Technical Note

Project:	**Mount Pleasant – Phoenix Place**	Job No:	**60556156**
Subject:	**Approval In Principle to Camden Highways**	Revision:	**02**
Prepared by:	**Rob Mattimoe**	Date:	**02/03/2018**
Checked by:	**David Cuckow**	Date:	**02/03/2018**
Approved by:	**Darran Leaver**	Date:	**02/03/2018**

This document relates to the permanent works associated with the above project only, with periodic reference to the temporary works where prompted and as necessary. A separate AIP for the temporary works will be issued by the Principle Contractor.

The proposed development, in the permanent condition, should not adversely affect the surrounding highways. Both the substructure and superstructure is arranged within the site boundary, with the foundations set back from said boundary to allow for construction tolerances, temporary works and protection of the existing highway as necessary. The key aspect of the development that will pose a risk to the highway is the 2 storey basement and the key consideration in the design and construction of this basement will be to prevent the surrounding ground from being undermined or made unstable – that is one of the primary reasons that a secant piled wall has been proposed for the basement box, as it acts as a permanent formwork to a basement space.

Structural and Geotechnical Design has been progressed to a RIBA Stage 3 level of information and through the next design stage further analysis of the secant pile wall in particular will be made so that horizontal movements can be accurately predicted. At present the maximum horizontal deflection of the secant pile wall (at capping beam level) is 15mm. Since this value is less than typical construction tolerances for foundations it is deemed to be acceptable. The outer face of the secant piles and of the capping beam at their head is further than 3m from the kerb line of each of the three highways that bound the site.

The below headings have been extracted from the Camden Highways AIP template, with responses given in **bold** text. Whilst the template seems to be generic, in that it can be used for new bridges over the highway etc. as well as new developments adjacent the highway, every effort has been made to complete all sections clearly.

1. HIGHWAY DETAILS

1.1 Type of Highway

Gough Street (to the West of the site)

- **Southern section of the highway (between junctions with Coley Street and Mount Pleasant) is a one-way, single lane carriageway with traffic heading south (towards the junction with Mount Pleasant).**
- **There is an existing vehicular crossover onto the site which has been blocked off with large concrete blocks and a security gate.**
- **Northern section (above junction with Coley Street) of the highway is a wider two-way carriageway.**
- **There are parking bays along the East kerb, alongside the entirety of the site boundary (except for at the junction with Coley Street which occurs approximately half way along the site boundary).**
- **To the South of the junction with Mount Pleasant the highway becomes Laystall Street.**
- **The highway terminates in a 'dead end' where it meets Calthorpe Street to the North.**

Mount Pleasant (to the South of the site)

- **Two-way carriageway.**
- **There are 2no. existing vehicular crossovers onto the site. Neither are in use and both have been blocked off with large concrete blocks or security gates.**
- **There are parking bays along the North kerb, alongside the entirety of the site boundary.**
- **There are several parking bays for solo motorcycles on the South kerb.**
- **To the West of the junction with Gough Street the highway becomes Elm Street (a one-way carriageway heading west becoming a two-way carriageway).**
- **To the East of the junction with Phoenix Place the highway continues as Mount Pleasant.**

Phoenix Place (to the East of the site)

- **Two-way carriageway.**
- **There are 3no. existing vehicular crossovers onto the site. All are gated and in use by Royal Mail Group to access the site (entire site is currently used for parking Royal Mail Group vehicles).**
- **In addition to the crossovers mentioned above there are 2 no. redundant vehicular crossovers onto the site where the boundary wall has been permanently bricked up.**
- **There are parking bays along the West kerb, alongside the entirety of the site boundary.**
- **To the South of the junction with Mount Pleasant the highway becomes Warner Street**
- **To the North of the junction with Calthorpe Street the highway becomes Pakenham Street**

1.2 Permitted Traffic Speed

AECOM understand that all roads maintained by Camden Council have a 20pmh speed limit. Since there is no evidence of the roads surrounding the site being private roads or Transport for London Road Network (TLRN) 'red routes' it is assumed that the permitted traffic speed on Gough Street, Mount Pleasant and Phoenix Place is 20mph.

1.3 Existing Restrictions

- **There is a Waiting Restriction in place along Mount Pleasant, Phoenix Place and on the one-way section of Gough Street (between junctions with Coley Street and**

Mount Pleasant). The restriction is due to a local School and is active between 6:30pm and 8:00am for goods vehicles over 5 tonnes and for buses and coaches.

- **In addition to the above restriction there is a waiting restriction on all vehicles along Mount Pleasant and Phoenix Place between 8:30am and 6:30pm on Monday to Friday and between 8:30am and 1:30pm on Saturday.**
- **There is a No Loading Restriction in place along Phoenix Place. The restriction is active between 8:30am and 6:30pm on Monday to Friday and between 8:30am and 1:30pm on Saturday.**

2. SITE DETAILS

2.1 Obstacles Crossed

The site does not cross any active highways. It is bound by Gough Street to the West, Mount Pleasant to the South and Phoenix Place to the East.

3. PROPOSED STRUCTURE

3.1 Description of structure and design working life

The proposed structure is a residential development varying in height from 4 to 13 storeys with 2 storey basement car park. Residential units arranged in a horseshoe configuration around a central landscaped podium, with pedestrian access out onto the highway via the two ends of the horseshoe. Basement car park will be accessed via a ramp on Gough Street. The new build structure has been designed and specified to meet a minimum 50 year design life (subject to approval from NHBC).

3.2 Structural type

Reinforced concrete frame with flat slab (to be constructed in-situ).

3.3 Foundation type

Secant pile wall forming basement box (along Highways on 3 sides) with bearing piles under columns and stability cores within footprint of basement.

3.4 Span arrangements

Columns in basement areas are arranged to suit a car park layout (typically on a 6m x 8m grid).

3.5 Articulation arrangements

The secant pile walls that form the basement run within the site boundary, along Gough Street to the West, Mount Pleasant to the South and Phoenix Place to the East. Secant piles will be designed as propped cantilevers. The outside face of the secant piles is positioned more than 3m away from the nearest kerb line in all cases.

3.6 Road restraint systems requirements

Refer to Landscape Architect, Transportation Engineer and Highways Engineers layouts for requirements and details of road restraint systems. Under the conditions as outlined in the Building Regulations (Part A) the proposed building will be class 2B since it will be greater than 4 stories in height. As such, the structure will be designed so that effective vertical ties are provided in all concrete columns and an assessment will be made into the removal of key structural elements (from vehicular impact etc.).

3.7 Proposed arrangements for future maintenance and inspection/Inspection for Assessment:

3.7.1 Traffic management

N/A – Structure does not cross the Highway and therefore no inspection of the superstructure or substructure will be necessary from the Highway.

3.7.2 Arrangements for future maintenance and inspection of structure

Access arrangements to structure
N/A – Structure does not cross the Highway. All access to the structure for inspections will be from within the site boundary.

3.7.3A Intrusive or further investigations proposed
None

3.8 Environment and sustainability
AECOM have reviewed the constituents of a standard concrete mix with a view to offer suitable alternatives that would satisfy the requirements of a BREEAM, Code for Sustainable Homes (CfSH) or Home Quality Mark (HQM) assessment. The following mix design is proposed;

Constituent	Proposed Measure
Cement	**Up to 50% GGBS Substitution (i.e. CEM IIIA)**
Coarse Aggregate	**Minimum 10% Stent Substitution**
Fine Aggregate	**Glass Sand Substitution**

3.9 Durability. Materials and finishes/Materials strengths assumed and basis of assumptions.
Concrete in contact with the ground will require a high resistance to attack arising from the salinity levels within the ground water. Concrete Grade to be used throughout the substructure and superstructure:

Location	Grade	Special Requirements
Foundations	**C35/45**	**Sulphate resisting cement**
Slabs in contact with the ground	**C35/45**	**Sulphate resisting cement** **Waterproof concrete**
Slabs generally	**C35/45**	**None**

3.10 Risks and hazards considered for design. Execution, maintenance and demolition. Consultation with and/or agreement from CDM co-ordinator
Refer to AECOM Designers Risk Assessment appended to this document

3.11 Estimated cost of proposed structure, together with other forms considered (including where appropriate proprietary manufactured structure), and the reasons for their rejection (including comparative whole life costs with dates of estimates)
Construction costs are to be advised by Principle Contractor. Refer to AECOM's Basement Walls Options Study (appended to this document) which compares different construction techniques.

3.12 Proposed arrangements for construction
To be advised by Principle Contractor

3.12.1 Construction of structure
Final construction methodology is to be advised by the Principle Contractor. AECOM have made assumptions as to the build sequence for the secant pile wall and the basement box that it confines. These assumptions are appended to this document.

3.12.2 Traffic management
To be advised by Principle Contractor

3.12.3 Service diversions
To be advised by Building Services Engineer and Principle Contractor

3.12.4 Interface with existing structures
N/A. At the time of writing, the site has been cleared of buildings, leaving some boundary walls and a number of ground levels linked by ramps as a legacy of a past use as a carpark. Existing walls within the site boundary are to be demolished prior to construction of the substructure and replaced with a suitable hoarding.
The Fleet River Culvert which runs beneath Phoenix Place to the east of the site.

3.13 Year of Construction
Construction works planned to commence in 2018

3.14 Reason for assessment
To confirm that the construction of the two storey basement will have negligible, if any, impact on the adjacent highways that bound the site.

3.15 Part of structure to be assessed
Secant pile wall

4 DESIGN/ASSESSMENT CRITERIA

4.1 Actions

4.1.1 Permanent actions
No vertical loads to be applied to the highway. Quasi Permanent loads within the boundary, on ground floor podium slab = 11.0 kN/² (including saturated topsoil, planting, paving, waterproofing, insulation and suspended services) but these loads will be transmitted into the secant pile wall.
A ground surcharge force of 10.0 kN/m² has been assumed to act on the secant pile wall (SLS).
The ground earth pressure has been taken as 59.9 kN/m² at +7.10 mOD.
The ground water pressure has been taken as 56.5 kN/m² at 7.10 mOD.

4.1.2 Snow, wind and thermal actions
There will be no net uplift in snow, wind and thermal actions on the highway as a result of the proposed development.

4.1.3 Actions relating to normal traffic under AW regulations and C&U regulations
N/A

4.1.4 Actions relating to General Order Traffic under STGO regulations
N/A

4.1.5 Footway or footbridge variable actions
Footway loading = 5.0 kN/m²

4.1.6 Actions relating to Special Order traffic, provision for exceptional abnormal indivisible loads including location of vehicle track on deck cross-section
N/A

4.1.7 Accidental actions
Accidental loading = 20.0 kN surcharge

4.1.8 Actions during construction
It is assumed that the secant pile wall will be fully propped in the temporary construction case, until the permanent slabs are constructed that will provide restraint in the permanent case.
Principle Contractor to advise is mobile cranes (and their associated outriggers) or other heavy construction vehicles will be positioned close to the secant pile wall during construction.

4.1.9 Any special action not covered above

Vibration from construction activity: It is proposed that the secant pile wall be constructed with a CFA or rotary bored auger rig i.e. those of a non-vibratory nature. Driven piles, impact hammer or vibrating hammer piles will not be used.

4.2 Heavy or high load route requirements and arrangements being made to preserve the route, including any provision for future heavier loads or future widening
To be advised by Principle Contractor

4.3 Minimum headroom provided
N/A – no structures proposed over the highway.

4.4 Authorities consulted and any special conditions required
London Borough of Camden have confirmed that the maximum horizontal deflection at ground level = 25mm.

4.5 Standards and documents listed in the Technical Approval Schedule

- **BS EN 1990-2002 - Eurocode 0 - Basis of structural design**
- **BS EN 1991-1-1:2005 – Eurocode 1: Densities, Self-weight and Imposed Loads**
- **BS EN 1991-1-2:2005 – Eurocode 1: Actions on Structures Exposed to Fire**
- **BS EN 1991-1-3:2005 – Eurocode 1: Actions on Structures – Snow Loads**
- **BS EN 1991-1-4:2005 – Eurocode 1: Actions on Structures – Wind Actions**
- **BS EN 1991-1-5:2005 – Eurocode 1: Actions on Structures – Thermal Actions**
- **BS EN 1991-1-6:2005 – Eurocode 1: Actions on Structures – Actions During Execution**
- **BS EN 1991-1-7:2005 – Eurocode 1: Actions on Structures – Accidental Actions**
- **BS EN 1992-1-1:2004 – Eurocode 2: Design of Concrete Structures: Common rules for building and civil engineering structures**
- **BS EN 1992-1-2:2004 – Eurocode 2: Design of Concrete Structures: General Structural Fire Design**
- **BS EN 1997-1 -2004 – Eurocode 7: Geotechnical: General Rules**
- **BS 8002:1994 (2001) – Code of Practice for Earth Retaining Structures.**
- **BS 8102:2009 - Code of practice for protection of below ground structures against water from the ground**
- **CIRIA C760: Guidance on embedded retaining wall design**
- **CIRIA Report 143 (1995). The Standard Penetration Test (SPT): Methods and Use**
- **Institution of Civil Engineers Specification for Piling and Embedded Retaining Walls (SPERW) dated 2016, third Edition:**
  - **Section B1 General Requirements for Piling Work**
  - **Section B11 Secant Pile Walls**
  - **Section B15 Integrity Testing**
  - **Section B19 Instrumentation for Piles and Embedded Retaining Walls**

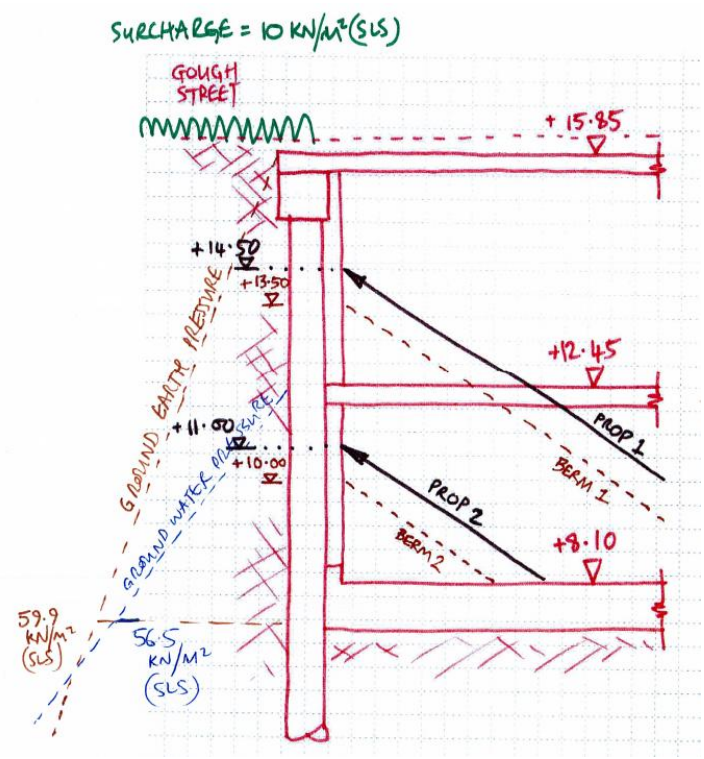
4.6 Proposed Departures relating to departures from standards given in 4.5
N/A

