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Civil & Structural Design Consultants

PROJECT:	**No 25 & 26 REDDINGTON GARDENS LONDON NW3 7RX**
PROJECT NO:	**19720**
DOCUMENT TITLE:	**CERTIFYING ENGINEER'S REPORT**
DOCUMENT NO:	**19720-RP-02**
DATE:	**22nd MAY 2019**

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Author	David Barden
Project Number	19720
Project Name	No 25 & 26 Reddington Gardens. London. NW3 7RX

CONTENTS

1. PREAMBLE

1.0. General

Barden Chapman Consulting Engineers have been appointed as Certifying Engineer to review a basement design undertaken by Cranston Consulting Engineers, who are the Permanent Works Engineer for a proposed development at No 25 & 26 Reddington Gardens, London. NW3 7RX.

This report addresses the S106 Agreement requirements, and in particular sections 3 and 4 which identify the duties of the certifying engineer as:

"to review the design plans and offer a 2 page review report to the Council confirming that the design plans have been formulated in strict accordance with this definition and being 2.8 and have appropriately and correctly incorporated the provisions of sub clauses (i)-(vi) above and are sufficient to achieve the objectives of the Detailed Basement Construction Plan AND should any omissions, errors or discrepancies be raised by the Certifying Engineer then these be clearly outlined in the report and thereafter be raised directly with the Basement Design Engineer with a view to addressing these matters in the revised design plans".

1.1. Brief

Barden Chapman Consulting Engineers (BCCE) have been commissioned to provide a Certifying Engineering review for the proposed development at No 25 & 26 Reddington Gardens, NW3 7RX, as per of the S106 Agreement requirements.

1.2. Scope & Check Assumptions

The review has been carried out based on the structural information produced by Cranston Consulting Engineers, which has been issued to BCCE between 8th January 2019 and 13th May 2019.

Checking review comments have been issued by BCCE, with responses addressed to these comments by Cranston Consulting Engineers to close out any review queries.

Third party information, inclusive of a detailed temporary works design (excluding the outline temporary works scheme provided by Cranston Consulting Engineers) are outside the scope of this report.

1.3. Report Author

The Checking Review has been prepared by:

David Barden.
BE(Hons), Dip Struct Eng, Adv Dip PM, CEng, MICE, MIStructE

Qualifications include a BE(Hons) in Civil Engineering, a chartered engineer (CEng), a member of the Institute of Structural Engineers, and over 15 years' specialist experience in projects of this nature.

1.4. Revision.

This is revision (P2) of this report, which has been revised for proposed scheme changes and mainly removal of the swimming pools and extension of the basement area and is issued for comment.

2. OBSERVATIONS

2.0. General

Please refer to Appendix I for Structural Review Comment Schedule and S106 Item Reference Schedule which contains detailed observations on each individual review item undertaken by BCCE. A brief summary of the review items is outlined below.

2.1. Drawings

We consider that a comprehensive set of Structural Engineers drawings have been provided, for what would usually be required at this stage of the project. Review comments where made by BC have been accounted & updated by revised drawings issued by Cranston Consulting Engineers.

2.2. Calculations

The calculations provided have generally been undertaken by a combination of hand calculations and by the Tedds & Master Series structural analysis design software. This could generally be considered a slightly conservative design approach if compared to finite element modelling software. The loads applied via hand calculations and used within the design software appear of the scale & magnitude to be expected for a project of this nature.

2.3. Specifications

A comprehensive specification for the project has been provided covering all elements of the construction work inclusive of demolition, excavation, piling, substructure and superstructure. Comments provided by BCCE were generally relatively minor in nature.

2.4. Outline Method Statement

The outlined methodology for the basement works will utilize top down construction. A summary of the methodology is as follows: -

- Construct secant pile wall & bearing piles.
- Construction of the ground floor slab, temporary supported on plunge columns/piles below.
- Basement bulk excavation.
- Cast basement foundations, RC slabs & walls.
- While basement works progressing, construction of superstructure above also progressing.

Comments in relation to heave, ground movement & water ingress have received appropriate responses from Cranston Consulting Engineers to close out BCCE review comments.

