Basement Impact Assessment

4 Wedderburn Road

November 2014

Job no. 1220

HEYNE | TILLETT | STEEL
STRUCTURAL ENGINEERS

www.hts.uk.com

Contents

1.0 Introduction:

1.1 Heyne Tillett Steel Limited has been asked by Stiff + Trevillion Architects on behalf of Dominic and Amanda Shorthouse, the building's owner and client, to consider the construction aspects and impact of the proposed subterranean development, in support of a planning application to the London Borough of Camden (LBC). The refurbishment of the existing building includes the excavation of a new basement and the reconstruction of the existing rear extension.

1.2 This Basement Impact Assessment (BIA) has been prepared by Heyne Tillett Steel in combination with GEA and in line with the Camden Planning Guidance CPG4 – Basement and Lightwells along with section DP27. Basement and Lightwells of Camden's Development Policies 2010 and supplementary reference documentation within these documents. The report provides specific details of each stage of the basement impact process as well as information on the excavation, temporary works and construction techniques, including details of the potential impact of the subterranean development on the existing and neighbouring structures, based on the specific site characteristics, geology and hydrogeology.

1.3 In support of the BIA, a Geotechnical Report has been conducted by Geotechnical and Environment Associates Ltd (GEA), available in Appendix D. GEA's report considers the geotechnical, hydrological and hydrogeological aspects of the structural scheme. It also summarises the 5 stages required for any BIA within Camden, these being Screening,Scoping Points Raised, Site Investigation and Study and Basement Impact Assessment.

1.4 This structural engineering and geotechnical report has been organised in a format and sequence which best addresses the engineering matters being discussed. This format is best presented to follow the previously highlighted 5 stages of any BIA in Camden. A summary of each stage is given below including where each stage is dealt with.

Camden CPG4 Stage	**Response and/or Reference Location**
1. Screening *1.1. Subterranean Screening Assessment* *1.2. Stability Screening Assessment* *1.3. Surface Flow and Flooding Screening Assessment*	 *GEA Report Section 3.1.1* *GEA Report Section 3.1.2* *GEA Report Section 3.1.3*
2.0 Scoping	*Summary of Potential Impacts provided with GEA Report Section 4.1 and investigation of these potential impacts detailed in GEA Report Section 9.0*
3.0 Site Investigation and Study	*GEA Report Section 4.0*
4.0 Impact Assessment	*GEA Report Section 9.0 and Sections 6-8 of HTS Report*
5.0 Review and Decision Making	*Audit Review Undertaken by LB Camden*

1.5 The remainder of this document will discuss the existing conditions on site along with proposals in line with GEA report and includes the previous highlighted sections above.

2.0 Existing Conditions

2.1 The Site

The site of approximately 65m x 12m on plan is located within the London Borough of Camden and fronts onto Wedderburn Road. This road houses a number of large scale residential properties of generally 4 storeys, the majority of which appear to have existing basements. Access to Wedderburn Road is provided at each end by the minor roads of Lyndhurst Gardens and Akenside Road which lead to the major roads of the B511, Fitzjohns Avenue and the A502, Rosslyn Hill respectively.

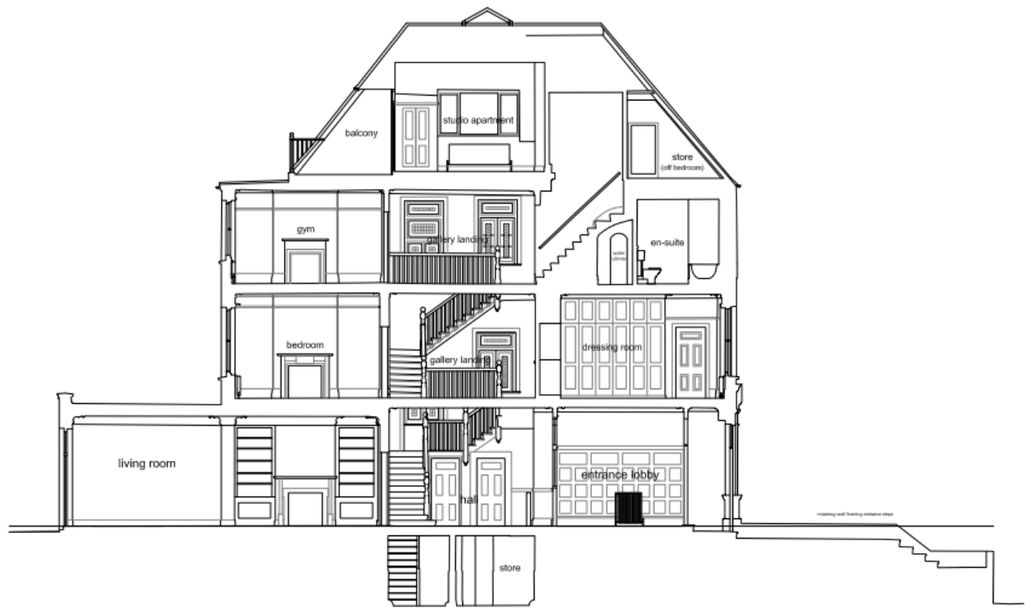
Much of the site is taken up by the garden space although 20% of the site is occupied by the footprint on the only existing building on site. Within the garden space a number of trees are noted, as a further addendum to the main planning documentation, an arboricultural report will be produced to discuss the impact of the scheme on these trees.

2.2 Existing Buildings

The site contains a single semi-detached property, No4 Wedderburn Road, which is a 4 storey house with partial basement. It also includes a large rear garden and smaller front garden containing a car-port. The adjoining property to No 4 is No6 which appears to mirror the property about the party wall. No 2 is detached and is separated by a small passage which provides access into the rear garden on No4.

The building is structured traditionally, with load bearing solid brickwork and spine walls supporting timber joists. The lateral stability of the building is provided by the main external walls and internal spine walls in combination with the diaphragm action of the floors. Generally the building appears to be in a sound structural condition, this is based on visual impaction only.

Site Location



Existing Building Section

2.3 Existing Ground Conditions

2.3.1 Site Investigations

A borehole has been carried out in the front carport to assess the existing subsoil conditions and a standpipe was installed to gauge the depth of water level (Borehole logs are contained within the GEA Report in Appendix A. A summary of the borehole below indicates that the subsoil comprises differing lenses of strata over the London clay as follows:

0.0	-	0.2	of Tarmac Surface Overlying Concrete,
0.2	-	0.4m	of Made Ground,
0.4	-	2.45m	of Stiff silty sandy clay,
2.45	-	4.00m	of Firm Silty Sandy Clay,
4.0	-	5.00m	of Firm Silty Clay with parting of fine sand and Silt
5.0	-	20+m	of Firm becoming Stiff clay with rare parting of sand and silt

Also within the rear of the property window sampling to a depth of 7m was yesterday to establish a ground profile within this area. The limited access to this area meant a window sampling rig could only be used hence the 7m depth.