4.7 Proposed departures relating to methods for dealing with aspects not covered by 4.5
N/A

5. STRUCTURAL ANALYSIS

5.1 Methods of analysis proposed for superstructure, substructure and foundations.
Secant pile wall has been modelled and analysed using Wallap software. Superstructure has been modelled and analysed using SCIA Engineer finite element software

5.2 Description and diagram of idealised structure to be used for analysis
Typical section through secant pile wall illustrating the assumed arrangement of temporary works:



5.3 Assumptions intended for calculation of structural element stiffness

- **The perimeter of the basement box will be formed by a 750mm diameter secant wall using hard-firm piles with a 150mm interlock i.e. at 600mm centres. The inside face of the secant wall will receive a waterproof membrane that will be protected by a waterproof concrete lining wall. The central part of the basement will be supported on internal 750mm diameter bearing piles arranged in caps under columns and stability cores.**
- **Secant wall along Gough Street will be supported by 2 levels of temporary props at +11.00 mOD and +14.50 mOD until the lower and upper ground floor slabs have been constructed.**
- **Secant walls along Mount Pleasant and Phoenix Place will be supported by a single level of temporary props at approx. +13.00 mOD until the Lower Ground floor slab has been constructed.**
- **Formation level has been assumed between 7.95 mOD – 8.90 mOD along the Phoenix Place elevation (i.e. 1m below the basement SSL).**
- **Formation level has been assumed between 6.80 mOD – 8.25 mOD along the Mount Pleasant elevation (i.e. 1m below the basement SSL).**
- **Formation level has been assumed between 6.80 mOD – 7.13 mOD along the Gough Street elevation (i.e. 1m below the basement SSL).**
- **Drained Parameters have been assumed for both short- and long-term conditions in view of the anticipated large construction period.**
- **Secant pile wall will be load bearing in the long-term and as such friction δ=0 was assumed for the retained material over the retained height (only for long-term) in accordance with CIRIA C760.**
- **The unit weight of the concrete of the base slab was added as a surcharge of 25kN/m2 at the formation level.**
- **Groundwater level is assumed at +12.75m (SLS) / +13.75m (ULS)**
- **Water in the long-term was assumed to have a piezometric level equal to the initial water table, starting from the formation level. To eliminate negative**

effective stresses at formation level, a surcharge equal to the uplift applied on the slab was considered acting downwards. The partial factor on it was taken equal to 1.

- **Overdig of 0.5m was considered for the ULS cases**

5.4 proposed range of soil parameters to be used in the design/assessment of earth retaining elements

Simplified stratigraphy used in the analysis (depth to top of stratum):

- **Made Ground** **0**
- **Alluvium** **6.8**
- **River Terrace Deposits** **Absent**
- **London clay** **7.9**
- **Harwich Formation** **11.5**
- **Lambeth Group (cohesive)** **12**
- **Lambeth Group (granular)** **23**
- **Thanet Sand** **30**

6. GEOTECHNICAL CONDITIONS

6.1 Acceptance of recommendations of the Geotechnical Design Report to be used in the design/assessment and reasons for any proposed changes.

All recommendations in the Ground Investigation report have been accepted.

See below excerpt from RSK Interpretative Geotechnical Report (June 2017) regarding retaining wall design parameters:

'***The proposed development will include a basement across the majority of the site footprint. In order to facilitate basement construction it may be necessary to construct some form of embedded wall. On the basis of the ground investigation information, the following soil parameters in Table 24 may be used for preliminary retaining wall design purposes.***

Table 24: Retaining wall design parameters

Soil type	Unit weight γ_k (kN/m³)	Short Term Parameters		Long Term Parameters		Earth Pressure Coefficients	
		$c_{u,k}$ (kN/m²)	$\phi'_{cv,k}$ (°)	c'_k (kN/m²)	$\phi'_{cv,k}$ (°)	$k_{o,k}$	$k_{a,k}$/ $k_{p,k}$
Made Ground	18.0	N/A[1)]	28	0	28	0.53	0.35/3.41
Alluvium	18.5	35	-	0	23	0.56	0.37/3.10
Hackney Gravel	19 (moist) 21 (sat.)	N/A[1)]	12	0	34	0.44	0.25/6.90
London Clay Formation	20.0	75 + 7.14z	-	0	22	1.00	0.39/2.95
Lambeth Group - cohesive	20.0	100 + 5.88z	-	0	24	1.0 – 0.8	0.26/6.30

Groundwater was encountered at levels of between 9.54mAOD and 14.99mAOD therefore allowance should be made for hydrostatic pressures acting behind retaining structures. Furthermore, any new basement construction must be designed to be fully sealed to prevent any future groundwater ingress.

In order to prevent damage to adjacent structures, the design of the retaining wall must address the risk of excessive deformation of the wall. Bracing, both in the temporary and permanent condition will therefore be required, to ensure that the horizontal and vertical soil movement around and below the excavation remain within acceptable levels.'

In response to the above;
The soil parameters provided in the RSK report have been used in the Wallap analysis of the secant pile wall.

The basement walls have been designed with 2 waterproofing measures i.e. to achieve a Grade 3 level of waterproofing protection to the internal spaces.

Bracing has been assumed in the temporary case by way of raking props (see section 5.3 and the Simplified Basement Construction Sequence which is appended to this document). In the permanent condition the secant wall will be propped by the ground floor, lower ground floor and basement slabs.

6.2 Summary of design for highway structure in Geotechnical Design Report
N/A

6.3 Differential settlement to be allowed for in the design/assessment of the structure
At basement level (i.e. 5-8m below street level) the maximum horizontal wall deflection is predicted to be 76mm on the Gough Street elevation and 60mm on the Mount Pleasant and Phoenix Place elevations. However, at street level the maximum horizontal wall deflection is predicted to be 15mm. These values are based on the assumptions listed in section 5.3 above and the methodology appended to this document.

6.4 If the Geotechnical Design Report is not yet available, state when the results are expected and list the sources of information used to justify the preliminary choice of foundations.
Refer to the Basement Walls Options Study which is appended to this document. A secant pile wall has been proposed for the basement construction as vibration will be minimised compared to other techniques, there is good groundwater cut-off and a higher axial load can be supported on the wall compared to alternative systems.

7. CHECK

7.1 Proposed Category
Category 2

7.2 If Category 3, name of proposed independent Checker
N/A

7.3 Erection proposals or temporary works for which Types S and P Proposals will be required, listing structural parts of the permanent structure affected with reasons
To be completed by Camden Highways

8. DRAWINGS AND DOCUMENTS

8.1 List of Drawings (including numbers) and documents accompanying the submission

Piling GA	**MPL-ACM-XX-B1-DR-S-01001**
Secant Pile Wall GA	**MPL-ACM-XX-B1-DR-S-01020**
Basement Level GA	**MPL-ACM-XX-B1-DR-S-01003**
Lower Ground Floor GA	**MPL-ACM-XX-GF-DR-S-01004**
Upper Ground Floor GA	**MPL-ACM-XX-GF-DR-S-01005**
Part Plan showing Fleet River Culvert Alignment	**MPL-ACM-XX-XX-DR-S-02001**
Substructure Sections Sheet 1	**MPL-ACM-XX-ZZ-DR-S-04001**
Substructure Sections Sheet 2	**MPL-ACM-XX-ZZ-DR-S-04002**

8.2 List of construction and record drawings (including numbers) to be used in the assessment.
N/A. See point 3.12.4 above.

8.3 List of pile driving or other construction records
N/A. See point 3.12.4 above.

8.4 List of previous inspection and assessment reports
N/A. See point 3.12.4 above.

9. THE ABOVE IS SUBMITTED FOR ACCEPTANCE

We confirm that details of the temporary will be/have been passed to the permanent works designer for review.

Signed _____

Name _____
Design/ Team Leader - Temporary works

Engineering Qualifications _____

Name of Organisation _____

Date _____

9a. THE ABOVE IS SUBMITTED FOR ACCEPTANCE

We confirm that details of the temporary works design will be/have been reviewed by the permanent works designer

Signed _____

Name DAVID CUCKSON
Design/ Team Leader - Permanent Works

Engineering Qualifications MIStruct E

Name of Organisation AECOM

Date 2-3-2018

10. THE ABOVE IS REJECTED/AGREED SUBJECT TO THE AMENDMENTS AND CONDITIONS SHOWN BELOW

Signed _____

Name _____

Position held _____

Engineering Qualifications _____

TAA _____

Date _____

APPENDIX

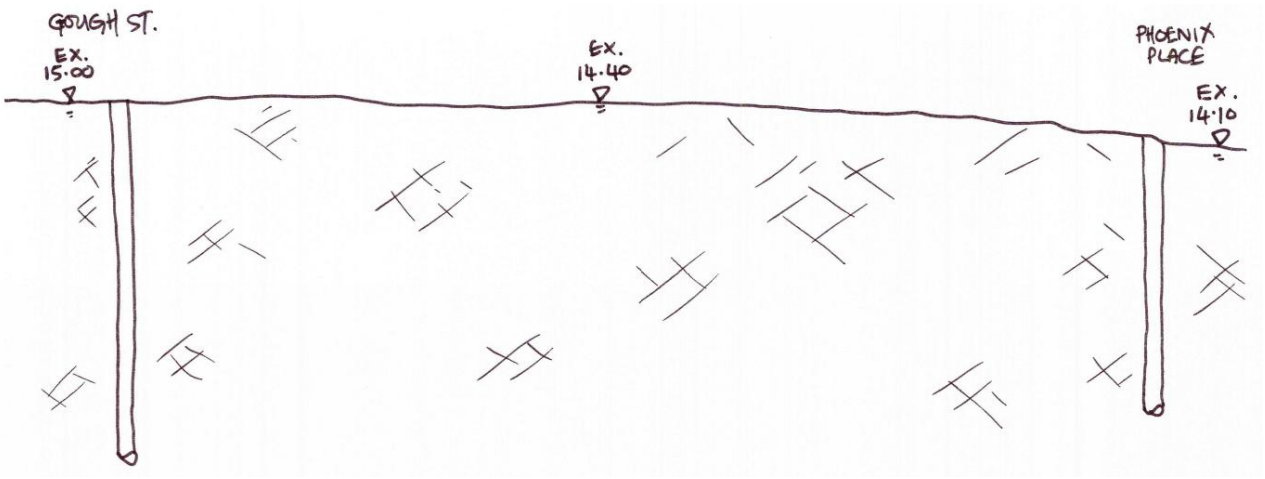
1 **Simplified Basement Construction Sequence**

2 **Basement Walls Options Study**

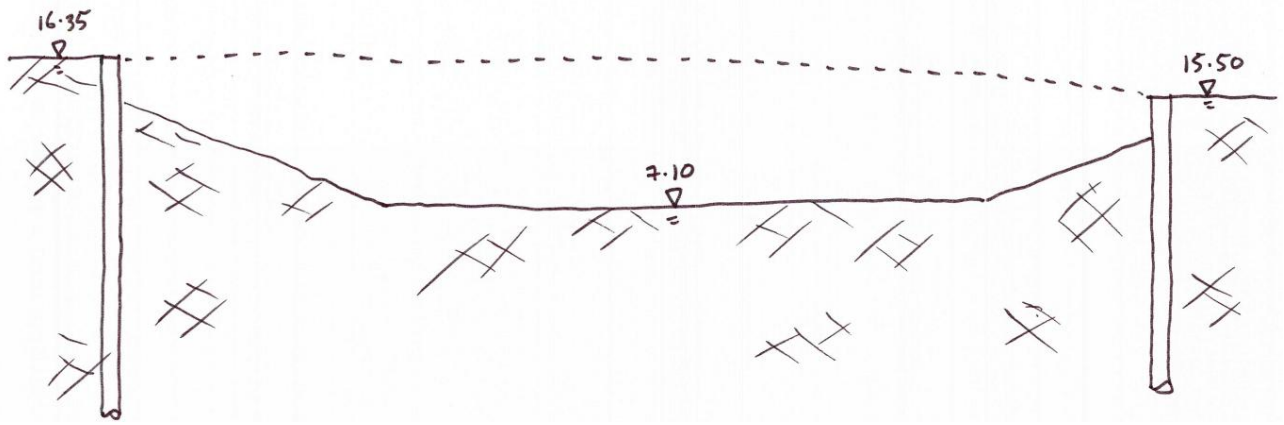
3 **Designers Risk Assessment**

4 **Structural Drawings**

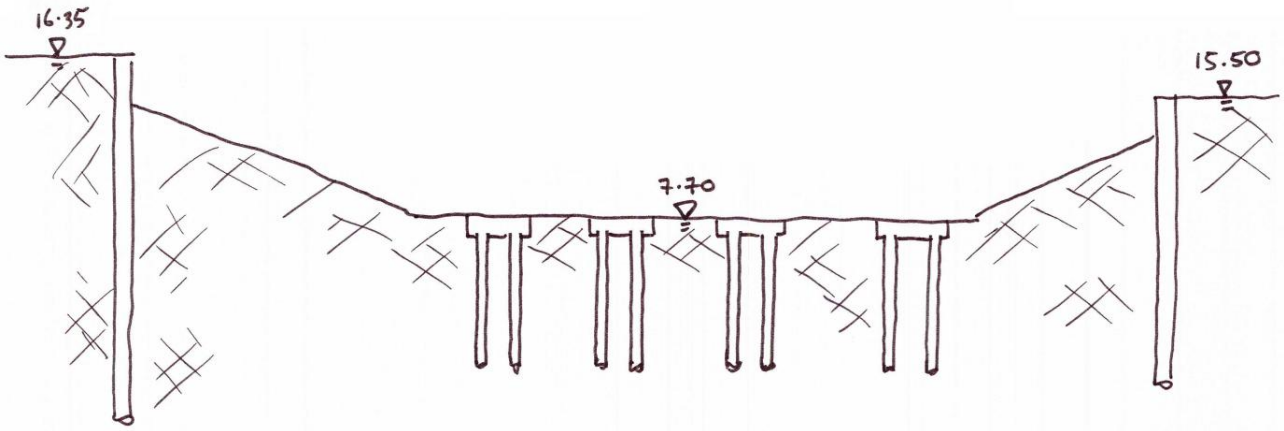
Simplified Basement Construction Sequence:



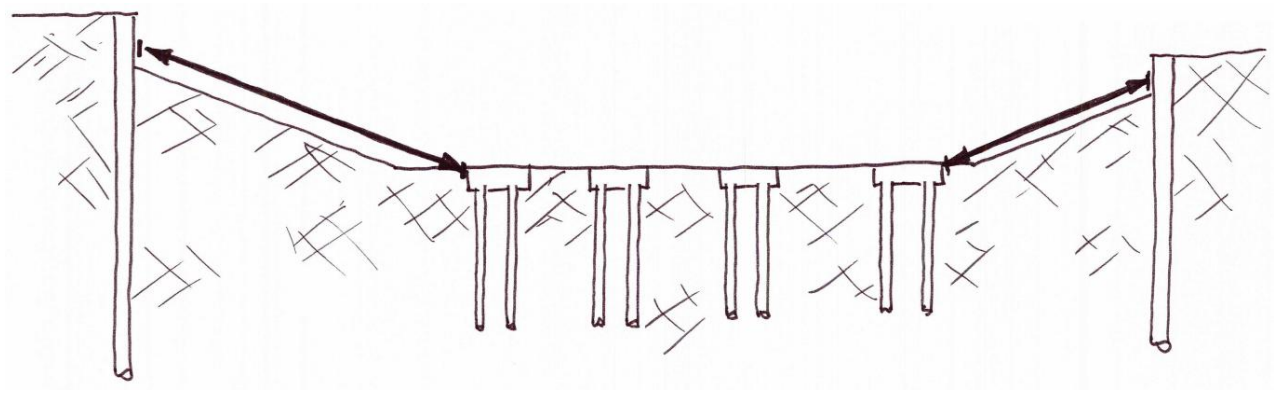
· Install upper piling mat and pile secant wall from or near pavement level



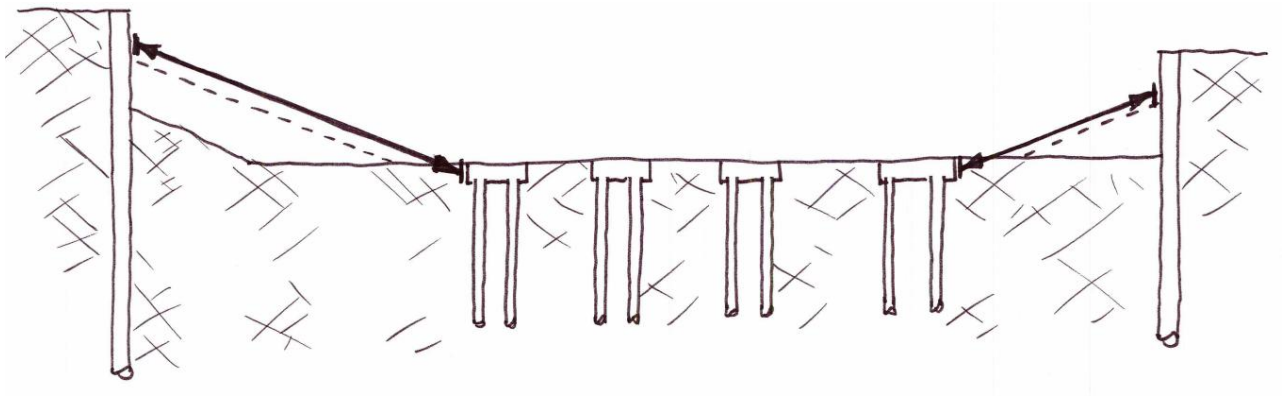
· Excavate centre of site to grade leaving berms to inside face of secant walls



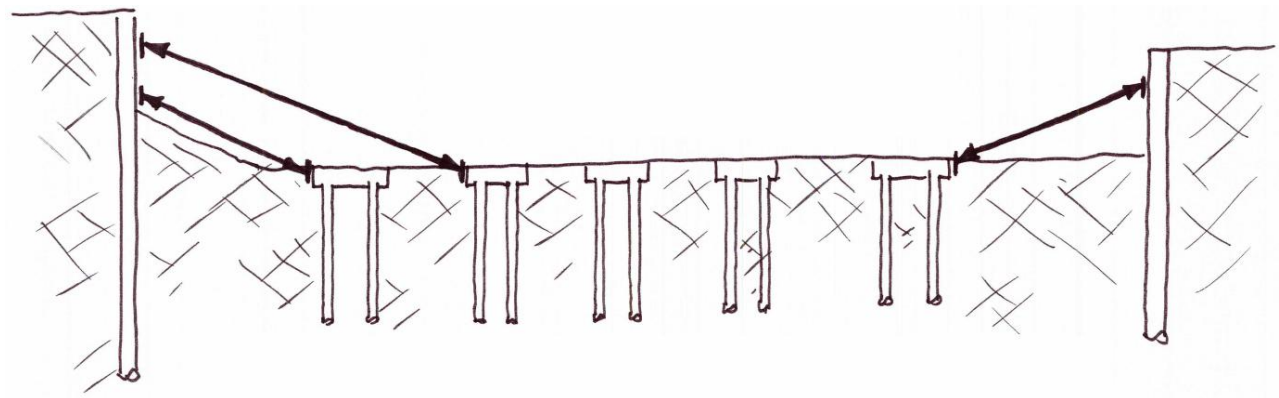
· Install lower piling mat and pile central area from grade, construct central pilecaps



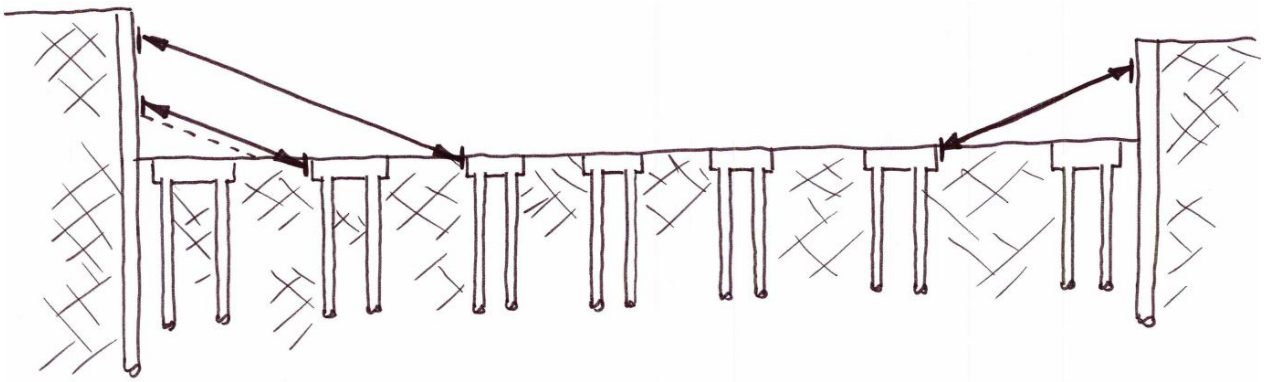
· Install first row of raking props (1:3) connecting secant wall and central pilecaps



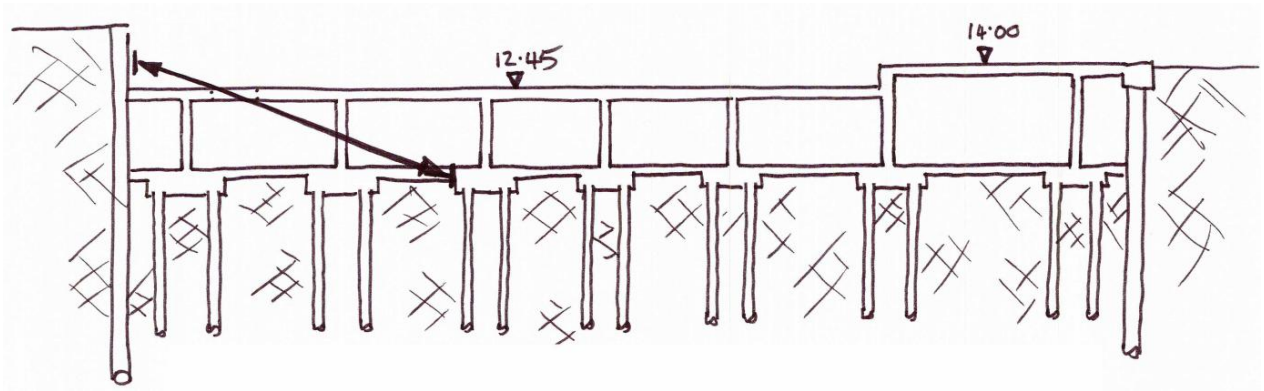
· Excavate site leaving secondary berm on Gough Street elevation



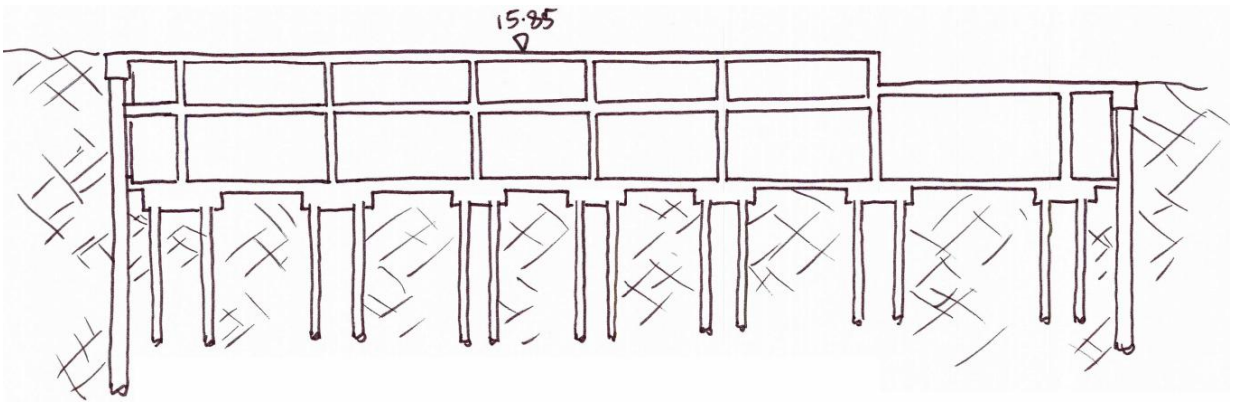
· Construct adjacent row of pilecaps and install second row of raking props (1:3)



· Complete excavation and install remaining pilecaps to perimeter columns (inbound of secant wall)



· Construct lower ground floor slab, removing first row of temporary props once complete



· Construct upper ground floor slab, removing remaining temporary props once complete

Retaining System

Different types of wall have been considered for the construction of the two-level basement for Plot P1 of the Phoenix Place Site at Mount Pleasant. However, in view of the high groundwater table (the majority of the excavation will take place below GWT) and the water-tightness requirements, and the column loads the retaining wall is envisaged to carry, the contiguous and sheet pile wall options have been discarded. The table below presents the most suitable options that were further considered for the retaining system.

Table 1: Retaining System Options

Foundation Option	Category	Advantages	Disadvantages
Secant Piled Wall (Hard-Firm)	Construction considerations (applications, access, dewatering)	✓ In a hard / firm construction the female (primary) piles are unreinforced "firm" whilst the male (secondary) piles are reinforced "hard" and are installed to intersect the softer female piles. ✓ It provides water-tightness to structure. ✓ Male piles can carry structural loads from columns. ✓ Slab to wall connection can be achieved with drilled in bars and couplers cast in wall.	x Less bending resistance compared to the hard/ hard secant pile walls and diaphragm walls. x Depth is limited due to rig capabilities and vertical tolerance that needs to be achieved. Piles to be installed to a maximum tolerance of 1 in 75mm in any direction. x Potential for water ingress at the joints between primary and secondary piles and between slab and wall connections. x Potentially reduced durability depending on the concrete mix used for the female piles. x Gunite or concrete facing is required if a drained cavity former is used.
	Cost	✓ It can be constructed with CFA rig, thus resulting in time and cost savings. ✓ Easier, faster and less expensive to construct than hard/ hard secant and/ or diaphragm wall. ✓ Female piles can be shorter, thus resulting in concrete savings.	x Penetration through hard strata may cause delays in the programme.
	Settlements	✓ Depending on the construction sequence and the temporary support considered for the basement excavation (i.e. top-down vs bottom-up with props/ berms vs bottom-up with anchors) deflections can vary between 0.1%H to 0.6%H, where H is the maximum excavation depth.	

Foundation Option	Category	Advantages	Disadvantages
	Environment (noise, vibration, spoil)	✓ Minimum environmental impact with regards to noise and vibration.	x Penetration through hard strata may cause vibration and noise.
Diaphragm Wall	Construction considerations (applications, access, dewatering)	✓ Panel lengths range typically between 2.4m and 6.0m length with shorter panels used when working close to adjacent structures. Wall panel thickness varies between 600mm and 1500mm. ✓ Greater wall depths can be achieved compared to other wall types. ✓ Penetration through hard strata can be achieved. ✓ There are fewer joints compared to the secant wall hence reduced risk for water ingress. Panels also have stop ends with integral water bars on either of their sides. ✓ Vertical tolerance to be achieved is 1 in 100mm, increasing with depth. ✓ A uniform wall cross section can be achieved with a smooth finish in clays, resulting in easier application of finishes to a flat wall if required. ✓ Connection of floors to wall is simpler than secant or contiguous piling. Box outs can be left in the wall face with either couplers or bend out bars.	x More difficult to construct compared to other wall types. x Bentonite storage and recirculation plant is required on site hence greater space requirements. x If bend out bars are used for slab-wall connection, the limitation on bar diameter would be 16mm in order to facilitate bending the bars out. Couplers are a more effective method of connecting the slabs to the wall however they are more expensive x Shadowing and mattressing effects may take place.
	Cost		x It is more expensive compared to other wall types. x Downtime for teeth replacement is likely to impact the programme. x The cost of setting up the bentonite plant is only justifiable for large projects.
	Settlements	✓ Lower deflections can usually be achieved compared to other wall types.	
	Environment (noise, vibration, spoil)	✓ Minimum environmental impact with regards to noise and vibration.	x Loss or spillage of bentonite slurry is a potential risk

Buildability

Issues to be reviewed with Bouygues:

- Propping level(s) vs pile diameter.
- Raking props vs flying propos.
- Props founded on piles vs raft vs separate pads.
- Piling rig level.
- Fleet River movements.

Summary/Recommendation

In summary our initial analysis indicates that a pure raft solution will be so deep as to uneconomic and potentially result in excavation depths that exceed the recommended limit governed by groundwater pressures. In addition the uplift under the podium results in an excessive thickness of raft, unless tension piles are adopted to resist the uplift.

