15 Landor Road
Basement Underpinning Proposed Method Statement and Temporary Works Design

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Beta Design Consultants provide cost-efficient, safe and timely design solutions to clients in the residential, commercial, institutional and industrial sectors. All work is carried out by fully qualified Civil and Structural Engineers from our office in West London. Our services meet the Clients' needs, budget and deadlines.

Contents

1. Scope

1.1. The scope of this method statement is to provide a proposal that the contractor may adopt to ensure a safe underpinning and basement construction. The proposals would ensure alignment with the design assumptions and the site conditions. The statement also contains suggestions and proposals for the temporary support to be provided during the works.

1.2. The proposal can be adopted by the contractor but the contractor must ensure that they understand it and they would still be responsible for the risk assessment and method statement RAMS. The Contractor is responsible for ensuring the safe execution of the works on site, the stability of the site throughout the works, the design and provision of the temporary works and the details of the temporary works for the property address, adjacent properties, and the site overall (including footways and pavements that are likely to be affected).

1.3. This method can be included in the Party Wall Award.

1.4. The contractor shall allow for site conditions. Should the site staff require alterations to the proposals in this method statement, an alternative proposal or modifications to the proposal may be submitted for the engineer's review and approval to ensure the suggestions still align with site conditions and design assumptions.

1.5. Party Wall Surveyors would need to be informed of any changes to this method statement. Changes would need to be incorporated as an Addendum to the Party Wall Award will be required.

1.6. The overall approach is to construct the basements in underpin segments (hit and miss sequence is provided in our drawings) that will support the permanent building.

1.7. Temporary props will be provided along the height of the pin in the temporary condition (refer to drawings showing proposed layout of temporary props also referred to as temporary works intent). Before the base is cast, props are needed. The basement slab would provide propping in the final condition as the underpins are designed as propped underpins. In the temporary condition, the edge of the slab is propped using props that are fixed to the middle of the property.

1.8. Also the skin friction between the concrete base and the soil provides further resistance. The central soil mass is to be removed in portions (thirds but no greater than 8m) and cross propping subsequently added as the central soil mass is removed.

1.9. A ground investigation has been undertaken. The soil present is Brown Clay with Gravels.

1.10. The bearing pressures have been limited to 85kN/m2, as advised in the ground investigation report.

1.11. The water table is expected to encountered below the basement level.

1.12. The structural waterproofer must comment on the proposed design and ensure that he is satisfied that the proposals will provide adequate waterproofing.

1.13. The concrete mix shall be according to the specifications and requirements mentioned in the design drawings. The contractor shall maintain records to demonstrate that the mix complies with these requirements and achieves the required strength and durability requirements.

2. Exclusions

2.1. Although the intent of the temporary works is included, the design and installation of the temporary works is the responsibility of the contractor.

2.2. Although, we have prepared this method statement to communicate residual risks and aid in the safe sequence, a full risk assessment shall be carried out by the contractor so they can identify all residual risks and manage them on site through robust RAMS.

2.3. The design of the waterproofing is not part of Beta Design Consultants scope. The contractor shall ensure that the basement drainage and waterproofing is planned in advance.

3. Enabling Works

3.1. The site is to be hoarded with ply board sheets, at least 2.2m high, to prevent unauthorised public access.

3.2. Licences for skips and conveyors should be posted on the hoarding.

3.3. Provide protection to public where conveyor extends over footpath. Depending on the requirements of the local authority, construct a plywood bulkhead over the pavement. Hoarding to have a plywood roof covering over the footpath, night-lights and safety notices.

3.4. No significant dewatering is expected. Localised removal of water may be required to deal with rain from perched water or localised water. This is to be dealt with by localised pumping. Typically achieved by a small sump pump in a bucket.

3.5. It is expected that the property has shallow corbelled foundations as shown on our drawings. On the party wall side, the foundations are deeper as there seems to be a partial cellar. On commencement of construction, the contractor will determine the foundation type, width and depth. Any discrepancies will be reported to the structural engineer in order that the detailed design may be modified as necessary.