Trial pits to the interior of the house as well as along the boundary will be conducted to ascertain the true depths of the existing foundations to allow a better understanding foundations and ground conditions.

GEA Geotechnical & Environmental Associates
Tyttenhanger House, Coursers Road, St Albans, AL4 0PG

Boring Method: Cable Percussion	**Casing Diameter**: 150mm cased to 2.00m	**Ground Level (mTBM)**: 97.77	**Site**: 4 Wedderburn Road, London, NW3 5QE
	Location	**Dates**: 10/10/2014	**Client**: Amanda Shorthouse
			Engineer: Heyne Tillett Steel

Borehole Number: BH1
Job Number: J14267
Sheet: 1/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mTBM)	Depth (m) (Thickness)	Description	Legend	Water
					97.57	(0.20) 0.20	Tarmac surface overlying concrete		
0.30	D1				97.37	(0.20) 0.40	MADE GROUND (grey clay with fine rootlets and fragments of concrete and brick)		
0.50	B2						'Stiff' high strength orange-brown mottled grey silty sandy CLAY. Roots and carbonaceous material noted to a depth of 1.75 m. Suspected desiccated soil to a depth of about 2.45 m		
1.20-1.65	SPT(C) N=9			3,1/2,2,2,3					
1.20	D3					(2.05)			
1.75	D4								
2.00-2.45	U5			23 blows					
					95.32	2.45	Firm orange-brown mottled grey silty sandy CLAY		
2.75	D6								
3.00-3.45	SPT N=13			1,2/3,3,3,4					
3.00	D7					(1.55)			
3.75	D8								
4.00-4.45	U9			28 blows	93.77	4.00	Firm brown mottled grey silty fissured clay with occasional partings of orange-brown fine sand and silt		
4.50	D10					(1.00)			
5.00	D11			Water strike(1) at 5.00m.	92.77	5.00	Firm becoming stiff fissured medium strength and high strength grey silty clay with rare partings of grey fine sand and silt and rare shell fragments		▽1
5.00-5.45	SPT N=15			1,2/3,4,4,4					
6.00	D12								
6.50-6.95	U13			35 blows					
7.50	D14								
8.00	D15			Water strike(2) at 8.00m.					▽2
8.00-8.45	SPT N=16			2,3/3,4,4,5					
9.00	D16								
9.50-9.95	U17			35 blows					

Remarks
Hand-dug trial pit to a depth of 1.20 m
One hour spent demobilising rig
One hour spent setting up rig
Standpipe installed to a depth of 10.00 m
Groundwater measured at a depth of 1.12 m on 29/10/2014
Car parked over standpipe on 10/11/2014

Scale (approx): 1:50
Logged By: HD
Figure No.: j14267.BH1

Borehole Log from GEA Report

2.4 Existing Foundations

At this stage no investigations have been undertaken to determine the existing foundations of the property. It is expected that the load bearing masonry walls will be supported on corbelled footings with a mass concrete base beneath them. This is likely to be founded within the clay layer of the ground strata. Due to the existing partial basement it is expected that footing depths with the deepest being found within the basement area.

2.4.1 Party Wall with No.6 Wedderburn Road

The party wall with No.6 Wedderburn Road is expected to contain the same footing as described above. From searches of both the Planning and Building Control records there appears to be no records that indicate the adjoining property has been underpinned or alternated in any way that would vary the foundations party walls foundation.

2.5 Existing Drainage

Based on the information contained within the Thames Water Asset Search, included within Appendix E, the existing foul and surface water drainage from the site is discharged into the existing combined sewer at the front of the building and this runs from east to west towards Akenside Road.

It is unknown if the foul and surface as separate within the site until the last manhole but this will be investigated as part of CCTV survey for the building. This survey will also confirm whether the assumption that the existing surface and foul is taken out at high level basement and not pumped from this lower basement level. This assumption is based on the visual inspection of the existing basement which appeared to contain no pump equipment or manholes.

Thames Water Asset Search – Main Report Included in Appendix E

2.6 Existing Hydrogeology and Hydrogeology

GEA have carried an assessment of the existing hydrogeology which is summarised as follows

The Claygate Member is classified by the Environment Agency as a Secondary 'A' Aquifer, which refers to permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. In the absence of significant sand horizons the Claygate Member is not capable of storing and transmitting water in usable amounts and receives very low levels of annual recharge due to very low permeability. Under the same classification system the London Clay is designated as unproductive strata, which refers to deposits that have low permeability and negligible significance for water supply or river base flow.

There are no Environment Agency designated Groundwater Source Protection Zones (SPZs) on the site and there are no listed water abstraction points within 500 m of the site.

The nearest surface water feature is the Hampstead Heath chain of ponds located 655 m northeast of the site.

A number of spring lines issue on Hampstead Heath at the interface of the Bagshot Beds and the Claygate Member, and to a lesser extent at the boundary between the Claygate Member and the underlying essentially impermeable London Clay. These springs have been the source of a number of London's "lost" rivers, notably the Fleet, Westbourne and Tyburn, which all rose on Hampstead Heath at the base of the Bagshot Beds. There are no known documented springs on the site.

A search of Camden's online planning records did not find any planning applications relating to No 4 Wedderburn Road between 1926 and present, apart from relating to trees on the site.

Historically the Tyburn River[4] rose approximately 200 m west of the site, under what is now No 41 Lyndhurst Road. It is shown on the map dated 1871 rising from a small pond near to what is annotated as Shepherd's Well / Conduit Wells, although is no longer shown on maps dated after 1896, after the construction of Fitzjohn's Avenue. As shown by the adjacent map, the stream flowed in a southerly direction, where it merged with another tributary, issuing to the southeast of site, just north of Regent's Park where it flowed into a large lake that is still present today. From there the river then flowed through central London and into the Thames, although due to the fact that the Tyburn was only a small stream, the exact course of the lower part of the river is relatively known.

Given the location of the source of the Tyburn, it is likely that it was formed by a spring issuing from within the Claygate Beds close to the boundary with the London Clay, which is located approximately 50 m to the south of the source. Therefore groundwater in the area would most likely to have been flowing to the source of the Tyburn, directly west of the site. The direction of groundwater flow within the Claygate Member beneath the site is likely to be controlled by the local topography and is therefore likely to be in a southerly direction, in the direction that the former river flowed. Water infiltrating the underlying London Clay will generally tend to flow vertically downwards at a very slow rate towards the lower chalk aquifer.

Due to the predominantly cohesive nature of the soils, the groundwater flow rate is unlikely to be particularly high. Information provided in the Envirocheck report indicates that the permeability of the Claygate Member may range from "very low" to "high". Published data for the permeability of the London Clay indicates the horizontal permeability to generally range between 1 x 10-10 m/s and 1 x 10-8 m/s, with an even lower vertical permeability.

The site is not at risk of flooding from rivers or sea, as defined by the Environment Agency; Wedderburn Road has not been identified as a street at risk of surface water flooding, specified in the London Borough of Camden (LBC) Planning Guidance CPG4 and therefore a flood risk assessment will not be required.