Item	Advantages	Disadvantages	Recommendation
Construction			
Contig piling	Lowest construction cost	Not considered Poor groundwater cu-off	
Secant piling	Good groundwater cut-off	Difficult to maintain plumb when encountering buried obstructions.	Yes
Sheet piling	Good groundwater cut-off	Low axial load capacity, thus perimeter columns required down to foundations. Inability to be able to punch thru buried obstructions.	
Diaphragm	Good groundwater cut-off	Highest cost, due to equipment and requirement for Bentonite	
Waterproofing			
Membrane plus drained cavity	Low cost. Ability to locate seepages.	Overall wall thickness	
Membrane plus liner wall	Minimum space take.	Waterproof treated concrete. Need to seal cracks	Yes

Our recommendation is to adopt a secant piled solution, with membrane and liber walls.

Job No.	60556156	**Aecom Office Location:**	Aldgate Tower, 2 Leman Street, London, E1 8FA				
Issue No.:	1	**Date:**	20.12.2017	**Prepared by:**	David Cuckow	**Signature:**	
Design Discipline:	Structural Engineering			**Reviewed by:**		**Signature:**	

Design Notes/Statement (see note 2):

Refer to Structural Reports and drawings for supporting information.

Guidance Notes:

1. A Worksheet should be completed for each job to provide an auditable record of the design process. It can also be issued to the Principal Designer and other project partners to demonstrate the design process and provide information on residual risk. Alternative risk register formats may be used instead where requested by other project partners.
2. Design Notes/Statement – the space above has been provided in case Designers wish to insert notes or a brief design statement to describe the scope of works and any criteria applicable to their design that may have a bearing on Health and Safety considerations (e.g. design imposed loads, etc.).
3. Design aspect or activity – consider aspects or activities that are relevant to the project and disciplines involved - a checklist is available (see SMS 302 INT Supplemental B) that can assist, although it is not intended to be an exhaustive list and should be edited to delete or add items as required.
4. Description of constraints, hazards, and associated risks - Designers should focus on hazards and associated risks that are **significant** in relation to Health and Safety, and should not include trivial items.
5. Designer's interventions – designers should utilise this section to describe the measures taken to eliminate or reduce risks. Designers should apply the 'principles of prevention' – e.g.:
   - Eliminate the hazard where possible.
   - If the hazard can't be eliminated, the next priority is to reduce the hazard, or to substitute the dangerous with the less dangerous.
   - Give priority to 'collective' control measures over 'personal' control measures (e.g. providing edge protection on a flat roof is a better option that providing anchor points for using a harness).
6. Description of the residual risk and information to be supplied to project partners – designers should use this section to record the residual risks and any information required by others to manage the risk. The designer has a legal duty to provide information regarding residual risks that are significant. Designers should specifically provide information in relation to items that are:
   - unusual, or
   - likely to be difficult to manage, or
   - not obvious to a competent contractor, or designer.

Ref.	Design aspect or activity (see note 3)	Description of constraints, hazards and associated risks (see note 4)	Designer's interventions to eliminate or reduce risk (see note 5)	Residual risk, and information to be provided to enable project partners to manage the risk (see note 6)
1.0	**EXISTING SITE**			
1.1	Access / Traffic Restrictions.	Site traffic causing congestion to local road network and danger to public due to large reversing vehicles.	An approved Traffic Control Officer/Banksman (to be appointed by the contractor) situated permanently at site entrance to control traffic flows and protect the public during works. *Information to be provided to the contractor:* Site plan.	*Residual Risks:* Cannot be eliminated
2.0	**DEMOLITION**			
2.1	Demolition of Existing Structures / Hard Standings	Dust and airborne contaminants	Operators to be masked and areas likely to produce dust kept wetted to reduce airborne particles.	*Residual Risks:* None
2.2	Hazardous Demolition Materials	Disposal of contaminated or hazardous waste can be a danger to the environment if not assessed and disposed of correctly.	Where contaminated waste is encountered, follow strict instructions outlined in the Demolition Specification and consult the Geotechnical Report for information on the soil classifications found.	Disposal of all contaminated waste is carried out by an approved removal specialist.
2.3	Removal of Demolition Spoil	Unsecured loose material in working areas.	Avoid excessively overloading trucks carrying away spoil and debris to reduce hazards.	Contractor should produce a carefully considered program to avoid difficulties in removing spoil.

Ref.	Design aspect or activity (see note 3)	Description of constraints, hazards and associated risks (see note 4)	Designer's interventions to eliminate or reduce risk (see note 5)	Residual risk, and information to be provided to enable project partners to manage the risk (see note 6)
3.0	**CONSTRUCTION**			
3.1	General works- Disturbance to Residential Environment.	The site is located close to a number of residential buildings. Residents may file complaints with the local borough against high noise levels, dust, disturbances and ground borne vibrations which may affect the construction programme.	Risk cannot be eliminated but can be reduced by requesting the contractor to: · Comply with noise requirements of planning authority. · Monitor areas of possible high noise and vibration. · Avoid or minimise use of high-percussive equipment. · Carryout works only within the times and days permitted by the client/project manager. *Information to be provided to the contractor:* - Information on local borough imposed restrictions applicable to construction works including specific working hours, noise levels etc.	*Residual Risks:* None
3.2	Excavation - Removal of Asbestos and hazardous materials.	Asbestos could potentially be found in the ground. Any found should be disposed by a specialist.	Asbestos testing carried out during the site investigation found no traces of asbestos. However, the SI is not an asbestos survey and traces of asbestos could be left of the site. Risk cannot be eliminated but can be reduced by: · Employing specialists to remove and dispose any asbestos. · Inspecting any areas highlighted in	*Residual Risks:* Traces of asbestos could be left in the site.

Ref.	Design aspect or activity (see note 3)	Description of constraints, hazards and associated risks (see note 4)	Designer's interventions to eliminate or reduce risk (see note 5)	Residual risk, and information to be provided to enable project partners to manage the risk (see note 6)
			the site investigation as a potential risk, by an asbestos specialist prior to commencement of works. · Ensuring that employees wear full PPE and receive an induction outlining the areas of risk. *<u>Information to be provided to the contractor:</u>* - Ground Investigation Reports (Factual). - Contamination & Remedial Strategy Report.	
3.3	Excavation - removal of excavation spoil from site.	Disposal of contaminated or hazardous waste (if found from the on-going ground investigation survey works). The ground beneath the site is expected to be contaminated from previous uses.	Risk reduced by designing foundation thicknesses so that the need to dig below the human separation layer is significantly less. Risk cannot be eliminated but can be reduced by requesting the contractor: · To adopt appropriate Health and Safety measures (minimise risks from contaminated ground through ingestion and inhalation by ensuring that operatives do not smoke, eat or drink - except in designated areas). · To inform the contractor of the potential hazards and report any observations of suspect material. · To use suitable PPE. · To prepare method statement for disposal of materials without forming	*<u>Residual Risks:</u>* Traces of contaminated material could be left in the site.

Ref.	Design aspect or activity (see note 3)	Description of constraints, hazards and associated risks (see note 4)	Designer's interventions to eliminate or reduce risk (see note 5)	Residual risk, and information to be provided to enable project partners to manage the risk (see note 6)
			dust. · To remove materials using licensed tip and using registered haulage contractor. *Information to be provided to the contractor:* - Ground Investigation Reports (Factual). - Contamination & Remedial Strategy Report.	
3.4	Excavation and Piling - Disruption of existing mechanical and electrical services running adjacent to, or through the site.	Unknown buried services may be affected through the activities of excavation, piling and applying unforeseen surcharging. Depending on the service, this could lead to flooding, electrocution or explosion.	Risk cannot be eliminated but can be reduced by: · Carrying out all necessary CAT/SCAN or GPR surveys to identify locations of services prior to demolition/excavation works. · Where required, existing services to be protected. · All workers to be made aware of the existing services and their locations clearly identified. · Requesting all operators to wear appropriate PPE. *Information to be provided to the contractor:* - STATS searches and records. - Any available records, drawings showing existing services. - M&E engineers specification related to services disconnection.	*Residual Risks:* None.

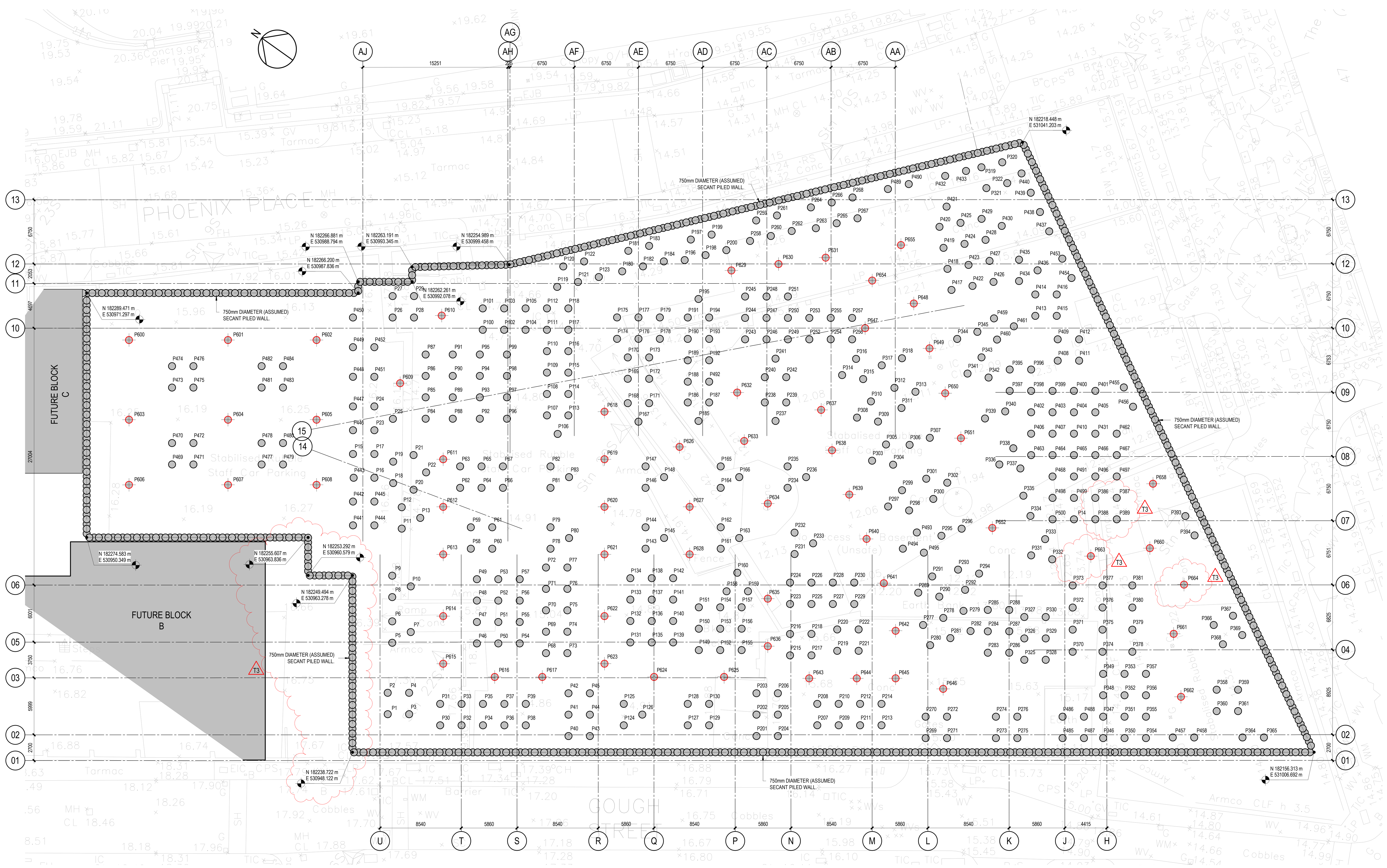
Ref.	Design aspect or activity (see note 3)	Description of constraints, hazards and associated risks (see note 4)	Designer's interventions to eliminate or reduce risk (see note 5)	Residual risk, and information to be provided to enable project partners to manage the risk (see note 6)
3.5	Excavation and Piling -Potential damage to buried assets belonging to Thames Water.	Excavation and piling within close proximity to, Thames Water buried assets.	Risk cannot be eliminated but can be reduced by: · Requesting the contractor to liaise with Thames Water at earliest possible opportunity so that the necessary agreements and approvals can be obtained prior to piling and excavation. *Information to be provided to the contractor:* - Any available Thames Water documents giving guidelines for third parties to carry out construction works close to Thames Water assets.	*Residual Risks:* Cannot be eliminated.
3.6	Excavation and Piling- Discovery of Unexploded Bombs (UXO's) from WWII.	Possibility of buried UXO's in the site. Piling and excavation activities may cause deadly explosions.	Risk cannot be eliminated but can be reduced by: · Carrying out relevant UXO surveys. *Information to be provided to the contractor:* - Any available UXO reports.	*Residual Risks:* UXO's can still remain buried deep within the site.
3.7	Excavation and Piling - Highways	Undermining of adjacent highways and potential for collapse.	Ensure temporary propping is provided in any instance where permanent propping to the highways supporting retaining walls is removed. A Highways Approval in Principle (AIP) must be agreed with the local authority.	Monitoring of level at intervals as noted with appropriate trigger values. Temporary works proposals to be submitted to and approved by the Structural Engineer.
3.8	Excavation and construction of sub-structure- Encountering	There is a possibility of ground water being encountered during	Shallow ground water was encountered during site investigation works.	*Residual Risks:* Risk cannot be eliminated.

Ref.	Design aspect or activity (see note 3)	Description of constraints, hazards and associated risks (see note 4)	Designer's interventions to eliminate or reduce risk (see note 5)	Residual risk, and information to be provided to enable project partners to manage the risk (see note 6)
	ground water.	excavations.	Risk cannot be eliminated but can be reduced by: · Making the contractor and the workers aware of the situation. · Contractor to allow provisions for suitable arrangements to pump water, if encountered. · Contractor to allow for temporary discharge license *Information to be provided to the contractor:* - Site investigation reports and data which will include ground water monitoring records.	
3.9	Temporary works to substructure construction	Temporary works are required to stabilize the basement perimeter piled walls during excavation works. Temporary Works are complex, expensive and fundamental to the stability of partially completed structures. Risk of exceeding target costs and programme duration.	Basement perimeter walls have been designed as piled secant walls, propped by the Basement, Lower and Upper Ground floor slabs. Contractor's temporary works proposals to be submitted to the Engineer in time to enable perimeter wall piles to be checked for the implications propping schemes more onerous than assumed in the design.	*Residual Risks:* Temporary propping proposals may require an increase in pile sizes/rebar.
3.10	Temporary works will be required during the entire construction phase to support partially completed structures.	Temporary Works are required to support insitu concrete super structure elements such as columns, slabs and walls.	Main structural shear walls designed to minimize the need of temporary works during the construction phase. Pre-fabricated bolt-on steel balconies	*Residual Risks:* None.

