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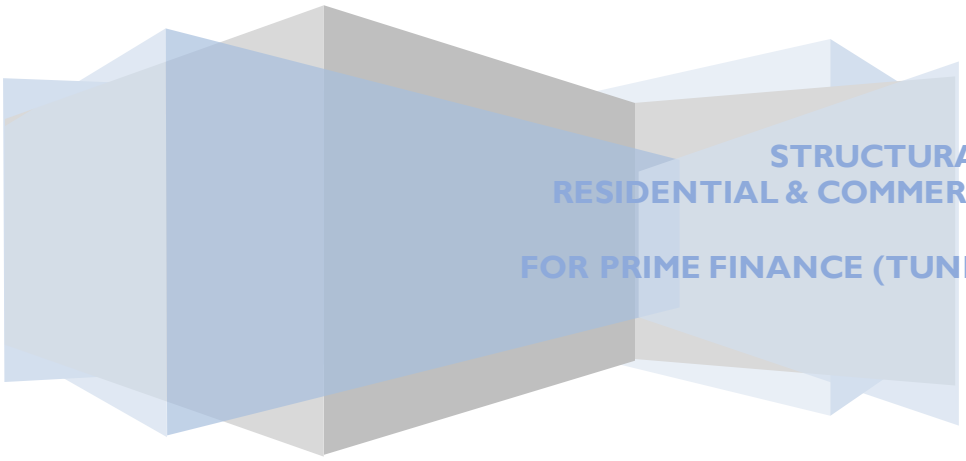
STRUCTURAL AND CIVIL CONSULTING ENGINEERS



PROJECT TITLE

STRUCTURAL DESIGN SUMMARY
RESIDENTIAL & COMMERCIAL DEVELOPMENT
TUNBRIDGE WELLS
FOR PRIME FINANCE (TUNBRIDGE WELLS) SARL

JULY 2017

1.00	**PROJECT DESCRIPTION**
1.1	The application is for a mixed use redevelopment comprising 3,039 sqm Gross Internal Area (GIA) retail uses (Use Class A1/ A2), 1,895 sqm GIA restaurant use (Use Class A3), 1,049 GIA sqm cinema (Use Class D2) and 99 dwellings (Use Class C3) together with the provision of car and cycle parking, highway works, public realm improvements, and associated works, the re-alignment of Public Right of Way ref WBX17 and extinguishment of Public Right of Way ref WBX18, and either:- (a) 9 additional dwellings (Use Class C3) and 372 sqm GIA office uses (Use Class B1), or (b) 1,144 sqm GIA medical centre (Use Class D1).
2.00	**SCHEME OVERVIEW**
2.1	The purpose of this report is to provide supplementary information to accompany the Planning Application. This report is included as an addendum to the COWI Report in respect of the potential impact of the development on the existing Network Rail Underground Tunnel which passes beneath the site. The information contained in this report is a preliminary overview of the structural engineering methodology that is to be adopted for the scheme, particularly in relation to new foundations adjacent/above the existing tunnel. No structural drawings have been prepared for Planning Stage. However more detailed Structural Reports, Drawings and Calculations will be submitted to Network Rail in due course as part of Technical BAPA submission for the project.
3.0	**SITE CONSTRAINTS/TOPOGRAPHY**
3.1	The Network Rail tunnel runs directly under the eastern boundary of the site adjacent to Mount Pleasant Road.
3.2	A tapered zone of influence (ZOI) Extends over part of the site from the rear of the footpath along Mount Pleasant Road. This ZOI measures approx. 14m at the southern boundary at retail unit 1 to approx. 7.5m at the north east boundary to retail 10 (i.e. corner of Church Road with Mount Pleasant Road).