4. Basement Sequencing

4.1. Please refer to Beta Design Consultants drawings of proposed pins sequence. Cantilevered wall formation around perimeter of basement shall follow the sequence on the drawings.

4.2. For each pin, please refer to Beta Design Consultants proposed method.

4.3. Excavation for the next sequential pin shall not commence until at least 8 hours after drypacking of previous pin. The method statement recommendations shown on the drawings shall be followed.

4.4. For the lightwell in the front, it is proposed that this be carried out subsequent to stabilizing the one level bay.

4.5. The one level bay can be stabilized by underpinning it. Alternatively, needling can be used to place the basement slab and then build up the bay from the basement slab.

4.6. Excavating and casting of basement slab.

4.6.1. For a full height pin, excavate top 1/3rd of underpin. Install temporary props locating props at a third of the height of the wall.

4.6.2. Excavate the middle 1/3rd and prop.

4.6.3. Excavation the bottom 1/3rd and prop.

4.6.4. Place below-slab drainage. All drainage shall be encased in concrete below the slab and cast monolithically with the slab. Placing drainage on pea shingle below the slab allows greater penetration for water ingress.

4.6.5. Place reinforcement for basement slab.

4.6.6. Building Control Officer and Engineer are to be invited for inspection.

4.6.7. Once inspected, pour concrete.

4.7. Provide structure to ground floor and water proofing to retaining walls as required. It is recommended to leave 3-4 weeks between completion of the basement and installing drain.

4.8. Concrete Testing:

4.8.1. For first 3 pins take 4 cubes and test at 7 days then at 14 days and inform engineer of results. Test last cube at 28 days. If cube test results are low then action into concrete specification and placement method must be considered.

4.8.2. A record of dates for the concrete pouring of each pin must be kept on site.

4.8.3. The location of where cubes were taken and their reference number must be recorded.

5. Superstructure

5.1. It is proposed that the contractor needs to undertake an inspection of the party wall, flank wall front and rear wall and confirm their condition. Propping the masonry walls is a strong recommendation as the ground floor is currently

removed and these walls are going to span double heigh so a restraint at ground floor level is required during the works (double joists internally and externally with raking props).

5.2. The permanent structural work can then be undertaken whilst ensuring that the full integrity of the structure above is maintained.

5.3. Provide propping to floor where necessary.

5.4. Excavation of pins involves working in confined spaces and working in excavations and the contractor shall use competent operatives that are trained for these working conditions and are familiar with risks and how to manage them.

5.5. The contractor shall prepare a detailed risk assessment and a method statement to manage all identified residual risks.

5.6. The following measures should be applied:

Operatives must wear **the correct PPE**.
An attendant must be present at all times, at ground level, while excavation is occupied.
A rescue plan must be produced prior to the works as well as a task-specific risk and method statement.

5.7. Working in the confined space should require a permit to work.

5.8. Install padstones at required locations.

5.9. Insert steelwork and dry pack to padstone

6. Approval

6.1. Building Control Officer/Approved Inspector to inspect pin bases and reinforcement prior to casting concrete.
6.2. Contractor to keep list of dates of pins inspected and cast.

7. Temporary Props Sizing for Underpinning Lateral Stability

The underpings have been designed as propped cantilevers. That means that until the basement slab is built, the underpins need to be restrained laterally. Furthermore, as the underpin is being excavated, the soil above is placing pressure on the vertical face of the wall. This calculation has been provided for the sizing of props required for the trench and standard underpins in the temporary condition. There are gaps left between the sheeting and as such no water pressure will occur. Any water present will flow through the gaps between the sheeting and will be required to be pumped out.

Trench sheets should be placed at regular centres to deal with the ground. It is expected that the soil between the trench sheeting will arch. Looser soil will require tighter centres. It is typical for underpins to be placed at 1200c/c in this condition the highest load on a trench sheet is when 2 No.s trench sheets are used. It is for this design that these calculations have been provided.

