Construction Methodology and Engineering Statements

Outline Geotechnical Design Parameters

For the type of soil present, the following geotechnical parameters have been considered:

Soil density, $\gamma = 19\ kN/m^3$

Angle of friction, $\phi' = 23.5°$

$K_a = 0.43$

$K_p = 2.33$

Hydrostatic Pressure

The temporary condition will be designed for the water table level, and if deeper than the basement will be ignored.

In the permanent condition, the reinforcement will be designed for the water table at a meter below ground level to allow for the local failure of water mains, drainage, storm water etc.

Intended Use & Loadings

The intended use of the building is residential. Below ground level, the reinforced concrete retaining walls are designed to support the lateral loading applied via the earth pressure and the vertical loads applied from above.

The retaining walls will be designed to resist the overturning moments produced by the lateral earth pressure. These lateral forces will be applied from:

- Soil loads
- Hydrostatic pressures
- Surcharge loading

The thrust produced by the retaining wall will be resisted by the opposing retaining wall.

Surcharge Loading

The following loads will be applied as surcharge loads:

- $10kN/m^2$ if within 45° of a road

- 100kN point loads if under road or within 1.5m
- 5kN/m² if within 45° of a pavement
- Garden surcharge of 2.5kN/m²
- Surcharge for adjacent property 1.5kN/m² + 4kN/m² for concrete ground bearing slab

Adjacent Properties

The geotechnical engineers are to provide comment as to the expected impact on all adjacent property footings within 45° of the excavations. No. 26 Burgess Hill does not fall within this area however the footings for No. 22 will.

Permanent Design Proposals

The retaining walls will be formed using reinforced concrete and designed as cantilevers, propped at the base by the basement slab.

The calculations for the retaining wall, contained within this report, have been produced using the Tekla TEDDS software, which is specifically designed for basement retaining walls.

The overall stability of the walls is designed using K_a & K_p values, whilst the design of the wall structure uses K_0 values. This ensures that movement within the concrete is minimised and therefore the impact on adjacent properties is kept as low as possible.

As mentioned previously, the retaining walls will be designed to resist the hydrostatic pressure, considering long term scenarios. The water table will therefore be taken as 1m below ground level.

The design also considers the risk of floatation and will ensure that the weight of the building exceeds the uplift forces generated from the water.

The calculations contained within this report consider one the most heavily loaded retaining walls.

Temporary Works Proposals

The basement retaining walls will be constructed in bays no wider than 1m, in a predetermined sequence. Any bays being undertaken as the same time will be no closer than 4m to each other. This approach minimises any movement to the existing walls above and the neighbouring properties.

In the temporary condition, the retaining walls will be propped at 1/3rd height via waling beams and horizontal props. These will remain in place until the basement slab has cured.

The demonstrate the feasibility of the works, a proposed basement construction sequence is shown within this report.

Monitoring

In order to safeguard the existing structures during underpinning and new basement construction, movement monitoring using total stations or similar is to be undertaken.

Before the works begin, a detailed monitoring report is required to confirm the implementation of the monitoring. The items that this should cover are:

- Risk Assessment to determine level of monitoring
- Scope of Works
- Applicable standards
- Frequency of Monitoring
- Specification for Instrumentation
- Monitoring of Existing cracks
- Monitoring of movement
- Reporting

We would recommend that the monitoring frequency should follow:

Pre-construction: Monitored once.

During construction: Monitored after every pin is cast for first 4 no. pins to gauge effect of underpinning. If all is well, monitor after every other pin.

Post construction works: Monitored once.

Trigger values should be taken from the detailed ground movement assessment at design phase. Typical Trigger values are:

Green 0-4mm vertical . No action

Amber 3-8mm Vertical 4-6 Horizontal Implement remedial measures review method of working and ground conditions

Red >10mm Vertical , >8mm Horizontal Cease works with the exception of necessary works for the safety