RBL WEBINAR

Ground Improvement:

Unlocking RBL's Value Engineering Capabilities

ROGER BULLIVANT

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RBL'S
PRESENTERS

Andrew Wandless

Ground Improvement Manager

Dan Tayler

Ground Improvement Manager

Megan Goodchild

Marketing Manager

ROGER BULLIVANT

WHAT ARE WE COVERING?

ROGER BULLIVANT LIMITED
AT A GLANCE

Total employees.

500+

Linear metres of precast beam manufactured annually.

>250,000 LM

Providing piling and foundation solutions in the residential sector.

Residential

RBL has the capacity to manufacture over 1 million metres of precast pile every year.

1M

Fleet of piling rigs.

50+

100% of precast products manufactured with low carbon concrete.

100%

Providing piling and foundation solutions for various commercial projects.

Commercial

ROGER BULLIVANT

OUR PRODUCTS

WHAT WE DO

PILING

- Driven Precast Concrete Piles
- Driven Steel Tubular Piles
- RB Combipile
- Continuous Helical Displacement Piles (CHD)
- Continuous Displacement Auger Piles (CDA)
- Continuous Helical Auger Displacement Piles (CHAD)
- Continuous Flight Auger Piles (CFA)
- Contiguous Piled Retaining Walls

GROUND IMPROVEMENT

- Vibro Stone Columns
- Rigid Inclusions

FOUNDATION SYSTEMS

- RBeam Precast Concrete Ground Beams
- Precast Caps

RESTRICTED ACCESS

- Sectional Flight Auger (SFA)
- Bottom Driven Minipiles
- Overburden Drilling System
- Jack Piles & Jack Pile Raft
- Grundomat Piles
- Drill Bar Piles
- Underpinning

LOCAL KNOWLEDGE
NATIONAL SUPPORT

International expertise

THINK FOR A SECOND
PUT SAFETY FIRST

BRITISH SAFETY COUNCIL
International Safety Awards 2025 Winner

ROSPA Member

2025
ROSPA President's Award

1 Safety First

ROGER BULLIVANT

Sustainability

TO REDUCE OUR CARBON FOOTPRINT BY 40% BY 2030

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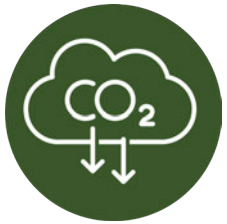
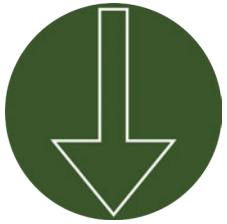


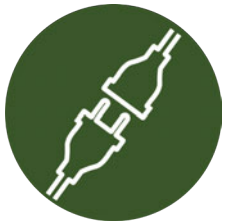
Low Carbon Concrete
Reduced cement content by 50% by replacing it with recycled material.

Displacement Pile Solutions
Generates minimal spoil reducing number of lorry movements, lowering carbon emissions.



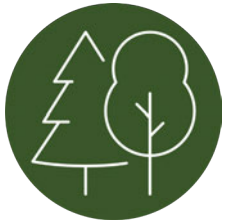
Continuous Helical Displacement (CHD) Piles
Offer shorter pile lengths, therefore reducing concrete usage and associated carbon emissions.

PV Panels
PV panels installed on HQ and precast manufacturing facility.



Electric Forklift Fleet at HQ
Electric trucks can save an average of 679,805 kilograms of C02 a year.

HVO Fuel
RBL now only supplies HVO fuel to power its bulk tanks and rigs, as well as onsite forklift trucks.



Supporting the National Forest
RBL supports improvements at Albert Village Lake and the Princess Diana Memorial Woodlands, near its HQ.

Electric Piling Rigs
First in the UK to trial the Junttan PMX2e fully battery powered driven piling rig to provide carbon savings on existing projects.

RBL’s Value Engineering Capabilities

Case Study: Bidfood
CHD x RI

Bidfood, Renfrew

Rigid Inclusions x CHD Piles

Key issues/requirements

- Historic foundations
- Site regrade
- Variable soils
- Variable foundation depth
- Airport flight path

Project Solution

- Remediation of historic foundations.
- Localised Bespoke designs.
- Incorporating WP into LTP
- CHD Piled beneath frame
- RI Ground Improvement beneath slab

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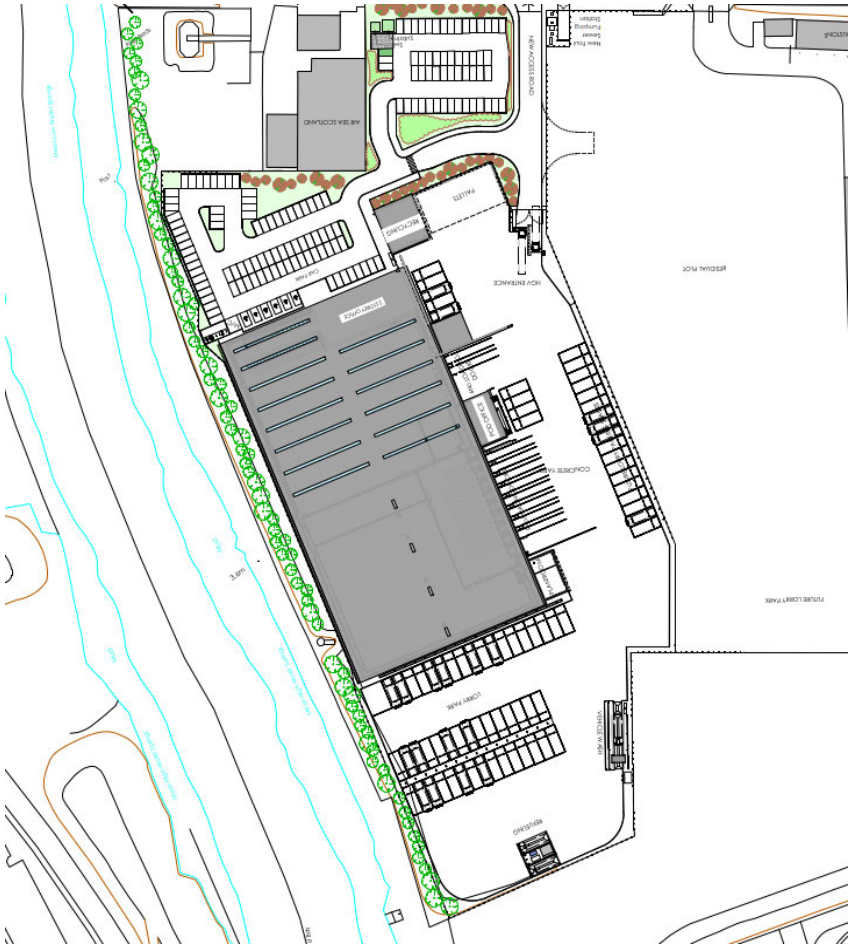
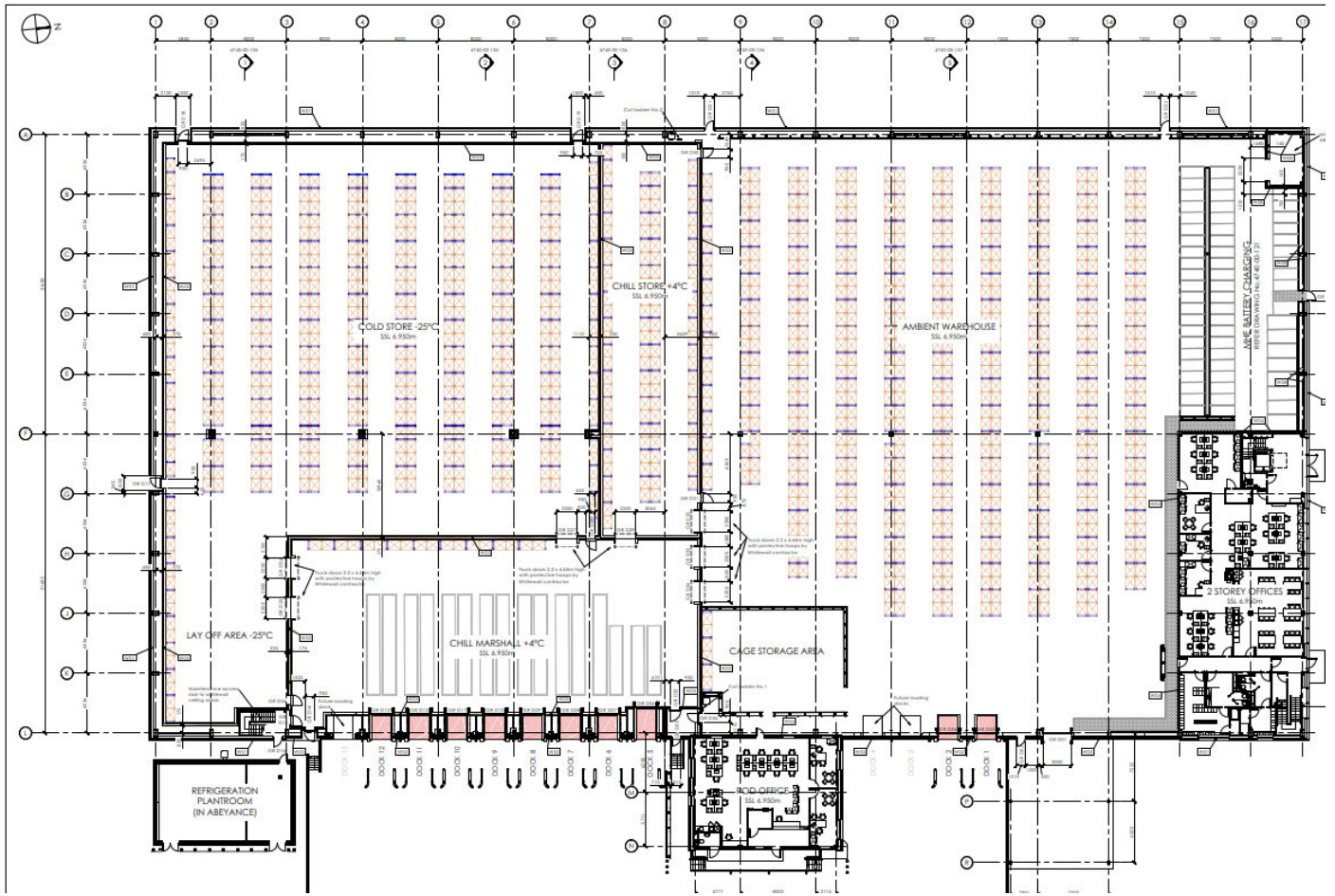