Soil and ground conditions are variable. Typically, in the temporary condition, clays are more stable and the Cu (cohesive) values in clay reduce the risk of collapse. It is this cohesive nature that allows clays to be cut into a vertical slope. For these calculations, weak sand and gravels have been assumed. The soil properties are:

Retained height H = 3m

Surcharge	p = 10 kN/sqm
Soil density	γ = 18 kN/m^3
Angle of friction	ϕ = 25^0
Active soil pressure	ka = (1 – sin ϕ) / (1 + sin ϕ) = 0.4
Passive soil pressure	kp = 1 / ka = 2.5
Hyrdostatic pressure at base (triangular)	p1 = ka*γ*H = 21.6 kN/sqm
Surcharge pressure along wall face (rectangular)	p2 = pa * ka = 0.4 *10 = 4 kN/sqm
Applied force per linear metre ignoring passive	F = (0.5 p1 + p2)*H = 44.4 kN

Assuming 3 No acrow props

Each has a loading capacity of 32 kN. OK.

Acrow Prop Data Sheet – Scaffolding Supplies Limited

Safe Working Load (kN) for Props loaded 25mm Max. Eccentric and 1.5° Max. Out-of-Plumb.

Recommended safe working loads for Props where concentric loading cannot be guaranteed. When supporting timber bearers prop load may be limited by allowable stress in timber.

Height (m)	1.25	1.5	1.75	2.0	2.25	2.5	2.75	3.0	3.25	3.5	3.75	4.0	4.25	4.5	4.75	5	5.25	5.5	5.75	6.0
Prop Size																				
0,1,2,3	17	17	17	17	17	17	17	15	13	11	10	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	17	14	11	10	9	8	7	7	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	13	11	9	8.5	7.5	6	5	4.5	4

Source: Based on CIRIA Technical Note 79 (1977), (Except for size '0' props).

Safe Working Load (kN) for props loaded Concentrically and 1.5° Max. Out-of-Plumb.

Recommended safe working loads for props supporting Metriform or similar formwork systems ensuring concentric loading. Also for timber bearers where fork heads are used to ensure concentric loading, but load on prop may be limited by allowable stress in timber.

Height (m)	1.25	1.5	1.75	2.0	2.25	2.5	2.75	3.0	3.25	3.5	3.75	4.0	4.25	4.5	4.75	5	5.25	5.5	5.75	6.0
Prop Size																				
0	32	32	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3	-	-	32	32	32	26	23	19	17	15	13	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	24	19	15	12	11	10	9	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	18	15	12	11	9	8	7	6	6

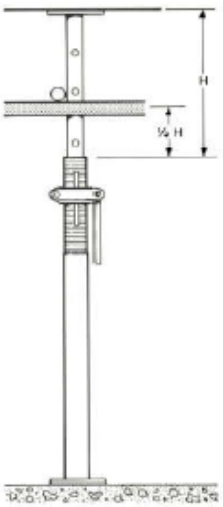
Source: Based on CIRIA Technical Note 79 (1977), (Except for size '0' props).

Safe Working Load (kN) for props loaded Concentrically and Suitably Laced with Tube and Fittings.

Recommended safe working loads for props laced in two directions, at right angles, at a level ⅓ of the height of the extended inner tube (see sketch). The lacing and the formwork deck must be restrained against horizontal movement by tying to the building or by diagonal bracing.
When using the loading tables, the height of any drop head or similar attachment should be included in the prop height.

Height (m)	2.0	2.25	2.5	2.75	3.0	3.25	3.5	3.75	4.0	4.25	4.5	4.75
Prop Size												
1,2,3	-	-	32	32	32	32	28	24	20	-	-	-
4	-	-	-	-	-	32	32	30	26	22	19	16

Source: calculated in accordance with BS449: Part 2: 1969, but using a load factor of 2.



N.B For all practical purposes, to convert KN to tons or metric tones divide by 10.

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Figure 1: Acrow Props Safe Working Load