ANCHOR SYSTEMS (INTERNATIONAL) LTD

Anchor Screw Foundation Solution

Design, Performance, Applications & Services

Tel : 01342 719 362
www.anchorsystems.co.uk

Have any questions?
01342 719 362

The System

ABOUT ANCHOR SYSTEMS (INTERNATIONAL) LTD

Anchor Systems (International) Ltd is a global business that specialises in the design, manufacture and supply of foundation and earth anchoring systems and solutions. Our foundation systems, the Anchor Screw, the Anchor Post, and the Anchor Base are all easy to install alternatives to using concrete as a foundation. Our Vulcan range of Earth Anchors is the largest and most versatile globally and are utilised for many universal applications from slope stabilisation and retaining walls to tethering utility poles and anchoring sapling trees, refer to our 'Vulcan Brochure' or 'Anchor Post Brochure' for further detail.

Established in 1995, Anchor Systems have become the 'Go To' experts to the UK Rail industry for alternative foundation systems over using concrete. We have provided foundation solutions for London Underground and Network Rail for many applications ranging from elevated troughing to signal masts.

We provide full support as part of our service. This begins as soon an enquiry is received, we work with you to gain a full understanding of what you are trying to achieve and how you like to work. We give full support and advice throughout the design and ordering process. To go even further, we offer training and on-site supervision too. We make sure expectations are met throughout the process and can also offer our clients bespoke designed products that are unique to them and their project.

ABOUT THE ANCHOR SCREW

Our patented Anchor Screw is an easy to install foundation solution that irradi- cates the need to use traditional methods like concrete. It is entirely manufactured in the UK from recycled steel and can offer a design life in excess of 50 years. Through the design of the dome head and bespoke interface plates, this is a very versatile and flexible foundation system that allows the structure that is to be mounted on the Anchor Screw to always be correctly positioned.

MADE IN BRITAIN

Anchor Screws come in a selection of sizes that suit a range of loads and jobs and can be used in multiples, with a common interface plate, to achieve even greater capabilities. Typically installed in less than 10 minutes, the Anchor Screw allows work to progress without the need for drying times.

Anchor Screw

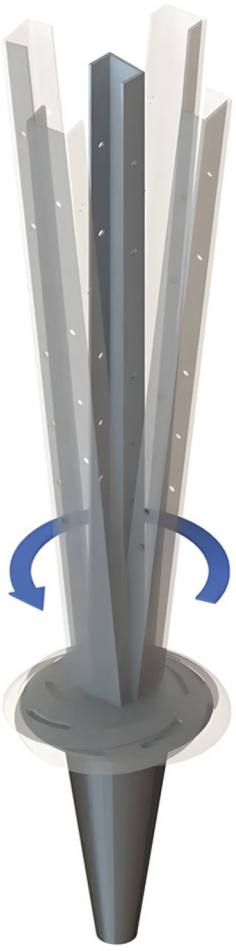
Benefits & Features

- **Speed:** Typically installed in under 10 minutes per anchor
- **Easy to Install:** Zero on-track plant or RRV's required as installed with lightweight, handheld equipment
- **Dust:** Zero dust is generated as no cementitious products required
- **Environmental:** Fully reusable and Made in Britain from UK recycled steel
- **Longevity:** Can be designed with 50 or 100+ year lifespans dependant on client requirements
- **Water and Drying Times:** Zero water consumed or drying time required, as no wet trades involved
- **HAVS:** Zero risk as the installation equipment is non-percussive
- **Noise:** Installation is relatively quiet. The installation equipment runs at 80-85db
- **Versatility:** Easily adjustable to guarantee the correct positioning with patented design features
- **Mess and Waste Materials:** Zero mess due to no digging required nor any general wasted materials, which reduce manhours and project risks

Have any questions?
01342 719 362

Adjustability

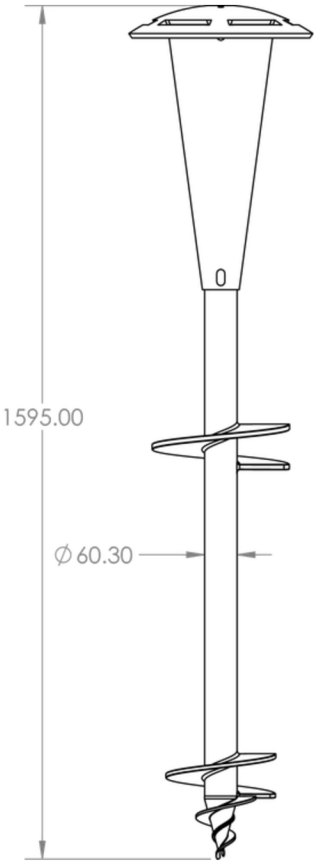
The patented, adjustable interface connection allows for a 7° alignment in all directions. This means that even if the Anchor Screw is slightly misaligned when installing, the structure on the top can still be levelled.