3.0 Basement Impact: Stage 1 Screening

The LB of Camden guidance suggests that any development that includes a basement should be screened to determine whether or not a full Basement Impact Assessment (BIA) required.

A screening assessment toolkit is included in the Arup document and for the basis of section 3.0 of GEA Report. This forms the basis of the next 3 stages of any BIA and continues accordingly.

4.0 Basement Impact: Stage 2 Scoping /Stage 3 SI and Study

4.1 As noted within Section 4.1 of the GEA Report there are a number of scoping points that have a potential impacts and require further assessment by site investigation.

4.2 GEA have provided the design of the site investigation to correctly assess these scoping points and have concluded each point within section 9.0

4.3 To summarise both of these stages a table containing the potential impacts, consequence and conclusion of the site investigation is summarised below.

Potential Impact	***Consequence***	***Site Investigation Conclusion***
Seasonal shrink-swell can result in foundation movements	*If a new basement is not dug to below the depth likely to be affect by tree roots this could lead to damaging differential between the subject site and adjoining properties.*	*Plasticity index tests indicate the Claygate Member to be of moderate and high volume change potential at the site and the London Clay has been confirmed to be of high volume change potential. Shrinkable clay is present within a depth that can be affected by tree roots. The proposed 4.00m and 6.00m deep basements are however likely to extend well below the potential depth of root action,but this should be confirmed once proposals have been finalised*
Increase in areas of hardstanding	*Less surface cover for surface water infiltration.The Claygate Member are of relatively low permeability so it will not make much difference. It is understood that attenuation is proposed to store the increase amount of water.*	*The proposed development for the site will marginally increase the amount of hard-standing and paved areas.*
The site may be located within 100m of former pond/springline.	*This may affect flow to former springlin.*	*Groundwater was encountered during drilling at a depth of about 5.00m in the rear garden from within the Claygate Member.*
Site within 5m of a highway or pedestrian right of way.	*Excavation of a basement may result in structural damage to the road or footway.*	*The site fronts onto Wedderburn Road,but the proposed basement is set back from the road.In any case, a retention system will be adopted that maintains the stability of the excavation at all times.*
Founding depths relative to neighbours.	*If not designed and constructed appropriately, the excavation of a basement may result in structural damage to neighbouring buildings and structures.*	*The house is semi-detached and the existing foundations will need to be underpinned to ensure the stability of the house and neighbouring adjoining house.The retention system will ensure the stability of the excavation and neighbouring properties at all times.*
Trees will be felled as part of the proposals.	*Heave of the clay soils may result in the structural damage to the buildings.*	*Removal of trees may result in long term swelling of clay. Foundations should however bypass the zone affected by tree root activity. An arboriculturist should be consulted for advice.*
The site is located above a Secondary 'A' Aquifer as designated by the EA	*The proposed basement level may be below monitored water levels, but there will not be a consistent "water table" in the clay.*	*The basement is likely to encounter water during excavation, however, the Claygate Member and London Clay beneath the site are characterised by a very low permeability and cannot store or transmit significant quantities of groundwater. It is not considered that the proposed basement would result in a significant change to the groundwater flow regime in the vicinity of the proposal.*
The proposed basement may extend beneath the water table.		*Monitored water levels in the standpipes have been measured between 1.12m and 2.05m (99.92 m TBM and 95.67 m TBM) and groundwater inflows are likely to be encountered within the 4.0 m and 6.0 m deep basement excavations. This will be allowed for within the design. The 4.00m deep basement is wholly within the Claygate Member. On the basis of the findings from the site investigation the 6.00 m deep basement will have a formation level near the base of the Claygate Member and may extend into the London Clay.*

5.0 Basement Impact: Stage 4 Impact Assessment

5.1 BIA Conclusion

As noted in Section 9.1 on the report the conclusions of the GEA BIA is as follows:

A Basement Impact Assessment has been carried out following the information and guidance published by the London Borough of Camden. Information from a Site Investigation gas been used to assess potential impacts identified by the screening process.

It is concluded that the proposed development is unlikely to result in the any specific land or slope stability issues, groundwater or surface water issues.

6.0 Proposed Works

6.1 Proposed Development - (structural drawings included in Appendix C)

The proposed structural works are described in detail on the HTS drawings, in Appendix C, and are summarised as follows. The proposed scheme involves the installation of a single storey basement under the entire footprint of the existing building and large extent of the rear garden space. Where the current basement exists, this will be deepened to the new proposed level of the basement. At ground floor level an existing single storey extension will be rebuilt over similar footprint and existing single storey rear bay structure will also be rebuilt. Each of these structures will be built off the new rear garden basement structure. Within upper floors of the existing house a number of load bearing walls will be removed and will require the resupporting of the existing structure in these locations. Existing chimney breasts will also be removed.

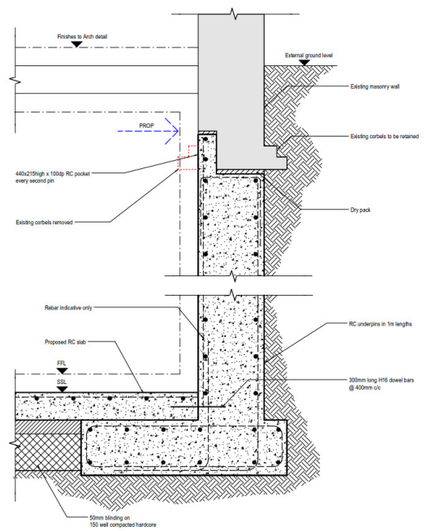
6.2 Proposed Substructure

The new basement structures can be separated into two different types based on their location. Each area will require a different substructure as described below:

6.2.1 Basement within footprint of Existing Building (including Proposed lightwell) – Reinforced Concrete Underpinning

The walls of the basement within the footprint of the existing will be constructed using reinforced concrete underpinning to the depth of the proposed depth of circa 4m.

Where existing basement walls exists, the height of the proposed pins will be reduced to circa 1.7m. A typical detail of the full height pin is shown in section below and included in Appendix C.



TYPICAL SECTION THROUGH EXTERNAL WALL UNDERPINS SHOWING KEY DETAIL BETWEEN RC & EXISTING MASONRY

1 : 10

Typical RC Underpin Section

6.21 continued…

The allowable bearing pressure at the base of the underpinned walls will be in the region of 120kN/m^2 within the Claygate Member at the firm silty sandy clay gravel layer as noted by the geotechnical report (available in Appendix D).

The sequence of the underpinning is to be undertaken inline with Figure 19 from the Arup guide Camden Geological, Hydrogeological and Hydrological Study. In the formation of the proposed lightwell areas to the front of the building this 1-3-5-2-4 sequence will be repeated to form the permanent retaining walls but without the limitation of maintain the existing wall lines above. The traditional method of forming RC retaining walls cannot be undertaken in this area due to the local party walls and existing public bridleway.