Proposed Development Plan



Proposed Warehouse

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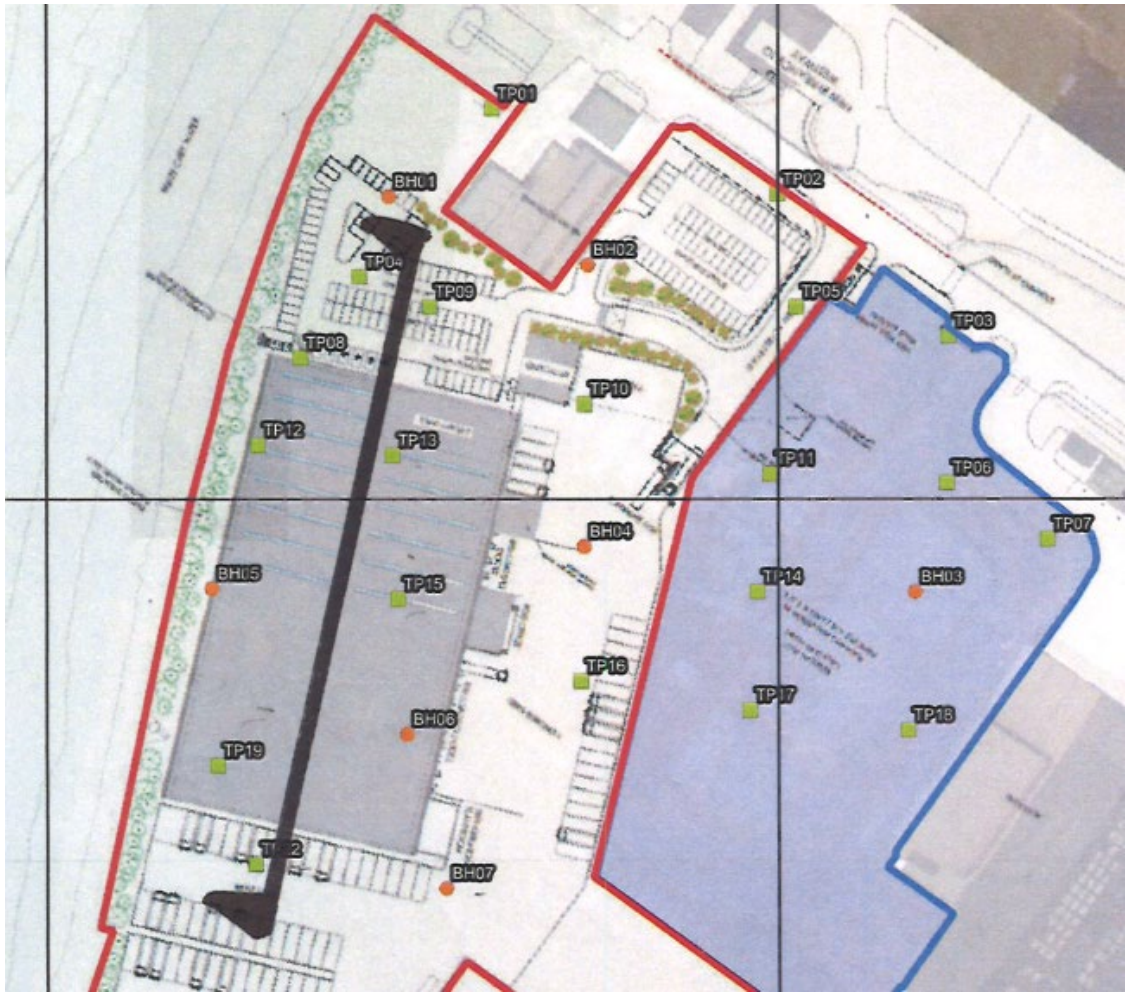
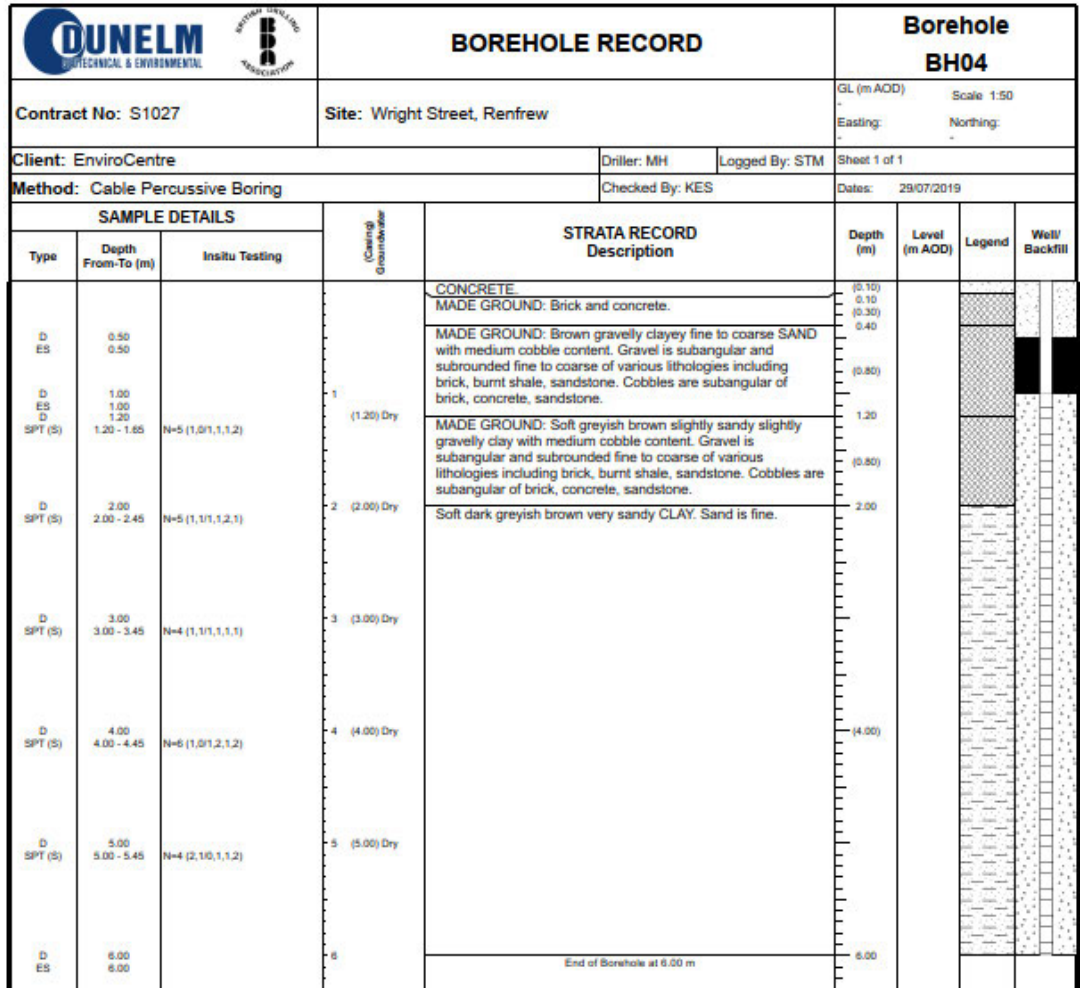
Arial Image – Google Earth
Pre-2008

Arial Image – Google Earth
Post-2008

Completed Displacement Piling Projects



Original Site Investigation Layout
EnviroCentre Limited Report (Ref: 8828)



DUNELM GEOTECHNICAL & ENVIRONMENTAL

BOREHOLE RECORD

Borehole BH04

Contract No: S1027 | **Site:** Wright Street, Renfrew | GL (m AOD): - | Scale 1:50 | Easting: - | Northing: -

Client: EnviroCentre | Driller: MH | Logged By: STM | Sheet 1 of 1

Method: Cable Percussive Boring | Checked By: KES | Dates: 29/07/2019

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
				CONCRETE.	(0.10)			
				MADE GROUND: Brick and concrete.	0.10 (0.30) 0.40			
D 0.50 ES 0.50				MADE GROUND: Brown gravelly clayey fine to coarse SAND with medium cobble content. Gravel is subangular and subrounded fine to coarse of various lithologies including brick, burnt shale, sandstone. Cobbles are subangular of brick, concrete, sandstone.	(0.80)			
D 1.00 ES 1.00 D 1.20 SPT (S) 1.20 - 1.65	N=5 (1,0/1,1,1,2)		1 (1.20) Dry	MADE GROUND: Soft greyish brown slightly sandy slightly gravelly clay with medium cobble content. Gravel is subangular and subrounded fine to coarse of various lithologies including brick, burnt shale, sandstone. Cobbles are subangular of brick, concrete, sandstone.	1.20 (0.80)			
D 2.00 SPT (S) 2.00 - 2.45	N=5 (1,1/1,1,2,1)		2 (2.00) Dry	Soft dark greyish brown very sandy CLAY. Sand is fine.	2.00			
D 3.00 SPT (S) 3.00 - 3.45	N=4 (1,1/1,1,1,1)		3 (3.00) Dry					
D 4.00 SPT (S) 4.00 - 4.45	N=6 (1,0/1,2,1,2)		4 (4.00) Dry		(4.00)			
D 5.00 SPT (S) 5.00 - 5.45	N=4 (2,1/0,1,1,2)		5 (5.00) Dry					
D 6.00 ES 6.00			6	End of Borehole at 6.00 m	6.00			