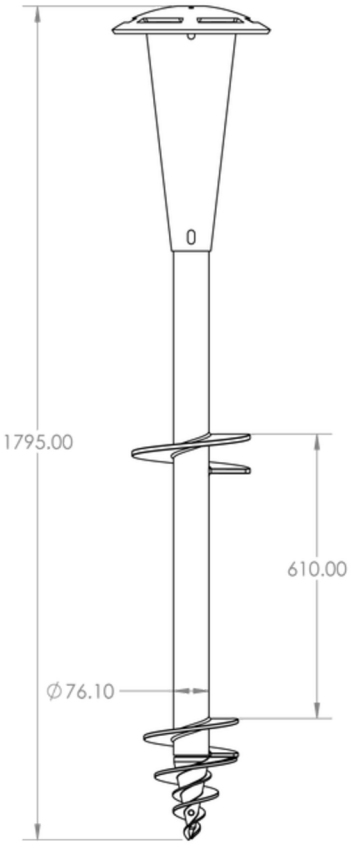
Product Sizes

The Anchor Screw has been designed for different purposes in varying ground conditions along with bespoke interface plates which are made to suit your project requirements. Below are some of our standard systems, however the Anchor Screw can be made to any bespoke size for your project.

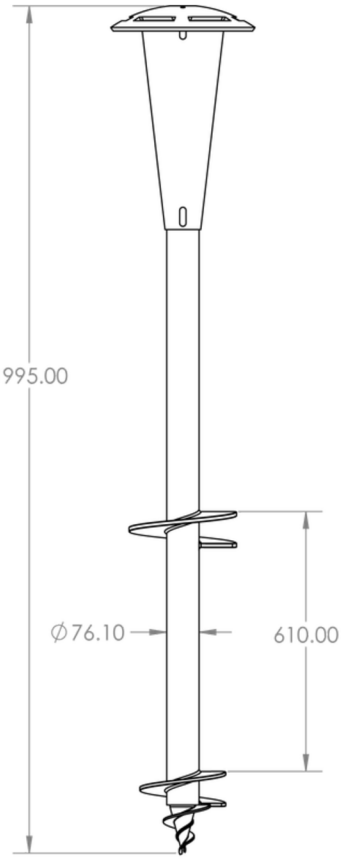
AS_601
60.3 x 6.3mm CHS



AS_767
76.1 x 9.5mm CHS



AS_770
76.1 x 9.5mm CHS



AS_780
76.1 x 5mm CHS

Have any questions?
01342 719 362

Resistance to Vertical Loads

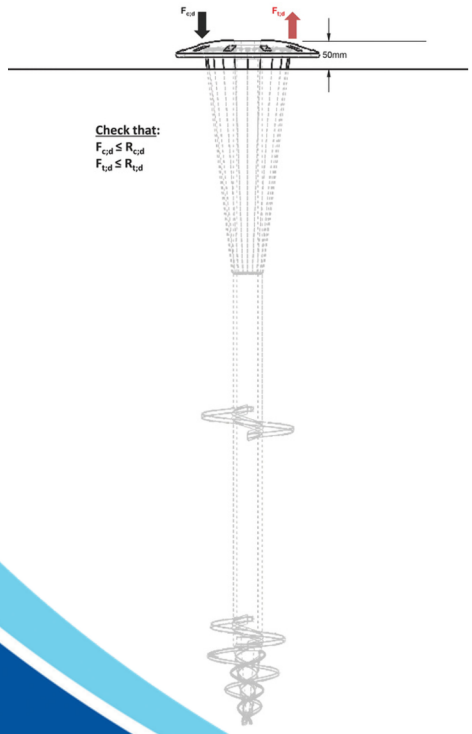
The Anchor Screws are designed to resist both vertical and horizontal actions, including the associated destabilising moments. Anchor Screws are designed as helical pile steel pile foundations following guidance in Annex A of BS8004:2015. Vertical compressive and tensile (uplift) forces are resisted by end bearing on each helix plate. Shaft resistance between the helix plates and the ground surface is ignored.

Coarse grained soils - Design axial resistance (Rc;d - Compression / Rt;d - Tension)

Soil Classification	Friction angle φ'; k	895mm		1395mm		1595mm		1995mm	
		Rc;d	Rt;d	Rc;d	Rt;d	Rc;d	Rt;d	Rc;d	Rt;d
BS EN1997-2	(°)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)
Loose	30	3.5	1.0	10.1	3.5	12.7	5.0	18.0	8.6
Medium Dense	32	4.4	1.1	12.7	4.3	16.0	6.1	22.6	10.9
	34	5.6	1.3	16.2	5.3	20.4	70.6	28.8	13.3
Dense	36	7.1	1.4	20.8	6.6	26.1	9.5	36.9	16.8
	38	9.2	1.6	26.9	7.1	33.9	14.0	47.8	21.4
Very dense	40	12.1	1.8	35.3	8.2	44.4	13.0	62.7	27.4

Fine grained soils - Design axial resistance (Rc;d - Compression / Rt;d - Tension)

Strength description	Undrained Shear Strength	895mm		1395mm		1595mm		1995mm	
	C u;k	Rc;d	Rt;d	Rc;d	Rt;d	Rc;d	Rt;d	Rc;d	Rt;d
BS EN1997-2	(kPa)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)
Low Strength	20	2.9	1.1	7.1	3.2	7.4	3.9	7.6	5.1
Medium Strength	40	5.6	2.2	14.0	6.1	14.5	7.5	14.7	9.8
High Strength	75	10.5	4.1	26.1	11.2	27.0	13.9	27.1	18.1
	100	14.0	5.5	34.7	14.9	35.9	18.4	36	24



For designs carried out in accordance with BS EN1997-1 (Eurocode 7), the design (i.e. 'factored') vertical actions must not exceed the design resistance of the Anchor Post. The design actions, Fc;d and Ft;d include appropriate partial load factors. For geotechnical assessment, the partial factor set for Design Approach 1, Combination 2 is usually critical and therefore, the vertical actions should be factored by partial factor set A2 (i.e. yG = 1.0 and yQ = 1.3). The design resistances are calculated using partial factor set R4 (refer to Table A.NA.6, UK NA to BS EN1997-1).