In terms of waterproofing this basement, a cost exercise will the run to determine the most cost efficient first layer of waterproofing with the current proposals either upgrading the current reinforced concrete with water resisting concrete (WRC) or externally tanking the RC pins between the back/external face of the pins and adjacent ground. The internal face of the RC pins will be lined with a drained cavity to provide a second layer of waterproofing as required for residential use.

The internal basement slab to the footprint of the house will be designed as a two way spanning ground bearing slab and for the requirements of heave as well as the determined hydrostatic pressures associated with the confirmed water level. It is assumed that tying in of the slab to the RC underpins is required at this stage.

The waterproofing of the slab will again be either WRC or externally tanked, while the internal drained cavity will continue across the floor space and be picked up at localised gullies and chambers and pumped to high level.

The design of the RC pins local to the Party Wall with No6 Wedderburn Road has been designed to limit any damage to Damage Category 1 – Very Slight in line with C580 Stage damage assessment. This calculation is included in the Appendix F.

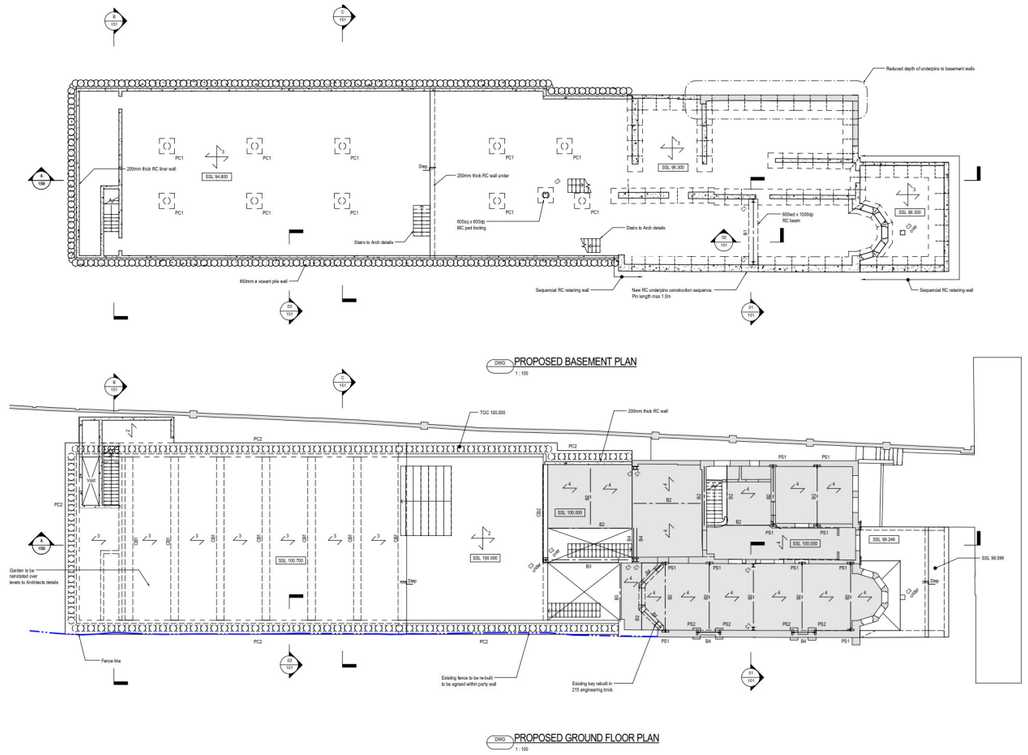
6.2.2 Basement within garden area – Secant Piled Walls

Within the garden area where there is less restriction on space and existing structure a secant (interlocking) piled wall is proposed to act as both the permanent and temporary retaining walls of the basement, it will also restrict any flow of water into the excavation during the construction.

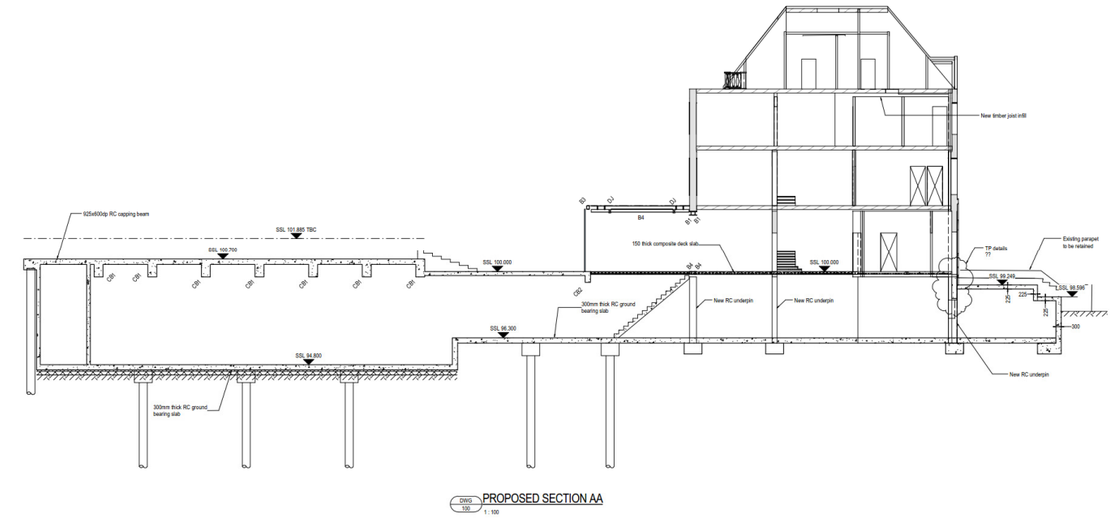
The design of the wall is ultimately a contractor designed portion but will be designed based on the soil properties noted within GEA report and additional loading requirements specified by HTS. It will designed to limit any settlement/deflection to suitable limits and where local to party walls designed to ensure any damage to the party wall is limited an agreed limit with the Party Wall Surveyor. This is assumed to be Damage Catergory 1 – Very Slight in line with Ciria C580 Stage 2.

Inboard of the secant piled wall WRC will be used to create the liner wall and also act a support for the RC beams which span with full width of the proposed basement. The RC beams are sized to support the suspended RC slab spanning between them as well as the reinstated earth above this slab.

The basement slab is designed to accommodate the heave pressures associated with the relief of overburden and hydrostatic uplift due to the water level. These upwards forces will be transferred into the secant piled wall. The predicted rise in groundwater levels during the design life of the structure has been taken into account in the design and it has been deemed necessary to provide internal tension piles to resist these forces.



Proposed Basement and Ground Levels



Typical Basement Section

6.3 Proposed Superstructure

The works to the superstructure are generally limited to the rebuilding of the single storey extension and bay structures with removal of a main internal loading walls perpendicular to the party wall. As the underpinning of the existing walls to form the basement will require the removal of the existing floor structure this will also be replaced as part of the superstructure works.