Example Borehole
EnviroCentre Limited Report (Ref: 8828)

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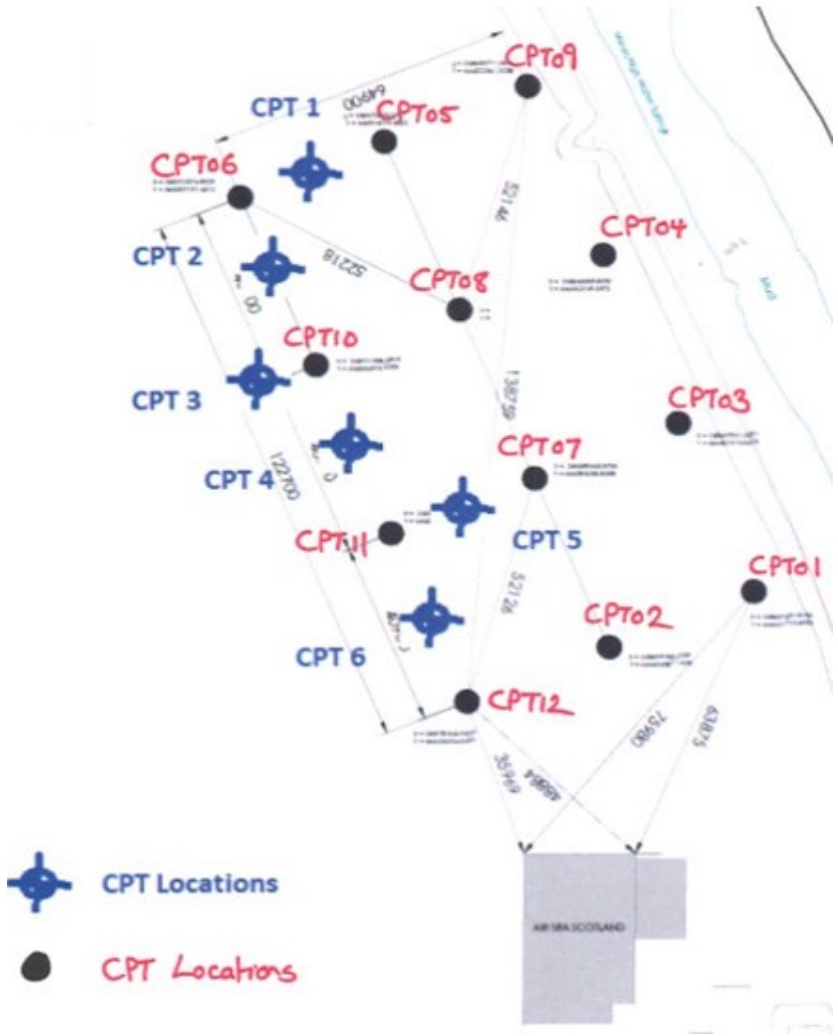
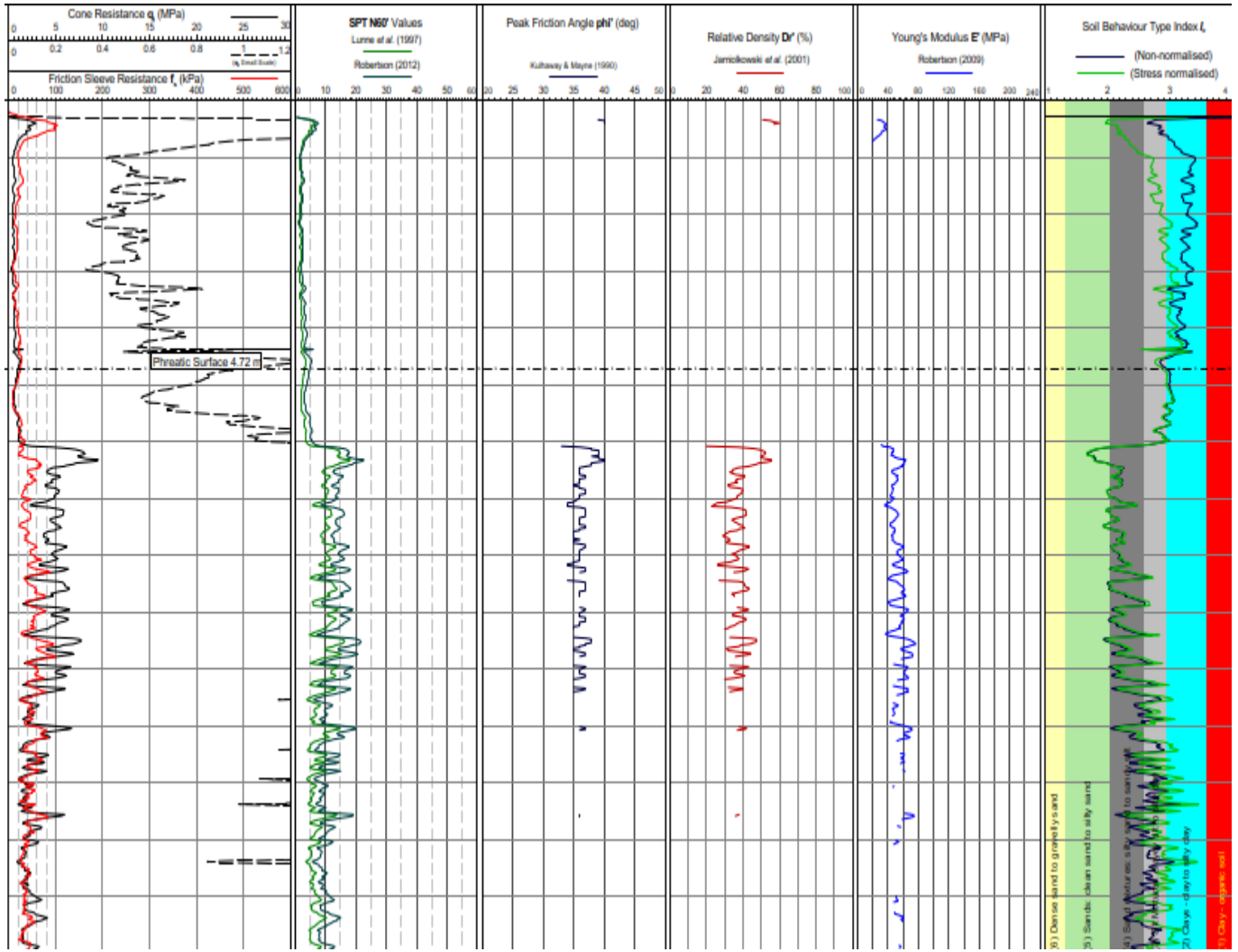
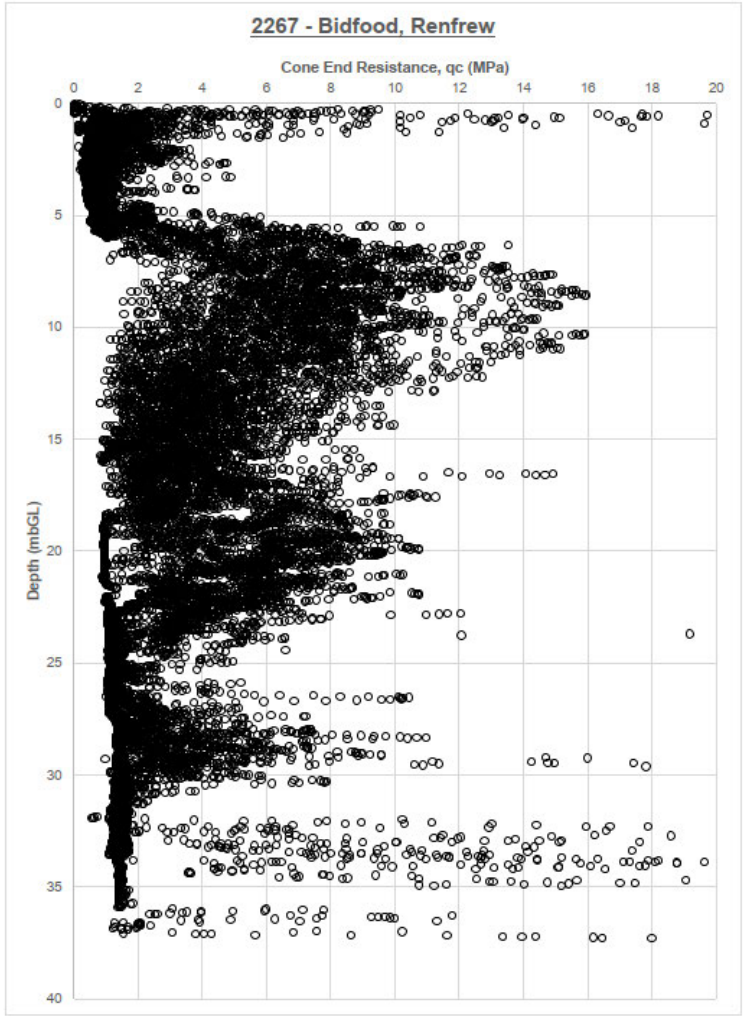