Calculated design resistances for compressive and tensile forces for the four lengths of Anchor Screw are shown in the tables below. These tables assume the Anchor Screws are installed entirely within a single homogenous soil type and are for illustrative purposes only. The 'coarse grained' soils table is applicable to sands and gravels and assumes the water table is below the lowest helix plate. Where groundwater is at or close to ground level, the values for coarse grained soils should be reduced by 50%. The 'fine grained' soils table is applicable to silts and clays. Greater resistances than those shown in these tables may be justified by load testing a number of the installed Anchor Screws.

Resistance to Horizontal Loads

For horizontal actions, the Anchor Screw may be designed according to BS EN1997-1 as a laterally loaded pile. Alternatively, a simplified approach may be adopted using the method in BD94-17 - Design of Minor Structures, for planted columns and posts. This approach uses characteristic (i.e. 'unfactored') actions and three soil qualities defined as 'Poor', 'Average' and 'Good'.

Calculated resistances for horizontal forces for the four lengths of Anchor Screw are shown in the tables below. For each length, the resistance for a 60mm and 76mm diameter shaft have been determined. These tables include values for the load applied at the top of the Anchor Screw and 1m above the dome plate. The resistances are calculated using the BD94-17 method for the three soil qualities defined in Table 3. Where the quality of the foundation soil is unknown, assume 'Poor' quality. The calculated resistances in this table should be compared with the characteristic (i.e. unfactored) horizontal loads applied to the Anchor Screw. It is assumed that the top of the dome plate projects no more than 50mm above ground level. The structural resistance of the Anchor Screws have been calculated for 50 and 100 year service lifes, assuming the foundations are embedded in undisturbed natural soils or non-aggressive compacted fill. The loss of section due to corrosion is based upon Table 4.1 of UK NA to BS EN1993-5. The structural resistances were calculated assuming a partial load factor, yQ=1.50, based upon the horizontal action being a variable load such as wind.

Soil quality description from Table 3 of BD94-17	
Poor	Compact, well-graded sand and gravel, hard clay, well-graded fine and coarse sand, decomposed granite rock and soil. Good soils drain well.
Average	Compact fine sand, medium clay, compact well drained sandy loam, loose coarse sand and gravels. Average soils drain sufficiently well that water does not stand on the surface.
Good	Soft clay, clay loam, poorly compacted sand, clays containing a large amount of silt and vegetable matter, and made-up ground. Where the Quality is unknown, it shall be taken as Poor.

In situations where suitable ground investigation has been carried out, a more rigorous analysis to BS EN1997-1 may allow higher characteristic horizontal loads and/or moments to be resisted. Greater resistances than those shown in this table may be justified by load testing a number of the installed Anchor Screws.

Horizontal resistance (RH-0m - At 0.0m)

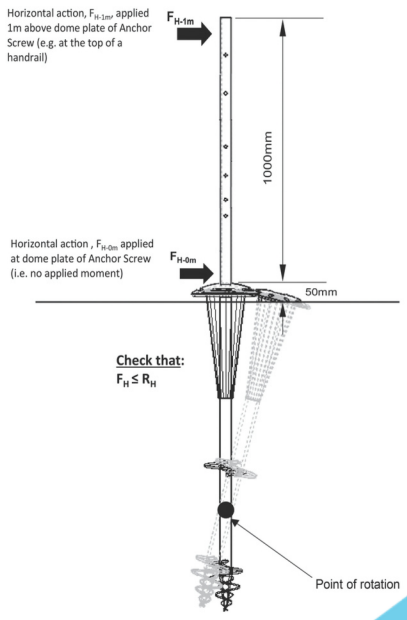
Quality of Soil (Table 3 of BD94-17)	Shaft Thickness (service life)	895mm		1395mm		1595mm		1995mm	
		60mm	76mm	60mm	76mm	60mm	76mm	60mm	76mm
		(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)
Poor	5 (50 years)	1.0	1.3	2.7	3.4	3.5	4.4	4.1	6.2
	5 (100 years)	1.0	1.3	2.7	3.4	3.5	4.4	3.6	5.6
	8 (50 years)	1.0	1.3	2.7	3.4	3.5	4.4	5.4	7.2
	8 (100 years)	1.0	1.3	2.7	3.4	3.5	4.4	5.0	7.2
Average	5 (50 years)	1.7	2.1	4.5	5.7	4.8	7.3	4.8	7.3
	5 (100 years)	1.7	2.1	4.21	5.7	4.2	6.5	2.4	6.5
	8 (50 years)	1.7	2.1	4.5	5.7	6.1	7.7	6.4	9.9
	8 (100 years)	1.7	2.1	4.5	5.7	5.9	7.7	5.9	9.2
Good	5 (50 years)	2.8	3.5	5.5	8.4	5.5	8.4	5.5	8.4
	5 (100 years)	2.8	3.5	4.8	7.5	4.8	7.5	4.9	7.5
	8 (50 years)	2.8	3.5	7.3	9.3	7.3	11.4	7.3	11.4
	8 (100 years)	2.8	3.5	6.8	9.3	6.8	10.6	6.8	10.6

Horizontal resistance (RH-1m - At 1.0m)