The new rear extension will comprise a steel frame with timber infill roof. This will be supported off a new steelwork frame at ground floor level, this steel frame will be run throughout the reinstated ground floor and will be constructed using ultra shallow floor beams USFB and metal deck infilled with concrete. In the permanent condition this new deck will act a prop to the basement retaining walls but sufficient propping will be required in the temporary case.

As the main internal wall perpendicular to the party wall will be providing horizontally restraint to this wall, a new steel box frame is to be introduced in it places. This will provide the necessary vertical support for the retained upper floors as well reinstate the horizontal restraint that the original wall provided.

6.4 Stability

Lateral stability of the building is generally provided by the timber floor diaphragms transferring lateral loads into the comprehensive masonry shear walls, their foundations and in turn into the underlying soil. As the ground floor is to be removed this new deck is required to maintain this composite action and will be designed accordingly. Longitudinal stability is provided by the masonry flank walls including the party wall with No 6 while transverse stability is provided by the front and rear facades which are retained and also the new box frame internally which is replacing the spine wall removed as part of the proposed superstructure works.

6.5 Disproportionate Collapse

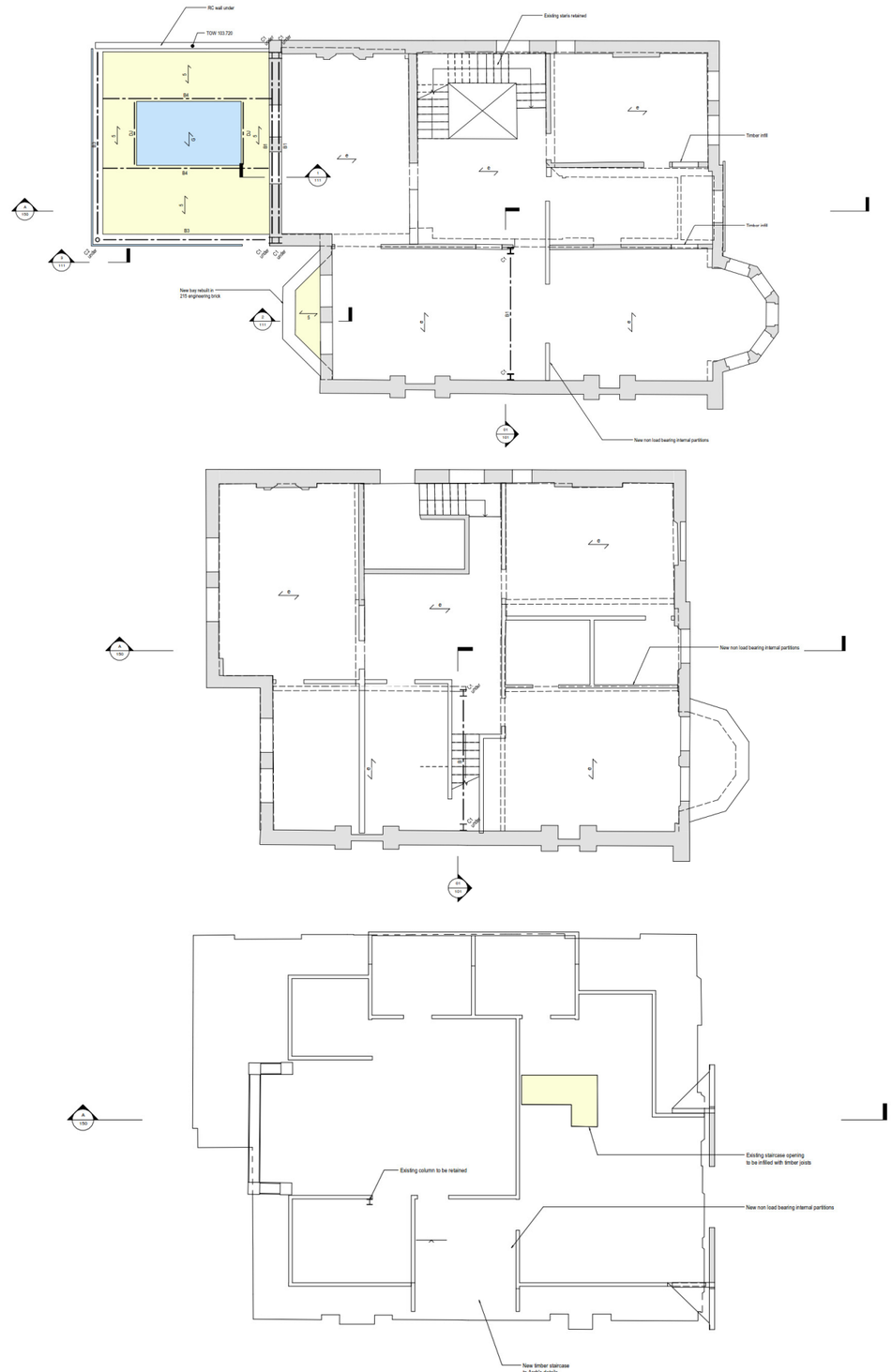
The existing building is a class 2B building under section A3 of the building regulations. However there is no requirement to apply section A3 to the original building retrospectively unless it is altered. The alteration works to the building below ground may be disregarded as the reinforced concrete frame is designed to be sufficiently robust. Where the steel frame is adopted to replace the ground floor structure and new single storey extension this will be designed with sufficient ties and robustness to meet the requirements of a Class 2B building.

6.6 Hydrogeology - assessment of the impact on groundwater flows

The assessment of the hydrogeology is covered in GEA's report and is summarised as follows.

Previous investigations have indicated that the Claygate Member has very low bulk hydraulic permeability. Movement of groundwater within the silty sandy clay of the Claygate Member is very slow. The Claygate Member receives very low levels of annual recharge due to its lowly permeable nature and this stratum is not capable of supporting flow to any watercourses within 100 m of the site. On the basis of the above, the proposed basement would not affect the amount of annual recharge into the Claygate Member (as it is naturally very limited) and it would not result in a significant change to the groundwater flow regime in the vicinity of the proposal.

Shallow monitored groundwater levels within standpipes is a common feature of low permeability clay strata and is not necessarily indicative of a consistent water table as would be the case within a permeable water bearing strata. Thus, although the basement may extend below the monitored water levels in standpipes it is not the case that it extends below a general groundwater table.



First Second and Third Floor Plans

7.0 Temporary Works & Sequence of Construction

The proposed construction sequence is adopted on the basis that sufficient groundwater control can be introduced to allow the underpinning to be adopted within the footprint of the existing building. Adequate investigation and testing will be undertaken to ensure this is possible but should this not be deemed adequate to allow underpinning prior to piling a supplementary sequence is provided in summary in Section 7.6.