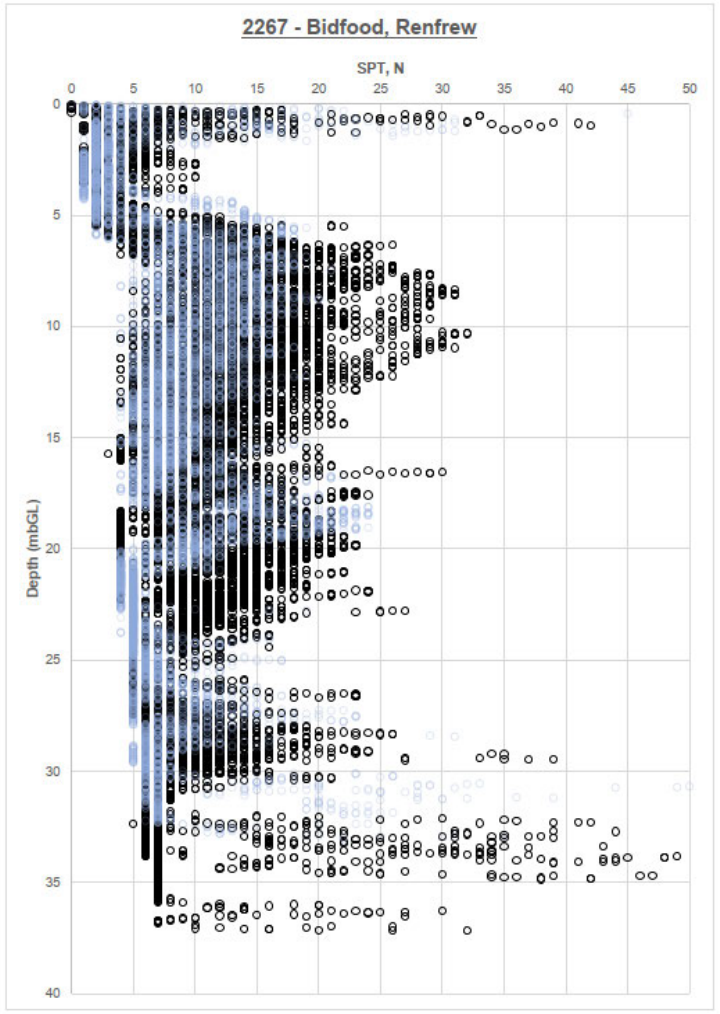
Additional Site Investigation Layout
Lankelma Report (Ref: P-107635-1)



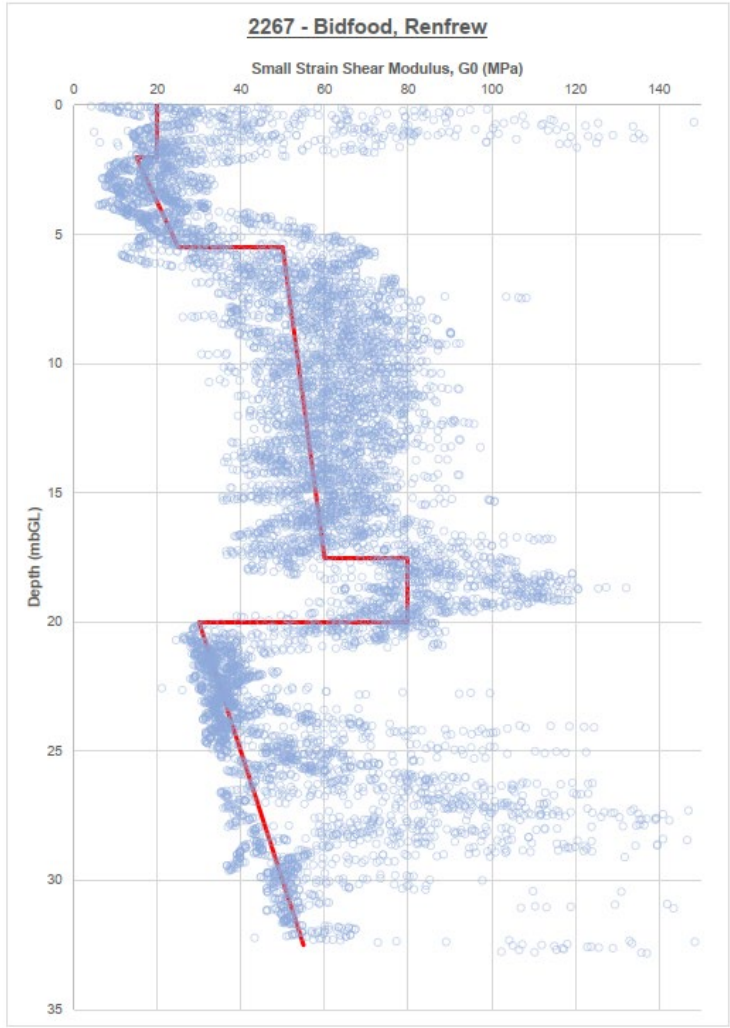
Example Cone Penetration Test (CPT)
Lankelma Report (Ref: P-107635-1)



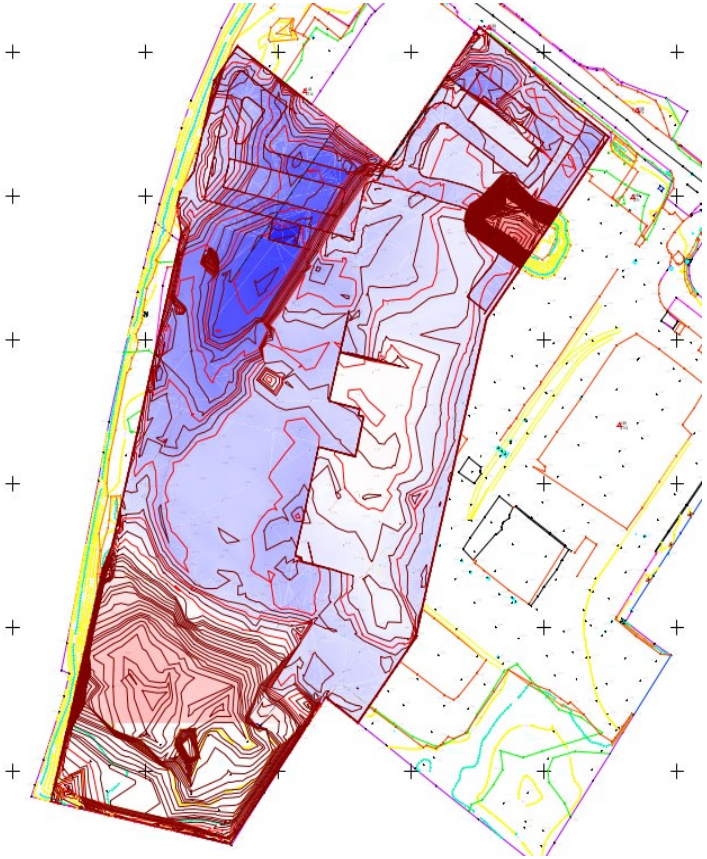
Plotted Cone End Resistances (qc)



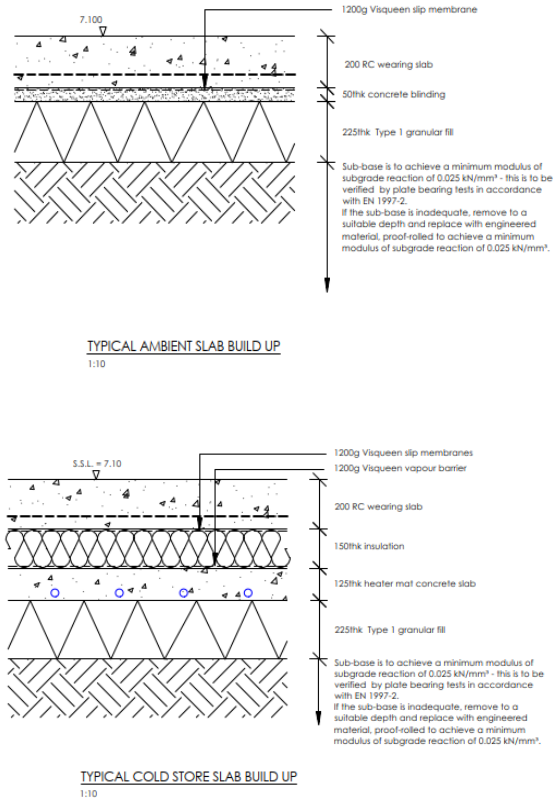
Standard Penetration Tests (Blows - N)



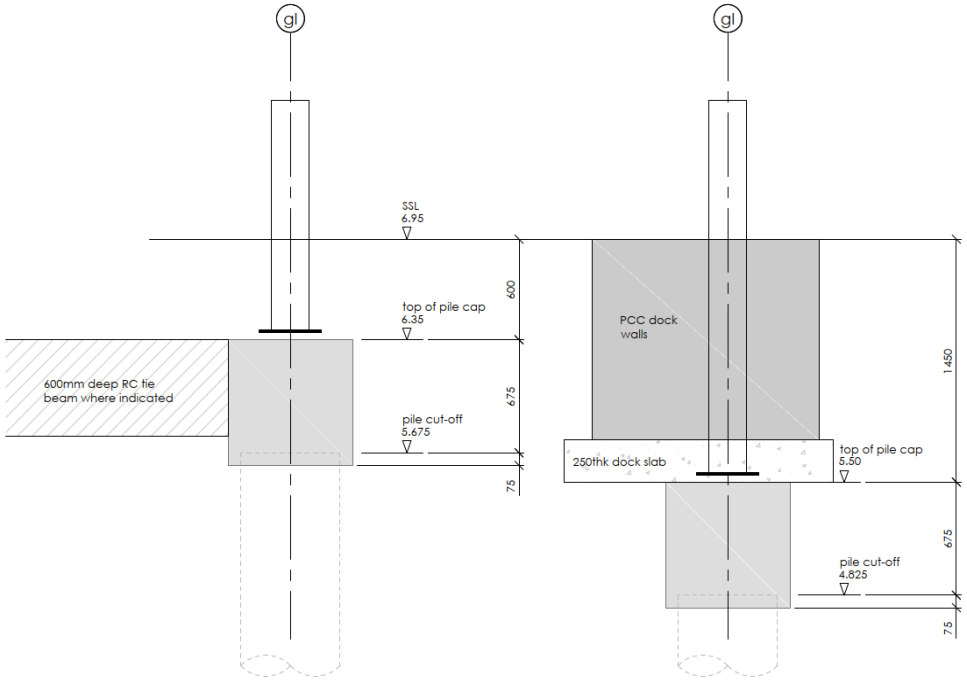
Small Strain Shear Modulus (Go)



