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Basement Construction Management Plan

74 Fortune Green Road, London, NW6 1DS

Project Ref: EX18/132/07

Preamble

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Revisions & additional material

Document History and Status

Revision	Date	Purpose/Status
-	13.08.2018	First Issue
A	07.09.2018	Revised according to Soil report findings

Document Details

Project Director	Daniel Staines (CEng, MIStructE, BEng, PgDip (Construc. Management)
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Project Name	74 Fortune Green Road, London, NW6 1DS – Basement Construction Plan
Planning Reference No.	N/A

Contents

Appendices

Executive Summary

1.1.1. The site location is 74 Fortune Green Road, London, NW6 1DS. The site falls within the London Borough of Camden. Grid Reference: TQ2517854 (Easting: 525130; Northing: 185483)

1.1.2. The current site arrangement includes a retail space at ground floor, and residential flat in the upper floors. Refer to Architect's drawings for existing plans.

1.1.3. The proposed development comprises of office space at basement and ground floor, residential flats at upper levels. An additional mansard floor is added. Refer to Architect's details for proposed plans and section.

1.1.4. The following assessments are presented:

- Construction Methodology
- Outline Temporary and Permanent Works Proposal
- Ground Movement and Damage Assessment
- Control of Construction Works

1.1.5. Refer to JMS drawings for:

- Proposed foundation layout and proposed lower ground floor plan showing structure over (EX18/132/07 – 500)
- Typical Retaining wall section (EX18/132/07- 501)
- Proposed ground floor and first floor plan showing structure over (EX18/132/07 – 502)
- Proposed second floor and third floor plan showing structure over (EX18/132/07 – 503)
- Proposed section 1-1 (EX18/132/07 – 504)
- Typical superstructure details (EX17/132/07 – 510)
- Steelwork notes (EX18/132/07 – 520)

1.1.6. The authors of the assessments are:

– G Chapman CEng MIStructE (Structural Engineer): Structural stability analysis has been provided by JMS Engineers (London) Ltd.

- M Jones TMICE MCHIT (Civil Engineer): Surface flow & flooding analysis has been provided by JMS Engineers (Midlands) Ltd.

- D Staines CEng MIStructE (Structural Engineer): Damage Assessment provided by JMS Engineers Ltd.

1.1.7. The ground and groundwater conditions beneath the site are as stated in Hydrological/Site report by others.

1.1.8. The construction methods proposed are standard underpinning construction technique. Sequence of works and typical underpinning sections are as presented in JMS drawing EX18/132/07 – 500; 501. Please note that the drawings may be subject to confirmation of details and final input from the successful contractor.

1.1.9. A structural monitoring strategy to control the works and impacts to neighbouring structures will comprise, if required, of monitoring tools and scheduled movement registration. Slope monitoring is at the present not required, based on the finding of the soil investigation (completed by others). The engineer must be notified immediately if any slope stability issues are encountered.

1.1.10. The strategic drainage system is as per JMS design and drawings.

1.1.11. This is a live document and that further detailed assessments will be ongoing as the design and construction progresses.

2.0 Introduction

This report has been prepared to set out the proposed design philosophy and construction method statement for the proposed basement construction at 74 Fortune Green Road. It will summarise the basis of the structural and civil engineering design and will be issued to all relevant parties including the Client, Local Planning Authority and Design team members.

This report is for the exclusive use of the Client and should not be used in whole or in part by any third parties without the express permission of JMS Engineers in writing.
This report should not be relied upon exclusively by the Client for decision-making purposes and may require reading with other material or reports.

The scope of the proposal is for the creation of a basement beneath the footprint of an existing property adjacent to an existing property. The current property presents an existing cellar, which floor will be removed to accommodate the proposed basement height. The extent of the existing foundation will be removed.

The report is based on the information produced by the clients Architects, & borehole data provided by trial holes examination on site and is intended to provide the basis for planning and may be subject to further design discussion and development with the successful Contractor.

2.1. Sources of Information

2.1.1. The following baseline data have been referenced to complete the BIA in relation to the proposed development:

- Site visit for structural purposes conducted by JMS Engineers on the 7th August 2018*;*
- Current/historical mapping provided by Google Maps and Online Historic Maps resources*;*
- Association of Specialist Underpinning Contractors (ASUC), Guidelines on safe and efficient basement construction directly below or near to existing structures;
- LB Camden, Planning Guidance (CPG) – Basements (March 2018);
- Fiona Cobbs, Structural Engineer's Pocket Book;
- Architect's floor layouts, sections and elevations.
- Additional technical reports (soil report, hydrological and hydrogeological studies) by others.
- BS8000-0:2014: Workmanship on construction site.

2.2. Existing and Proposed Development

2.2.1. The existing property is currently being occupied by a retail space at ground floor level, and residential flats at upper level.

2.2.2. The adjacent properties present similar features of 74 fortune Green Road. In addition, the adjacent properties present a loft level.

2.2.3. The property at 74 Fortune Green Road, and adjacent properties are not in the Listed Building.

2.2.4. Underground infrastructures are not present beneath/close to the site. Refer to Transport for London Property Asset Register in Appendix

2.2.5. Existing and Proposed development drawings are provided by Architect. Refer to Architect's drawings for details.

2.2.6. The proposed development will utilise standard underpinning construction technique which include sequenced stages of works as denoted by the ASUC "Guidelines on safe and efficient basement construction"

2.2.7. The outline construction programme for the proposed development is as shown in JMS Drawing EX18/132/07-500 series. The set of drawings include the proposed basement construction and superstructure which includes ground floor, first floor, second floor and loft.

2.2.8. The full extent of the proposed basement will be below the footprint of the existing above-ground construction so there will be no increase in impermeable surface area.

3.0 Construction Methodology/ Engineering Statements

3.1. Outline Temporary and Permanent Works Proposals

3.1.1. The works proposals are presented in JMS Drawings EX18/132/07 – 500series, which includes:

- Foundations / Retaining Walls
- Basement Underpinning sequences on plan and typical sections
- Permanent structure and typical details/
- Drainage strategy/SUDS proposals
- Flood risk mitigation measures, if applicable.

3.1.2. This method statement has been prepared to provide information on the likely methods for Basement Construction, subject to confirmation of details and final input from the successful contractor.

3.1.3. The final methods will be subject to the limitations and constraints noted in this document. Any revised matters associated with the Method Statement will be issued for review and comment prior to any site construction works.

3.1.4. The method of construction is to be agreed by all parties, with specific reference to the potential for vibrations and noise from the basement construction.

3.1.5. A detailed method statement for means of access, site logistics and intended vehicle movements, particularly spoil removal, will be agreed with the main contractor prior to commencing any site works and any variations reported accordingly.

3.1.6. All services surveys, diversion agreements and temporary supply requirements will be agreed, and approvals will be in place prior to commencement of works.