7.1 Site Set Up

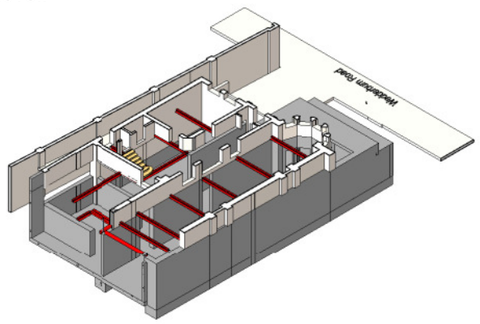
- It is noted that LB Camden require the contractor and subcontractors to be members of the Considerate Contractors Scheme. If approved this will be a condition of all the tendering contractors and sub-contractors for the projects.
- Access is only available from Wedderburn Road so it is assumed that all deliveries, removals and access for operatives will be made from here, this is further explained within the Construction Management Traffic Plan include within Appendix H.
- Terminate and divert existing services as required.
- Site hoarding will be constructed along the pavement boundary to provide protection from passers-by. The hoarding will also be required locally along the front and rear garden wall lines to protect the boundary walls.

7.2 Demolition of Rear Extension and Existing Ground Floor Structure with Initial Temporary Works

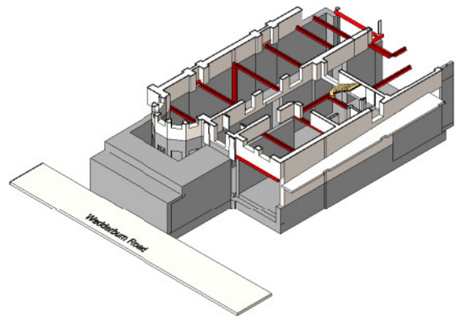
- Commence demolition works to existing rear extension.
- Remove existing suspend timber ground floor structure and internal sleeper wall structures.
- Undertake reduced level to expose the corbel
- High level steels installed at first floor to allow removal of ground floor walls that don't require underpinning.

7.3 Underpinning of Basement within Existing footprint

- All excavations for underpins are to be constructed in an agreed sequence, to be a maximum of 1m wide. The sequence is to be such that no two adjacent pins are cast within 48 hours of one another. Typically the underpins are cast in a 1 3 5 2 4 1 sequence and in line with the requirements of Figure 19 of the Arup Guide.
- Underpins bases are to extend to -4.0m BGL (within the firm clay). Proprietary side shutter would be used to provide protection to operatives and retain stability to ground.
- Dry-pack to be installed tight between top of pins and underside of existing walls at least 24hours after casting. Back fill excavations to top of existing lower ground floor slab level.
- It may be necessary to provide some limited groundwater control during the construction works however sufficient testing and investigation will have been conducted to ensure the stability of the structure is not compromised by this process.
- The ground level will be reduced to allow sufficient propping of wall basement retaining walls prior to being excavated to the full reduced level.

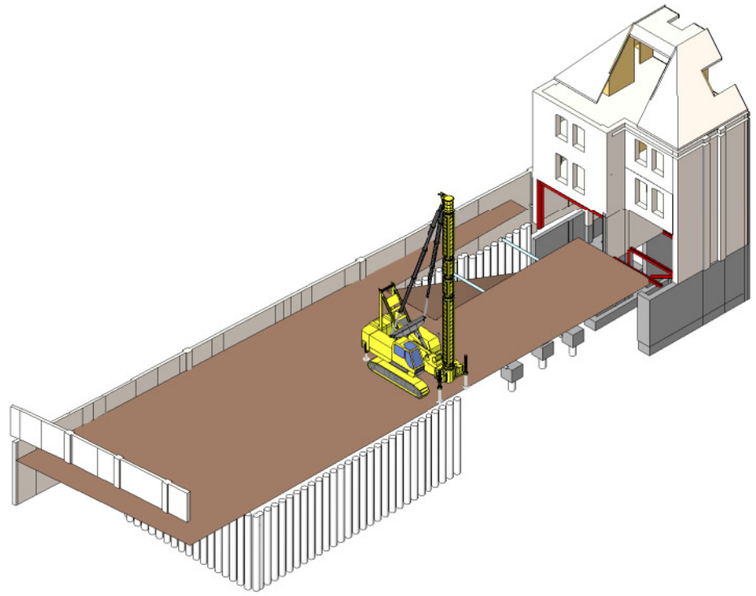


- Access into the newly created existing house basement will be created by in needling to allow the installation of steel beams just below ground floor level to top right of the basement to create an access way for a restricted access piling rig which will be used to form the new rear garden basement. The proposed model is Klemm KR 709-2 but this will be confirmed by the contractor.



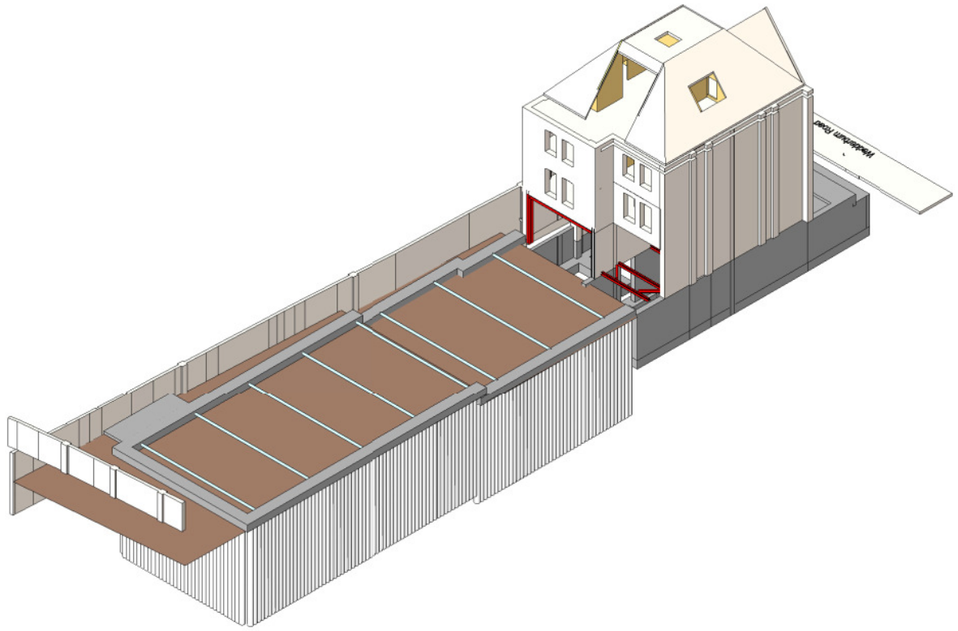
7.4 Secant Piling of Rear Garden Basement

- Once access is formed as sufficient pilling matt created within the garden space:
- Commence secant piling to perimeter walls (required depth to be agreed with specialist sub-contractor).
    - Internal tension piles within the footprint of the basement also to be installed.

