MOMENTUM
structural engineers

75 Bayham Street

Approval in Principle
(Bridge and other Highway Structures), Non Eurocodes

9th March 2017 . 2631 Bayham Street RPT Approval in Principle 01

90 Walcot Street . Bath BA1 5BG . 01225 444194
103 Timber Yard . Drysdale Street . London N1 6ND . 020 77396939
www.momentumengineering.com

Background

This document has been prepared for the sole benefit, use and information of W12 Studios and for the purposes set out in the following pages.

The liability of Momentum Consulting Engineers Ltd in respect of the information contained in the document will not extend to any third party.

Author
H Richardson

[redacted]

Checker
A Matthews

[redacted]

Issue History

Rev.	Date	Comments
00	7.2.17	First Issue
1	9.3.17	Revisions to Sections 4.1.1 and 4.4

Contents

1. Highway Details

1.1. Type of Highway

Bayham Street is a two lane, one way road in the Borough of Camden.

The length of road close to the site has permit parking along one side of the road. There is a single yellow line directly outside the site

1.2. Permitted traffic speed

20 mph

1.3. Existing restrictions

None

2. Site details

2.1. Obstacles crossed

None

3. Proposed structure

3.1. Description of structure and working life

75 Bayham Street is an existing terrace property, built in the late 18th Century. The property is roughly L shaped, with the narrower front elevation onto Bayham Street, extending approx 20m from this frontage. The rear is approximately 17m in width, extending behind no's. 73 and 71 Bayham Street. The building was, until recently, used as a Piano factory.

The proposed alterations to the property are intended to convert the space into office use. It is intended to provide a basement around 4m in depth under the entire property, and to re-work the internal spaces and floor levels.

The part of the structure under consideration in this report is the new reinforced concrete retaining wall at the front of the property on Bayham Street. This new RC wall will underpin the existing front wall of the property, including the existing masonry retaining wall to the historic basement of the property.

3.2. Structural type

The existing retaining wall is assumed to be a 400mm thick masonry retaining wall, currently with a masonry corbeled foundation.

The new retaining wall will be a 400mm thick reinforced concrete cantilever retaining wall with 600mm thick reinforced concrete boot tied into the 200mm thick reinforced concrete ground floor slab.

3.3. Foundation type

The new foundation will be the 600mm thick reinforced concrete boot of the retaining wall. This is tied to the 200mm thick reinforced concrete ground floor slab.

3.4. Span arrangements

The new retaining wall runs the full width of the property - 7.311m total

The new retaining wall extends 2.265m in height, from the top of the boot (600mm thick) to the underside of the existing masonry

3.5. Articulation arrangements

The new retaining wall is a cantilever retaining wall.

3.6. Road restraint systems required

None

3.7. Proposed traffic arrangements fro future maintenance and inspection / inspection for assessment

None

3.7.1. Traffic management

None

3.7.2. Arrangements for future maintenance and inspection of structure. Access to structure

None

3.7.3. Intrusive or further investigations proposed

None

3.8. Environment and sustainability

The existing masonry retaining wall is to be retained as much as is feasible

3.9. Durability. Materials and finishes / Material strengths assumed and basis of assumptions

The following materials are to be used in the construction of the retaining wall

- Concrete : RC35 to BS8500-1:2002 or ST4 to BS8500-1:2002
- Reinforcement : To BS 4449, Grade 460

The wall will be lined with a cavity drain system between the RC retaining wall and a masonry lining wall built in concrete block.

3.10. Risks and hazards considered fro design, execution, maintenance and demolition. Consultation with and/or agreement from CDM coordinator

A copy of the designers risk assessment is attached.

3.11. Estimated cost of proposed structure, together with other structural forms considered (including where appropriate proprietary manufactured structure), and the reasons for their rejection (including comparative whole life costs with dates of estimates)

Cantilever retaining walls underpinning the existing masonry were chosen so to maximise the internal floor area of the proposed basement.

A piled option was not considered due to the complexities of piling adjacent to an existing masonry construction, in addition to the potential loss of internal floor area.

3.12. Proposed arrangements for construction

3.12.1. Condition of structure

The existing structure will be underpinned following a typical hit and miss underpinning sequence. The final sequencing is to be confirmed by the contractor once appointed.

3.12.2. Traffic management

None

3.12.3. Service diversions

None

3.12.4. Interface with existing structures

The new RC retaining wall will underpin an existing masonry basement wall. Presently the existing basement has been infilled, it is not know when this was completed.

The two adjacent properties, No. 73 and No 77 Bayham Street, have existing basements at approx 1.34m and 1.5m deep respectively.