Ref.	Design aspect or activity (see note 3)	Description of constraints, hazards and associated risks (see note 4)	Designer's interventions to eliminate or reduce risk (see note 5)	Residual risk, and information to be provided to enable project partners to manage the risk (see note 6)
		Temporary Works are complex, expensive and fundamental to the stability of partially completed structures. Risk of exceeding target costs and programme duration.	are proposed where possible. Risk cannot be eliminated but can be reduced by: · Using pre-fabricated elements where possible as shown in the drawings. *Information to be provided:* - All drawings and specification for the proposed structure.	
3.11	Multi-storey construction.	Injury or death from falling objects from height.	Risk cannot be eliminated but can be reduced by using: · Mechanical methods for the movement of debris. · Protective measures such as "safety nets" around the working areas. *Information to be provided:* - Drawings and specification of the proposed structure.	*Residual Risks:* Risk will remain.
3.12	Construction of insitu cast reinforced concrete structure.	Reinforcement storage and access. General obstacles for material movement, imposing a danger for workers and the public.	Large diameter bars (i.e. H40 and H50 have been avoided to increase the manageability in handling reinforcing bars. Risk cannot be eliminated but can be reduced by: · Contractor should look into the logistics of reinforcement deliveries and storage. Possibly exploring out-of-hours rebar deliveries.	*Residual Risks:* None.

Ref.	Design aspect or activity (see note 3)	Description of constraints, hazards and associated risks (see note 4)	Designer's interventions to eliminate or reduce risk (see note 5)	Residual risk, and information to be provided to enable project partners to manage the risk (see note 6)
			Information to be provided: - All drawings and specification for the proposed structure. - Rebar mark-ups for the contractor to prepare rebar schedules.	
3.13	Construction of insitu cast reinforced concrete structure.	Working in wet conditions and construction of concrete onto wet material (natural ground water level may cause problems during the excavation of the ground, and rainwater is likely to accumulate whilst the ground is exposed).	Risk cannot be eliminated but can be reduced by: · Planning ahead by preparation of suitable dewatering proposals by the contractor. *Information to be provided:* - All drawings and specification for the proposed structure. - All available ground investigation reports with ground water monitoring records.	*Residual Risks:* None.
3.14	Construction of insitu cast reinforced concrete structure.	Cracking and displacement of concrete on removal of formwork and propping.	Risk cannot be eliminated but can be reduced by: · Contractor to ensure that propping/ back propping and shuttering shall only be removed after a minimum period after pour time to allow the concrete to gain near optimum compression capacity. · The contractor must forward onto the Structural Engineer the cube/cylinder test results as per the Concrete Specification. These will be reviewed and approved by the SE to ensure that the concrete properties are acceptable.	*Residual Risks:* None.

Ref.	Design aspect or activity (see note 3)	Description of constraints, hazards and associated risks (see note 4)	Designer's interventions to eliminate or reduce risk (see note 5)	Residual risk, and information to be provided to enable project partners to manage the risk (see note 6)
			Information to be provided: - All structural engineers drawings and specification.	
3.15	On-site welding of steel.	Risk of fire.	Site welding will not be acceptable without prior approval. Steel-to-steel connections are to be bolted together and steel-to-concrete connections are to be cast in or anchored in to reduce the requirement for site welding. Risk can eliminated but can be reduced by: · Pre-fabrication of steel elements where possible and using only bolted connections as shown in structural engineers drawings. *Information to be provided:* - Structural engineers drawings and specification.	*Residual Risks:* None.



NOTE:
UPLIFT PRESSURES (INCLUDING WATER PRESSURES AND HEAVE) MAY REQUIRE THE USE OF TENSION PILES UNDER LARGE SLAB SPANS. REQUIREMENTS TBC.

NOTE:
ADDITIONAL PILES MAY BE REQUIRED TO SUPPORT WATER TANK ADJACENT RAMP STRUCTURE. REQUIREMENTS TBC.

NOTE:
ALL BEARING PILES ARE TO BE DESIGNED TO RESIST UPLIFT (TENSION) IN THE TEMPORARY CASE.

NOTE:
FOR PILING SCHEDULES REFER TO DRAWING No's.
DR-S-6001, DR-S-6002, DR-S-6003 & DR-S-6004.

LEGEND

ALL PILES ARE ASSUMED TO BE 750mm DIAMETER.

- DENOTES BEARING PILE
- DENOTES TENSION PILE

AECOM

Project
Phoenix Place
Mount Pleasant

Client
Taylor Wimpey
Central London

Consultant
AECOM
Aldgate Tower
2 Leman Street
London E1 8FA
United Kingdom
Tel +44 (0) 20 7061 7000
www.aecom.com

Notes

General Notes:

1. Work to figured dimensions only.
2. This drawing is to be read in conjunction with the structural specification and all relevant drawings issued by the Architect, the Building Services Engineer and specialist sub-contractors.
3. All dimensions are in mm except levels which are in m.

Notes:

1. Concrete Grades as follows:
   Slabs C35/45
   Columns C35/45
   Cores C35/45
2. Reinforcement Grade : B500B.
3. Concrete finishes to be in accordance with the specification.
4. Tolerances to concrete elements to be in accordance with the specification.
5. Concrete members are positioned centrally about the grid unless noted otherwise.
6. R.C. walls 250mm thick U.N.O.
7. Allow for 225mm thick r.c. parapets to all flat roofs.
8. Allow for r.c upstand to all risers and service penetrations at roof level.
9. All steelwork to be Grade S355 J0 (hot rolled sections) or S355 JHR (tubular sections). U.N.O. All external steelwork to be galvanized in accordance with the specification.
10. Precast concrete stairs by specialist subcontractor. Half landings to 200mm thick in-situ slabs spanning between core walls.

Issue/Revision

Rev	Date	Description
T3	09FEB18	STAGE 3 - REVISIONS AS CLOUDED
T2	19JAN18	STAGE 3
T1	08DEC17	INTERIM STAGE 3

Key Plan

Pupose Of Issue
STAGE 3

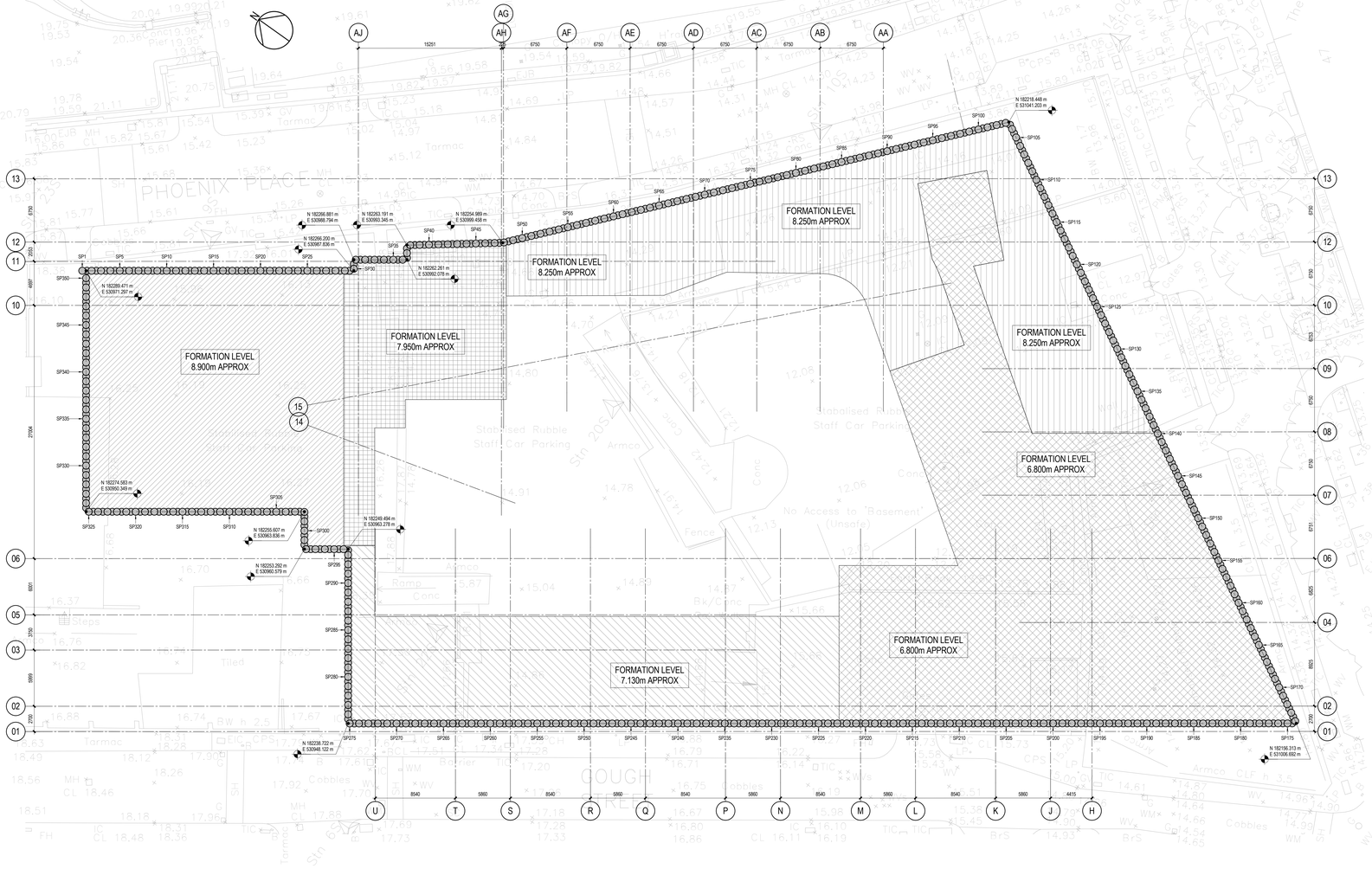
Project Number
60556156

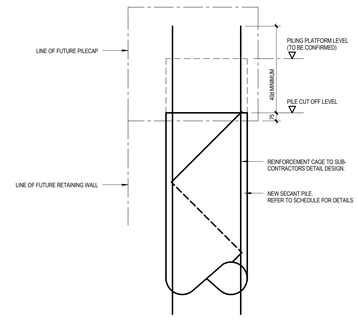
Sheet Title
General Arrangement of Piles

Sheet Number
MPL-ACM-XX-B1-DR-S-01001

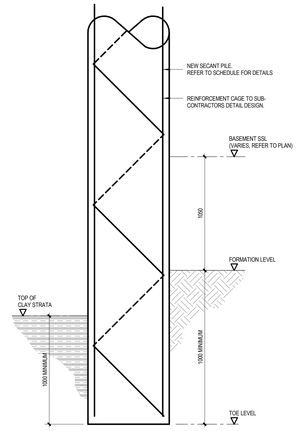
Scale: 1 : 200@A0 Rev: T3

Project Management Initials: Designer: RM Checked: RM Approved: DC Drawn by: CB ISO A0 841mm x 1189mm





TYPICAL PILE HEAD DETAIL
1 : 20



TYPICAL FEMALE PILE TOE DETAIL
1 : 20

NOTE:
FOR PILING SCHEDULES REFER TO DRAWING No's. DR-S-6005 & DR-S-6006.

0 2 4 6 8 10 12 14 16 18 20m
SCALE 1:200

AECOM

Project

Phoenix Place
Mount Pleasant

Client

Taylor Wimpey
Central London

Consultant

AECOM
Aldgate Tower
2 Leman Street
London E1 8FA
United Kingdom
Tel +44 (0) 20 7061 7000
www.aecom.com

Notes

General Notes:

1. Work to figured dimensions only.
2. This drawing is to be read in conjunction with the structural specification and all relevant drawings issued by the Architect, the Building Services Engineer and specialist sub-contractors.
3. All dimensions are in mm except levels which are in m.

Notes:

1. Concrete Grades as follows:

Slabs	C35/45
Columns	C35/45
Cores	C35/45
Capping Beams	C35/45
Piles	C28/35

2. Reinforcement Grade : B500B.
3. Concrete finishes to be in accordance with the specification.
4. Tolerances to concrete elements to be in accordance with the specification.
5. Concrete members are positioned centrally about the grid unless noted otherwise.
6. R.C. walls 250mm thick U.N.O.
7. Allow for 225mm thick r.c. parapets to all flat roofs.
8. Allow for r.c upstand to all risers and service penetrations at roof level.
9. All steelwork to be Grade S355 J0 (hot rolled sections) or S355 JHR (tubular sections). U.N.O. All external steelwork to be galvanized in accordance with the specification.
10. Precast concrete stairs by specialist subcontractor. Half landings to 200mm thick in-situ slabs spanning between core walls.

Issue/Revision

Rev	Date	Description
T1	21/03/18	STAGE 3

Key Plan

Purpose Of Issue

STAGE 3 - FOR TENDER

Project Number

60556156

Sheet Title

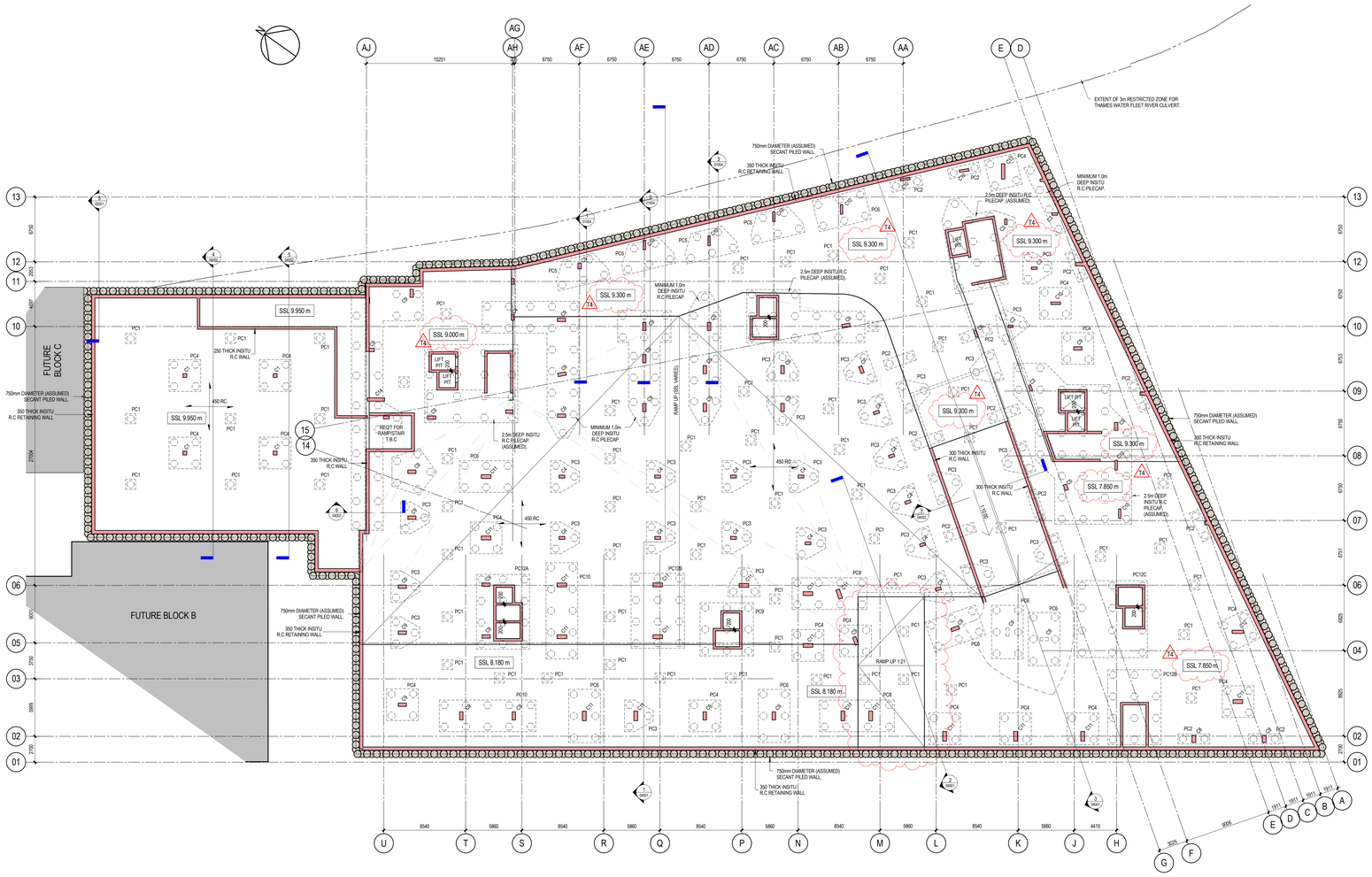
General Arrangement of Secant Pile Wall

Sheet Number

MPL-ACM-XX-B1-DR-S-01020

Scale: As indicated@A0 **Rev:** T1

Project Management Initials: | Designer: RM/MC | Checked: RM | Approved: DC | Drawn by: C.Boyd | ISO A0 841mm x 1189mm