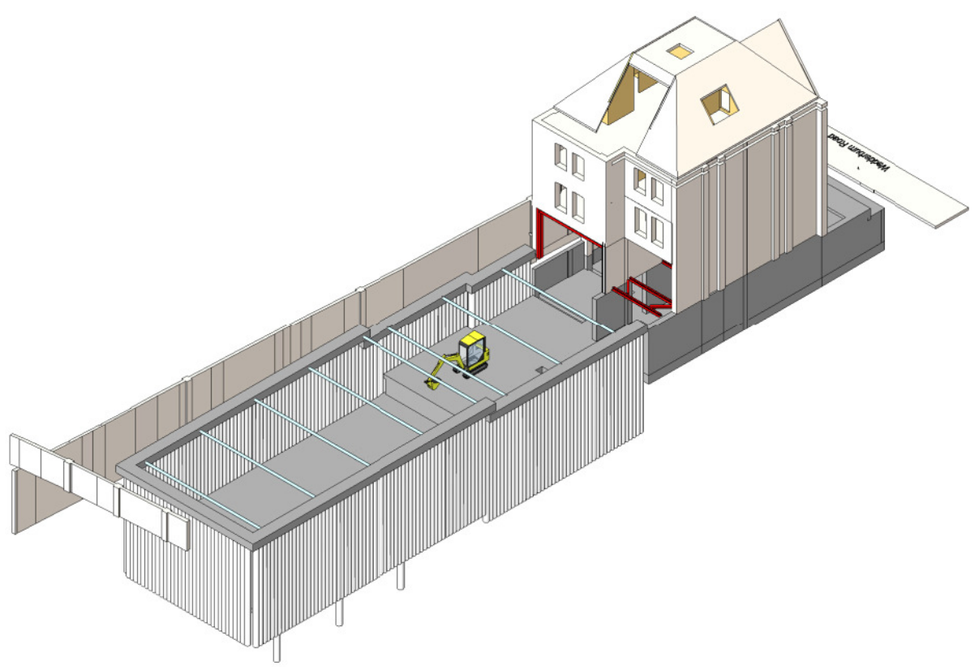


- Initial reduced level dig to undertaken to allow casting of capping beam.
- The piles will be designed to either cantilever beyond the exaction of the proposed basement slab or be required to be propped in the temporary case by whaler beams and flying shores spanning across the width of the basement.
- In the permanent case the propping will be provided by the new suspend slab and beam arrangement.

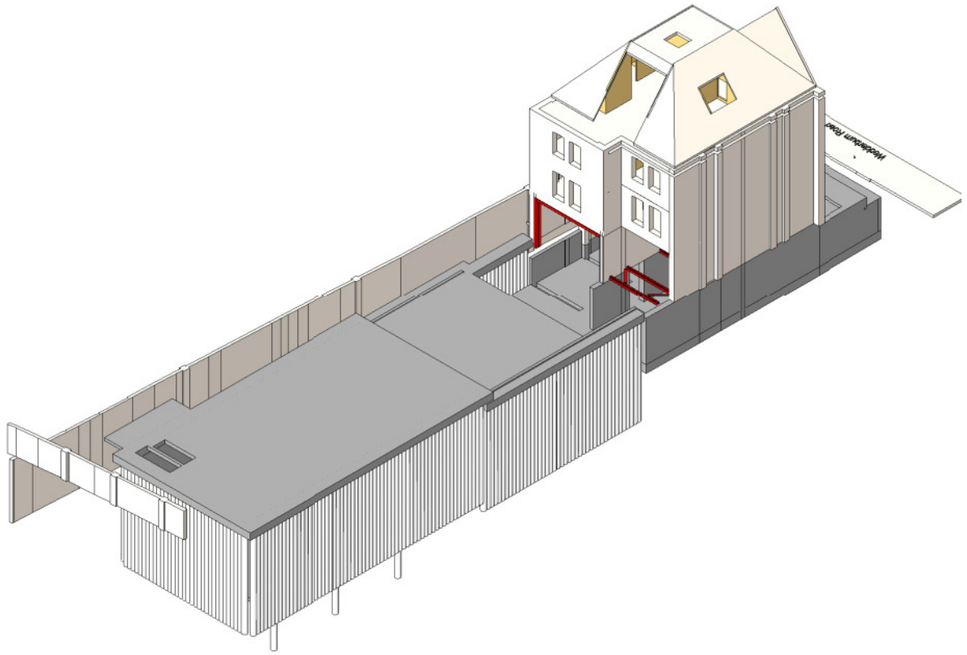
7.4 *continued*



- Following the installation of temporary works the ground level will be reduced fully and tension piles broken down to allow the casting of the basement ground bearing slab which will be casting directly onto the heave protection system adopted. (Localised dewatering should be allowed for).
- WRC liners wall will then be installed to the underside of the capping beam and formwork for the suspend ground floor structure and RC beams be installed prior to casting.



- This will then be cast, tank externally above and ground reinstated over.
- Internally the drained cavity will be installed to provide a watertight box.



7.5 Internal Superstructure/Rear Extension and Bay

- Sequenced removal of the ground floor propping will be undertaken to allow the installation of the ground floor structure
- Steel box continued up from basement space to be tied into previously installed first floor steels
- Removal of spine wall to continue with box frame following on accordingly.
- Rear extension frame installed and joisted out
- Rear bay rebuilt off ground floor steelwork
- Install rear garden retaining walls where required and complete Screw ply sheeting to top of joists to form diaphragm and replace existing boards where required. Connect floors to steel frames as required.
- Remove temporary beams, temporary bracings and props. Make good existing masonry walls as required.
- The structural works are now complete and the work can concentrate on making the building weather tight, upon which the finishing trades can commence. At this stage further discussion of these issues is premature and unnecessary.

7.6 Revised Sequence to Control Ground Water with existing basement.

Should adequate water control to allow initial underpinning not be possible it is proposed that following sequence be adopted.

Sections 7.1 and 7.2 will be maintained however sections 7.3 and 7.4 will be effectively switched to allow for the formation of the rear garden basement first. Adequate access for the piling rig through the ground floor will need to be provided again through temporary steelwork and possibly reinforcement of the existing ground floor structure.

The benefit of the rear garden basement being installed first will be the reduction in any level of ground water, which follows the contour of the site from rear garden to front. This will reduce or omit the need for any ground water control measures when underpinning.

8.0 Impacts of Subterranean Development On Existing & Neighbouring Structures

8.1 Stability of Existing Buildings

The temporary works framing will provide horizontal and vertical stability in the temporary condition. In the permanent condition the new steel framing and concrete box construction will provide the horizontal and vertical stability of the building. The temporary works framing will not be removed until all of the permanent works are completely installed.

Several existing internal walls are to be demolished post installation of the temporary support structures. The temporary props, bracings and foundations will provide vertical and lateral stability of the retained superstructure throughout construction.

A significant depth of the existing ground comprises made ground and claygate member. Therefore all excavations will require temporary support to the sides of the excavations. The temporary supports may be installed as excavation progresses in 1.0m deep sections, to ensure stability of the surrounding ground. Underpin excavations are to be backfilled after each underpin is installed.