2.5. Outline Temporary Works

An outline set of temporary works drawings have been issued by Cranston Consulting Engineers as part of the structural engineer's package of information. The drawings issued appear to be a comprehensive and appropriate for the later temporary works design portion to be undertaken by the Contractor.

3. CONCLUSION

Correspondence between BCCE & Cranston Consulting Engineers, along with revisions of Cranston drawings to account BCCE review comments, have exhaustively addressed the Certifying Engineers check provided by Barden Chapman Consulting Engineers. An additional review has been undertaken for the revised basement plans and structural layouts with additional Structural Review Comment Schedule included in Appendix I.

It is out considered opinion that the Permanent Works Engineers design is in accordance with the terms of the Agreement, with the following items to be dealt with at detailed design stage: -

- A detailed temporary works design should be undertaken by the Contractor's Engineer prior to construction works commencing on site.
- Party Wall Awards for the neighbouring properties are by the Party Wall Surveyors, but will require input from the Permanent Works Engineer at detailed design stage to ensure agreements are in place with the neighbouring properties.

APPENDIX I – STRUCTURAL REVIEW COMMENT SCHEDULE & S106 ITEM REFERENCE SCHEDULE

PROJECT NO:	**19720**	**PROJECT ENGINEER:**	**N/A**
PROJECT NAME:	**No 25-26 Reddington Gardens. NW3 7RX**	**CHECK ENGINEER:**	**David Barden**
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Barden Chapman Consulting Engineers

Structural Review Comment Schedule

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Comment Ref No.	BC Comments 11.01.2019	CC Response	BC 18.01.2019
Drawing Review			
BC-C1.1	Please provide architects site plan to provide an understanding of the basement construction in relation to the existing neighbours buildings.	Please refer to drawings provided.	Have received drawings under separate cover, allowing BC to obtain a greater understanding of the design intend. Comment closed.
BC-C1.2	For a reviewing engineer, the full extent of the existing neighbouring buildings is unclear. Key plan/showing neighbouring buildings hatched in this regard would more accurately reflect the 7No party wall agreements required.	See attached Monitoring Points Drawing No TW53 along with existing Site Survey Drawing	Survey overlay has provided clarity. Comment closed.
BC-C1.3	Site boundaries not indicated on drawings?	Boundaries Added to Drawings	Note drawings updated accordingly. Comment closed.
BC-C1.4	On Drg SE 02, Foul Sump Pits clashing with pile cap? How is this to work?	Sumps are located in floor void under pool deck	Comment closed.
BC-C1.5	Suggestion only. The 3D schematic in the bottom RHS, would be really useful to include at basement level, lower ground & upper ground floor level, to show the building in 3D as height progresses. BC have employed this method on other projects for clarity.	Noted	Comment closed.
BC-C1.6	On Drg SE 02, RC column incorrectly shown.	Drawing Updated	Comment closed.
BC-C1.7	Drg SE 04, piles below structure should be shown for clarity?	Drawing Updated	Comment closed.
BC-C1.8	Drg SE 04, how does block and beam floor account uplift on the underside of the slab?	Beam and block floor is at Basement level SSL 88.800, which is above pool base slab at SSL 86.600. Bool base is 300mm thick RC Slab which resists uplift.	Comment closed.
BC-C1.9	Drg SE 06, boundary details are unclear. TW trench sheet supporting 2.4m of retained ground will not work without TW propping.	Trench sheets shall be propped – refer to sketch TWSK-03.	Thank you for clarifying. Comment closed.
BC-C1.10	Below ground drainage drgs. Not provided?	Drainage drawing attached	Thank you for clarifying. Comment closed.
BC-C1.11	Drg SE06, underpinning details require more clarity? Width of existing wall? Depth of existing footing? Depth of underpinning? How is it constructed? TW Required?	Refer to Setches TWSK-01, 02 & 03.	Thank you for clarifying. Comment closed.
BC-C1.12	Do highway loads along GL J need to be considered? TFL will usually require a UDL of 25kN/sqm if adjacent to a red route.	Site not adjacent to a red route. Ha loading of 10KN/m2 is sufficient.	Comment closed.
BC-C1.13	There is no reference to party wall awards on the drgs? There are 7No party wall awards required. Does reference need to be made to same?	Attached are Separate party wall drawings for the scheme.	Comment closed.
BC-C1.14	Drg SE 08, Structure below now shown on drg, which is confusing. How is slab supported.	Drawing updated to indicate structure below.	Comment closed.
BC-C1.15	Drg SE 08. How is the proposed chimney to be supported? Lightweight structure?	Chimney structure comprises structural steel frame hung from upper floor slabs. Horizontal beams and shelf angles support brick masonry façade.	Thank you for clarifying. Comment closed.
BC-C1.16	Drg SE 22. Transfer beam does not appear to be shown on upper ground floor plan?	Drawing updated to indicate structure below.	Comment closed.
BC-C1.17	Drg SE 22. Stairs and Ground to front of building needs clarification?	Ground level to front mid way between lower ground and upper ground floor levels.	Comment closed.