Quality of Soil (Table 3 of BD94-17)	Shaft Thickness (service life)	895mm		1395mm		1595mm		1995mm	
		60mm	76mm	60mm	76mm	60mm	76mm	60mm	76mm
		(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)
Poor	5 (50 years)	0.4	0.5	1.3	1.6	1.9	2.4	2.1	3.3
	5 (100 years)	0.4	0.5	1.3	1.6	1.8	2.4	1.8	2.9
	8 (50 years)	0.4	0.5	1.3	1.6	1.9	2.4	3.0	4.2
	8 (100 years)	0.4	0.5	1.3	1.6	1.9	2.4	2.7	4.2
Average	5 (50 years)	0.7	0.9	2.2	2.9	2.2	3.6	2.2	3.6
	5 (100 years)	0.7	0.9	1.9	2.9	1.9	3.1	1.9	3.1
	8 (50 years)	0.7	0.9	2.3	2.9	3.2	4.0	3.2	5.2
	8 (100 years)	0.7	0.9	2.3	2.9	2.9	4.0	2.9	4.8
Good	5 (50 years)	1.1	1.4	2.4	3.8	2.4	3.8	2.4	3.8
	5 (100 years)	1.1	1.4	2.0	3.3	2.0	3.3	2.0	3.3
	8 (50 years)	1.1	1.4	3.4	4.7	3.4	5.6	3.4	5.6
	8 (100 years)	1.1	1.4	3.1	4.7	3.1	5.1	3.1	5.1

R_H The lateral resistance of highlighted values are limited by the strength of the soil.

R_H The lateral resistance of highlighted values are limited by the moment capacity of the CHS steel post sections



Have any questions?
01342 719 362

Environmental

Through innovation, the Anchor Screw has become an alternative foundation solution to concrete. The eradication of concrete is not the only environmental benefit the Anchor Screw achieves.

Benefits & Features

Design Life
The Anchor Screw can achieve 100+ years

Whole Life Cycle
With the use of maintenance free fixings, the Anchor Screw and its Interface plate can be completely maintenance free throughout its design life

Made in Britain
Holds the Made in Britain accreditation and is made from 100% recycled UK steel

Reusable
Can be extracted and reused or recycled

Reliability
Made from quality materials and installed by approved contractors which in turn reduces installation breakages and guarantees the design life

No Hazardous Materials
Zero water, no airborne dust nor hazardous materials

Low Noise
During installation, noise exposure levels are in the range 80-85db

ANCHOR SYSTEMS (INTERNATIONAL) LTD
Caring for the Environment

The Company

Our aim is to constantly try to reduce, reuse and recycle to help lower our overall environmental impact. Through innovation, our products are reducing the use of concrete. 100% of our packaging is recyclable or made from recycled material. Our products are Made in Britain to reduce our carbon footprint. We monitor the efficiency of our processes from transportation and packaging to power consumption and waste management and look to improve on these on an ongoing basis.

Anchor Post Vs Anchor Screw

Due to their sizes and design, the Anchor Post is typically more cost effective than the Anchor Screw initially however there are many benefits for using the Anchor Screw and in some situations, it may be the only viable option.

Noise

The Anchor Screw is ideal for installing foundations in noise sensitive areas. During installation, noise exposure levels are between 80-85db at 2 metres for approximately 5-8 minutes whilst each one is being installed. This is a lower level of exposure to noise in comparison with the Anchor Post, which is a percussion driven system.

HAVS

Due to its installation methodology, the Anchor Screw produces no HAVS (Hand-Arm Vibration Syndrome). It is turned into the ground, like a screw, through a rotary action produced through a torque head. Therefore, the action is a smooth turning one that does not produce any vibration. The Anchor Post is percussion driven utilising a specialised breaker which can have an increased effect on general fatigue and HAVS in comparison with an Anchor Screw.

Load and Capabilities

The design of the Anchor Screw, with its coned upper body, large domed head, flights and larger overall body allows it to withstand much larger loads than that of an Anchor Post. However, if there is a requirement to install between cable runs or in very tight positions, the Anchor Post is the better option due to its slimmer body and the shape of the installation equipment.

Speed

The Anchor Screw is typically consistent in terms of speed. Installation times are typically between 5 and 8 minutes regardless of ground conditions (within reason). The Anchor Screw will turn at the same constant rpm allowing the installer to plan their work more accurately. The Anchor Post will typically vary between 1 and 10 minutes depending on ground conditions.

Anchor Post Foundation system with fins which is percussion driven into the ground.

Anchor Screw Foundation system which is screwed into the ground.

Have any questions?
01342 719 362

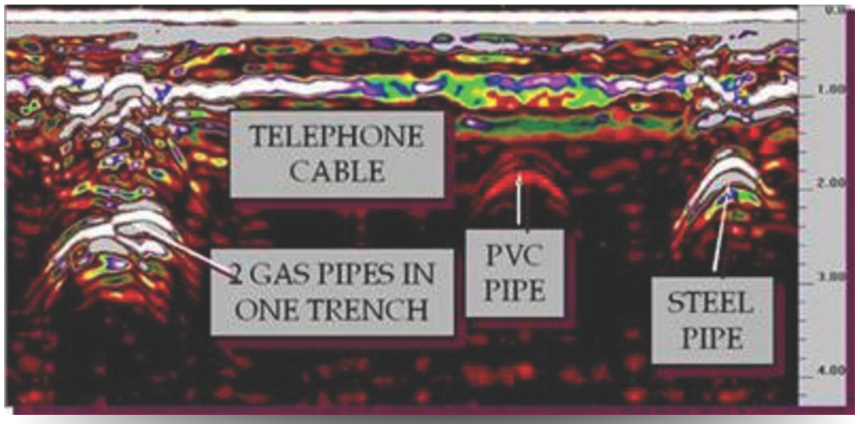
GPR Scanning

A combination of Ground-Penetrating Radar (GPR) and electromagnetic induction imaging (EI) is used to map the area in the vicinity of the anchor location to verify that there are no hidden services or geophysical issues that would affect the installation of the anchor.