Site Regrade Topographic



Typical Cross-Section of Slab Foundations



Cross-Section - Pile Cap with CHD

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RBL'S
VALUE ENGINEERING APPROACH

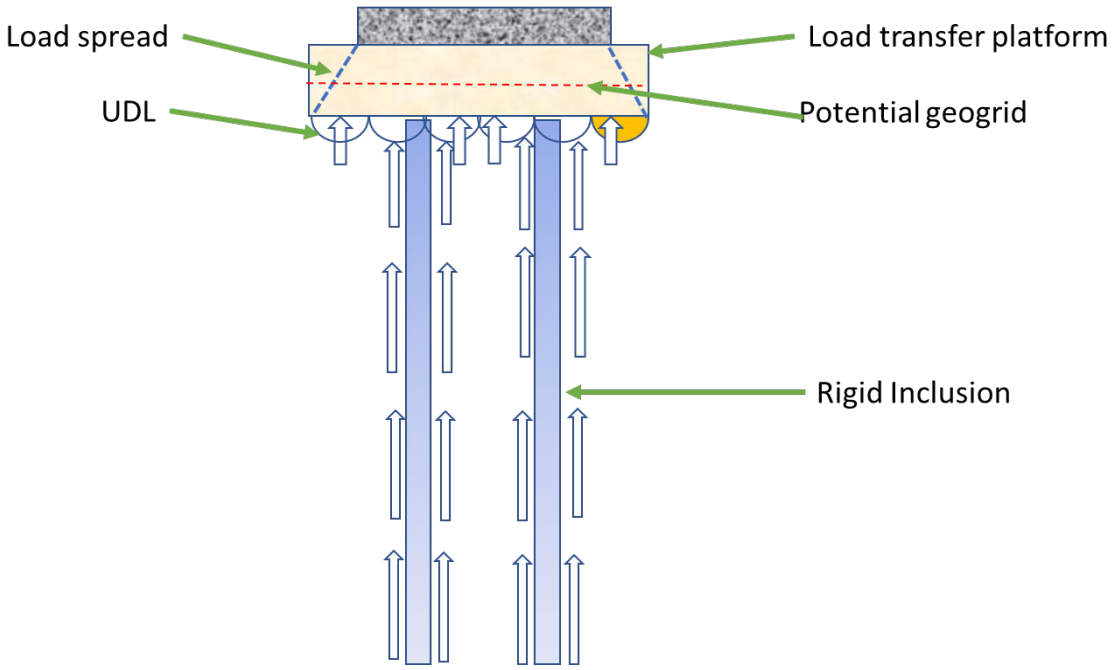
Engineers Specification	RBL Proposal
Frame: 600mm dia CFA Piles Compression (max) – 350kN Tension (Max): 10kN Lateral (Max): 75kN	**Frame:** 300/600mm dia CHD Piles from 8.0 – 16.0m Compression (max) – 350kN Lateral: 50kN Diameter: 400/700mm Lateral(Max): 75kN
Internal Floor Slab: 600mm dia Vibro Stone Column ABP: 60kN/m^2 Total settlement: <25mm	**Internal Floor Slab:** 300mm dia Rigid Inclusion (RI) Length: 6.0-8.0m Load Transfer Platform: 400mm Spacing: 1.75m^2 to 3.0m^2 ABP: 9kN/m^2 to 68kN/m^2 Total settlement: <30mm

RIGID INCLUSIONS
(RI)

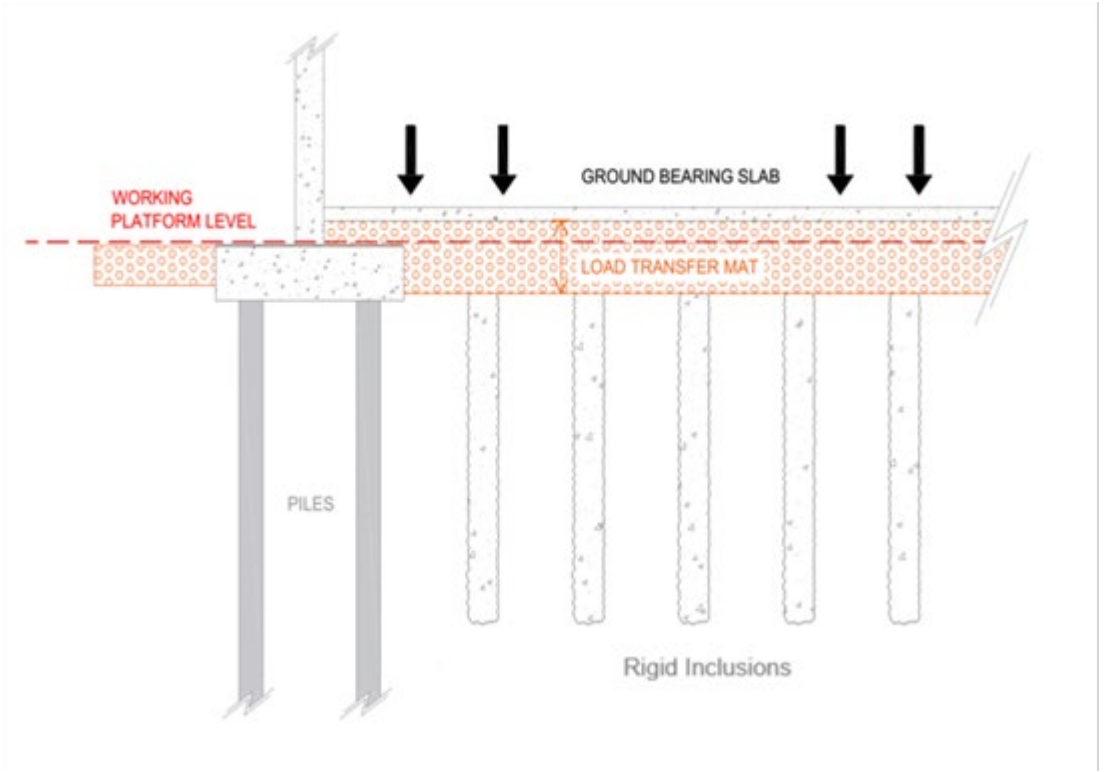
Vertical inclusions of unreinforced concrete in a helical formation with a solid central core.

- Intended to Improved composite modulus of soil / inclusion through volume replacement.
- As part of the design process a balance of negative, positive skin friction resistances and end bearing (Neutral plane)
- Load transference by a pre-determined thickness of platform (LTP) to ensure proportionate distribution of load between RI and intermediate soil.

RIGID INCLUSIONS
(RI)

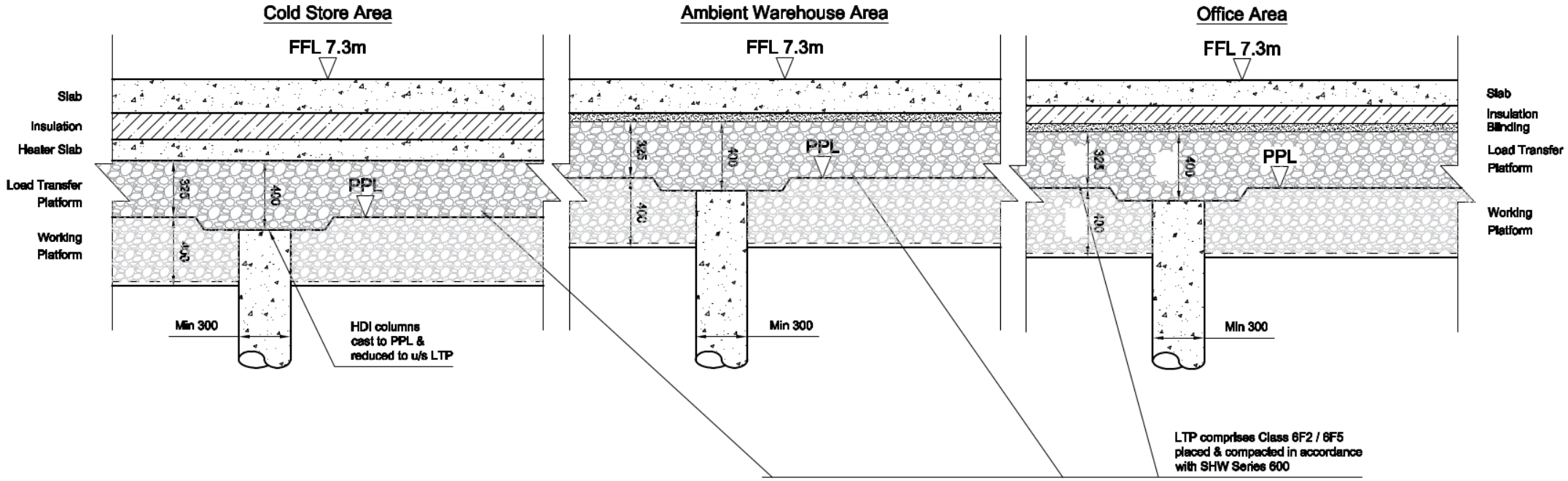


RI Functionality



Typical Cross-Section of RI / CHD foundations

RIGID INCLUSIONS
(RI)