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Structural Review Comment Schedule

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BC-C1.18	Drg SE 23. Have effects of vibration from piling been considered on neighbouring building?	Foundations of adjacent building confirmed as piled, therefore vibration from piling operations should be minimal. Vibration monitoring shall be carried out during piling operations limiting accelerations to 10m/s/s	Comment closed.
	Sequence of Basement Construction. 1. Stage 3. Has the slab been designed for the various temporary conditions? 2. Stage 4. Specify the min strength the slab should acquire. 3. Stage 5. How is the final lift of load bearing RC structure to underside of ground floor RC Slab cast? To ensure load transferred from TW structure to permanent works structure?	1. Slab has been designed to account for various temporary support conditions and checked for punching shear at plunge columns. 2. Minimum concrete strength of 35N/mm2 should be attained before proceeding to stage 4. Main contractor may propose a higher strength concrete in order to attain an early age strength. Walls and columns shall be cast beneath the lower ground floor slab with a small downstand, to permit the use of letterbox shuttering to cast final lift of of rc structure.	Thank you for clarifying. Comment closed.
Specification Review			
BC-C2.01	Is testing for contamination of the muck away required?	Waste Classification Testing shall be carried out by the Contractor prior to disposal of excavated material	Noted. Comment closed.
BC-C2.02	Condition survey of adjacent properties not specified, would be prudent to carry out same?	Condition surveys carried out by party wall surveyor.	Noted. Comment closed.
BC-C2.03	A DC-1 Class is specified for the piles, which is the least onerous class. Is this correct?	Sulphate class DS-3 found in Alluvium and that an ACEC class of AC-3 applies, therefore A DC-3 class concrete shall be specified for the piles.	Noted. Comment closed.
BC-C2.04	Is any movement monitoring of the contig basement pile wall required during the excavation work?	With top down construction monitoring of the Secant wall will not be carried out.	Full ground movement analysis of the adjoining buildings has been undertaken. We suggest that movement monitoring via Digital Inclinometer System installed within 4No. piles may be useful but is not a necessity. Comment closed.
BC-C2.05	40 x bar diameter lap length does not account EC lap length requirement for good bad conditions.	Noted	Comment closed.
Detailed Method Statement Review			
BC-C2.06	Has heave been accounted in the detailed design calculations?	Heave under a 300mm slab is expected to be approximately 10-15KN/m2	Comment closed.
BC-C2.07	Please provide details of the ground movement assessment carried out.	Attached	A detailed ground movement assessment has been carried out and checked by Campbell Reith. Comment closed.
BC-C2.08	Damage Category 2 stated. Have condition surveys of the existing neighbouring properties been carried out?	Condition surveys carried out by party wall surveyor.	Comment Closed.
BC-C2.09	How is water ingress during construction being controlled?	Perimeter wall is Secant piled wall, which should limit ingress of ground water into the excavation. Localised pumping may be required for any perched water or seepage.	Comment closed.
Pile Wall Design Calculations Review			