3.1.7. Existing building condition surveys will be carried out prior to commencing any works, of neighbouring property.

3.2. Sequence of works

3.2.1. Establish site access & hoarding.

3.2.2. Investigatory works as required for full detailed design.

3.2.3. It is presumed that all the temporary works to ensure stability to adjacent properties are provided during demolition as designed and specified by contractor.

3.2.4. It is the contractor’s responsibility to take all necessary steps to ensure that the structure is adequately propped, shored and braced to ensure that during the progress of the works excessive deflections and deformation of the structure do not occur. Therefore, the contractor shall discuss with the engineer any proposals for temporary works. It is frequently necessary for the contractor to brace or prop existing openings so that isolated load bearing piers may be underpinned. The contractor is to allow in his tender price for all propping, shoring and bracing to ensure that the works may be safely undertaken with no undue disruption to the structure.

3.2.5. In addition, no floors are to be removed to allow the excavation of the basement until adequate propping has been provided to ensure continuity of support of opposing walls. Propping system to remain insitu until new floor has been fully installed and strapped. Design of propping is a contractor designed item, unless instructed otherwise.

3.2.6. The sequence of works shall be based on a maximum leg length of approx. 1.0m. and max. of 1.2m. The agreed sequence of operations shall be strictly adhered to. In case the contractor wishes to alter any sequence, it must be discussed in prior with the engineer and/or local authorities and any amendment must be confirmed in writing.

3.2.7. During the excavation, the contractor shall take all the necessary steps to prevent softening of the ground. The contractor shall also endure that the base of the excavation shall not become contaminated by loose material falling into the excavation. The contractor shall take steps to ensure that the size of the excavation loosely matches the required size agreed with the engineer /local authorities. Excessive overbreak will not be permitted and the contractor shall provide all necessary trench sheeting and strutting to prevent overbreak. The contractor might be required to provide sheeting and strutting to prevent any ingress of loose material beneath the existing floor.

3.2.8. Prior to concreting, the contractor shall incorporate shear keys to permit shear transfer between adjacent retaining wall legs. Where necessary, projecting dowel bars should be cleaned of all loose dirt prior to concreting.

3.2.9. The underside of all existing footings (where exposed by excavation in preparation for underpinning) shall be cleaned of all loose soil and fragments. Any major projections or inclusions such as bricks broken concrete or boulders shall be broken away from the underside of the existing footing. Prior to concreting the underpinning leg, the existing footing should be clean and firm and level, so the dry packing may be accomplished satisfactorily.

3.2.10. All concrete shall be grade C20 (unless specified otherwise) and strictly operated according to the concrete specifications contained in BS8110:Part 1:1985. It should be noted that the concrete should be adequately compacted with a vibrator poker to ensure adequate density. The concrete for the retaining wall legs should be brought up to 75mm from the underside of the existing footing.

3.2.11. Once the retaining wall legs have set (at least 3 days after concrete placement) the gap between the underside of the existing footing and the top of the new footing is to be packed with dry concrete. Mix proportions for the dry concrete are to be by weight 1:3 (cement:zone 2 sharp sand) with combex non-shrink admixture added in accordance with manufacturers recommendation. The constituents are to be mixed dry and small volume of water is to be added that such that when compressed, a small bar of the mixture retains its shape. The dry packing concrete is then to be rammed solid into the gap between the underside of the existing footing and the top of the new footing using a steel bar.

3.2.12. A sufficient time should elapse between the completion of dry packing and the excavation of any retaining wall legs in the vicinity. The curing time shall be 72h between adjacent bays, unless stated otherwise.

3.2.13. Internal waterproofing membranes, screeds and finishes are to be placed at completion of the retaining wall boxes and ground floor slab.

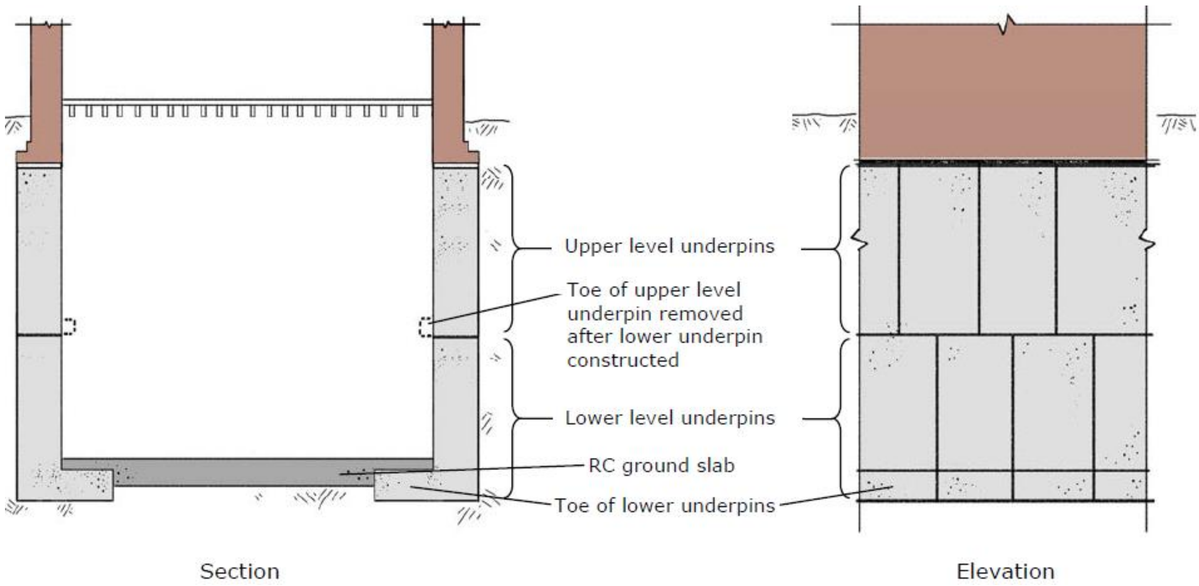
3.2.14. The final sequence of working in detail will be agreed with the successful main contractor and any variations reported accordingly. It is worth mentioning that retaining wall legs may be punctured by the services entering the building. The means of “sleeving” these services shall be agreed with the engineer during the progress of the works.

3.2.15. Based on the size of the proposed development, it is presumed that is it likely that the bays construction will be undertaken on “top down” construction method, to be confirmed by the successful contractor.

3.2.16. Top-down sequence of works consists in multi-stages underpinning which allow shallower individual underpin excavations and hence it can be advantageous from a health and safety point of view. In such method the two stages will require to be constructed in staggered bays in order to avoid vertical day joints. Moreover, vertical and horizontal propping must be designed and in place at all times. There must be reinforcement continuity between the different vertical stages of underpinning provided by dowel bars.

3.2.17. Figure below represent typical Section and Elevation of the multistage underpinning as specified in ASUC Guideline on “Safe and efficient basement construction directly below or near to existing structures”. Refer to Appendix 3 for typical details. (Note: details are INDICATIVE only, shown only for illustrative purposes.)