INSITU R.C COLUMN SCHEDULE

Column Ref	Column Size
C1	400x400-RC COL
C2	500x250-RC COL
C3	800x250-RC COL
C4	600x300-RC COL
C5	600x350-RC COL
C6	750x250-RC COL
C7	750x350-RC COL
C8	750x400-RC COL
C9	850x350-RC COL
C10	1000x250-RC COL
C11	1000x400-RC COL
C12	1200x325-RC COL
C13	1600x350-RC COL
C14	1800x350-RC COL
C15	1975x350-RC COL
C16	2000x350-RC COL
C17	2350x350-RC COL
C18	2400x350-RC COL
C19	800x250-RC COL

NOTE:
SETTING OUT AND SIZE OF ALL SERVICE PENETRATIONS TO BE CONFIRMED BY THE BUILDING SERVICES ENGINEER.

NOTE:
REFER TO DRAWING No. DR-S-05001 & DR-S-05002 FOR TYPICAL PILECAP DETAILS

NOTE:
BASEMENT SLAB LEVELS ARE BASED ON SWECO RAMP DESIGN ISSUED BY ARCHITECT ON 19.12.17. ANY SUBSEQUENT CHANGES TO SLAB LEVELS MADE AFTER 26.01.18 (i.e 2 WEEKS PRIOR TO STAGE 3 ADDENDUM ISSUE) HAVE NOT BEEN REFLECTED.

LEGEND:

DENOTES STRUCTURAL SLAB LEVEL IN METRES AOD: SSL 12.450m

DENOTES INSITU R.C COLUMN:

DENOTES INSITU R.C COLUMN UNDER:

DENOTES TWO WAY SPANNING INSITU R.C FLAT SLAB:

DENOTES STEP IN SLAB: Step

DENOTES HORIZONTAL MOVEMENT JOINT OF 40mm NOMINAL WIDTH (95mm MAXIMUM WIDTH) WITH SHEAR LOAD CONNECTORS AT MAXIMUM CENTRES (ANCON H.D. HALFEN HSD OR SIMILAR APPROVED) AND WITH JOINT FILLER CAPABLE OF 20mm COMPRESSION (PROMAT PROMASEAL OR SIMILAR APPROVED). MJ1

DENOTES HORIZONTAL MOVEMENT JOINT AS ABOVE BUT WITH 35mm NOMINAL WIDTH. 70mm maXIMUM WIDTH AND CAPABLE OF 10mm COMPRESSION. MJ2

0 2 4 6 8 10 12 14 16 18 20m
SCALE 1:200

AECOM

Project

Phoenix Place
Mount Pleasant

Client

Taylor Wimpey
Central London

Consultant

AECOM
Aldgate Tower
2 Leman Street
London E1 8FA
United Kingdom
Tel +44 (0) 20 7061 7000
www.aecom.com

Notes

General Notes:

1. Work to figured dimensions only.
2. This drawing is to be read in conjunction with the structural specification and all relevant drawings issued by the Architect, the Building Services Engineer and specialist sub-contractors.
3. All dimensions are in mm except levels which are in m.

Notes:

1. Concrete Grades as follows:
   Slabs C35/45
   Columns C35/45
   Cores C35/45
2. Reinforcement Grade : B500B.
3. Concrete finishes to be in accordance with the specification.
4. Tolerances to concrete elements to be in accordance with the specification.
5. Concrete members are positioned centrally about the grid unless noted otherwise.
6. R.C. walls 250mm thick U.N.O.
7. Allow for 225mm thck r.c. parapets to all flat roofs.
8. Allow for r.c upstand to all risers and service penetrations at roof level.
9. All steelwork to be Grade S355 J0 (hot rolled sections) or S355 JHR (tubular sections). U.N.O. All external steelwork to be galvanized in accordance with the specification.
10. Precast concrete stairs by specialist subcontractor. Half landings to 250mm thick in-situ slabs spanning between core walls.

Issue/Revision

Rev	Date	Description
T4	16FEB18	BASEMENT LEVELS REVISED IN ACCORDANCE WITH ARCHITECTS STAGE 3 ISSUE
T3	09FEB18	STAGE 3 - REVISIONS AS CLOUDED
T2	19JAN18	STAGE 3
T1	06DEC17	INTERIM STAGE 3

Key Plan

Pupose Of Issue

STAGE 3

Project Number

60556156

Sheet Title

General Arrangement at Basement Level

Sheet Number

MPL-ACM-XX-B1-DR-S-01003

Scale: As indicated@A0 **Rev:** T4

Project Management Initials: Designer: RM/MC Checked: RM Approved: DC Drawn by:C.Boyd ISO A0 841mm x 1189mm

LEGEND:

DENOTES STRUCTURAL SLAB LEVEL IN METRES AOD: SSL 12.450m

DENOTES INSITU R.C COLUMN:

DENOTES INSITU R.C COLUMN UNDER:

DENOTES TWO WAY SPANNING INSITU R.C FLAT SLAB:

DENOTES STEP IN SLAB: Step

DENOTES HORIZONTAL MOVEMENT JOINT OF 40mm NOMINAL WIDTH (95mm MAXIMUM WIDTH) WITH SHEAR LOAD CONNECTORS AT MAXIMUM CENTRES (ANCON HLD, HALFEN HSD OR SIMILAR APPROVED) AND WITH JOINT FILLER CAPABLE OF 20mm COMPRESSION (PROMAT PROMASEAL OR SIMILAR APPROVED). MJ1

DENOTES HORIZONTAL MOVEMENT JOINT AS ABOVE BUT WITH 35mm NOMINAL WIDTH, 70mm mAXIMUM WIDTH AND CAPABLE OF 15mm COMPRESSION. MJ2

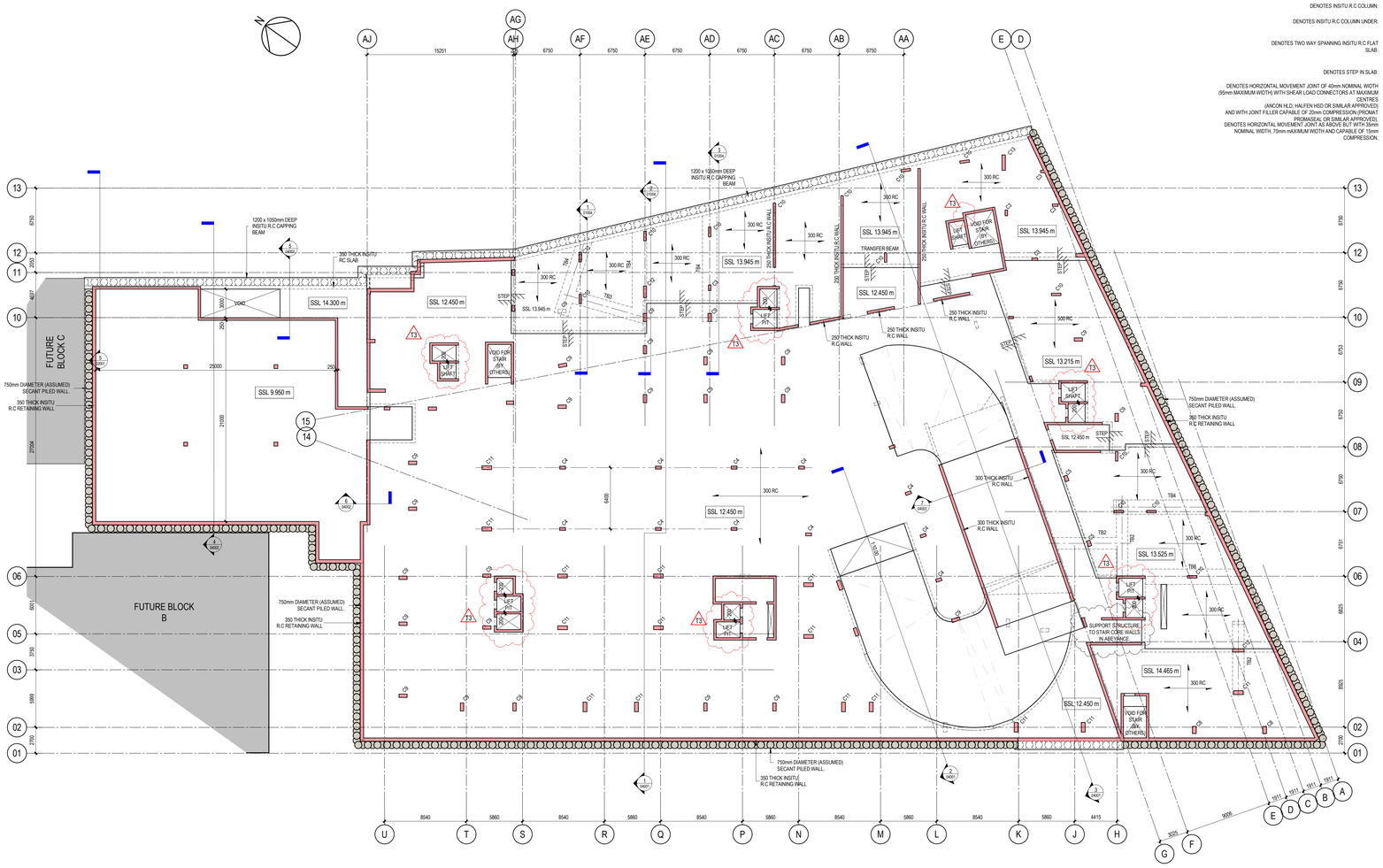
INSITU R.C COLUMN SCHEDULE

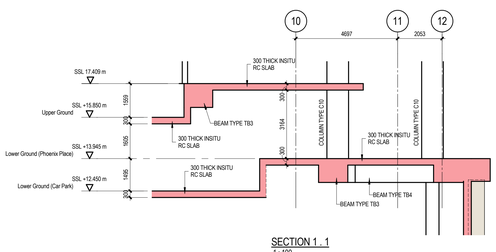
Column Ref	Column Size
C1	400x400-RC COL
C2	500x250-RC COL
C3	600x250-RC COL
C4	600x300-RC COL
C5	600x350-RC COL
C6	750x250-RC COL
C7	750x300-RC COL
C8	750x400-RC COL
C9	850x350-RC COL
C10	1000x250-RC COL
C11	1000x400-RC COL
C12	1200x325-RC COL
C13	1600x350-RC COL
C14	1800x350-RC COL
C15	1975x250-RC COL
C16	2000x350-RC COL
C17	2350x350-RC COL
C18	2400x350-RC COL
C19	800x250-RC COL

INSITU R.C TRANSFER BEAM SCHEDULE

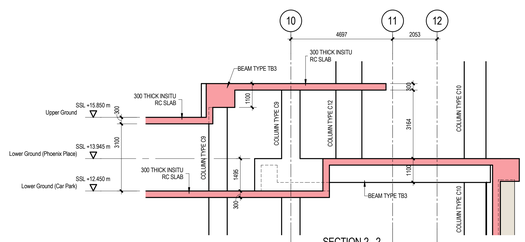
Beam Ref	Beam Dimensions	
	Depth	Width
TB1	500 mm	250 mm
TB1	800 mm	1000 mm
TB2	1000 mm	1200 mm
TB3	1100 mm	1300 mm
TB4	1100 mm	1500 mm
TB5	1250 mm	1250 mm
TB6	1250 mm	1600 mm
TB7	1300 mm	1700 mm
TB8	1100 mm	1260 mm

NOTE:
SETTING OUT AND SIZE OF ALL SERVICE PENETRATIONS TO BE CONFIRMED BY THE BUILDING SERVICES ENGINEER.

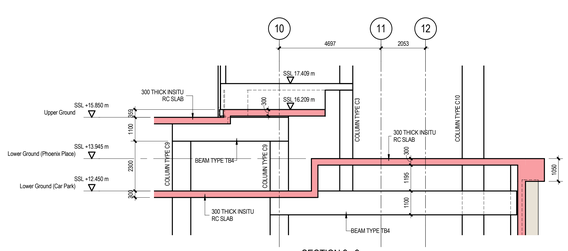




SECTION 1 . 1
1 : 100



SECTION 2 . 2
1 : 100



SECTION 3 . 3
1 : 100

SCALE 1:200

AECOM

Project

Phoenix Place
Mount Pleasant

Client

Taylor Wimpey
Central London

Consultant

AECOM
Aldgate Tower
2 Leman Street
London E1 8FA
United Kingdom
Tel +44 (0) 20 7061 7000
www.aecom.com

Notes

General Notes:

1. Work to figured dimensions only.
2. This drawing is to be read in conjunction with the structural specification and all relevant drawings issued by the Architect, the Building Services Engineer and specialist sub-contractors.
3. All dimensions are in mm except levels which are in m.