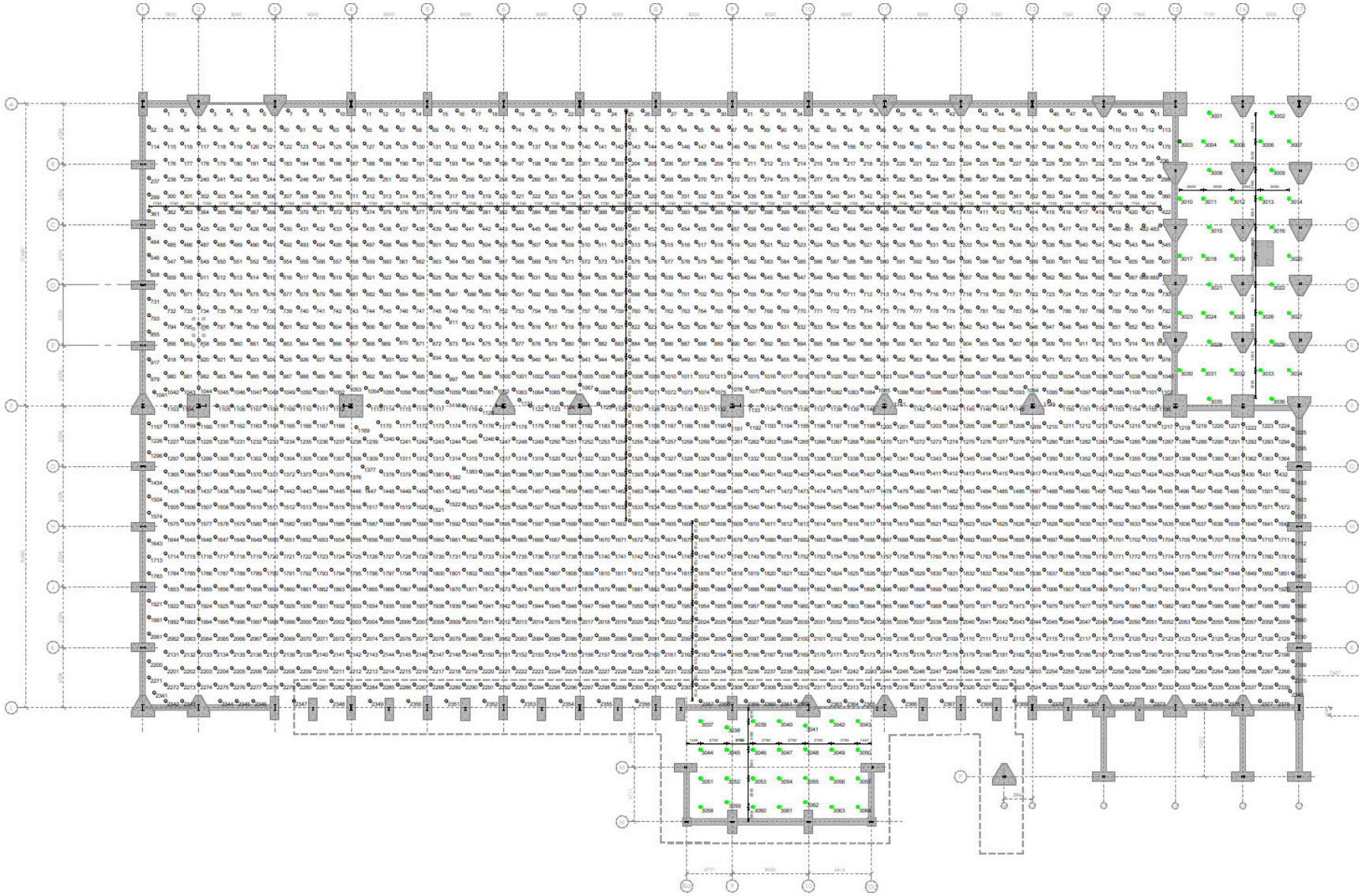


Cross-Section - LTP with RI

CONTINIOUS HELICAL DISPLACEMENT PILES (CHD)

Auger displacement steel reinforced concrete pile in a helical formation with a solid central core.

- Direct distribution of structural loading through the shaft and flights via skin friction resistance and end bearing into competent underlying soils.
- As part of the design process a balance of negative, positive skin friction resistances and end bearing (Neutral plane).
- Steel reinforcement cages and / or bars to provide structural support and lateral resistance and enhanced stiffness.



Construction Layout

Frame:
197 No. CHD (300/600)
60 No. CHD (400/700)

Ambient / Cold Store:
2378 No. RIs

Offices:
65 No. RIs

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RI & CHD
INSTALLATION PROCESS

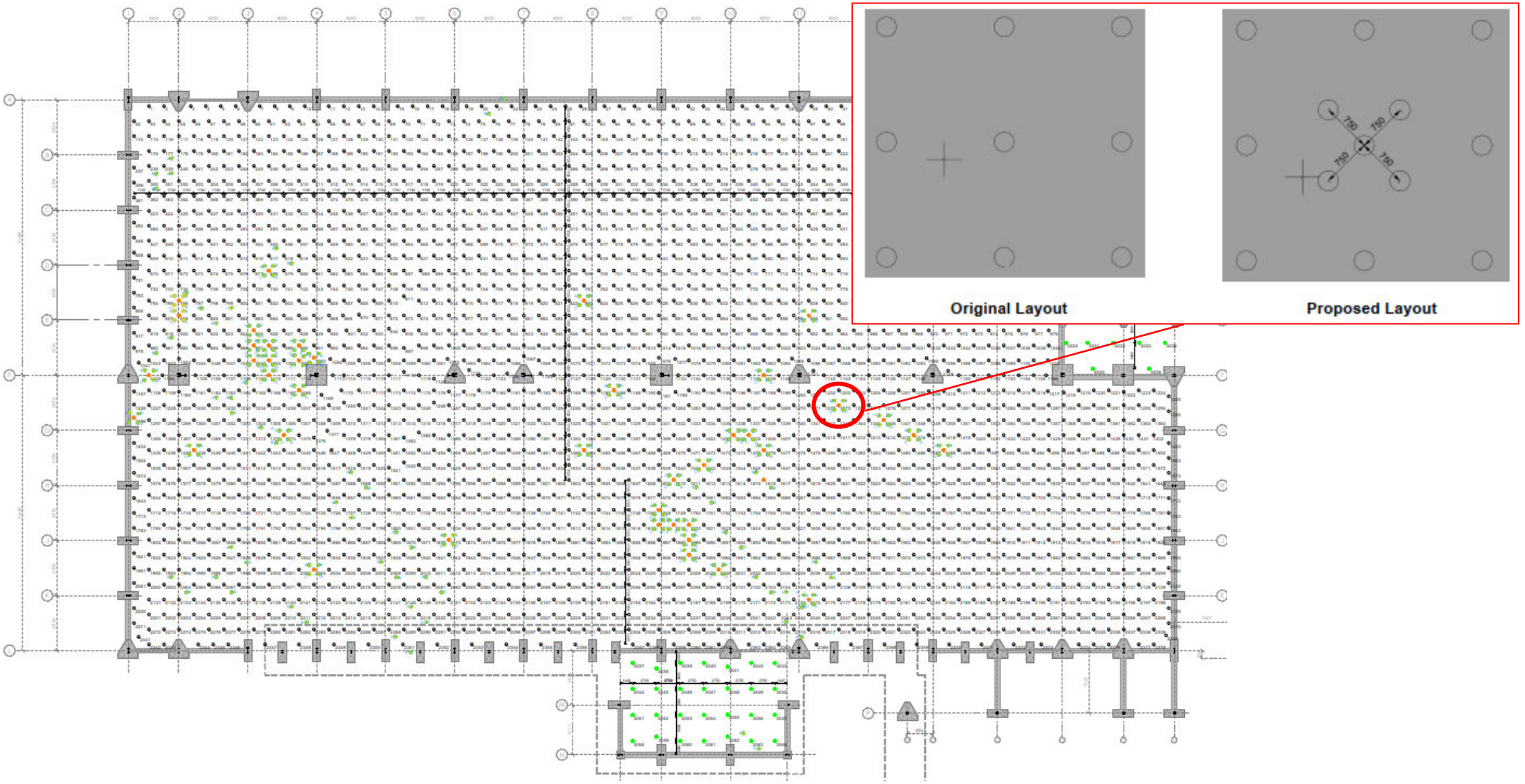
STEP 1
Drilling the bore – A multi-flight bullet-ended shaft is driven into the ground using a torque rotary head.

STEP 2
Pumping concrete – Concrete is pumped down the hollow shaft under pressure to the boring head as the tool is reverse-rotated and withdrawn, the helical shape with solid core.

STEP 3
Excavation & LTP formation (RI) – Prior to curing, immediately following installation, RI heads are excavated as necessary, to allow formation of the load transfer platform (LTP).

Inserting reinforcement (CHD) – A reinforcement cage is inserted into the bore to ensure structural integrity. After curing period, cropping to require formation level.

STEP 4
Clearing heave and waste – Remove any excess material from formation to complete installation and ensures site levels are reinstated.



Replacements Layout

RI & CHD
BENEFITS

COST-EFFICIENCY

Changing from CFA to CHD on the frame piles saved the client **£118,000.00** on equivalent pile number and depth.

Utilising RIs on the slab foundation saved against an equivalent capacity CHD solution by **£75,000**, excluding associated costs of cropping, disposal, tie beams and tie details within the foundations.

SUSTAINABILITY

Changing from CFA to CHD on the frame piles reduce the required concrete from **460 m^3** on equivalent pile number and depth. Utilising RIs on the slab foundation reduced the required concrete volume on an equivalent pile capacity CHD solution by **150 m^3**.

This change also reduced spoil generation by as much as **1,100m^3** against equivalent CFA.

ENVIRONMENTAL

By changing from CFA to CHD on the frame, we reduced the foundations works projected equivalent CO2 by **83 tonnes**, inclusive of concrete and waste disposal.