GPR is a geophysical method that uses radar pulses to image the subsurface. This nondestructive method uses electromagnetic radiation in the microwave band (UHF/VHF frequencies) of the radio spectrum and detects the reflected signals from subsurface structures. GPR can have applications in a variety of media, including rock, soil, ice, fresh water, pavements and structures. In the right conditions, practitioners can use GPR to detect subsurface objects, changes in material properties, and voids and cracks.

Metal detectors use electromagnetic induction (EI) to detect metal and are available in different configurations, varying in sophistication and sensitivity. They have some capacity to discriminate between different types of metallic targets. Although not as commonly used in archaeology, sophisticated metal detectors are available having much greater sensitivity than hand-held models. These instruments are capable of data logging and sophisticated target discrimination. They can be mounted on wheeled carts for survey data collection.

A full underground clearance survey of each through route will be undertaken. This comprises metallic and non-metallic services, including Water, Power, Gas, Telecommunications, Fibre Optics, Drainage and other linear targets. GPR can also detect and map subsurface anomalies such as voids and obstructions. We will deliver a survey report including a drawing of the site. The output data typically appears in the following form and requires interpretation.

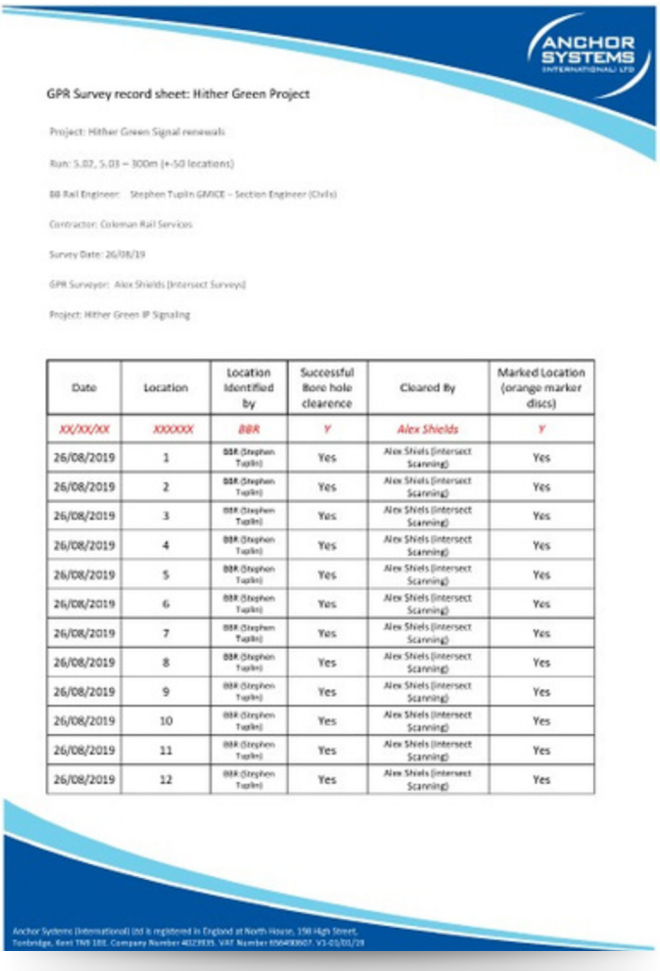


GPR Scanning

1. The areas where the anchors are to be installed are scanned thoroughly to check for any utilities and obstructions below the ground.

2. The Anchor Screw positions that have been scanned and declared clear of utilities and obstructions are marked up.

3. Finally, a full report of all the scanned areas is produced.



GPR Survey record sheet: Hither Green Project

Project: Hither Green Signal renewals

Run: S.02, S.03 – 300m (+-50 locations)

BB Rail Engineer: Stephen Tuplin GMICE – Section Engineer (Civils)

Contractor: Coleman Rail Services

Survey Date: 26/08/19

GPR Surveyor: Alex Shields (Intersect Surveys)

Project: Hither Green IP Signaling

Date	Location	Location Identified by	Successful Bore hole clearence	Cleared By	Marked Location (orange marker discs)
XX/XX/XX	XXXXXX	BBR	Y	Alex Shields	Y
26/08/2019	1	BBR (Stephen Tuplin)	Yes	Alex Shiels (Intersect Scanning)	Yes
26/08/2019	2	BBR (Stephen Tuplin)	Yes	Alex Shiels (Intersect Scanning)	Yes
26/08/2019	3	BBR (Stephen Tuplin)	Yes	Alex Shiels (Intersect Scanning)	Yes
26/08/2019	4	BBR (Stephen Tuplin)	Yes	Alex Shiels (Intersect Scanning)	Yes
26/08/2019	5	BBR (Stephen Tuplin)	Yes	Alex Shiels (Intersect Scanning)	Yes
26/08/2019	6	BBR (Stephen Tuplin)	Yes	Alex Shiels (Intersect Scanning)	Yes
26/08/2019	7	BBR (Stephen Tuplin)	Yes	Alex Shiels (Intersect Scanning)	Yes
26/08/2019	8	BBR (Stephen Tuplin)	Yes	Alex Shiels (Intersect Scanning)	Yes
26/08/2019	9	BBR (Stephen Tuplin)	Yes	Alex Shiels (Intersect Scanning)	Yes
26/08/2019	10	BBR (Stephen Tuplin)	Yes	Alex Shiels (Intersect Scanning)	Yes
26/08/2019	11	BBR (Stephen Tuplin)	Yes	Alex Shiels (Intersect Scanning)	Yes
26/08/2019	12	BBR (Stephen Tuplin)	Yes	Alex Shiels (Intersect Scanning)	Yes