3.2.18. It is to the successful contractor’s discretion to finalise appropriate methodology based on site accessibility and resources.



3.2.19.

3.3. Establish Access & Hoarding

3.3.1. The hoarding will be located around the property to enclose all works.

3.3.2. A plywood hoarding will be erected with vertical standards, anchored to the ground. The hoarding will be fully secure with a lockable door for access. Suitable heights and colours will be in accordance with the Local Authority requirements.

3.4. Waterproofing System and Screed

3.4.1. For all basement areas, the Architect will prepare design details in conjunction with a specialist contractor. The waterproofing system will be installed in accordance with the Architects details in conjunction with the specialist contractor technical specifications once the basement slab is complete.

3.4.2. The floor finishes, which may include insulation and under floor heating, can then be laid in accordance with the Architects details. A cement and sand screed will be applied on the slab surface.

3.4.3. The height of the basement and relative level of the water table determines that Types A (barrier), B (structurally integrated) or C(drained) protection against ingress of water will be satisfactory, as defined by BS 8102:2009. The basement will be constructed and detailed to achieve a Grade 3 Level of Performance, as defined by BS 8102:2009.

3.4.4.

Table 2 **Grades of waterproofing protection**

Grade	Example of use of structure [A)]	Performance level
1	Car parking; plant rooms (excluding electrical equipment); workshops	Some seepage and damp areas tolerable, dependent on the intended use [B)] Local drainage might be necessary to deal with seepage
2	Plant rooms and workshops requiring a drier environment (than Grade 1); storage areas	No water penetration acceptable Damp areas tolerable; ventilation might be required
3	Ventilated residential and commercial areas, including offices, restaurants etc.; leisure centres	No water penetration acceptable Ventilation, dehumidification or air conditioning necessary, appropriate to the intended use

A) The previous edition of this standard referred to Grade 4 environments. However, this grade has not been retained as its only difference from Grade 3 is the performance level related to ventilation, dehumidification or air conditioning (see BS 5454 for recommendations for the storage and exhibition of archival documents). The structural form for Grade 4 could be the same or similar to Grade 3.

B) Seepage and damp areas for some forms of construction can be quantified by reference to industry standards, such as the ICE's *Specification for piling and embedded retaining walls* [1].

Figure 1: Grades of waterproofing protection

3.4.5. To achieve Grade 3 Performance, we propose either a drained cavity installed in front of the concrete wall; or an applied waterproofing membrane applied and bonded to the internal faces of the pins. Waterproof concrete will also be employed.

3.5. Ground Movement and Damage Impact Assessment

3.5.1. The findings from the soil investigation will be used as parameters on the FE analysis software, Scia (refer to Appendix: Scia Engineer Fact Sheet) which provides results on displacements and settlements. Hence, enables the engineer to provide suitable and appropriate basement design.

3.5.2. Refer to JMS Basement design report for vertical and lateral displacement due to dead loads, live loads, water pressures. Refer to the preliminary basement impact assessment report, section 7.3.1 Shallow foundations within basements for settlement limits and allowable bearing pressure.

3.5.3. Based on the results shown on the report, the predicted movement will not have any noticeable effect on either this building or neighbouring properties. Moreover, refer to JMS typical retaining wall details for the underside of the basement slab at formation level.

3.5.4. At this site unloading of the London Clay as a result of the basement excavation, the reduction in vertical stress will cause heave to take place. Values of stiffness for the soils at this site are readily available from published data and the creation of the basement will result in a net unloading of about approximately 50 kN/m^2.

3.5.5. Such a reduction would mean that by the time the basement construction is complete, approximately <10 mm of heave is likely to have taken place at the centre of the proposed excavations, reducing to less than 5 mm at the edges. In the long term, following completion of the basement construction, a further 8 mm of heave (at the centre) is estimated as a result of long term swelling of the underlying London Clay.

3.5.6. It is, however, important to bear in mind that such figures are based on an unrestrained excavation as computer models are unable to take account of the mitigating effect of existing structures, the stiffness of the proposed floor slab and proposed underpins which in reality will combine to restrict these movements within the basement excavation.

3.5.7. The movements predicted at or just beyond the site boundaries are unlikely to be fully realised and should not therefore have a detrimental impact upon any nearby structures.

3.5.8. In order to mitigate the effects of heave on the new building, the basement should be designed to transmit heave forces into the walls.

3.5.9. Alternatively, a void or layer of compressible material could be introduced beneath the slab designed to be able to resist the potential uplift forces generated by the ground movements. In this respect potential heave pressures to be accommodated are typically taken to equate to around 30% to 40% of the total unloading pressure.

3.5.10. In addition to the above assessment of the likely movements that will result from the proposed development, some of the neighbouring structures have been considered as sensitive structures, requiring Building Damage Assessments, on the basis of the classification given in Table 2.5 of C580.

3.5.11. The potential heave movements predicted have been included in the assessment section, which can therefore be considered as conservative, as these movements are likely to have a mitigating effect on the downward settlement due to the increase in load.

3.5.12. Furthermore, based on the preliminary basement impact assessment, the site lies within a wider hillside setting in which the general slope is greater than 7°. However, based on the soil report, the slopes with angles >7° were observed only locally and more than 10m away from the area of excavation. Hence the excavation of the proposed basement would not affect the stability of the slope. The monitoring of the slope stability is not required unless the engineer is notified immediately on any issues encountered during the construction works.

3.5.13. It is noted that the proposed development will not include the felling of trees, therefore negligible to minimal changes should be expected to soil moisture conditions.

3.5.14. Subsequently, it is predicted that the damage to the adjoining and nearby structures would generally be Category 0 (negligible), with limited areas of Category 1 (Very Slight) damage due to differential movement from inconsistent loadings. On this basis, the damage that would inevitably occur as a result of such an excavation would fall well within the acceptable limits.

3.5.15. Note that these predictions are based on the presumption of the quality of the work and the construction tolerances adopted on site will comply with BS8000: Workmanship on construction site.

3.5.16. Any incongruencies found on site must be immediately reported to the engineer.

3.6. Control of Construction Works

3.6.1. The construction works will be closely controlled in accordance with standard code of practice.

3.6.2. In order to monitor potential effects of the proposed construction works at the above site, it is intended to undertake a monitoring regime so as to identify movement of existing structures to the site and take action accordingly. All works are to be undertaken by a suitably qualified monitoring engineer with relevant experience in such matters.

3.6.3. Condition surveys of the above existing structures should be carried out before and after the proposed works.

3.6.4. Monitoring sub-contractor to visit the site to inspect the site structures and those adjacent to it. Monitoring points to be installed as agreed by relevant parties. The monitoring points are therefore set in order to measure both vertical and horizontal movement to 1mm accuracy.

3.6.5. Targets may be 75x75mm Prism, which are considered the most accurate and is bolted to the building surface using a 8x80mm expanding bolts (once removed, they leave a drilled hole in the wall); OR alternatively 25x25mm Target which stick to the surface, they are slightly less accurate and have a potential to come away from the surface due to weather conditions and only to be used where Prism Targets are inappropriate. Type to be agreed by all parties.