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Case Study: Longbridge
VSC, CFA & RBeam

West Works Site, Longbridge

Vibro Stone Columns x CFA Piles and Foundation Package

Key issues/requirements

Deep made ground
Variable soils
Complex ground history
Significant enabling works

Project Solution

Multiple techniques delivered to provide the best value foundation solutions on a plot-by-plot basis

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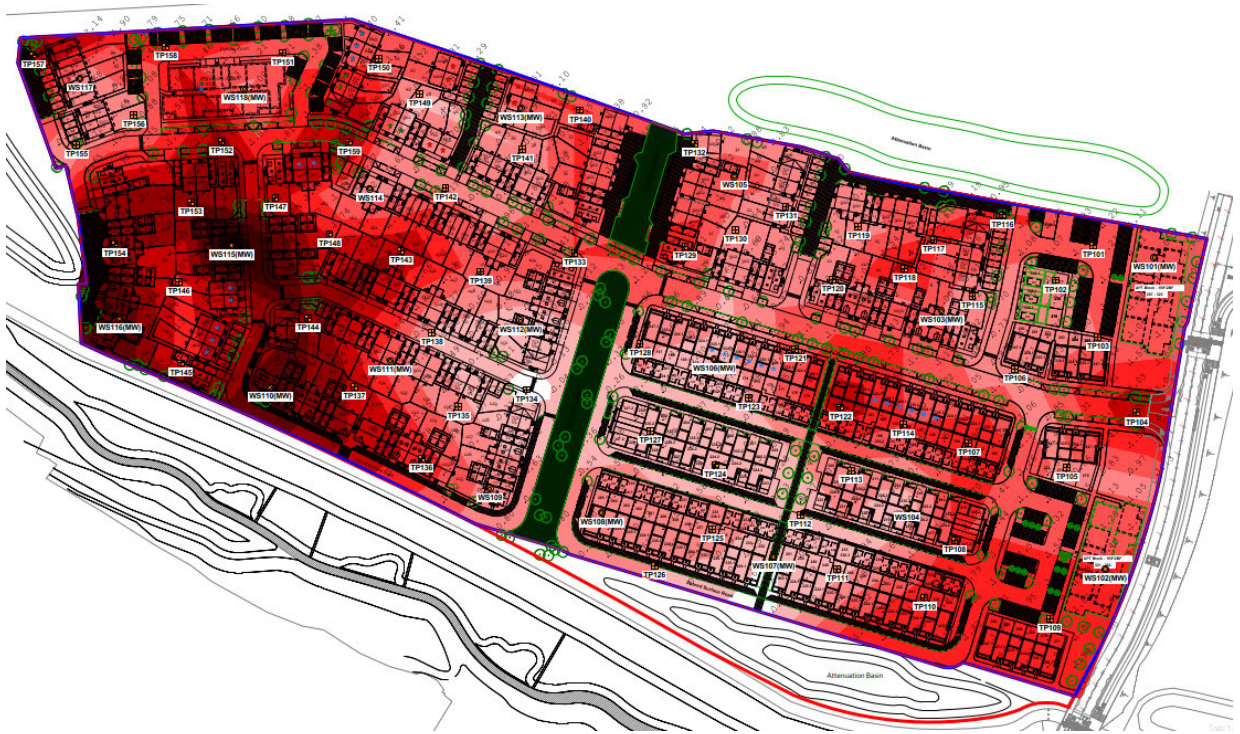
Remediation

Development Underway



Depth of Made Ground

e3p

Borehole Log

Borehole No. **WS105** Sheet 1 of 1

Project Name: Longbridge West	Project No. 15358	Co-ords: 400468.00 - 277866.00	Hole Type WS
Location:		Level:	Scale 1:50
Client: St Modwen Homes		Dates: 08/06/2022 -	Logged By J.Beer

Well	Water Strikes	Samples and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend
		1.00		N=8 (3,3/2,2,2,2)	1.20		MADE GR gravelly cla sub angula sandstone,
	▼	2.00 2.00 2.00	D ES	N=8 (2,2/2,2,2,2)			Firm low st slightly gra sub angula Becoming
		3.00 3.00	D	N=8 (1,2/2,2,2,2)			
		4.00 4.00	D	N=12 (2,2/3,3,3,3)	4.45		

Remarks
1. Terminated due to hole collapse at 4.00 m bgl. 2. Water strike at 2.00 m bgl.

RLRE

Borehole Log

Borehole No. **CP202** Sheet 1 of 1

Project Name: (R9108) Longbridge West Structures	Project No. P22-383	Co-ords: 400300E - 277794N	Hole Type CP
Location: Longbridge, Birmingham		Level: 176.76	Scale 1:50
Client: St Modwen Homes		Dates: 13/04/2023	Logged By BD

Sample and In Situ Testing Depth (m)	Ref.	Type	Results	Level (m)	Depth (m)	Stratum Description	Legend	Water Strikes	Well
1.00		SPT	N=16 (3,3/4,3,4,5)		1	MADE GROUND. Reddish brown slightly sandy gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded brick, concrete, timber, clinker, rebar, wire and metal.			
2.00		SPT	N=16 (2,4/4,5,4,3)		2				
3.00		SPT	N=14 (2,5/2,3,4,5)		3				
4.00		SPT	N=11 (2,2/2,3,3,3)		4				
5.00		SPT	N=20 (4,3/4,4,6,6)		5				
6.00		SPT	N=34 (6,7/10,8,8,8)		6				
				170.06	6.70	MADE GROUND. Grey becoming reddish brown mottled grey extremely weak MUDSTONE/SILTSTONE. (Reworked Natural).			
7.00		SPT	N=30 (4,5/6,7,7,10)	169.76	7.00	Extremely weak dark reddish brown MUDSTONE. (Alveley Member - Mudstone).			
8.00		SPT	N=24 (4,5/6,5,5,8)	168.76	8.00	End of Borehole at 8.000m			
					9				
					10				

Remarks
1. Borehole terminated at 8.0m. 2. No groundwater encountered. 3. No visual or olfactory contamination observed. 4. Borehole backfilled with arisings upon completion.

AGS

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RBL'S
VALUE ENGINEERING APPROACH

Initial Concept	RBL Proposal
Mix of deep trench fill foundations and CFA piling with cast instu ground beams	Vibro Stone Columns • 3812 stone columns ranging from 3.5m to 8m • 150kN/m2 bearing capacity with settlement limited to 25mm • Pre-bore utilised in some areas to accommodate full depth treatment CFA • 2935lm 300mm dia CFA installed to depths between 14m – 20m • 425kN compression with a FOS of 3.0 • Mix of precast and cast instu caps. Beams • 739m of RBeam

WHAT ARE
VIBRO STONE COLUMNS?

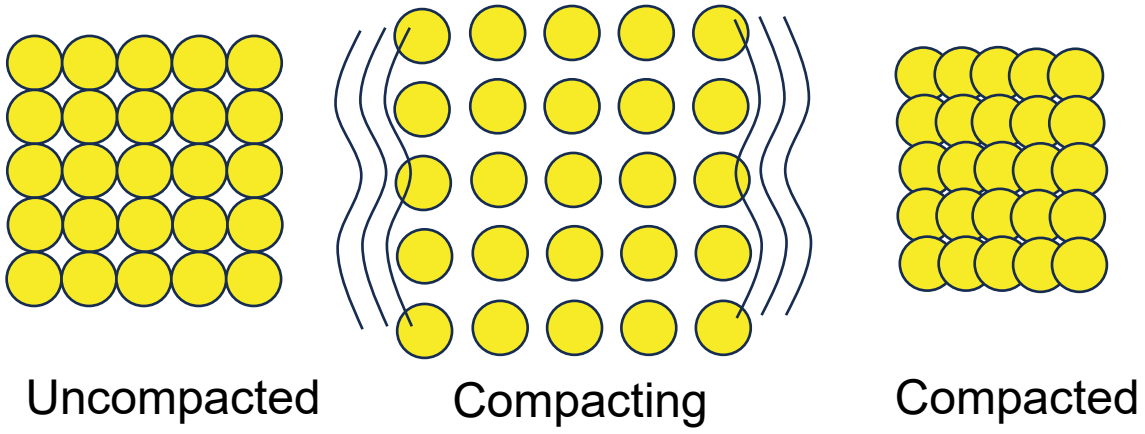
Vertical inclusions of dense, compacted gravel or stone installed using a vibrating tool.

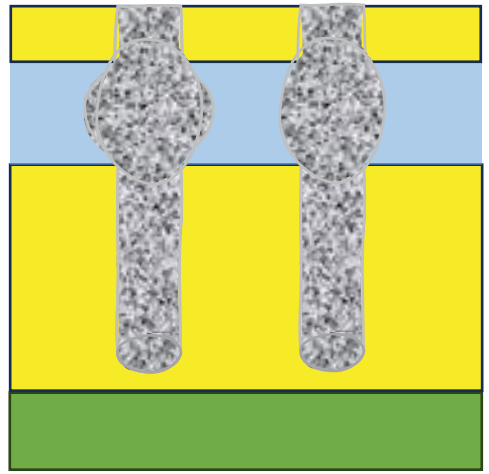
- Reduce Settlement
- Improve Bearing Capacity
- Increase shear strength
- Reduce risk of Liquefaction
- Allows the use of shallow foundations

VIBRO STONE COLUMNS

REPLACEMENT OR COMPACTION (OR BOTH)