Notes:

1. Concrete Grades as follows:
   Slabs C35/45
   Columns C35/45
   Cores C35/45
2. Reinforcement Grade : B500B.
3. Concrete finishes to be in accordance with the specification.
4. Tolerances to concrete elements to be in accordance with the specification.
5. Concrete members are positioned centrally about the grid unless noted otherwise.
6. R.C. walls 250mm thick U.N.O.
7. Allow for 225mm thick r.c. parapets to all flat roofs.
8. Allow for r.c upstand to all risers and service penetrations at roof level.
9. All steelwork to be Grade S355 J0 (hot rolled sections) or S355 J0H (tubular sections). U.N.O. All external steelwork to be galvanized in accordance with the specification.
10. Precast concrete stairs by specialist subcontractor. Half landings to 200mm thick in-situ slabs spanning between core walls.

Issue/Revision

Rev	Date	Description
T3	09FEB18	STAGE 3 - REVISIONS AS CLOUDED
T2	19JAN18	STAGE 3
T1	06DEC17	INTERIM STAGE 3

Key Plan

Pupose Of Issue

Project Number

60556156

Sheet Title

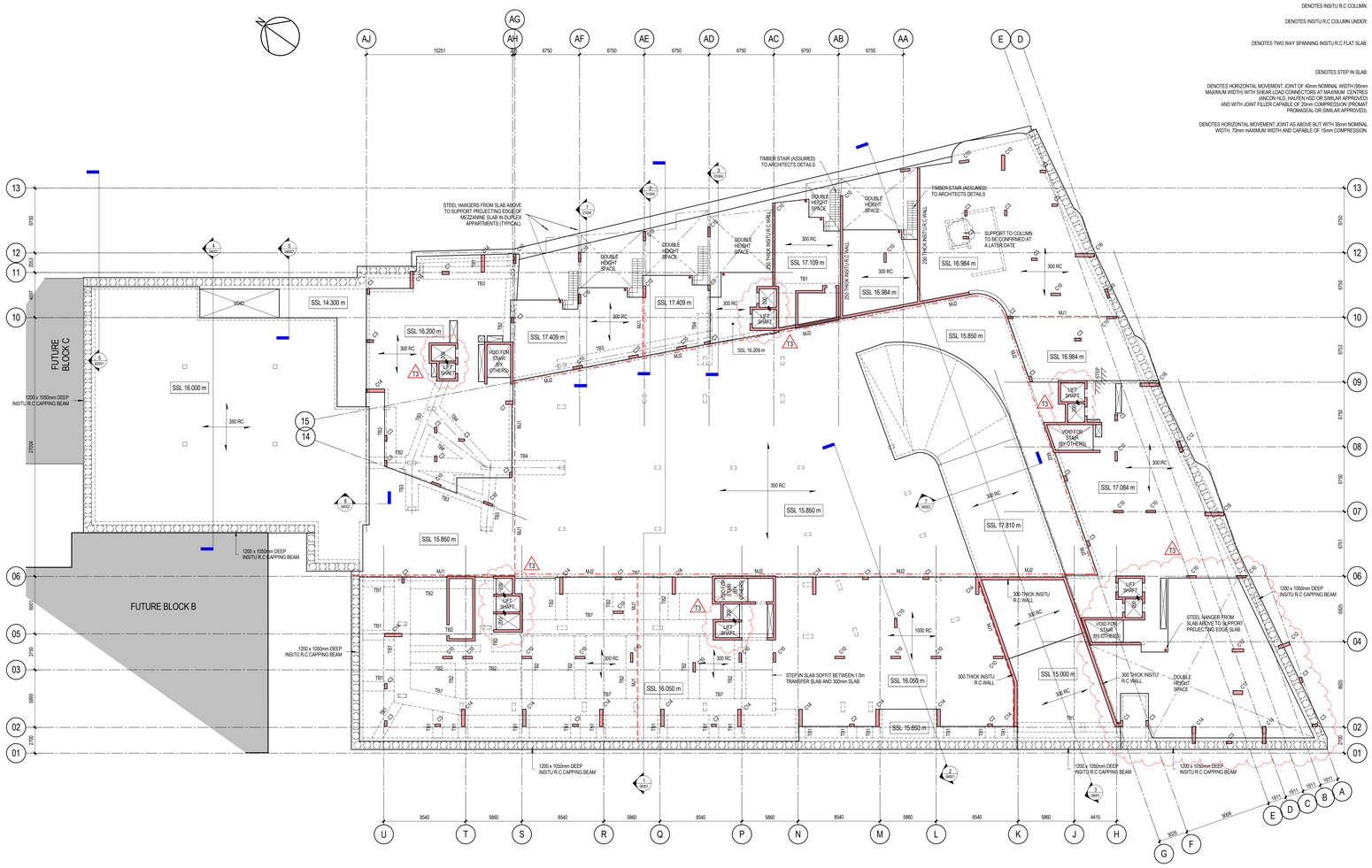
General Arrangement at Lower Ground Floor Level

Sheet Number

MPL-ACM-XX-GF-DR-S-01004

Scale: As indicated@A0 **Rev:** T3

Project Management Initials: Designer: RM/MC Checked: RM Approved: DC Drawn by: C.Boyd ISO A0 841mm x 1189mm



INSITU R.C COLUMN SCHEDULE

Column Ref	Column Size
C1	400x400-RC COL
C2	500x250-RC COL
C3	600x250-RC COL
C4	600x300-RC COL
C5	600x350-RC COL
C6	750x250-RC COL
C7	750x300-RC COL
C8	750x400-RC COL
C9	850x350-RC COL
C10	1000x250-RC COL
C11	1000x400-RC COL
C12	1200x325-RC COL
C13	1600x350-RC COL
C14	1800x350-RC COL
C15	1975x350-RC COL
C16	2000x350-RC COL
C17	2350x350-RC COL
C18	2400x350-RC COL
C19	800x250-RC COL

INSITU R.C TRANSFER BEAM SCHEDULE

Beam Ref	Beam Dimensions	
	Depth	Width
TB1	500 mm	250 mm
TB1	800 mm	1000 mm
TB2	1000 mm	1200 mm
TB3	1100 mm	1300 mm
TB4	1100 mm	1500 mm
TB5	1250 mm	1200 mm
TB6	1250 mm	1600 mm
TB7	1300 mm	1700 mm
TB8	1100 mm	1350 mm

NOTE:
SETTING OUT AND SIZE OF ALL SERVICE PENETRATIONS TO BE CONFIRMED BY THE BUILDING SERVICES ENGINEER.

0 2 4 6 8 10 12 14 16 18 20m
SCALE 1:200

AECOM

Project

Phoenix Place
Mount Pleasant

Client

Taylor Wimpey
Central London

Consultant

AECOM
Aldgate Tower
2 Leman Street
London E1 8FA
United Kingdom
Tel +44 (0) 20 7061 7000
www.aecom.com

Notes

General Notes:

1. Work to figured dimensions only.
2. This drawing is to be read in conjunction with the structural specification and all relevant drawings issued by the Architect, the Building Services Engineer and specialist sub-contractors.
3. All dimensions are in mm except levels which are in m.

Notes:

1. Concrete Grades as follows:
   Slabs C35/45
   Columns C35/45
   Cores C35/45
2. Reinforcement Grade : B500B.
3. Concrete finishes to be in accordance with the specification.
4. Tolerances to concrete elements to be in accordance with the specification.
5. Concrete members are positioned centrally about the grid unless noted otherwise.
6. R.C. walls 250mm thick U.N.O.
7. Allow for 225mm thick r.c. parapets to all flat roofs.
8. Allow for r.c upstand to all risers and service penetrations at roof level.
9. All steelwork to be Grade S355 J0 (hot rolled sections) or S355 JHR (tubular sections). U.N.O. All external steelwork to be galvanized in accordance with the specification.
10. Precast concrete stairs by specialist subcontractor. Half landings to 200mm thick in-situ slabs spanning between core walls.

Issue/Revision

Rev	Date	Description
T3	09FEB18	STAGE 3 - REVISIONS AS CLOUDED
T2	19JAN18	STAGE 3
T1	06DEC17	INTERIM STAGE 3

Key Plan

Pupose Of Issue

STAGE 3

Project Number

60556156

Sheet Title

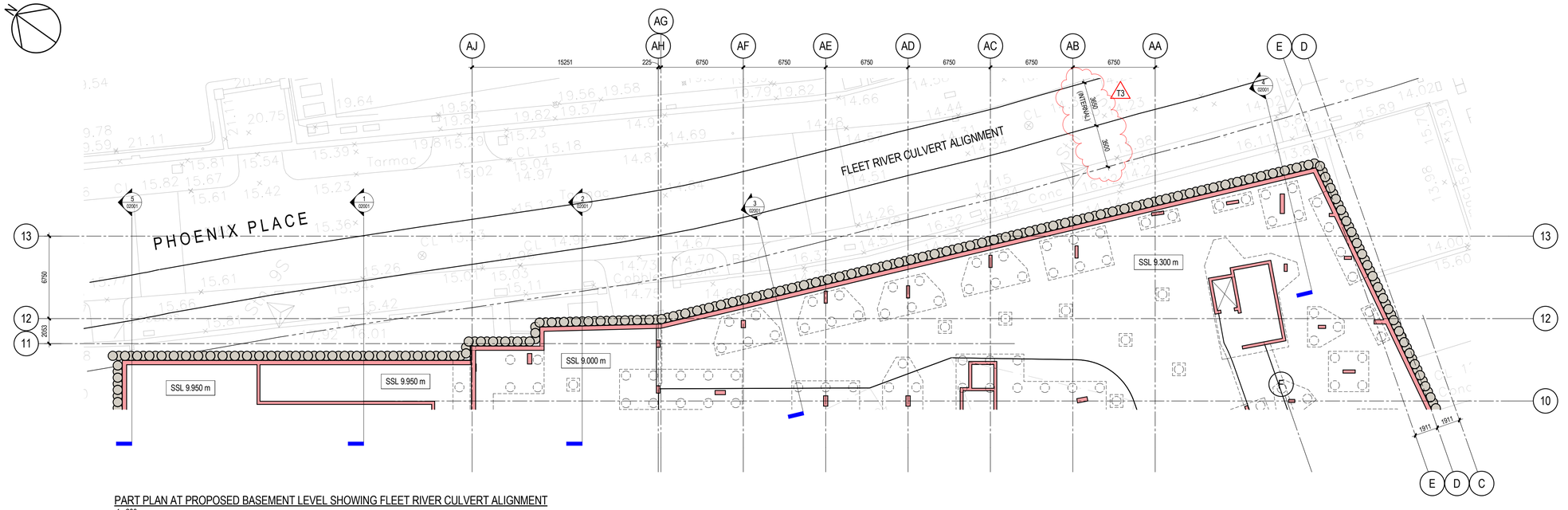
General Arrangement at Upper Ground Floor Level

Sheet Number

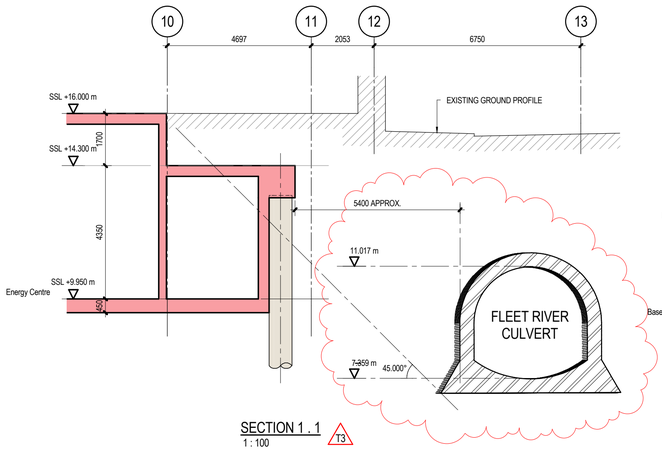
MPL-ACM-XX-GF-DR-S-01005

Scale: As indicated@A0 **Rev:** T3

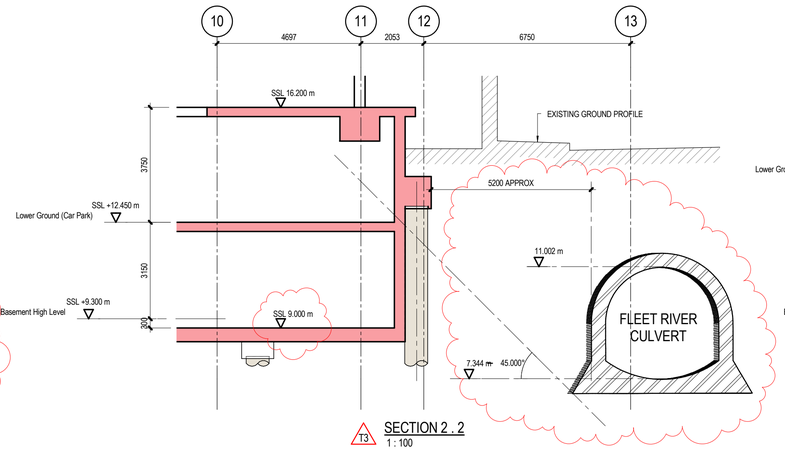
Project Management Initials: Designer: RM/MC Checked: RM Approved: DC Drawn By: C.Boyd ISO A1 594mm x 841mm



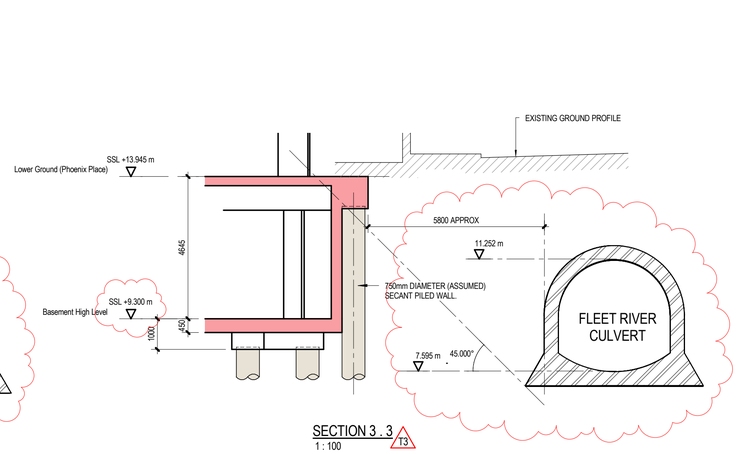
PART PLAN AT PROPOSED BASEMENT LEVEL SHOWING FLEET RIVER CULVERT ALIGNMENT
1 : 200



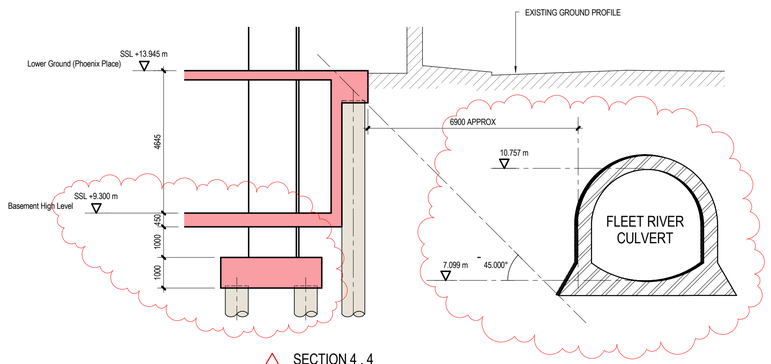
SECTION 1 . 1 T3
1 : 100



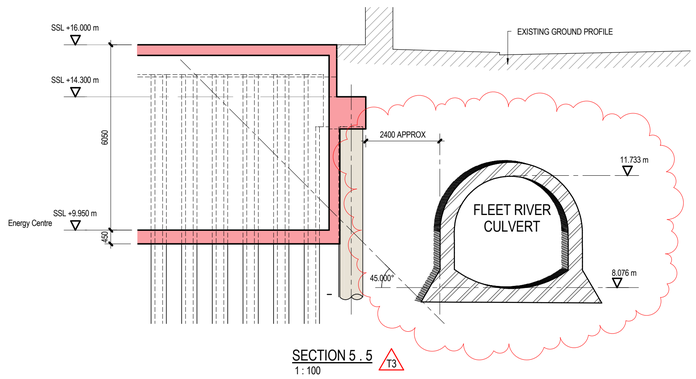
T3 SECTION 2 . 2
1 : 100



SECTION 3 . 3 T3
1 : 100



T3 SECTION 4 . 4
1 : 100



SECTION 5 . 5 T3
1 : 100

0 2 4 6 8 10 12 14 16 18 20m
SCALE 1:200

0 1 2 3 4 5 6 7 8 9 10m
SCALE 1:100

AECOM

Project

Phoenix Place
Mount Pleasant

Client

Taylor Wimpey
Central London

Consultant

AECOM
Aldgate Tower
2 Leman Street
London E1 8FA
United Kingdom
Tel +44 (0) 20 7061 7000
www.aecom.com

Notes

General Notes:

1. Work to figured dimensions only.
2. This drawing is to be read in conjunction with the structural specification and all relevant drawings issued by the Architect, the Building Services Engineer and specialist sub-contractors.
3. All dimensions are in mm except levels which are in m.