3.12.5. Year of construction

The date for the construction of the existing property is unknown, but is assumed to be a Victorian Property. Additionally it is not know when the property was converted from residential to factory use.

The new retaining wall will be constructed in 2017

3.12.6. Reason for assessment

Not applicable

3.12.7. Part of structure to be assessed

Not applicable

4. Design / assessment criteria

4.1. Actions

4.1.1. Permanent actions

Existing pitched roof (35^0 pitch)

Slates, Tiles		= 0.55 kN/m^2
Battens & felt		= 0.05 kN/m^2
Rafters & insulation		= 0.15 kN/m^2
New plasterboard ceiling		= 0.15 kN/m^2
		= 0.90 kN/m^2 on pitch
	Total	**= 1.17 kN/m^2 on plan**

Existing timber floors

Boards and joists		= 0.50 kN/m^2
Allowance for additional soundproofing		= 0.20 kN/m^2
	Total	**= 0.60 kN/m^2**

Masonry walls

400mm thick masonry walls @ 18 kN/m^3		= 7.2 kN/m^2
Allowance for plasterboard finishes		= 0.15 kN/m^2
	Total	**= 7.35 kN/m^2**

Soil properties (from geotechnical report)

Stratum	Bulk Density	Effective Cohesion	Effective Friction Angle
Made Ground	1700 kg/m^3	Zero	Zero
London Clay	1850 kg/m^3	Zero	20^0

[Revision 1]

Hydraulic pressure

No ground water was encountered during the site investigations. However the geotechnical report recommends assuming 1m depth of ground water against the retaining wall.

[Revision 1]

4.1.2. Snow, Wind and Thermal actions

Snow and roof access loads to BS 6399-3

Small roof with no permanent access	= 0.75((60-35)/30)
	= 0.625 kN/m^2 on plan

Wind loads to BS 6399-2

Wind pressure calculated using BREVe wind software;

BREVe32 : An aid to the use of BS6399-2 and EN1991-1-4

Design dynamic pressures in Pa

Provenance

Report generated by BREVe 3.2.1.5, 07/11/2016 14:23:41
TQ291837 BREVe3 site data for TQ291837
Design annual risk = 0.02000
Shelter effect from obstructions is **NOT** included.
Site altitude = 36.0m.
Topographic increment from internal parameters. Range = 500 m
Season length is all year.
Using UK / Irish direction factors.
Basic wind speeds :
BS *Vb* (1 hour) = 20.5 m/s.
EN *Vb*,map (10 min.) = 21.6 m/s.
(EN equiv. 1 hour = 20.3 m/s. Ratio EN/BS = 0.992.)

Site altitude = 36.0m
Probability factor, *Sp* & *Cprob* = 1.000
Seasonal factor, *Ss* & *Cseason* = 1.000

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Dir. fac. *Sd* & *Cdir* :	0.780	0.730	0.730	0.740	0.730	0.800	0.850	0.930	1.000	0.990	0.910	0.820
Topography :												
Crest height (m) :	5.0	26.3	12.5	13.0	10.5	9.0	3.0	10.0	6.0	2.0	1.5	2.5
Site location (m) :	1166.7	1004.8	0.0	200.0	100.0	780.0	1200.0	1160.0	1200.0	1433.3	1440.0	1400.0
Upwind length (m) :	333	752	10000	1300	1400	720	300	400	300	67	60	100
Dnwind length (m) :	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
Base altitude (m) :	31.0	26.0	26.5	25.0	27.0	28.0	33.0	34.0	35.0	36.0	36.0	34.5
Upwind slope :	0.015	0.035	0.001	0.010	0.008	0.013	0.010	0.025	0.020	0.030	0.025	0.025

BS6399-2 Standard Method - Effective gust dynamic pressures

TQ291837 BREVe3 site data for TQ291837
Site is in country, nearest distance to sea = 70.0km.

Height above ground (m)	Design dynamic pressure (Pa)	Size effect factor a=10m	Biggest effective height (m)	Biggest altitude factor *Sa*	Terrain & building factor *Sb*
9.0	736.7	0.948	9.0	1.038	1.629

Therefore design wind pressure **= 0.74 kPa**

4.1.3. Actions relating to normal traffic under AW regulations and C&U regulation

Consider HA loading to BD37/01
Assume loaded length equal to the building width (7.3m), therefore;
W = 336 x $(1/7.3)^{0.67}$
= 88.7 kN/m per notional lane

Consider KEL loading to BD37/01
KEL = 120 kN per notional lane

4.1.4. Actions relating to General Order traffic under STGO regulations

Consider HB loading to DB37/01
General highway therefore consider 30 HB units, therefore 300kN per axle.
To be applied as per BD37/01 Figure 12