3.6.6. Reports showing numbered positions of the monitoring targets together with a spreadsheet showing any discrepancies (both numerically and graphically) between the previous visit and the original visit is to be issued to all relevant parties within 24hrs of site visit by the monitoring sub-contractor.

- Movement of 2mm or less (to be shown in green): can be viewed as natural settlement as long as the direction of movement does not continue excessively on the next visit;
- Movement of between 2mm and 4mm (to be shown in amber): the Client is to consider keeping a closer check on works possibly improving his system of works;
- Movement in excess of 4mm (to be shown in red): the Client should take note of a possible significant change in load patterns on site and should look seriously at improving the system of works. Cessation of works on site, a visit by the engineer (structural) and report to explain why the red light has been breached and what changes will be implemented;

4.0 Conclusion

4.1.1. The proposed re-development of 74 Fortune Green Avenue can be achieved using standard construction techniques and materials.

4.1.2. Where mechanical means are necessary to construct permanent works, these can be of a type that generates low vibrations to which the surrounding buildings have a form and construction that is robust and resistant to.

4.1.3. We can therefore conclude with confidence that the construction of the proposed development generally, and the subterranean basement in particular, will not affect the integrity of the surrounding building stock or overload the near-surface geology.

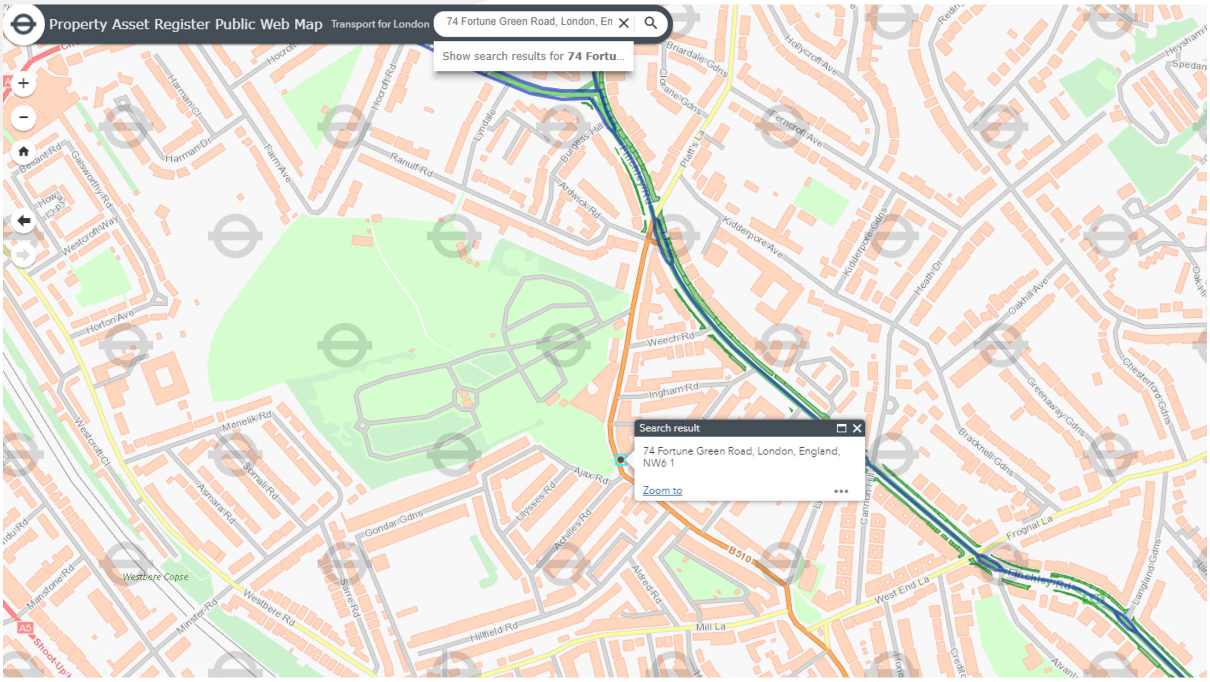
4.1.4. There are no critical utilities beneath the site that cannot be relocated easily to accommodate the construction and, as there is no change in use proposed there will be no significant increase in foul discharge to the sewer despite the increase in level of accommodation.

4.1.5. The techniques proposed for the subterranean element of the building and the nature of the underlying geology minimises the risk of instability, ground slip and movement.

4.1.6. The review of the proposals has concluded that the predicted damage to the neighbouring properties would generally be ‘Negligible’, with some limited areas of ‘Very Slight’.

4.1.7. On this basis, the damage that would inevitably occur as a result of such an excavation of the proposed basement, will in practice be separated by a number of weeks during which time construction will take place. This will provide an opportunity for the ground movements during and immediately after excavation to be measured and reviewed so that propping arrangements can be adjusted if required.

Appendix 1: Transport for London Property Asset Register



Appendix 2: Scia Engineer Fact Sheet

Scia Engineer Fact Sheet

SCIA
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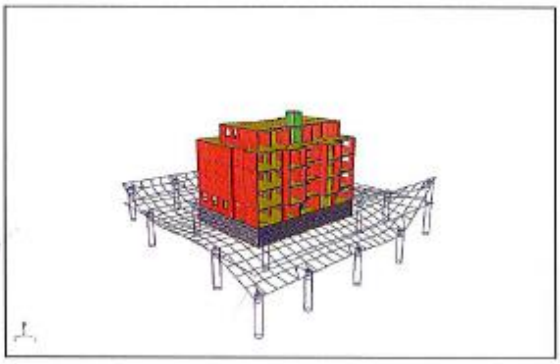
Soil interaction (Soil-in)

esas.06

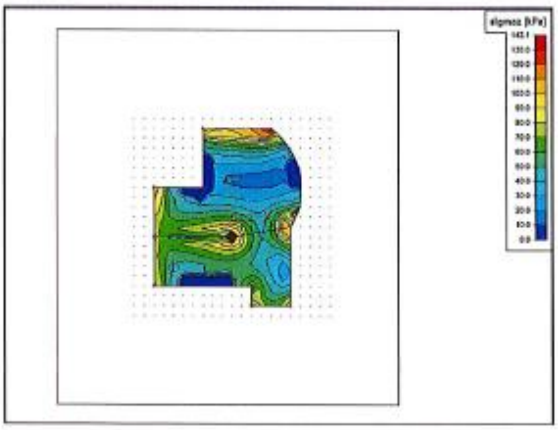
Determination of the 'real' C parameters and calculation of the interaction between the structure and the soil due to settings of the soil. The distribution of the tension in the soil under the foundation plates, the distribution and the level of the load, the contact tension between the structure and the subsoil, the geometry of the contact layer and the geological characteristics of the subsoil at a specific position. As the C parameters have an influence on the contact tension (and vice versa), the subsidence of the contact layer and a consequence also the C parameters are influenced by the contact tension; the calculation of the properties is iterative. The calculation determines the occurring settings and the influence of these settings on the structure. The calculation is based on the Pasternak model.