Notes:

1. Concrete Grades as follows:
   Slabs C35/45
   Columns C35/45
   Cores C35/45
2. Reinforcement Grade : B500B.
3. Concrete finishes to be in accordance with the specification.
4. Tolerances to concrete elements to be in accordance with the specification.
5. Concrete members are positioned centrally about the grid unless noted otherwise.
6. R.C. walls 250mm thick U.N.O.
7. Allow for 225mm thick r.c. parapets to all flat roofs.
8. Allow for r.c upstand to all risers and service penetrations at roof level.
9. All steelwork to be Grade S355 J0 (hot rolled sections) or S355 JHR (tubular sections). U.N.O. All external steelwork to be galvanized in accordance with the specification.
10. Precast concrete stairs by specialist subcontractor. Half landings to 200mm thick in-situ slabs spanning between core walls.

Issue/Revision

Rev.	Date	Description
T3	16FEB18	FLEET RIVER CULVERT PROFILE UPDATED. BASEMENT LEVELS REVISED TO SUIT ARCHITECTS STAGE 3 ISSUE.
T2	09FEB18	STAGE 3 - REVISIONS AS CLOUDED
T1	19JAN18	STAGE 3

Key Plan

Purpose Of Issue

STAGE 3

Project Number

60556156

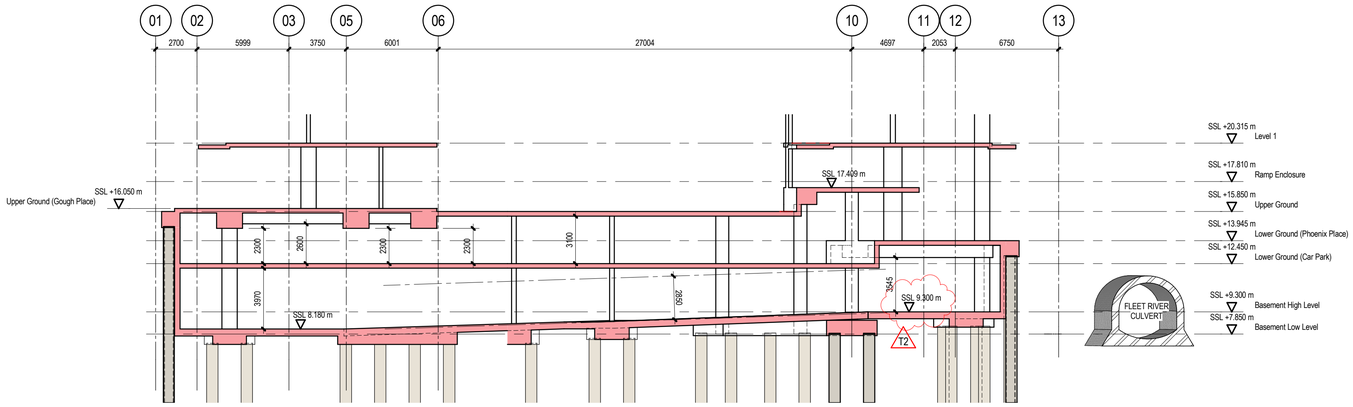
Sheet Title

Part Plan at Basement Level Showing Fleet River Culvert Alignment

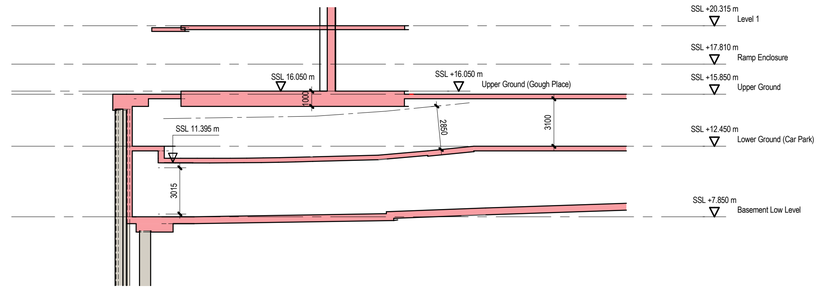
Sheet Number

MPL-ACM-XX-XX-DR-S-02001

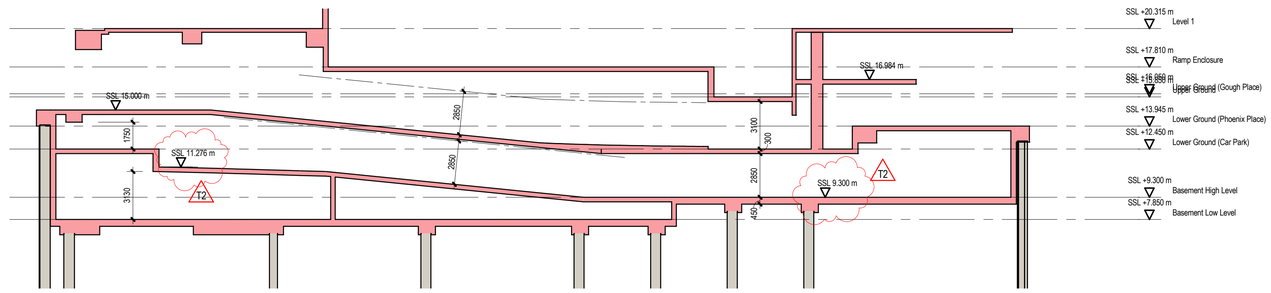
Scale: As indicated@A1 **Rev:** T3



CROSS SECTION 1 . 1
1 : 200



CROSS SECTION 2 . 2
1 : 200



CROSS SECTION 3 . 3
1 : 200

0 2 4 6 8 10 12 14 16 18 20m
SCALE 1:200

AECOM

Project

Phoenix Place
Mount Pleasant

Client

Taylor Wimpey
Central London

Consultant

AECOM
Aldgate Tower
2 Leman Street
London E1 8FA
United Kingdom
Tel +44 (0) 20 7061 7000
www.aecom.com

Notes

General Notes:

1. Work to figured dimensions only.
2. This drawing is to be read in conjunction with the structural specification and all relevant drawings issued by the Architect, the Building Services Engineer and specialist sub-contractors.
3. All dimensions are in mm except levels which are in m.

Notes:

1. Concrete Grades as follows:
   Slabs C35/45
   Columns C35/45
   Cores C35/45
2. Reinforcement Grade : B500B.
3. Concrete finishes to be in accordance with the specification.
4. Tolerances to concrete elements to be in accordance with the specification.
5. Concrete members are positioned centrally about the grid unless noted otherwise.
6. R.C. walls 250mm thick U.N.O.
7. Allow for 225mm thick r.c. parapets to all flat roofs.
8. Allow for r.c upstand to all risers and service penetrations at roof level.
9. All steelwork to be Grade S355 J0 (hot rolled sections) or S355 JHR (tubular sections). U.N.O. All external steelwork to be galvanized in accordance with the specification.
10. Precast concrete stairs by specialist subcontractor. Half landings to 200mm thick in-situ slabs spanning between core walls.

Issue/Revision

Rev.	Date	Description
T2	16FEB18	BASEMENT LEVELS REVISED IN ACCORDANCE WITH ARCHITECTS STAGE 3 ISSUE
T1	19JAN18	STAGE 3

Key Plan

Purpose Of Issue

STAGE 3

Project Number

60556156

Sheet Title

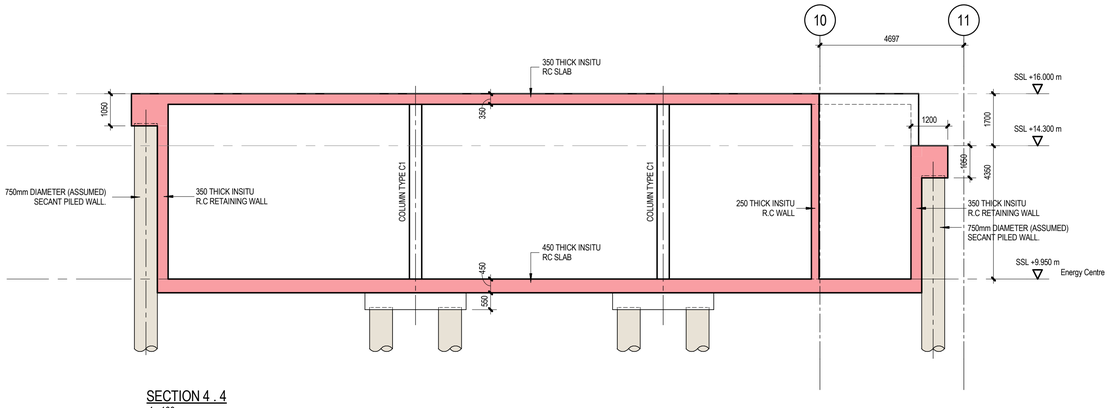
Cross Sections Through Substructure

Sheet Number

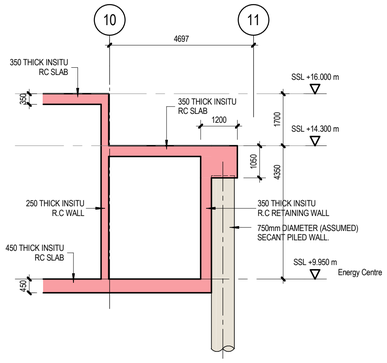
MPL-ACM-XX-ZZ-DR-S-04001

Scale: 1 : 200@A1 **Rev:** T2

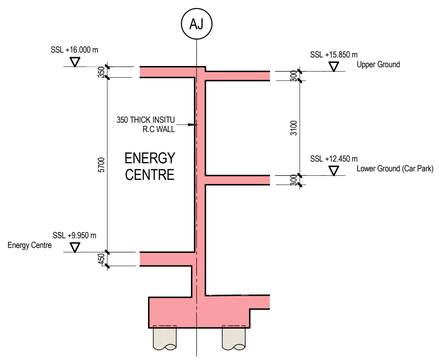
Project Management Initials: Designer: ACM Checked: ACM Approved: ACM Drawn By: ACM ISO A1 594mm x 841mm



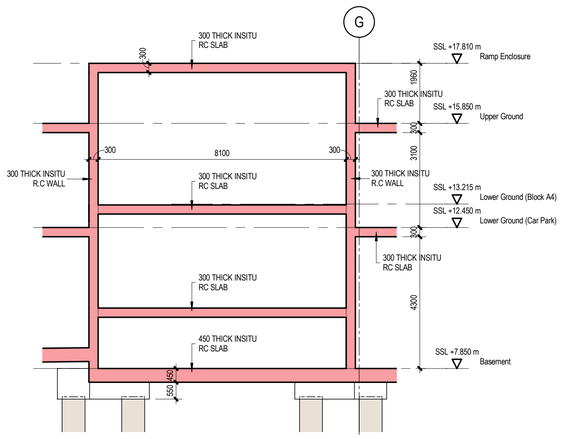
SECTION 4 . 4
1 : 100



SECTION 5 . 5
1 : 100



SECTION 6 . 6
1 : 100



SECTION 7 . 7
1 : 100

0 1 2 3 4 5 6 7 8 9 10m
SCALE 1:100

AECOM

Project

Phoenix Place
Mount Pleasant

Client

Taylor Wimpey
Central London

Consultant

AECOM
Aldgate Tower
2 Leman Street
London E1 8FA
United Kingdom
Tel +44 (0) 20 7061 7000
www.aecom.com

Notes

General Notes:

1. Work to figured dimensions only.
2. This drawing is to be read in conjunction with the structural specification and all relevant drawings issued by the Architect, the Building Services Engineer and specialist sub-contractors.
3. All dimensions are in mm except levels which are in m.

Notes:

1. Concrete Grades as follows:
   Slabs C35/45
   Columns C35/45
   Cores C35/45
2. Reinforcement Grade : B500B.
3. Concrete finishes to be in accordance with the specification.
4. Tolerances to concrete elements to be in accordance with the specification.
5. Concrete members are positioned centrally about the grid unless noted otherwise.
6. R.C. walls 250mm thick U.N.O.
7. Allow for 225mm thick r.c. parapets to all flat roofs.
8. Allow for r.c upstand to all risers and service penetrations at roof level.
9. All steelwork to be Grade S355 J0 (hot rolled sections) or S355 JHR (tubular sections). U.N.O. All external steelwork to be galvanized in accordance with the specification.
10. Precast concrete stairs by specialist subcontractor. Half landings to 200mm thick in-situ slabs spanning between core walls.

Issue/Revision

Rev.	Date	Description
T1	19JAN18	STAGE 3

Key Plan

Purpose Of Issue

STAGE 3

Project Number

60556156

Sheet Title

Substructure Sections

Sheet Number

MPL-ACM-XX-ZZ-DR-S-04002

Scale: 1 : 100@A1 **Rev:** T1