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United Kingdom

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PCT RoadCem
Based on PowerCem Technologies Ltd



RoadCem sustainable soil stabilisation technology for UK Water Utilities.....

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PCT ImmoCem
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PCT NucliCem
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RoadCem technology improves the capabilities of cement when used for stabilising soils, the advantages of RoadCem for use by the Water and Power Utilities companies are clear and easily demonstrated with reductions in cracking, impermeability and the unique capability to effectively stabilise all organic soils and marginal materials including contaminated organic silts.

Using all the existing sites soils and materials for construction purposes is sustainable and sensible. Saving both time and cost.

PowerCem and Delft University of Technology, simulated the properties of absorption of dynamic forces such as traffic and impacts, when using RoadCem in cement bound materials. The proven visco-elastic properties are a significant added value and very important for construction design.

Based on the Severn Trent project at Clay Mills in Derbyshire it was shown that the stabilisation could bear high intensive dynamic forces such as the driving of piles through the RoadCem soil concrete. With no cracks occurring in the direct periphery of the piles nor in the completed structure on site.

In summary the engineering advantages of RoadCem soil concrete are:

- Enables the stabilisation of organic soil and silts.
- Reduces swell/heave when sulphates are present.
- Eliminates voids and frost pockets, forcing problematic water from the stabilisation.
- Greater modulus of elasticity, meaning increased stiffness and ability to span weaker sub grades.
- RoadCem soil stabilisation's are 100% recyclable.
- RoadCem stabilisation's have great longevity and are maintenance free, allowing temporary works to be left in place as permanent foundation base and blinding.

The most successful of our projects, have been where our own engineers have been involved with Alliance design teams, at an early stage in the planning process. When pre planning of the foundation and platform load requirements together with the temporary works needs are considered. Allowing scheduling to be considered and rationalised to reduce costs and timing Issues.

In summary the environmental advantages of RoadCem soil concrete are:

Compared to traditional stone construction (NIBE Environmental report 2017):

- Overall environmental emissions are between 172% to 240% lower.
- Co 2 emissions are between 118% to 174% lower
- Human Toxicity emissions between 277% and 361% lower

The UNESCO World Water Authority have been supporters of RoadCem technology for a number of years and the following link will take you to full report on the use of RoadCem in areas of flooding and high inundation, this report has been reissued twice and distributed through out the world.

[UNESCO RoadCem Report](#)



Macro-economic Effects of Using the PowerCem Technology on Road Infrastructure in flood risk Areas

Ref nr: RC.INT.17.24052012

May 24th, 2012





Innovation produces the perfect piling mat after only seven days

In the early part of 2012 MWH Global were upgrading Clay Mills WwTW in a major project for Severn Trent Water.

An early part of the scheme involved building a 75m² concrete structure (Activated Sludge Plant or ASP) on driven piles.

The conventional method of constructing a piling mat for a structure of this size would need over 2000 truckloads of stone delivered to site.

This would impact heavily on the project's major constraint; an automatic level-crossing at the site's entrance!



During the project's design phase, alternative methods of constructing the ASP piling mat were reviewed through Value Engineering (VE) workshops. A key drive for these meetings was to reduce the amount of heavy goods traffic using the level-crossing at the site entrance.

This traffic posed many H&S and programme risks to the project and would adversely affect the local community.

Finding a way to reduce the traffic over the level-crossing would negate many of these risks and lessen the impact of construction traffic in a busy urban area.

The VE workshops, led by the MWH design team, looked at soil stabilization techniques as an alternative to traditional piling-mat construction.

Research by the design team indicated that an innovative new soil stabilization material called RoadCem could be viable. Desktop studies and on-site trials with industry experts confirmed that RoadCem would indeed be most suitable for stabilizing the silty organic soils at Clay Mills. Further analysis confirmed the commercial benefits of using RoadCem and the process was subsequently adopted at Clay Mills.

Stabilizing the ground with RoadCem prevented 2000 return truckloads of stone being delivered to site and provided a safe and stable piling platform seven days after application.

RoadCem manufactured in Holland is product designed and sold for building stabilised soil road base, used as a sustainable replacement for unbound stone and binder course.

The use of RoadCem to form a piling mat from the soft organic silts on site exceeded everyone's expectations, the wrapping matrix that RoadCem created increased the visco elastic properties of the mat. With increased dynamic absorption and reduced cracking the Bullivant's piling team progressed quickly with easy set up, nil deflection and minimal bounce back.



Clay Mills Soil Stabilization Winner of the ICE East Midlands Merit Awards 2013



Developing a sustainable solution

The Activated Sludge Plant (ASP) at Clay Mills WwTW is a large-scale civil structure (75m²) supported on driven piles. Before piling can start, a stone-based piling mat generally needs to be constructed to allow safe and accurate operation of the piling rigs. For the Clay Mills ASP, this would have meant a 600mm deep piling mat using over 6000 tonne of virgin aggregate (imported stone). As a threatened resource, virgin aggregates are difficult and costly to obtain and are a high-carbon product with few alternatives. Using **RoadCem** to stabilize the soil at Clay Mills has significantly reduced the use of this threatened resource and provided a wide range of additional sustainability benefits including:

- Prevented the carbon emissions of nearly 2000 return journeys of heavy-goods vehicles carrying aggregate to site
- Reduced the dust and noise pollution from large scale movements of heavy vehicles in a busy urban area
- Increased road safety for the local community (especially vulnerable groups such as school children and the elderly) near to the Clay Mills WwTW project
- Reduced costs of RoadCem (compared to more traditional construction methods) allowed land that was previously classed as uneconomic, to be developed
- Reduced the H&S risks associated with heavy-goods traffic using the national rail level-crossing at the site's entrance





RoadCem is an innovative material successfully used by MWH to stabilize ground conditions and form a piling for a 75m² concrete structure (Activated Sludge Plant) at Clay Mills WwTW.