Have any questions?
01342 719 362

Project Report

CONTRACTOR
J Murphy & Sons Ltd

CLIENT
Network Rail

OTHER PARTNERS
Scott Parnell

INSTALLER
J Murphy & Sons Ltd

Requirement

During the construction of the new Beaulieu Park Railway Station, J Murphy & Sons Ltd faced a significant engineering challenge in relation to their cable route management system. While approximately 70% of the site was fitted with standard ARCO troughing, one section of the embankment proved problematic. The steep slope and unstable ballast caused the original concrete troughing to slip, creating both safety concerns and long-term durability issues. It was critical to source a system that could remain structurally sound on a gradient and offer a secure route for cabling across difficult terrain. A rapid, reliable and slope-stable cable route management solution was urgently required to ensure continuity of the project and long-term system resilience.

Solution

Anchor Systems and Scott Parnell provided the answer with the supply and installation of their elevated Rapid Route Size 1 Cable Route Management System. This system is specifically designed for environments where traditional ground-level troughing is unsuitable, such as steep or unstable embankments. Over 100 metres of Rapid Route were successfully installed within just two days, demonstrating both the speed and efficiency of the system.

To support the installation process, Anchor Systems delivered tailored training to Murphy's installation team, both at their yard and directly on site. Given the sloped working environment, operatives were fitted with safety harnesses secured to the rail throughout the installation. The elevated troughing was securely anchored into the slope, providing a long-lasting and stable solution where concrete options had failed. This bespoke approach ensured the safe routing of cables while maintaining access for future maintenance.

Beaulieu Station

Rapid Route

Have any questions?
01342 719 362

Project Report

CLIENT

Hither Green Signalling

CONTRACTOR

Rail UK

SUB CONTRACTOR

Balfour Beatty

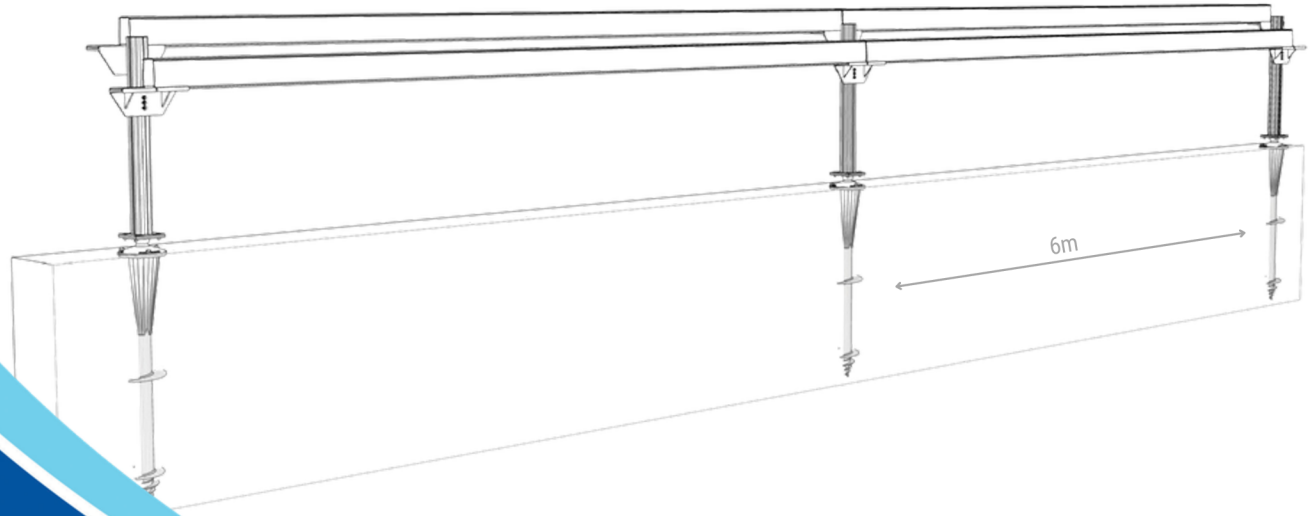
At the commencement of the Hither Green Signalling Renewal project, our team recognised the opportunity to improve both the efficiency and sustainability of our standard construction materials and methods. Through introducing the Anchor Screw foundation system, we have promoted a 25x25 initiative through reducing on-site activity, realised cost savings and contributed significantly towards delivering in-line with Balfour Beatty's Sustainability Blueprint.

The Measures

The Anchor Screw foundation system replaced the need to use cast in-situ posts to support elevated cable route, although the system can be used to support a variety of different super-structures. The steel screws are driven into the ground from the surface, following a ground clearance check which is completed using 3D Ground Penetrating Radar. The hemi-spherically domed heads then allow for up to 7 degrees of vertical alignment correction, in the case the screw has been knocked off alignment during driving.