Highlights
Multi-parametric interaction between ground slab and foundation soil
Taken into account: distribution and intensity of load, contact stress between structure and soil, footing surface geometry, local geological conditions
Input of subsoil using data from borehole surveying
Display of SigmaZ and soil structure strength
Generation of Vertexes (soil points)



- The module calculates C parameters for the interaction between ground slab and foundation soil, taking into account loading distribution and intensity, structure/soil border contact stress, footing surface geometry and local geological conditions.

- The model used in "Soil-in" is called the Energy or More-constants Model and has been used in practice since 1975, comparing well with many in-situ measurement systems. The "More-constants model" name refers to the energy model capacity:
  a. the shear stiffness of the subsoil C_2 using the Pasternak model;
  b. the orthotropy or anisotropy of the subsoil by means of the C_{2x}, C_{2y} and C_{2xy} constants;
  c. the surface friction in the structure/soil interface by means of the C_{1x}, C_{1y} constants.
- The "Soil-in" module uses a layered half-space model with these features:
  a. Users can apply the Boussinesq influence function to calculate the development of the vertical stress component SigmaZ in the subsoil in any surface overload situation despite any layering, uneven soil constitution or other anomaly. The various geomechanical standards approve this method.
  b. Users can determine any overloading at the excavation surfaces using the Boussinesq formulae for a half-space loaded at a general depth.
  c. The model uses the approximate solution of an elastic layer of finite thickness to indicate the existence of an incompressible layer.
  d. The model calculates the soil compression strain components and settlements taking into account the nature of the subsoil layers.
- The program follows the Eurocode 7 and ČSN 73 0001 codes.



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For a complete list of all our international agencies and partners, please visit our website nemetschek-scia.com

Input

The user selects foundation plates where the "Soil-in" module should determine stiffness, meaning that he or she can select only those foundation slabs that should be analysed by "Soil-in".

The model can define several boreholes with different layers and properties in each borehole:

- t = thickness of the layer;
- E = deformation modulus of soil mass in compression (cylindrical standard test);
- n = Poisson's ratio;
- g = specific weight dry and wet;
- m = soil structure strength factor (defined in different codes).

Engineers will have to consider excavating if the foundation plate and subsoil do not interact on the original terrain surface. The program calculates the parameters automatically.

Calculation

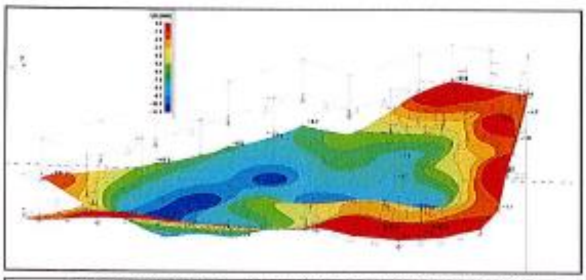
The program needs the structure-soil interaction parameters for subsequent iteration. Firstly the FEM analysis of the upper structure with initial C interaction parameters (which the user can modify) gives a first approximation of contact stress.

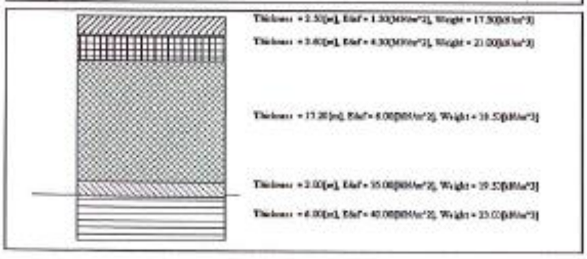
These subsoil contact stress values serve as input for "Soil-in". This program solves settlements and corrects C parameter values. The program repeats the whole FEM calculation + "Soil-in" cycle until iteration test completion, thus obtaining the correct deformation and internal force values.

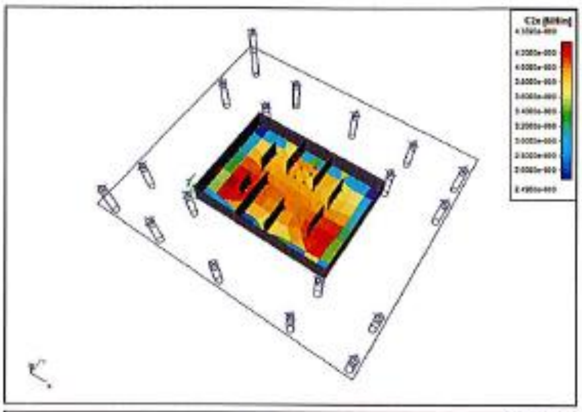
Results

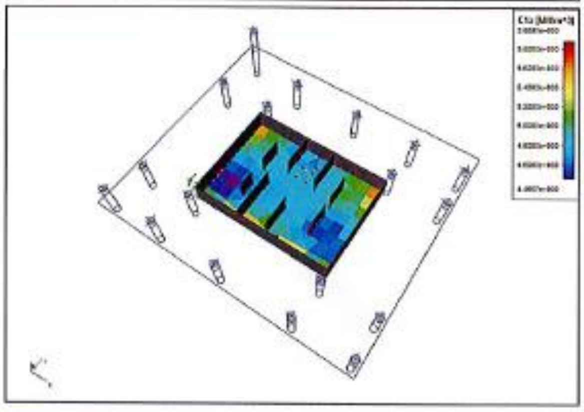
Both graphical and numerical results, along with all standard SCIA Engineer output facilities - iso-bands, isolines, DXF export, search for extremes, and documentation - are available.

The program determines and displays the C_{1z}, C_{2x} and C_{2y} coefficients. Foundation plate/subsoil contact stress values at every iteration are also available.