4.1.5. Footway or footbridge variable actions

Consider nominal pedestrian live load to DB37/01
Assume loaded length of 7m, therefore
w = 5.0 kN/m^2

4.1.6. Actions relating to special order traffic, provision for exceptional abnormal indivisible loads including location of vehicle tracks on deck cross-sections

None

4.1.7. Accidental actions

Consider accidental wheel loading to BD37/01
Wheel loads of 100 kN and 75 kN to be applied as per BD37/01 Figure 14

4.1.8. Actions during construction

During construction there are no anticipated additional actions. It is not anticipated that any large cranes will be required, nor large piling rigs which will put additional load onto the retaining wall.

4.1.9. Any special action not covered above

None

4.2. Heavy or high load route requirements and arrangements being made to preserve the route, including and provision for future heavier loads or future widening

None

4.3. Minimum headroom provided

Not applicable - no public access

4.4. Authorities consulted and any special conditions required

Camden Council

LB Camden : The horizontal deflection of the wall at road/footpath level should be less than 25mm.
[Revision 1]

4.5. Standards and documents listed in the Technical Approval Schedule

Where appropriate the following codes of practice have been used;

- Weights of materials BS 648
- Imposed loading on structures BS 6369
- Use of masonry BS 5628
- Structural use of steelwork BS 5950
- Structural use of concrete BS 8110
- Loading for Highways BD 37

4.6. Proposed Departures relating to departures from standards given in 4.5

None

4.7. Proposed Departures relating to methods for dealing with aspects no covered by standards in 4.5

None

5. Structural analysis

5.1. Methods of analysis proposed for superstructure, substructure and foundations

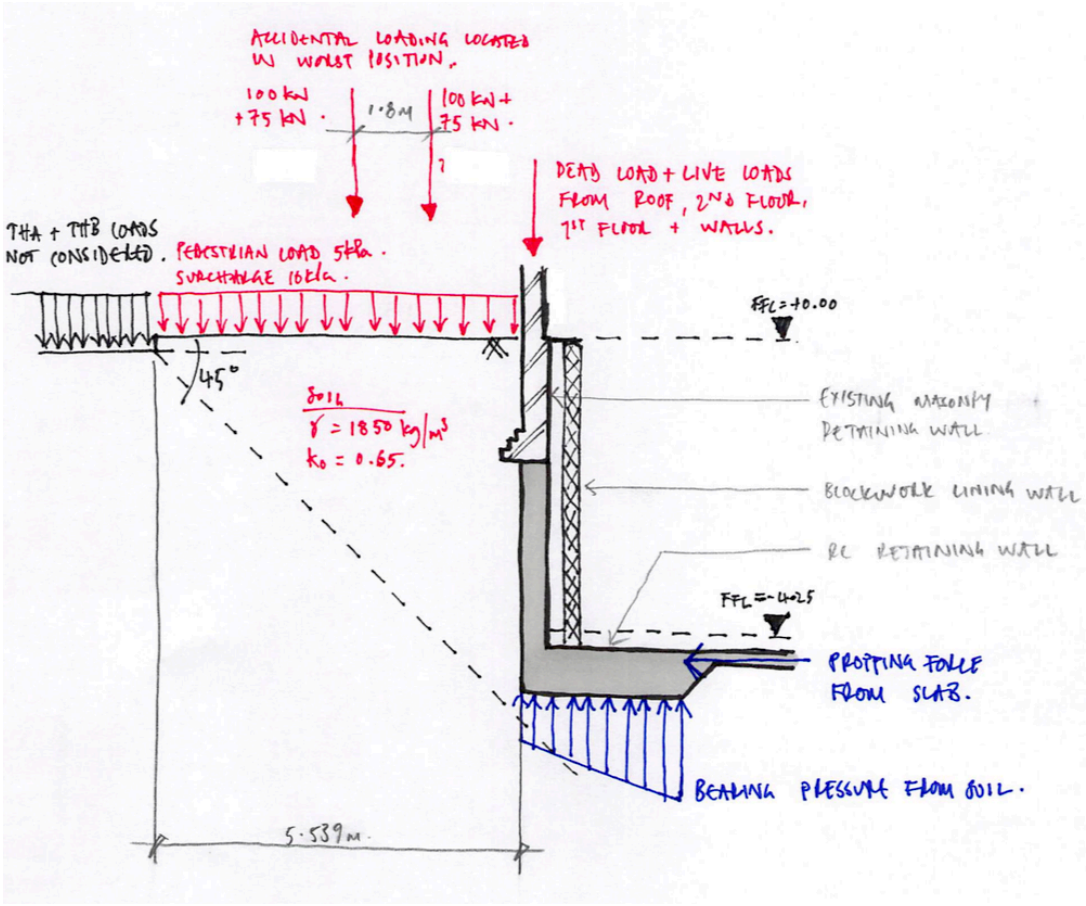
Retaining wall to be analysed using Tedds 2014 analysis software by CSC (UK) Ltd.