To prevent lateral movement and provide lateral stability of the ground throughout excavation, new underpins underneath the existing external walls will be propped horizontally at the head. The props restraining the head of the wall will comprise the temporary waler beams located just above the existing lower ground floor level. These are to remain in place until the permanent basement and ground floor structure is completed. The props will ensure that the surrounding ground beyond the excavation is continuously supported during construction.

New steel frames are to be installed to provide permanent vertical and lateral support to the existing structure retained. The frames will also re-instate lateral restraint to the party wall and act as replacement for the oringnial internal spine wall.

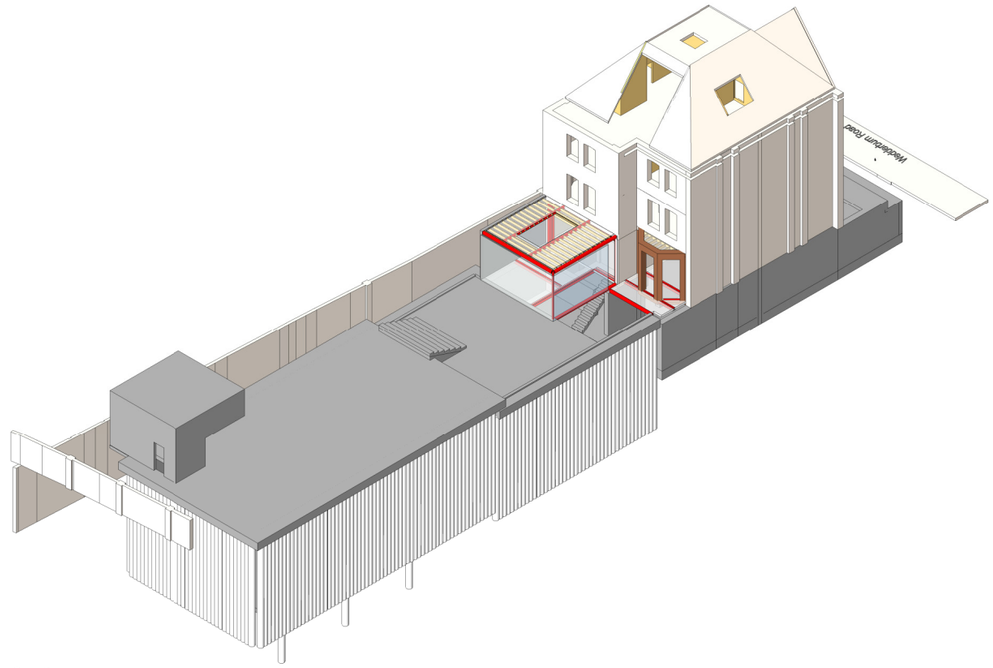
As described above, the stability and structural integrity of the surrounding earth and the neighbouring properties will be maintained throughout construction without any structurally detrimental effect to existing conditions.

As a precautionary measure a set of monitoring targets may be installed onto the external adjoining walls with No 6 Wedderburn Road. These will be monitored throughout the building process for 3 dimensional movements. This will act as an early warning system to identify any unexpected movement allowing time for remedial action to be taken.

8.2 Predicted Movements

A supplementary report and design calculations by GEA Ltd, geotechnical consultants will be provided for the project, but included within Appendix F is a calculation to show the predicted that the movement of the party walls due to the basement underpinning will be in the range 0-7mm vertically and 0-7mm horizontally at the head of the underpin.

This CIRIA C580 stage 2 damage assessment has been carried out in line Boscardin and Cording (1989) which indicates that the effect of the excavation will be no worse than ‘Negligible’. This equates to an approximate crack width <0.1mm which is considered to be within acceptable limits.



3D Isometric Section

Appendix A – Outline Specification

Outline Specification

A.1 General:

A.1.1 The following design elements should be in accordance with the architects details:

- Water and damp proofing
- Setting-out
- Fire protection
- Floor separation and acoustic isolation
- External works
- Landscaping
- Finishes
- Internal partitions

A.2 Concrete:

A.2.1 The concrete grades to be used are as follows:

- Blinding, Gen1
- Mass concrete to underpinning, Gen3
- Insitu RC concrete slabs, underpinning and walls, RC40

A.2.2 All formed surfaces to be Type A (basic) finish in accordance with BS-8110. Tops of ground beams and floor slabs to be uniformly leveled and tamped to type 1u finish, subject to agreement with raised flooring manufacturer.

A.2.3. Caltite Waterproof concrete may be used for the retaining walls and basement slab.

A.3 Steelwork:

A.3.1 All steelwork to be grade S275 to BS EN 10025 and in accordance with BS-5950 UNO.

A.3.2 All connections to have minimum 2no. M16 bolts, with minimum 6mm leg length continuous fillet welds, unless specifically noted.

A.3.3 All steelwork to be blast cleaned to SA2.5. Internal steelwork painted with 75 µm of zinc phosphate primer, 75 µm sealant. External steelwork to be galvanised to 140µm.

A. 3.4 Reinforcement for profiled composite slabs to be minimum A252 mesh in the top reinforcement layer. For single spans (not continuous) 2 No. H8 bars are to be placed in all decking troughs.

A. 3.5 All profiled composite slabs are to be formed using RC40 lightweight concrete.

A.4 Timber:

A.4.1. All timber members are to be grade C16 to BS 5268 unless noted otherwise. Timber to be pressure impregnated with preservative and cut ends brush treated

A.4.2. Lateral restraint straps for floors are to be minimum 900 long 30 x 5 galvanized MS straps at 1200crs with 150 bobend.

A.5 Temporary Works: The contractor is responsible for the design, installation and maintenance of all necessary temporary works to ensure the strength and stability of the building throughout the construction process

Appendix B – Design Parameters

Design Parameters

B.1 Codes of Practice:

B.1.1 British Standards:

Loading	BS6399	Part 1 (Dead & Imposed Loads)
		Part 2 (Wind Loads)
		Part 3 (Imposed Roof Loads)
Concrete	BS8110	
Basements	BS8102	
Foundations	BS8004	
Steelwork	BS5950	
Masonry	BS5628	
Timber	BS5268	
Balustrades	BS6180	

B.1.2 Building Regulations 2000:

Approved Document A – Structure (2004 edition)
Approved Document H – Drainage & Waste Disposal (2002 edition)

B.1.3 Temporary Works

Façade retention works should be designed in accordance with the recommendations set out in CIRIA guide C579 (2003 ‘Retention of Masonry Facades).

Demolition Works to be carried out in line with ICE Demolition Protocol 2008.

The deflection of the retained façade should be limited to Span/750 under full loading.

B.2 Design Loadings:

B.2.1 Imposed Loadings (new build areas): kN/m2

a.	Residential	1.5
b.	Roof, access / including snow	1.5
c.	Plant areas	5.0

B2.3 Deflection:

Imposed load deflections will be limited to:

Timber:

Typical Floors	- Span / 360 or 14mm, whichever is less
Steel	- Span / 360 or 25mm, whichever is less

B.2.4 Wind Loading to BS 6399-part 1