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BC-C2.10	Grade of Concrete used for piles is C30/37 whereas C32/40 is outlined in the specification. Calculations are therefore marginally conservative.	Noted	Comment closed.
	Calculations appear comprehensive. No further comment.	Noted	Comment closed.
Basement Design Calculations Review			
BC-C2.11	How are the floor UDL comprised? Blanket loads only applied in calculations.	Swt 300mm Slab = 7.2KN/m2, Screed =2.4KN/m2, Live = 2.5KN/m2 inc Partitions.	No further comment. Comment closed.
BC-C2.12	How are tension loads calculated? Has heave, water pressure and 0.9gk load case been accounted? 40kN/sqm appears underestimated for the expected uplift UDL force.	Generally, 10KN/m2 heave plus 40KN/m2 water pressure to main basement and 60KN/m2 to pool area. Min dead load provided to piling designer to determine net uplift	No further comment. Comment closed.
BC-C2.13	Even though heave protection has been provided, the RC basement should still be designed for the collapse load.	Uplift from residual heave shall be accommodated within the design.	No further comment. Comment closed.
BC-C2.14	Has surcharge load been considered in the design the RC basement retaining wall.	Only water pressures considered in liner walls, surcharges load resisted by Secant Piled Wall.	Noted. Comment closed.
Temporary Works Review Drg SE 21			
BC-C2.15	Temporary Propping on Section 4 is unclear. Can you please out?	Refer to sketches TWSK01,02 & 03	Sketches have provided clarity. Comment closed.

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(Via email to PlanningObligations@camden.gov.uk)

30 January 2019

Dear Sirs,

Job Name: **19720 No 25 & 26 Reddington Gardens. NW3 7RX**
Re: **Planning queries in relation to Appendix F of submitted BCP.**

We thank you for your recent email dated 25th January 2019 with regard the above queries and having reviewed, append our response to each individual S106 item as requested.

We trust this fully answers your queries, but should you require any further assistance, please do not hesitate to contact the undersigned.

Yours sincerely,

David Barden
Chartered Engineer
for Barden Chapman Consulting Engineers

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S106 Item Reference Schedule

Barden Chapman
Civil & Structural Design Consultants

S106 Ref No.	Comment	Certifying Engineer Reference Address.
2.11 "Detailed Basement Construction Plan"		
2.11.2(a)	that the design plans have been undertaken in strict accordance with this definition being clause 2.8 incorporating proper design and review input into the detailed design phase of the development and ensuring that appropriately conservative modelling relating to the local ground conditions and local water environment and structural condition of the Neighbouring Property have been incorporated into the final design; and	Barden Chapman Consulting Engineers, as Certifying Engineers, have undertaken a full design review of the following design information provided by the Basement Design Engineer: - 1. Full Set of Drawings. 2. Full Specification. 3. Detailed Method Statement 4. Pile Wall Design Calculations. 5. Basement Design Calculations. 6. Temporary Works Drawings. The geotechnical parameters used within the pile wall calculations have been specifically taken from the site investigation undertaken by Geotechnical & Environmental Associates (Ref J15031), and/or conservative assumptions applied to the geotechnical parameters should specific information be unavailable. Ground water levels are taken from ground water monitoring information within Report J15031, however a conservative high-water check has also been applied within the design calculations for the worst case condition. We consider that Item 2.11.2(a) has been addressed under the requirements of S106.
2.11.2(b)	That the result of these appropriately conservative figures is appropriate to ensure that the basement aspects of the Development will be undertaken without any impact on the structural integrity of the Neighbouring Property beyond "Slight" with reference to the Burland Category of Damage; and	A comprehensive Ground Movement and Building Damage Assessment Report has been carried out by Byland Engineer Limited. In total, 42 separate damage category calculations have been undertaken from various load cases and wall types. 38 of the damage category calculations classify damage as either "negligible or very slight", with only 4No. classified as "Slight". Given that no classification is by "slight" we consider Item 2.11.2(b) has been addressed under the requirements of the S106.
2.11.2(c)(i)	That the Basement Design Engineer having confirmed that the design plans have been undertaken in strict accordance with this definition being 2.8 and includes a letter of professional certification confirming this and that the detailed measures set out in sub-clauses (i)-(vi) below have been incorporated correctly and so far as appropriate and are sufficient in order to achieve the objectives of the Detailed Basement Construction Plan; (i) Reasonable Endeavours to access and prepare a detailed structural appraisal and conditions survey of all the Neighbouring Property to be undertaken by an independent suitably qualified and experienced chartered surveyor (and for details to be offered if this is not undertaken in full or part);	Inspections to record a Schedule of Conditions have been carried out by Brooke Vincent & Partners (BVP) at 7 Redington Gardens, No 27 Redington Gardens and No 38 Redington Road, and reasonable endeavours have been made to access the flats at No 27 Redington Gardens. BVP have however been unable to access all Flats at No 27 Redington Gardens. We consider that item 2.11.2(c)(i), insofar as reasonably possible, has been addressed under the requirements of the S106.
2.11.2(c)(ii)	A method statement detailing the proposed method of ensuring the safety and stability of the Neighbouring Property throughout the Construction Phase including temporary works sequence drawings and assumptions with appropriate monitoring control risk management contingency measures and any other methodologies associated with the basement and the basement temporary works.	The basement design engineer has completed a Detailed Basement Method Statement for the proposed construction works, which includes full temporary works sequencing for the top down construction of the proposed basement. A specific section within the method statement has been included for Structural Monitoring, with movement monitoring threshold values classified as Green, Amber, Red. Temporary Works Sequencing drawings have been provided as part of the overall Detailed Basement Methodology. Risk management contingency measures have been outlined within the Detailed Basement Method Statement for each classification, with Red classification requiring that all work cease immediately on site. Given the detailed information provided, we consider that item 2.11.2(c)(ii) has been addressed under the requirements of the S106.
2.11.2(c)(iii)	Detailed design drawings incorporating conservative modelling relating to the local ground conditions and local water environment and structural condition of the Neighbouring Property prepared by the Basement Design Engineer for all elements of the groundworks and basement authorized by the Planning Permission together with specifications and supporting calculations for both the temporary and permanent basement construction works;	Barden Chapman Consulting Engineers have reviewed a detailed set of drawings provided by the Basement Design Engineer. The drawings provided are inclusive of the follow: - 1. General Arrangement Plans. 2. Basement Sections & Detials. 3. Basement Temporary Works Drawings. 4. Temporary Works Sections. 5. Drainage Drawing. The drawings account conservative modelling relating to the local ground and water environment, supported by design calculations (pile wall calculations) as outlined in item 2.11.2(a) above. The ground movement and building damage assessment calculations incorporate conservative modelling to account the structural condition of the Neighbouring Property.