As the system had not been used on Network Rail infrastructure previously, it was crucial to work with our Client,Network Rail, to ensure full buy-in throughout design and construction. The subsequent approval we received clearly shows both the collaborative relationship between client and contractor, and the obvious value this system could provide.

Authorisation for the use of the Anchor Screw system was obtained from Network Rail. This is the first time the system has been installed on Network Rail infrastructure. Approval was gained and the system was installed on the Hither Green Signalling Renewals project resulting in multiple benefits for the project and our customer.



Hither Green

Result

The Anchor Screw system was installed for the first time in February 2020. During the first shift 124 screws were installed in five hours, enough for 744m of elevated route, with no on-track plant required and zero accidents or incidents. A summary of benefits can be seen below:

- 60% time saving on foundation installation
- 40% cost saving of £369/m to £221/m (derived from man hour savings, elimination of plant requirements, reduced possession requirements)
- 73% embodied carbon reduction on materials, equivalent to 13920kgCO2e and 89.4% material saving
- Zero on-track plant and zero water consumed
- UK manufacturing and local materials, eliminating mainland European transportation miles
- No noise or HAVS risk

Have any questions?
01342 719 362

Project Report

DESIGNER
Arcadis

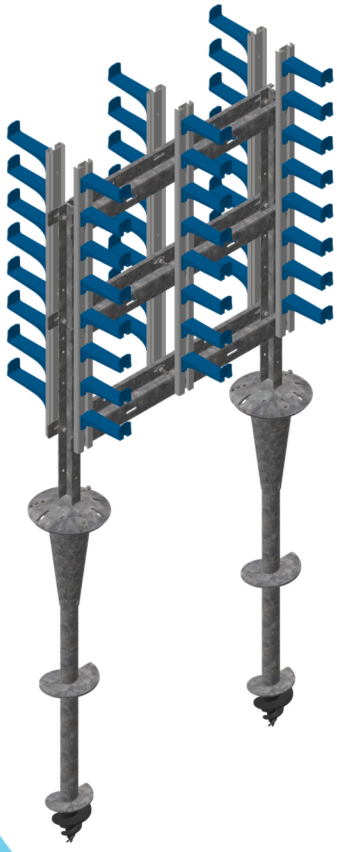
CLIENT
Transport for London

INSTALLER
Site 7

CONTRACTOR
Spoortech

As part of Transport for London's Piccadilly Line Upgrade, around 450m of a new Cable Route Management System (CRMS) was required at Cockfosters Depot to support additional track installations there. A faster, more cost-effective, and environmentally friendly alternative to traditional CRMS that is concreted in place was asked for, and Anchor Systems' CRMS which is approved for use on the LU network for up to 16 cable hangers (8-way back-to-back) was an ideal solution.

Minimal site preparation was necessary and mostly included vegetation clearance and levelling. While no pre-installation soil testing was needed due to a conservative design approach that assumed poor conditions, post-installation load testing was performed on 1 in 25 pairs of Anchor Screws using pull tests, and all of the tested Anchor Screws passed and even exceeded required load capacities, confirming compliance with TfL standards.



Solution

The system used 1795mm Anchor Screws at 1.2m spacing, supporting 1.4m cable posts joined together by Horizontal Span Rails. These rails also supported GRP backplates at 0.6m centres, which GRP hangers were then mounted to in order to support the cables. By using the GRP backplate and hangers it added a touch-safe/non-conductive element and increased the safety of the system.

A total of 359 Anchor Screws were installed, with an additional 40 added later for where underground obstructions were found. In these instances, the spacing of the Anchor Screws was widened to 2.4m centres, and 1995mm screws were used in order to remain compliant with testing standards.

Most of the Anchor Screws were installed using a machine mounted torque head (600X) as there was plenty of space to work with on site, and the Anchor Screws were being installed in a relatively straight line, making the machine mounted option the obvious choice. In some of the harder to access areas, handheld equipment was used (400H) to install the Anchor Screws. The remainder of the system was assembled by hand using handheld power tools to tighten up all the fixings.

Cockfosters Depot

Phase 1

Result

The installed Cable Route Management System exceeded expectations in both performance and ease of installation, as well as providing a real-world case study showing the difference in speed and efficiency of our CRMS compared to traditional install methods and existing systems.

Anchor Systems delivered a reliable, adaptable, and standard-compliant solution under challenging conditions and tight timelines, and with the success of Phase 1 led to a direct invitation from Transport for London to design and supply CRMS for Phase 2 of the Cockfosters Depot upgrade, extending the system by an additional 700 metres.

Overall, the project demonstrated the versatility and efficiency of Anchor Systems' ground anchoring solutions, reinforcing our position as a trusted partner in critical rail infrastructure projects.

Have any questions?
01342 719 362

Project Report

CONTRACTOR
Atkins

CLIENT
Network Rail

PRODUCT USED
161 x Anchor Screws

INSTALLER
Readypower Terrawise

Requirement

The Malvern Midlands railway faced structural concerns with the shoulder and slope of the track, resulting in speed restrictions for passing trains. The compromised integrity of the track shoulder presented safety risks and operational inefficiencies, prompting the need for immediate intervention to restore track stability and ensure safe, unrestricted train movement.

Testing

While no direct testing was conducted by Anchor Systems, the structural integrity and site conditions were evaluated by the project's consultant, Atkins. The assessment identified critical areas requiring reinforcement to sustain load conditions and environmental factors. This evaluation informed the selection of appropriate anchoring solutions, although specific load tests and soil resistance analyses were not documented as part of Anchor Systems' involvement.