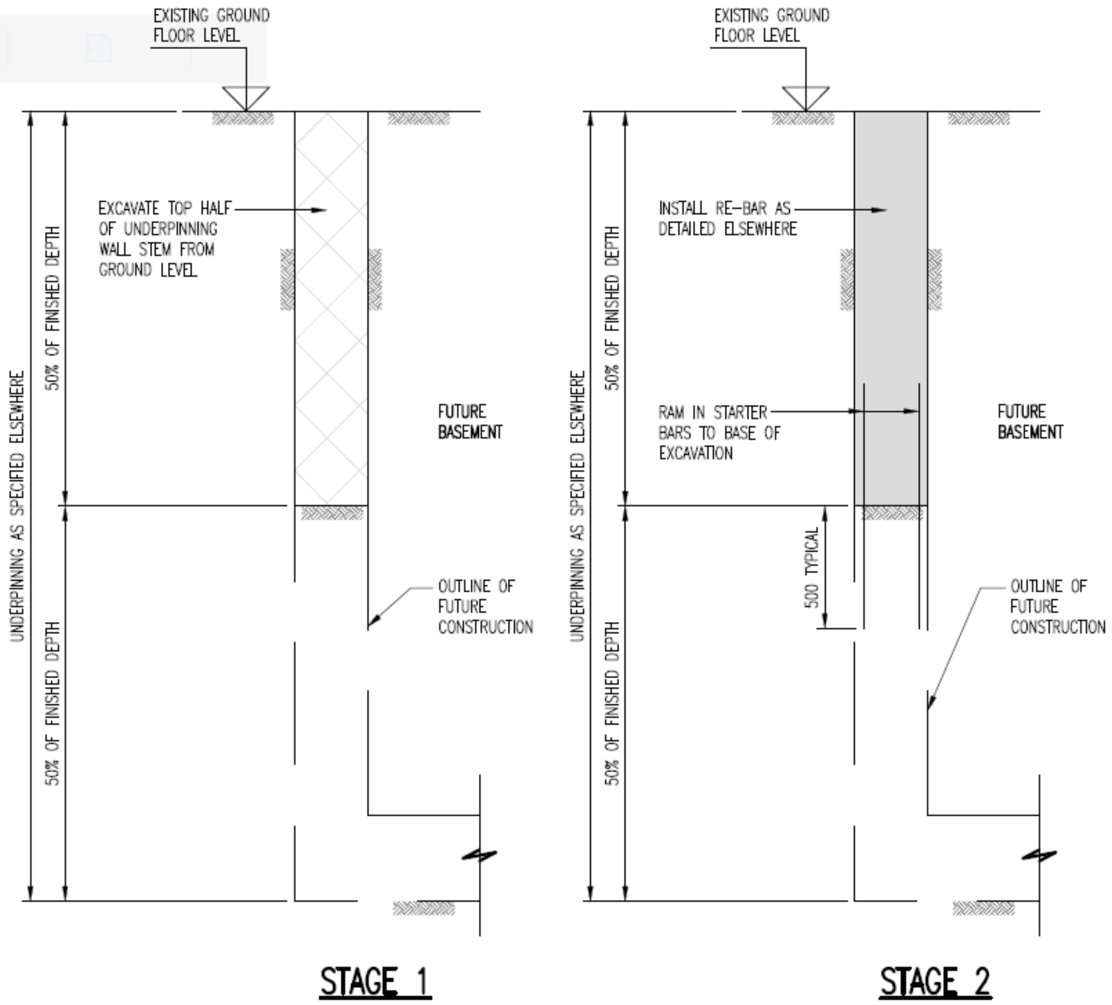


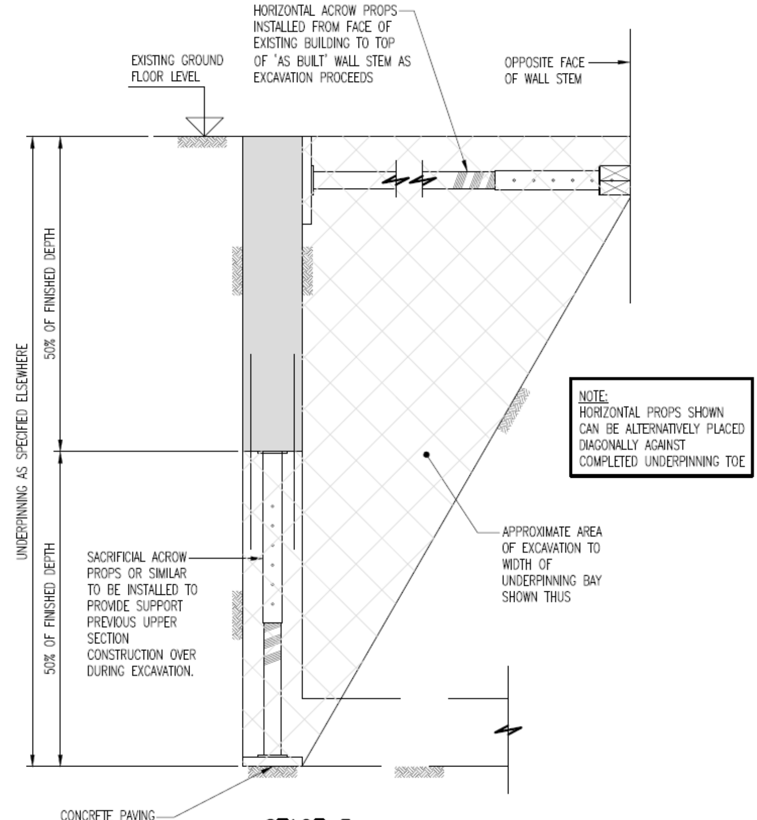
Required modules

esa.01 and esas.00

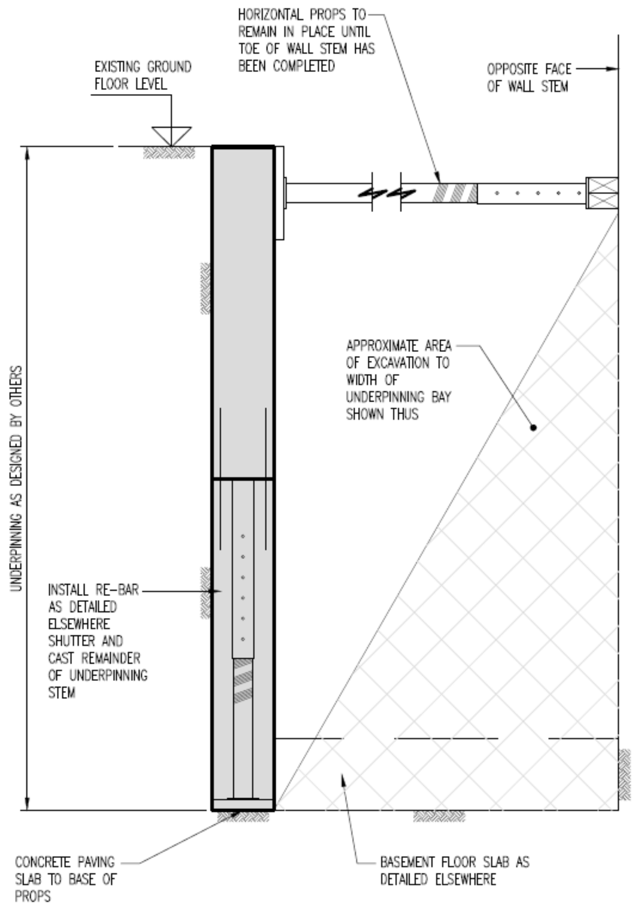
Appendix 3: Typical sequence of envisaged "top down" retaining wall construction