Barden Chapman Consulting Engineers

S106 Item Reference Schedule

		Structural design calculations for the temporary and permanent basement construction works have also been undertaken by hand (Appendix B of the Basement Design Engineers report), which is a conservative design approach if compared with a finite element analysis of the structure. We consider that item 2.11.2(c)(iii) has been addressed under the requirements of the S106.
2.11.2(c)(iv)	The Basement Design Engineer to be retained for the purposes of monitoring the Property throughout the Construction Phase to inspect approve and undertake regular monitoring of both the permanent and temporary basement construction works throughout their duration and to ensure compliance with the plans and drawings as approved by the building control body.	It is Barden Chapman Consulting Engineers understanding that The Basement Design Engineer will be retained in his role by the main client for monitoring, inspection and approval of the permanent and temporary basement construction works throughout their duration. We understand he will also be responsible for compliance with the building control body. We consider that item 2.11.2(c)(iv) has been addressed under the requirements of the S106.
2.11.2(c)(v)	Measures to ensure the on-going maintenance and upkeep of the basement forming part of the Development and any and all associated drainage and/or ground water diversion measures in order to maintain structural stability of the Property the Neighbouring Property and the local water environment (surface and groundwater);	The Basement Design Engineer has provided the following statement with regard to Ongoing Maintenance and Upkeep: - The full structural design of the permanent and temporary works will be included within the Operations and Maintenance Manual for the completed development. Although the structure has being designed with conservative assumptions to ensure long term durability, the Manual will include a section on the required ongoing inspection of the permanent structure to ensure any potential issues are discovered quickly before they have the capacity to have any influence on the structural stability of the building or neighbouring structures. This maintenance regime will include regular cleaning and inspection of the underground drainage. We therefore consider that item 2.11.2(c)(v) has been addressed under the requirements of the S106.
2.11.2(c)(vi)	Measures to ensure ground water monitoring equipment shall be installed prior to implementation and retained with monitoring continuing during the Construction Phase and not to terminate monitoring until the issue of the Certificate of Practical Completion (or other time agreed by the Concil in writing);	Ground water monitoring equipment is currently installed on site following completion of the site investigation works completed by Geotechnical & Environmental Associates. We understand that ground water monitoring will be carried out for the duration of the works until Certificate of Practical Completion. We consider that item 2.11.2(c)(vi) has been addressed under the requirements of the S106.