The ASP ground stabilisation at Clay Mills is a first for the UK water industry.

The benefits of using RoadCem on the £45m upgrade project at Clay Mills WwTW include:

- Prevented 2000 heavy vehicle movements to site, significantly reducing H&S risks and carbon emissions
- Saved £70k in project costs
Reduced construction programme by three weeks
- Eliminated blinding' of the ASP structure.



"The Merit Award winner of the Small and Medium Project category was Clay Mills STW, submitted by MWH, for its precast final settlement tanks where significant project cost and time savings in creating an aesthetic solution impressed the judges.

Also their soil stabilisation project which involved the introduction of RoadCem a new product to the UK and combined with innovative and courageous thinking by those involved marked them out as winners."



Driving piles through the RoadCem stabilised soils was fast and safe.

With no deflection and easy set up.

Visco-Elastic behaviour

Delft University of Technology, simulated the properties of absorption of dynamic forces such as driven piles in to soils stabilised with PowerCem technology. Based on on projects such as the piling platform at Clay Mills.

The result clearly showed that these stabilisation's could bear high intensive dynamic forces such as the driving of piles through the RoadCem soil stabilisation. No cracks occurred in the periphery of the piles, nor in the complete RoadCem treated structure.

By observing the longitudinal displacement mode after excitation, the dynamic modulus is obtained. Which gives you the dampening characteristics and the visco-elastic properties. It is clear that adding RoadCem to cement bound materials restrains vibration, essential properties for piling, mats, road base and rail track applications.



RoadCem soil concrete base after two years construction plant trafficking.



In the late Summer of 2015 with works completed our contractor DNS (Midlands) Ltd returned to site to; milling areas back to soil and converting other stabilised sections to car parks and permanent site roads.

For some areas the original un-surfaced RoadCem soil concrete was adequate for ongoing use. For the car parks a thin gravel surface topping was added.

For the permanent site access roads after cleaning, these were given a tack course and finished with a resin and chip wearing course. Bonded directly to the soil concrete these should prove to be durable and maintenance free.



Early in 2013 we were invited by MWH Global to their Clay Mills site to meet the design team for the planned Cambridge STW redevelopment. The largest planned project spanning both AMP4 and 5 programmes.

The site in Cambridge had limited access from the busy A14 and needed a solution which reduce truck movements to and from the site by allowing the re-use of all the existing weak organic soils for construction purposes.



The existing ground was a mixture of soft brown silty clays with occasional layers of peat.



Following soil sample testing at our laboratories. Rogers Leask Consulting Engineers of Derby prepared mix designs to meet the required 100kN/m² loadings for heavy tracked plant and the 13tonne axle loadings of delivery lorries for the two-year construction project.

Warranted designs to allow the safe outrigger loadings and both crawler and truck mounted cranes up to 84 tonne per m² were also produced.



Working for the GCA Alliance a 9,000 m² Piling mat was constructed with RoadCem from the existing weak silt clays



Shortly after a RoadCem presentation the GCA Alliance team based at Lingley Mere, Warrington. Requested engineered designs for a soil piling mat for use with Bauer BG40 Piling rig.

The area to be treated was mainly made ground with a high organic silt content. In addition to buried foundations the remains of a number old piles were excavated during construction.

A certified design based on BISAR desugn software was produced by Rogers Leask Consulting Engineers of Derby.

The soil piling mat ensures a safe flat platform with no raised edges. With no deflection from stone nor snags from support geogrids or mats.

The work was carried out by our contractor DNS (Midlands) Ltd.

The high E Modulus and improved visco static behaviour of the RoadCem soil mat. Will prevent cracking and bounce during the piling programme.



During stabilisation several tonnes of house bricks, concrete and reinforcing steels, were relocated to the far corner of the site.

Allowing engineers during their design process to retain the mat in-situ, as a blinding base or actual foundation element.

For this application a thin gravel surface was added to give extra traction and avoid any dust created during piling.



**Trecott Sewage Treatment Works.
Perton,
Wolverhampton**

January 2018

Contractors:

**Mott Macdonald Bentley
for Severn Trent Water
AMP6.**

**Haul road and washing
plant platform.**

An impermeable operating slab for the washing of bio filter media.

Following on from previous works carried out with RoadCem soil concrete technology by our contractor DNS (Midlands) Ltd.

The Severn Trent AMP 6 Alliance chose RoadCem for this project.

After removing the turf layer the existing soils were mixed to a depth of 300mm with our patented RoadCem soil concrete process. To form a durable impermeable slab for the media washing plant.

RoadCem soil concrete can be used without surface protection, even in trafficked areas for both temporary and permanent works.



Treating the sites top soils, makes sense from a financial and sustainability angle.

Reducing construction time and the carbon footprint of the project.

Local planners and residents should also look favourably on the big reduction of trucks to and from the site.

The overall environmental impact of importing stone for for this type of construction work is 150 to 250% higher.

With Human toxicity levels even higher.

The Weather during the construction was wet but fairly frost free for the time of year.
With no delays encountered during construction.