INDICATIVE ONLY

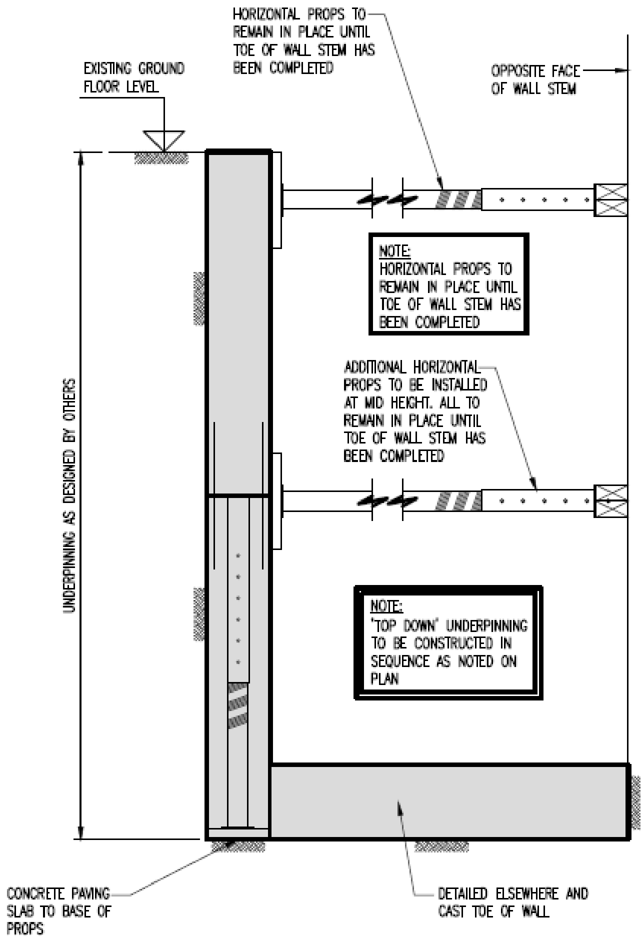




STAGE 3



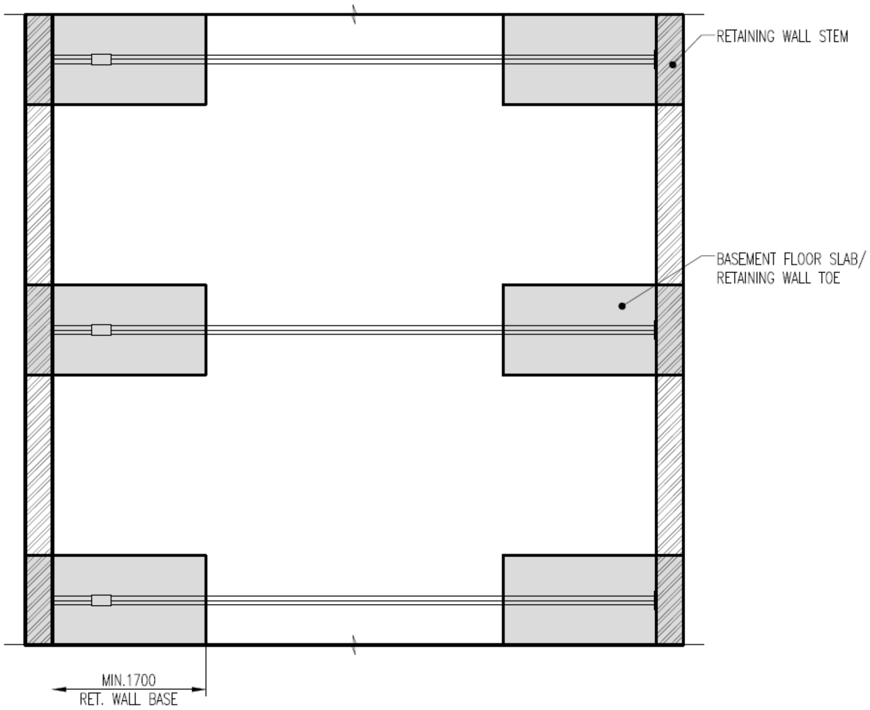
STAGE 4


HORIZONTAL PROPS TO REMAIN IN PLACE UNTIL TOE OF WALL STEM HAS BEEN COMPLETED
EXISTING GROUND FLOOR LEVEL
OPPOSITE FACE OF WALL STEM
NOTE: HORIZONTAL PROPS TO REMAIN IN PLACE UNTIL TOE OF WALL STEM HAS BEEN COMPLETED
ADDITIONAL HORIZONTAL PROPS TO BE INSTALLED AT MID HEIGHT. ALL TO REMAIN IN PLACE UNTIL TOE OF WALL STEM HAS BEEN COMPLETED
UNDERPINNING AS DESIGNED BY OTHERS
NOTE: 'TOP DOWN' UNDERPINNING TO BE CONSTRUCTED IN SEQUENCE AS NOTED ON PLAN
CONCRETE PAVING SLAB TO BASE OF PROPS
DETAILED ELSEWHERE AND CAST TOE OF WALL