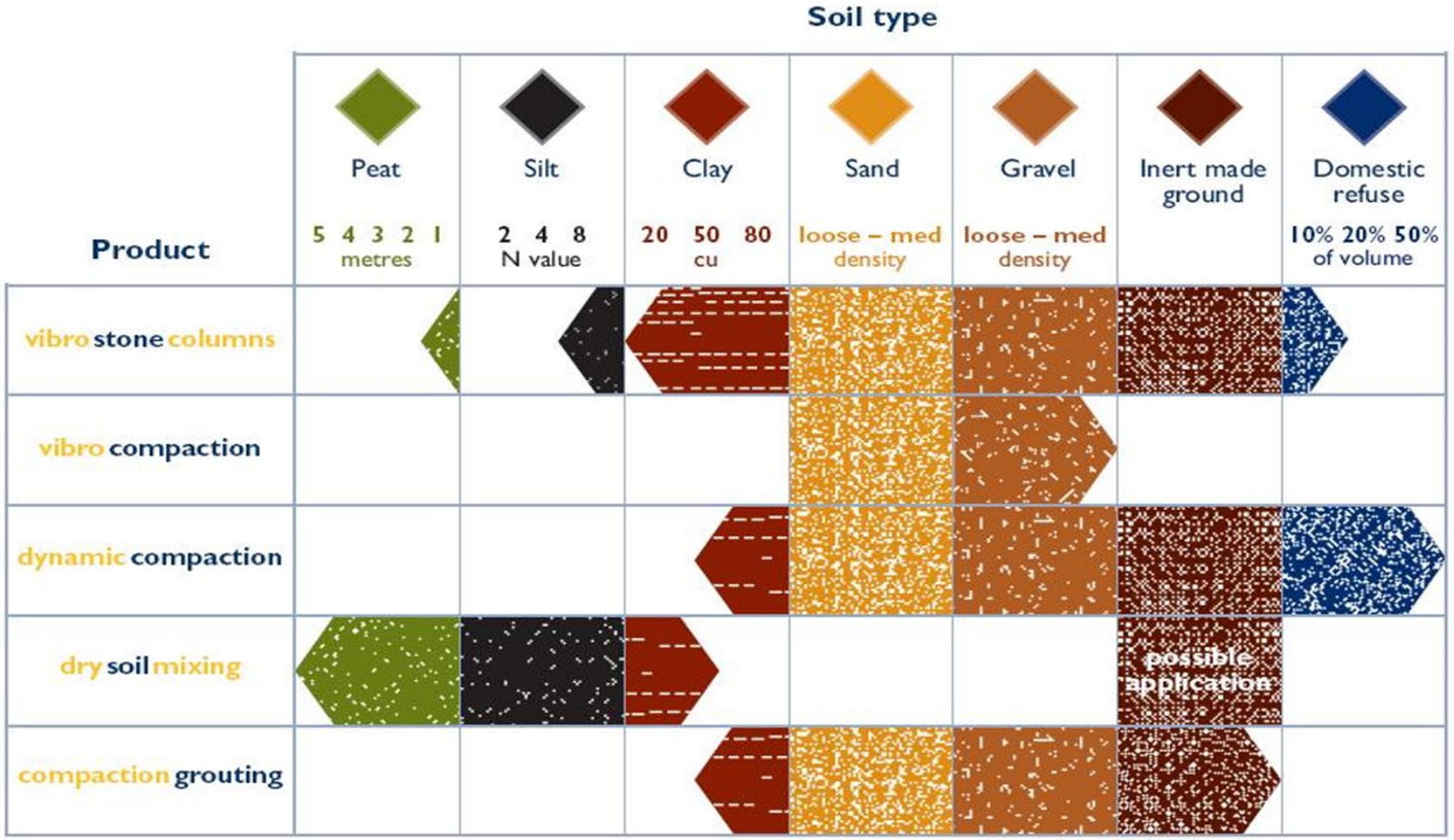
Vibro Compaction	Vibro Replacement
Granular Soils (Sands, Gravels)	Cohesive or mixed soils (soft clays, silts, fills)
Densifies existing soil using vibration	Reinforces soil with compacted stone column
Additional material not always required	Single size aggregate, recycled aggregate





VIBRO STONE COLUMNS

SUITABLE SOILS



- Granular Soils
- Cohesive Soils
- Made Ground
- Obstructions
- Organic Matter

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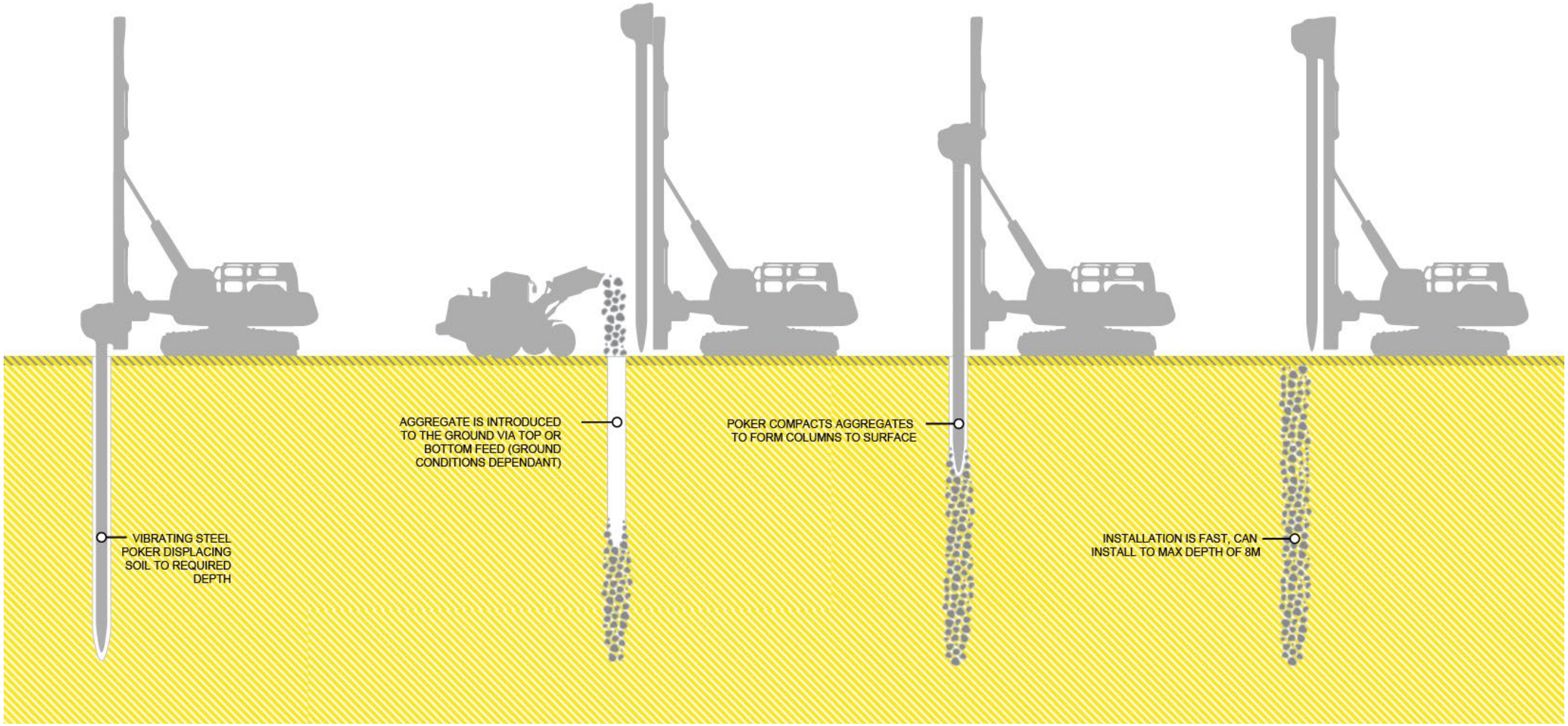
VIBRO STONE COLUMNS

THE INSTALLATION PROCESS



VIBRO STONE COLUMNS
VALIDATION / TESTING

1. Plate Tests

2. Dummy Footing Tests.

3. Zone Test

VIBRO STONE COLUMNS
BENEFITS

- Designed in-house
- Recycled Aggregates
- Zero spoil
- Cost-effective solution
- Immediate follow-on construction
- Quick installation

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RBEAM

PRECAST GROUND BEAM SYSTEM

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RBEAM

PRECAST GROUND BEAM SYSTEM

1.

2.

3.

4.

RBEAM
BENEFITS

- Package solution - design, setting out, manufacture & installation.
- Factory quality & safety.
- Produces a flexible modular foundation.
- Improved cost certainty.
- Reduced waste.
- Manufactured using low carbon concrete.
- Ideal for both traditional and modern methods of construction.

VSC & RBRAM
PROJECT BENEFITS

Cost benefit

By reducing the overall amount of concrete needed for foundations we saved an average of 21m2 per plot

Programme benefits

Both Rbeams and VSC are quick to install. They provide surety of programme by mitigating risk in the ground.

Environmental

By using low carbon concrete we saved over 35 tonnes of carbon per piled plot

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Summary

VALUE ENGINEERING

WHAT ARE THE BENEFITS?

Cost reduction
Identifies unnecessary expense without compromising on quality.

Improved project value
Prioritises project objectives to deliver maximum value for money.

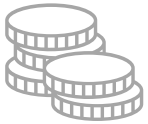
Enhanced quality & performance
Encourages innovative alternatives that improve durability, efficiency and functionality.

Optimised use of materials & resources
Cuts waste by selecting more efficient materials, methods and systems.

Environmental & sustainability benefits
Reduces carbon footprint through better resource management.

VALUE ENGINEERING

WHAT ARE THE BENEFITS?



Cost reduction
Identifies unnecessary expense without compromising on quality.

Improved project value
Prioritises project objectives to deliver maximum value for money.

Enhanced quality & performance
Encourages innovative alternatives that improve durability, efficiency and functionality.

Optimised use of materials & resources
Cuts waste by selecting more efficient materials, methods and systems.

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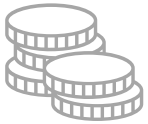

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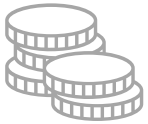

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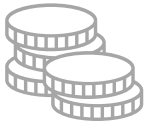

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Q & A

Thank you for listening

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