3.3	The Restaurant and Residential Elevations along Mount Pleasant Road (Blocks A & B) have been set back from the Boundary to limit the building height over the ZOI to approx. 2-3 storeys. This is in keeping with the former shop fronts that occupied this part of the site along Mount Pleasant Road, prior to demolition.
3.4	The Site topography slopes steeply from highest point at the North West corner of the site (adjacent to Pitcher & Piano) to lowest point at the South East corner of the site along Mount Pleasant Road. The overall difference in level across the site vertically is approximately 9m.
3.5	Stepped ground floor levels between units and a series of sloping walkways between buildings provides a transition between the levels. Concrete retaining walls are required between changes in ground levels.
4.0	**GEOTECHNICAL REPORT**
4.1	A Geotechnical Report was undertaken by BAM Ritchies for the site in April 2012. The report indicated that site contained made ground (up to 1m in depth), that overlays Lower Tunbridge Wells Sands & Slits, with bands of Sandstone and Mudstone (approximately 16m to 20m deep) that overlays Wadhurst Clay. Testing on the sandstone shows that it has weak uniaxial compressive strength, so it is proposed to adopt a sleeved rotary piled solution at all areas outside of the Network Rail Zone of Influence. A raft foundation will be adopted along Mount Pleasant Road to spread the load from the low-rise section of the building evenly over the ground. Section 5.0 below refers.
5.0	**FOUNDATIONS**
5.1	A concrete raft foundation solution has been adopted over the ZOI to limit the applied bearing pressure over the Network Rail tunnel to 125KN/m^2. This matches the original bearing pressure of the former shop units that were previously on the site along Mount Pleasant Road prior to demolition. Therefore there is no net increase in bearing pressure and Network Rail have confirmed they are satisfied with this methodology.
5.2	The remainder of the site outside the ZOI has a piled foundation solution supported on concrete pile caps and ground beams. The piles are a mixture of 900mm/600mm diameter concrete CFA piles depending on the vertical load capacity required. The

	piles are sleeved adjacent to the ZOI to avoid any load transfer to the tunnel and they extend below the lowest point of the tunnel.
5.3	An Embedded secant piled retaining wall is required along the Western boundary to the car park and service yard areas to create the required levels. This can be accommodated as part of the scheme proposals.
5.4	All of the residential buildings, restaurant, commercial, cinema and car park are supported on the piled foundations.

6.0	**SUPER STRUCTURE**
6.1	The building is predominately a braced concrete frame full height. The 1st floor slab acts as a Reinforced Concrete transfer structure to transfer the column loads from the residential layout into the ground floor columns and down to foundations. The residential level slabs at generally 225thk post tensioned flat slab structure.
6.2	Stability is provided by Reinforced Concrete core walls at the stairwells and life shafts cores to transfer all lateral loads to foundations.
6.3	The cinema structure is a braced steel framed building off a concrete frame podium slab separating the cinema from the retail levels below. The roof to the cinema is formed using steel trusses spanning across the width of the cinema supported on internal steel columns between auditorium walls. Precast hollowcore slabs span between the steel roof trusses to support the roof finishes and plant.
6.4	Loadings - The super structure slabs have been designed for the following dead and imposed loading excluding the self-weight of the concrete structure:
6.4.1	Residential – Dead load (finishes only) - 2.5kN/m^2 Imposed load - 2.5kN/m^2
6.4.2	Restaurant – Dead load (finishes only) – 3.0kN/m^2 Imposed load - 3.0kN/m^2
6.4.3	Retail – Dead load - 3.0kN/m^2 Imposed load - 4.0kN/m^2
6.4.4	Cinema – Dead load - 3.0kN/m^2 Imposed load - 5.0kN/m^2 (at all areas)
6.4.5	Plant Room – Dead load - 3.0kN/m^2 Imposed load - 7.5kN/m^2

6.4.6	Commercial Areas – Dead load Imposed load	- 3.0kN/m^2 - 3.0kN/m^2
6.4.7	Car park – Dead load Imposed load	- 3.0kN/m^2 - 2.5kN/m^2
6.4.8	Service Yard – Dead load Imposed load	- 3.0kN/m^2 - 12kN/m^2
6.4.9	Roofs (all buildings) – Dead load Imposed load	- 3.0kN/m^2 - 1.0kN/m^2
6.4.10	Courtyard at 1st floor L01 – Dead load Imposed load	- 7.5kN/m^2 - 3.0kN/m^2
7.0	**CONCLUSIONS**	
7.1	The structural solution proposed for the construction of the building has been given detailed consideration by the Client and the Design Team. The proposal to limited the building height/loading directly over the tunnel ensures that there is no net increase in loading in this area. This matches the previous building footprint on the site prior to demolition. The sleeved piled foundation solution to the medium-rise buildings on site ensures that no additional load is transferred to the brick tunnel walls. The proposal has been discussed in principle with James Fazakerley (Network Rail South East Senior Construction Manager) and he is familiar with the site. Network Rail are satisfied with the initial structural methodology adopted subject to final review of the detailed drawings, reports and calculations. Detailed conditions surveys will be carried out on all properties adjacent to the site prior to any construction. Monitoring of the tunnel will be carried out a Network Rail Approved Surveyor before and during the works. It is estimated that detailed design for the project will commence once Planning Approval has been confirmed. Detailed design is expected to take approximately 4-6 months after which time a more detailed submission will be submitted to Network Rail for review and approval prior to commencing works on site.	