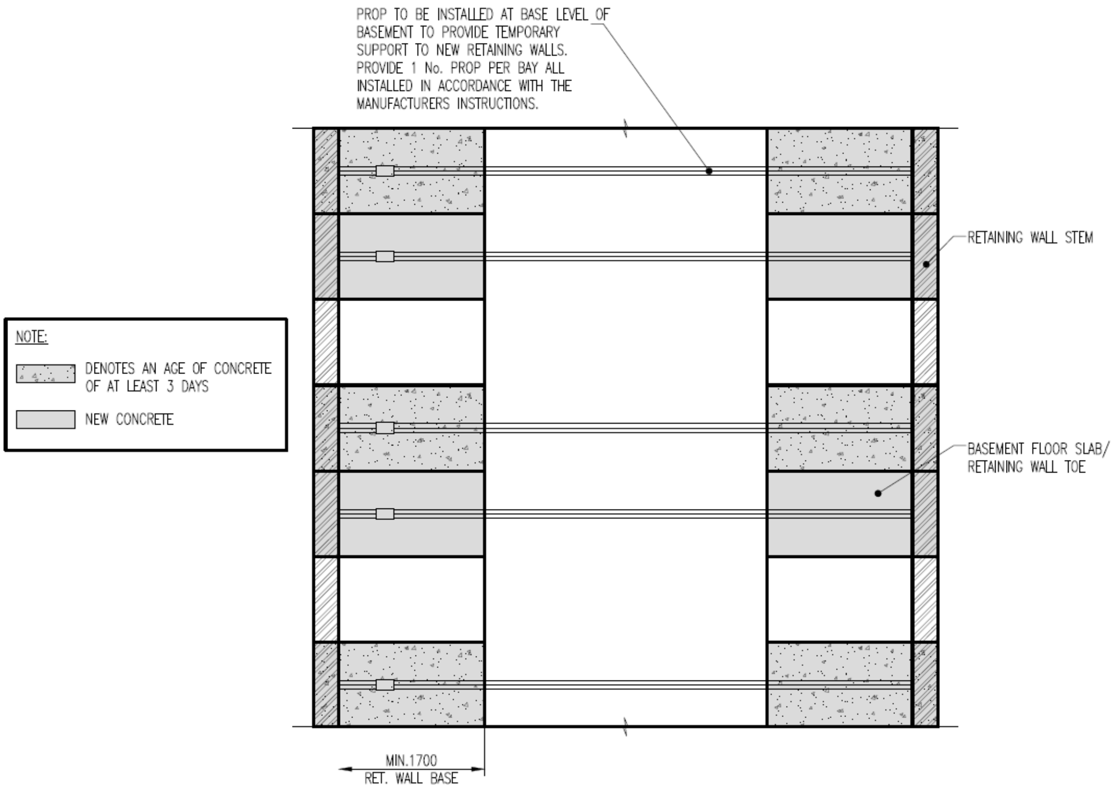
STAGE 5

Appendix 4: Plan on envisaged basement works

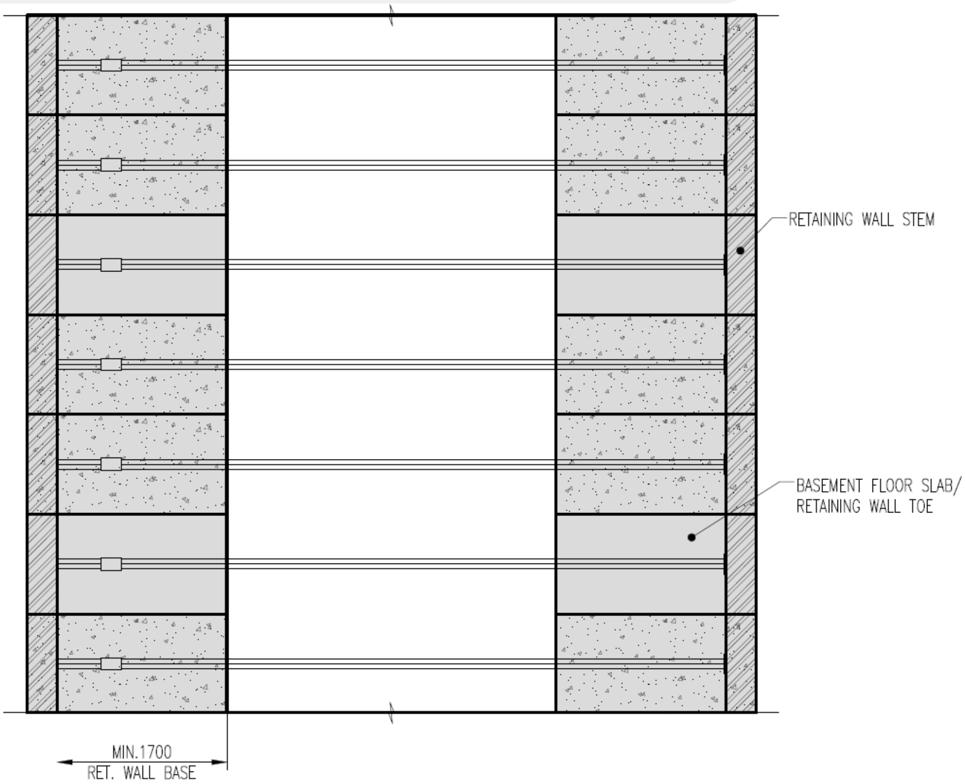
INDICATIVE ONLY



PLAN ON BASEMENT WORKS

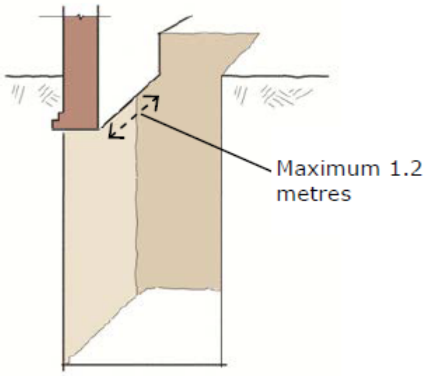


PLAN ON BASEMENT WORKS



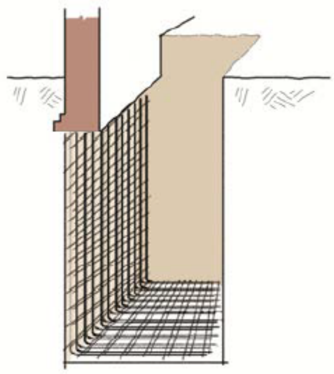
PLAN ON BASEMENT WORKS

Appendix 5: Typical Underpinning sequence (ASUC Guideline)



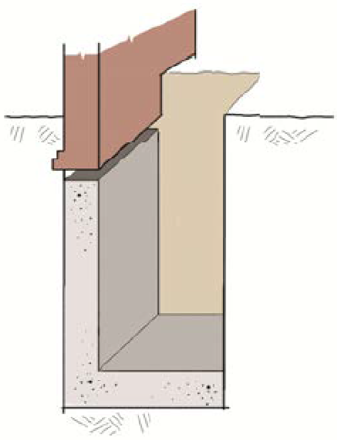
1. Excavation must be fully supported by props and shoring.
2. Edge protection to prevent falls into the excavation must be installed.
3. A temporary vertical prop or support may be placed under the wall to keep any loose bricks or masonry in place.
4. The main load from the existing wall will span onto the wall and foundations on either side of the excavation.

<u>Stage 1. Excavation</u>



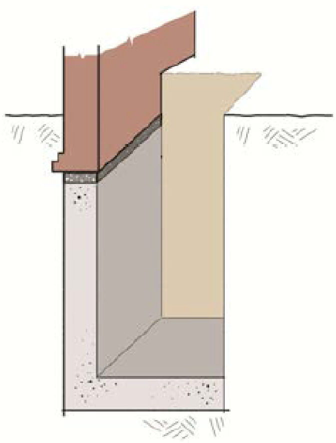
1. Reinforcement is fixed into position.
2. Reinforcement details are given in the engineering design. It is critical that the reinforcement is installed as detailed in the design
3. The design will usually require a shear connection between adjacent underpins. This is generally achieved using dowel bars between adjacent pins or by building sheer keys in the concrete underpin walls.

<u>Stage 2. Reinforcement</u>



1. Concrete is placed in the toe first.
2. Once the toe is sufficiently cured the concrete wall is poured.
3. Shuttering, usually timber, is used to hold the concrete for the wall in place while it is placed.
4. Gap of approximately 75mm left between the top of the concrete and the underside of the existing foundation.

<u>Stage 3. Concrete placement</u>



1. After a minimum of 24 hours dry-pack is rammed into the 75mm void that has been left above the new underpin.
2. Dry-pack is a mix of sharp sand and cement. It is easy to handle and has a low shrink volume, minimising settlement of the wall onto the new underpin foundation.
3. The completed underpin must be supported horizontally either by horizontal propping or by backfilling the excavation until the ground slab and possibly other permanent works are constructed.

<u>Stage 4. Dry packing</u>