

Depth between fillets d= 160.8 mm — TABLE 11 rolled section

| | | | | | | |
|---|---|---|---|---|---|---|
| ratio | d/t= | 22.03 | | class 1 | class 2 | class 3 |
| 40 ε | = | 35.21 | d/tlim= | 61.55 | 72.38 | 99.88 |

The classification is based on the general web condition — **The section is class1 plastic**

**Shear capacity** CL 4.2.3

| | | | | | |
|---|---|---|---|---|---|
| Shear area | | Av y= | 1483 mm2 | (t x D) | |
| Shear capacity | (0.6pyA) | Pvy= | 316 KN | | |
| Shear force | | Fvy= | 24.0 KN | Fvy/Pvy= 0.08 | **SHEAR PASS OK** |

**Moment Capacity**

| | | | | |
|---|---|---|---|---|
| Elastic modulus | Zx= | 449.2 cm3 | Mcx1= | 159.5 |
| Plastic modulus | Sx= | 497 cm3 | Mcx2= | 176.6 |
| Moment capacity for section | Mcx= | **177** KNm | | |
| Elastic modulus | Zy= | 151 cm3 | Mcy1= | 53.61 |
| Plastic modulus | Sy= | 230 cm3 | mcy2= | 81.65 |
| Moment capacity for section | Mcy= | **82** KNm | | |

**Local capacity check Clause 4.8.3.2**

$\frac{F}{Ag.\,py} + \frac{Mx}{Mcx} + \frac{My}{Mcy} = \;<=1$

0.029 + 0.179 + 0.039 = **0.247** **LOCAL CAPACITY IS SATISFIED**

**restraint/effective length Clause 4.31 to 4.3.5** TABLE 13

| | | | |
|---|---|---|---|
| Effective length | Le lt1= | 5700 mm | normal condition |
| Effective length | Lelt2= | 5700 mm | |
| | L e lt= | 5700 mm | |
| Radius of gyration y-y | ry= | 5.11 cm | |
| | rx= | 8.81 cm | |
| | Lam'y= | 111.5 | |
| | La'mx= | 64.7 | |

CONTINUE OF FB2.03

**Buckling resistance Clause 4.8.3.3.1**

**Compressive strength:perry strust formula from Appendex C.1**

| | | | | |
|---|---|---|---|---|
| Limiting slenderness | lam 0= | 15.10 | py= | 355 N/mm2 |
| For buckling about y-y | | | λ L0= | 30.20 TABLE 16 |
| Robertson constant for section | | | | |
| | a= | 5.5 for table 23 | c | |
| Perry factor | eta= | 0.53 | | |
| Euler strength | pe= | 163 N/mm2 | | |
| Factor | phi= | 302 N/mm2 | | |
| Compressive strength | pcy= | **119.1** N/mm2 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Lam'y= | 111.5 | La'mx= | 64.70 | Lamy/x= | 6.302 |
| Slenderness of section | Lamda= | 111.5 | | | Lamx/x= | 3.6553 |
| Torsional index | x= | 17.7 | | | | |
| | N= | 0.5 | | | | |
| Slenderness factor | v= | 0.76 from Table 19 | | | | |
| | β w = | 1.0 | | | | |
| Buckling parameter | u= | 0.846 | | | | |
| Equivalent slenderness | lamlt= | 71.8 | | | | |
| Buckling strength (Table 16) | pb= | 205 N/mm2 | for lamlt= | 75 | py= | 355 |
| Buckling resisrance moment | Mb= | 102 KNm | | | | |
| | Mb L= | 102 KNm | | | | |
| | Mry= | 82 KNm | | | | |
| | Pc= | 700.2 KN | | | | |
| | Pcy= | 700.2 KN | | | | |

$\frac{Fc}{PC} + W \frac{x\,Mx}{Py\,Zx} + W \frac{y\,My}{py\,Zy} = \leq 1$   W x= 0.95   W y= 0.95

0.086 + 0.188 + 0.056 = **0.330**   **The interaction formula is satisfied**

$\frac{Fc}{Pcy} + W \frac{LT\,M\,lt}{Mb} + W \frac{y\,My}{py\,Zy} = \leq 1$

0.086 + 0.310 + 0.056 = **0.452**   **The interaction formula is satisfied**

♦ David Smith Associates LLP ♦
8 Duncan Close ♦ Moulton Park ♦ Northampton NN3 6WL
Tel: (01604) 782620 ♦ Fax: (01604) 782629
E-mail: northampton@dsagroup.co.uk

| Project No: | 24/54720 | Sheet No: | 52 |
|---|---|---|---|
| Made By: | *OAM* | Revision: | |
| Date: | Mar-24 | Checked By: | TG |

**Project:** **34 NASSAU ROAD, LONDON**

**DIMENSIONS IN THESE CALCULATIONS ARE ONLY APPROXIMATE AND THE CONTRACTOR MUST CHECK THE LATEST ARCHITECTURAL DRAWINGS AND MEASURE UP ON SITE BEFORE ORDERING ANY MATERIALS.NO WORK SHOULD START BEFORE THE CALCULATIONS HAVE BEEN RECEIVED AND APPROVED BY THE LA BUILDING CONTROL.**

**SECOND FLOOR LEVEL**

**STEEL BEAM** **FB2.04**

Max span = 3.2 m Cover= 1 m

**USE** **203x133x30 UB** **S355** SEE PAGE 53 - 55

**STEEL BEAM** **FB2.05**

Max span = 6.9 m
Cover= 2.5 m

**USE** **203x203x60 UC** **S355** SEE PAGE 56 - 58

**STEEL BEAM** **FB2.06**

Max span = 2.4 m

| **BEAM LOADING** | | D LOAD | I LOAD | cover y | | dead load | live load |
|---|---|---|---|---|---|---|---|
| | | KN/m2 | KN/m2 | m | | KN/m' | KN/m' |
| ROOF | dead | **1.2** | | **0.6** | => .6* 1.2= | 0.72 | |
| | live | | **1.00** | **0.6** | => .6*1.00= | | 0.6 |
| 1ST floor | dead | **0.6** | | **0.6** | => .6* .6= | 0.36 | |
| | live | | **1.50** | **0.6** | => .6*1.50= | | 0.9 |
| wall | dead | **2.5** | | **4.4** | => 4.4* 2.5= | 11 | |
| | | | | | **UDL** | **12.08 KN/m'** | **1.5 KN/m'** |

**USE** **203x102x23 UB** **S355** SEE PAGE 59 - 61

**STEEL BEAM** **FB2.07**

Max span = 6.9 m
Cover= 2.6 m

**USE** **203x203x60 UC** **S355** SEE PAGE 62 - 64

**STEEL BEAM** **FB2.08**

Max span = 2.4 m

| **BEAM LOADING** | | D LOAD | I LOAD | cover y | | dead load | live load |
|---|---|---|---|---|---|---|---|
| | | KN/m2 | KN/m2 | m | | KN/m' | KN/m' |
| ROOF | dead | **1.2** | | **3.5** | => 3.5* 1.2= | 4.2 | |
| | live | | **1.00** | **3.5** | => 3.5*1.00= | | 3.5 |
| 1ST floor | dead | **0.6** | | **0.6** | => .6* .6= | 0.36 | |
| | live | | **1.50** | **0.6** | => .6*1.50= | | 0.9 |
| wall | dead | **5** | | **4.4** | => 4.4* 5= | 22 | |
| | | | | | **UDL** | **26.56 KN/m'** | **4.4 KN/m'** |

**USE** **152x152x37 UC** +PLATE **S355** SEE PAGE 65 - 67

go to page 68