



CASE STUDY CADHAM ROAD, GLENROTHES



PILING/GI/FOUNDATION SYSTEMS

CLIENT

**Bellway Homes Limited
Advance Construction
Group Limited**

SCOPE OF WORKS

**Driven Precast Concrete
Piles
Vibro Stone Columns
RBeam**

ACHIEVEMENTS

**Completed on time
Completed on budget**

Project Brief

In 2020, the Roger Bullivant Limited (RBL) Scotland team were approached by Advance Construction Group Limited (AC) to assist with a foundation solution on a 145 No. plot residential development off Cadham Road, Glenrothes. The project was to be developed in partnership with Bellway Homes (East) Ltd as part of several low to mid-rise residential commitments in the area.

Upon review, it was found the engineer's foundation proposal was for traditional foundations consisting of strip, high under build, deep trench fill and piled solutions due to the variability in soil conditions and requirement for re-use of surplus site won cohesive (i.e. clay) materials. As part of our proposed alternative solution, RBL suggested a rezoning of the project to include Vibro Stone Columns (VSC) and Driven Precast Concrete (DPC) Piles with a precast ground beam solution, RBeam, to mitigate unnecessarily deep trench fill, whilst providing savings to the client and compliant foundations to the proposed warrant provider, NHBC.



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Key Issues/Requirements

- ↘ The design for the units required an allowable bearing pressure of 100kN/m² (up to 250kN pile load) beneath suitably reinforced strip foundations and ground beams.
- ↘ Ground conditions generally comprised of an upper covering of made ground, with a maximum recorded depth of 4.00mbgl. Underlying the made ground, superficial deposits consisting of medium dense gravelly sand on a stiff to very stiff clay. This profile continued onto bedrock.
- ↘ During the initial design review, RBL noted that a site regrade was to occur prior to works commencement, ranging between 0.00 – 4.00m above existing ground level (EGL). Due to AC requirement to use site won “cohesive” material, further justification and agreement on fill specification was required.

Solution

- ↘ Prior to RBL works commencing works, discussion and agreement had been sought with the client, project engineer and warrantor on a proposed fill specification in compliance with ‘Specification for Highways, Series 600’, whereby engineering conditions were met on the fill material beneath the proposed ground improvement works, namely compaction and moisture levels. In addition, agreement on the maximum permissible depth of cohesive fill and material composition, accounting for duration of global settlement and self-weight consolidation to dissipate in advance of our works.
- ↘ From this agreement, RBL proposed a rezoning of the site between our two systems as a the most cost-effective solution when accounting for masses of concrete fill or wholly piled solutions.
- ↘ RBL proceeded to install 682 No. 250mm / 10” diameter PCC piles to an average depth of 10.00mbgl with approx. 2,700Lm of RBeam to support 48 No. units.
- ↘ A further 2080 No. 600mm dia VSC’s were installed to support 68 No. units (incl. garages) to an average depth of 3.00m. Due to the compact nature and depth of the proposed fill, RBL required to adopt pre-boring in advance of the stone column installation to ensure satisfactory depth to meet the warrant providers conditions.
- ↘ The DPC’s piles were tested using dynamic load testing and maintained load tests. The VSC’s were tested using both short duration plate load tests and dummy footing / mini-zone loading tests at an agreed frequency compliant with the engineers and warrant providers specifications.
- ↘ The benefits of adopting this hybrid technique were both operational due to the fast installation of VSC’s over conventional methods, resulting in programme betterment against original schedule. In addition, substantial savings were provided as RBL proposals negated the requirement for mass concrete fill and re-use of on-site materials, whilst also changing a number of piled units to ground improvement removing the need for piles and beams.