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Barden Chapman Consulting Engineers

Structural Review Comment Schedule

Barden Chapman
Civil & Structural Design Consultants

Comment Ref No.	BC Comments 21.05.2019	CC Response	BC Comment
Drawing Review			
BC-C1.1	Drg GA 04, the columns along GL N (1225x200) appear to be different sizes from GL 1-2 and GL 4-5.	Noted	Comment closed.
BC-C1.2	Drg GA 08, there is an approximately 100mm wide continuation RC nib on the lift wall along GL H, what is the purpose of this?	Nib removed	Noted. Comment closed.
BC-C1.3	Drg GA 10, the 200mm RC wall along GL 03 appears to be continuous throughout its length up to roof. It also appears to be broken up through solid lines. Please confirm if there are full height openings in this wall in which case the wall should be indicated dashed under where broken?	Wall extends to underside of 2nd floor only.	Noted. Comment closed.
BC-C1.4	Drg GA 12, padstone supports have been proposed along GL 03 which would indicate load bearing masonry under. As per comment 1.3 above, RC walls are outlined on GA 10. Please clarify?	Wall above 2nd floor to be LB Masonry	Noted. Comment closed.
BC-C1.5	Drg GA 12, the ends of the proposed raking steel roof beams are proposed to be bolted to the concrete slab. Sections 4-4 and E-E indicate the raking roof members are supported on load bearing masonry. More detailed local sections would give a better perspective of the proposed cranked roof steel members and their support details.	Steel will be cranked down to rc frame. Details still in development	Noted. Comment closed.
BC-C1.6	Full height section locations should be called up on plan to determine the location of sections (Section 4-4, E-E)?	Noted	Comment closed.
BC-C1.7	A detailed section through the chimney outlining the steel support details would clarify the proposed steel frame hung from the upper floor slabs. Not fully clear how this is supported from the General Arrangement plans.	Detail still in development – not necessarily part of current review!	Noted. Comment closed.
BC-C1.8	Drg GA 15, The drained cavity outflow, from sump along GL 08, is proposed to be pumped to S4. Please include additional S4 manhole on drg if required.	See attached drainage layouts	S4 to be outlined on drg. Comment closed.
BC-C1.9	Drg GA 06, step location should be clearly outlined along GL D.	Noted	Comment closed.
Specification Review			
BC-C2.01	Refer to Structural Review Comment Schedule for No. 24 Reddington Gardens.	Noted	Comment closed.
Detailed Method Statement Review			
BC-C3.1	Section 4.1 of the detailed method statement references the proposed swimming pool which has now been omitted.	Noted	Comment closed.
BC-C3.2	Section 9.3 and 9.4 have contradicting red trigger levels of 8 and 10mm. Please confirm which is the proposed final red trigger level?	10mm adopted	Noted. Comment closed.
BC-C3.3	Refer also to comments on construction sequence and temporary works drawings in Structural Review Comment Schedule for No. 24 Reddington Gardens.	Noted	Comment closed.
Pile Wall Design Calculations Review			
BC-C4.1	Reviewed in line with Structural Review Comment Schedule for No. 24 Reddington Gardens. Calculations appear comprehensive. No further comment.	Noted	Comment closed.

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Barden Chapman Consulting Engineers

Structural Review Comment Schedule

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Basement Design Calculations Review			
BC-C5.1	Reviewed in line with Structural Review Comment Schedule for No. 24 Reddington Gardens. Calculations appear comprehensive. No further comment.	noted	Comment closed.
Temporary Works Review Drg SE 20			
BC-C6.1	Reviewed in line with Structural Review Comment Schedule for No. 24 Reddington Gardens. Calculations appear comprehensive. No further comment.	noted	Comment closed.

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