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MMP DESIGN

Consulting Civil and Structural Engineers

IStructE

Date: 17th December 2008

Planning Department
London Borough of Camden
Town Hall
Argyle Street
London **WC1H 8ND**

Dear Sirs,

RE: 10 LINDFIELD GARDENS, NW3 - PROPOSED BASEMENT EXTENSION

As Structural Engineers on the above project, we have been asked by The London Basement Company to assist with clarifying the design philosophy in relation to the proposed basement.

Clearly no detailed design is carried out on such schemes as this until planning approval is obtained so I am unable to provide structural details for this particular job. However, The London Basement Company have constructed numerous basements similar to this including a number within your own Borough, and MMP Design have been their appointed Structural Engineers on more than 450 basement schemes to date.

In the absence of the detailed design, I have therefore prepared a simple design brief and a copy is attached.

I trust you find this of some use but if you should have any queries or require additional information, please do not hesitate to contact me.

Yours sincerely,

S. R. MASTERS.

B.Sc(Hons).,C.Eng.,M.I.Struct.E.,M.B.Eng..

cc. T. Foulsham - TLBC

BASEMENT EXTENSION AND/OR ALTERATION

DESIGN PHILOSOPHY

Ground Floor Structure

Where the existing internal below ground floor level load bearing structure is to be removed, replacement will be by the use of steel and/or timber beams supported by the existing load bearing walls or new load bearing brick piers and/or steel posts.

To ensure the continued stability of the structure without reliance from the adjoining properties, the existing and any new load bearing basement walls are strapped to the structural ground floor deck using 30mm x 5mm galvanised mild steel straps placed at 2m centres. Where the ground floor joists are parallel to the walls, the straps are fixed to not less than 3 joists and solid timber noggins are fixed between the joists at the strap position, also between the wall and the first joist. Where the ground floor is concrete, the straps are fixed to the underside.

New beams are not considered 'restrained' unless there is a mechanical connection to the top flange (or within 75mm of it). Hence timber floor joists do not restrain the compression flange unless they are notched into the web or nailed/screwed to a timber flange plate.

In order to restrict any possible damage to the existing structure, the deflection in the new beams is restricted to $1/360^{th}$ of the overall span, under the total characteristic load condition.

Basement

The remaining load bearing structure will be underpinned in a traditional 'hit and miss' method to achieve the increased headroom required. The underpins comprise a vertical stem which is immediately beneath the existing wall and a base which usually has a toe and a nominal heel. The heel size is determined by ignoring the earth pressure and considering the maximum vertical load on the wall only, using this to find a minimum foundation width based on the soil bearing capacity.

The toe of the base is then determined by considering the minimum vertical dead load on the wall along with the maximum pressure from the retained soil and with the wall assumed to be acting as a cantilever. In calculating the toe size, the maximum allowable bearing pressure is not exceeded and a minimum factor of safety against overturning of 2.5 is achieved.

The toe and/or stem will only be reinforced when the underpin stem is subjected to tensile stresses due to the pressures from the retained material. This usually only occurs where the London Clays are present or where the retained depth of soil is large.

To check the stresses in the underpin stem, the overturning moment taken about the basement slab is used. However, the design of the toe and the overall stability is based on the overturning moment taken about the underside of the underpin base.

Lightwell

These are invariably formed within the front garden of the property and are therefore adjacent to the public highway. Consequently surcharge loads are considered and are taken as either of the following, whichever produces the more onerous design conditions.

a... a uniformly distributed load of 2.5 kN/m^2, applied from within the garden and assuming private vehicle parking is possible,

b... a uniformly distributed load of 10 kN/m^2, applied from the highway and/or footpath,

c... a point load of 40 kN (a typical wheel load), applied over an area 0.3m x 0.3m and assumed to act at a point 0.6m from the property boundary, out toward the highway.

The lightwell walls comprise a vertical stem and a base with a toe and occasionally a heel. The stem utilises concrete blockwork only as a permanent shutter but in doing this it naturally provides additional resistance to the compressive forces generated. Nevertheless, the reinforced concrete wall behind provides all of the necessary resistance to the applied overturning forces and is cast against the soil. The size of the base toe is determined by considering only the self-weight of the wall along with the maximum pressure from the retained soil and any surcharge. In calculating the toe size, the maximum allowable bearing pressure is not exceeded and a minimum factor of safety against overturning of 1.5 is achieved. Since the base is usually cast up against the front wall of the basement, the design of the toe and the overall stability is based on the overturning moment taken about the top of the wall base.

DESIGN CRITERIA

Soil Parameters

Sandy gravel: $\phi = 40°$, hence $K_a = 0.217$
$\delta = 19$ kN/m^3 and basic bearing stress = 125kN/m^2
Hence allowable bearing stress = 125 + (weight of soil removed), say 150kN/m^2

London Clay: $\phi = 30°$, hence $K_a = 0.333$
$\delta = 18$ kN/m^3 and basic bearing stress = 100kN/m^2
Hence allowable bearing stress = 100 + (weight of soil removed), say 125kN/m^2

Existing Brickwork

Assuming 7N bricks in lime mortar, from CP.111, basic compressive strength = 0.49N/mm^2
Hence under a concentrated load, bearing strength = 1.5 x 0.49, say 0.7N/mm^2

Typical Underpinning Sequence

6	1	4	7	2	5	8	3	6	1	4	7

General

Concrete is grade C35 N/mm^2 and Class 1 to BRE Digest 363.
Reinforcement is grade 460 N/mm^2 Mortar is Class (iii).