Software solution will be confirmed using separate hand calculations.

5.2. Description and diagram of idealised structure to be used for analysis

The diagram below shows the position of the applied loads and resistance loads on the idealised retaining wall structure. This will be analysed for a 1.0m length strip of the wall.

Note: THA and THB loads to the roadway will not be considered as the 45 degree line of regression passes under the corner of the proposed retaining wall, as indicated in the diagram below.



5.3. Assumptions intended for calculations of structural element stiffness

The following materials are to be used in the construction of the retaining wall

- Concrete : RC35 to BS8500-1:2002 or ST4 to BS8500-1:2002
- Reinforcement : To BS 4449, Grade 460

5.4. Proposed range of soil parameters to be used in the design / assessment of earth retaining structures

From the geotechnical report the following soil parameters are provided;

Stratum	Bulk Density	Effective Cohesion	Effective Friction Angle
Made Ground	1700 kg/m^3	Zero	Zero
London Clay	1850 kg/m^3	Zero	20^0

As recommended by the geotechnical report in order to limit lateral deflections a Ko condition will be considered;
Ko = 1 - sin (ϕ) = 0.65

The allowable bearing pressure, from the geotechnical report has been taken as 150 kPa.

6. Geotechnical conditions

6.1. Acceptance of recommendations of the Geotechnical Design report to be used in the design/ assessment and reasons for any proposed changes

A geotechnical assessment has been carried out by LBH Wembley dated September 2016.

This report has been read and the advice accepted int he design of the retaining walls.

6.2. Summary of design for highway structure in Geotechnical Design Report

The geotechnical report is based on five trial pits and three window sample boreholes taken on site during February 2015. These have shown that the soil consists of made ground to a depth of around 0.9m, and London Clay below to a depth beyond the 5.0m depth of the boreholes.

The geotechnical report provides the following soil parameters;

Stratum	Bulk Density	Effective Cohesion	Effective Friction Angle
Made Ground	1700 kg/m^3	Zero	Zero
London Clay	1850 kg/m^3	Zero	20^0

The geotechnical report recommends in order to limit lateral deflections a Ko condition be considered;
Ko = 1 - sin (ϕ) = 0.65

The allowable bearing pressure has been gives as 150 kPa.

6.3. Differential settlement to be allowed for in the design/assessment of the structure

The geotechnical report suggests that a maximum of 15mm heave is predicted to occur at the centre of the site. This will not affect the retaining wall in question and is to be addressed by providing a Cellcore HSX heave protection system beneath the ground floor slab.

6.4. If the Geotechnical Design Report is not yet available, state when the results are expected and list the sources of information used to justify the preliminary choice of foundations

Not applicable - geotechnical received and accepted at time of writing AIP

7. Check

7.1. Proposed Category

Category 2

7.2. If Category 3, name of proposed independent checker

Not applicable

7.3. Erection proposals or temporary works for which Type S and P Proposals will be required listing structural parts of the permanent structure affected with reasons

Not applicable

8. Drawings and Documents

8.1. List of drawings (including numbers) and documents accompanying the submission

The following drawings are provided in the ZIP folder '2631 Bayham Street ZIP Approval in principle Supporting documents' accompanying this document

Innes Associates drawings;

- 107 02 00 [Ground Floor Plan] Ground Floor Plan
- 107 02 001 [Basement Floor Plan] Basement Floor Plan
- 107 03 01 Section AA
- 107 03 01 EX Existing/Demolition Section BB
- 107 03 02 Section B
- 107 13 03 Entrance Glazed Screen and Door

Momentum Engineering drawings

- 2631-200-5 Basement level GA
- 2631-201-7 Ground floor GA

8.2. List of construction and record drawings (including numbers) to be used in the assessment

None

8.3. List of pile driving or other construction reports

None

8.4. List of previous inspection and assessment reports

None

9. The above is submitted for acceptance

We confirm that details of the temporary works design will be passed the permanent works Designer for review

Signed _____

Name _____

Engineering Qualifications _____

Name of Organisation _____

Date _____

10. The above is rejected / agreed subject to the amendments and conditions shown below

Signed _____

Name _____

Position held _____

Engineering Qualifications _____

TAA _____

Date _____