Solution

Anchor Systems provided a comprehensive anchoring solution, including:

- 20 x 1795 mm Anchor Screws
- 111 x 1800 mm Anchor Screws
- 30 x 2300 mm Anchor Screws
- 150 Ballast Boards
- 141 Ballast Board Posts
- 20 Domed Signposts
- 6 Handrails

The installation was executed using a machine-mounted torque head (600x). A night shift team focused on installing the anchor screws, while a day shift team assembled the ballast boards and posts to form a robust retaining wall, effectively addressing the structural concerns.

Result

The project successfully met all performance criteria. The newly installed anchoring system reinforced the track shoulder, eliminated speed restrictions, and restored full operational efficiency. The seamless execution, despite challenging site conditions such as poor access and adverse weather, highlighted the reliability of Anchor Systems' solutions. The project was completed within the designated timeframe, without any unforeseen issues, underscoring the effectiveness of the Anchor Screw and Ballast Board systems in railway infrastructure reinforcement.

Malvern Midlands

Ballast Retention

Have any questions?
01342 719 362

Project Report

CONTRACTOR
Colas Rail

CLIENT
Network Rail and Crossrail

PRODUCT USED
Anchor Screw foundation system and GRP handrail interface manufactured

INSTALLER
Arbourtech Services Ltd

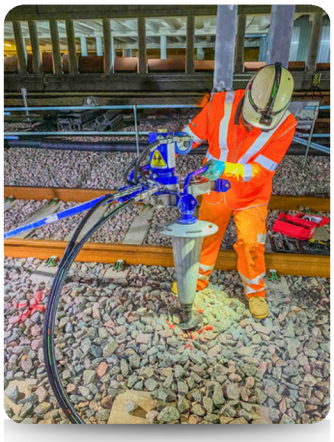
Requirement

A 400m segregation barrier was required within the six foot at Westbourne Park Station to divide the Network Rail and Crossrail Tracks. Due to the depth of ballast being over 1000mm, the proposed segregation barrier solution would utilise multiple concrete foundations, involving multiple RRV's, ballast removal, waste management, onsite con- crete shuttering and mixing. This method of installation was estimated to take more than 20 weekend shifts with an initial budget of over £1million, deeming the works uneconomical for the client and the network.

Solution

Anchor Systems were approached by Network Rail to discuss the use of our Anchor Screw foundation solution and asked to offer a design and installation cost for the segregation barrier. Due to the presence of concrete track drainage located approximately 1000mm below the ballast level, we conducted a Ground Penetration Radar (GPR) survey of the 400m section of works to identify the accurate location and depth of the concrete drain. During the survey, the GPR technician marked out every installation location and gave clearance of services and obstructions (bore hole clearance) to ensure that safe and efficient installation could take place. Following the GPR survey, the Anchor Screw design was modified, reducing its overall length to 850mm to ensure clearance from the existing drain while at the same time being able to achieve the vertical and lateral load requirements for the seg- regation barrier in line with Network Rail standards.

A total of five tests were conducted along with five trial pits to confirm the GPR survey results. All five test anchors were in- stalled and tested within one four-hour night shift and removed using the same installation equipment. The product design, manufacture, and mobilisation for anchor suitability testing was all carried out by Anchor Systems and our installation partner within a one-week time frame.



Westbourne Park

Anchor Systems worked with Colas Rail and Network Rail to offer a complete solution with one of our approved installers to guarantee workmanship and onsite efficiency. The entire solution was offered at a saving of 30% for the design, testing, supply, installation, and commissioning of the barrier.

- Over 300 Anchor Screws were installed at 1500mm spacings along Westbourne Park within 14 night shifts, including the erecting of the barrier
- Delivering a massive reduction in project costs compared to the original solution
- Huge reduction in relative project ecological footprint through reduction of workforce, heavy machinery/RRV's, concrete, waste management, water consumption and material delivery miles
- A saving to the network of over 30%

Over and above the project benefits, the Anchor Screw offers further benefits to the network and local environment:

- On average the Anchor Screw foundation offers a carbon reduction of over 70%
- All materials are recyclable, easily removable, and reusable
- Made in the UK from 100% recycled steel, with a minimum design life of 50 years
- Anchor Screw can be designed to offer 100+ year design life solution
- No wet trades, curing times or excavation
- No requirement for RRV's
- Portable and lightweight installation equipment. Materials can all be transported by hand and with track trolleys
- Reduction in hours on site and workforce required during installation
- Zero HAVS (Hand Arm Vibration) and low noise pollution output offering lower disturbance to local residents
- Adjustable domed head to ensure the asset or interface is always level and offers horizontal and lateral adjustment to ensure the route is straight. The patented dome head of the Anchor Screw and interface plate offers 14° overall tolerance

"The Anchor Screw system helped to significantly reduce construction time and provided greater tolerance to satisfy gauging requirements on the Westbourne Park Barrier Scheme. Throughout the design stage, Network Rail design and Anchor Systems collaborated to produce a bespoke post that could be installed entirely within the ballast formation. This system has many other applications and can offer significant efficiencies whilst providing a more environmentally friendly option compared with alternative foundation types."

Sam Fletcher,
CEng MICE - Senior Design Engineer (Building & Civils), Network Rail

Have any questions?
01342 719 362

Project Report

CONSULTANT/ENGINEER:
TRU East

CLIENT
Network Rail

OTHER PARTNERS
Scott Parnell

CONTRACTOR
J Murphy & Sons Ltd

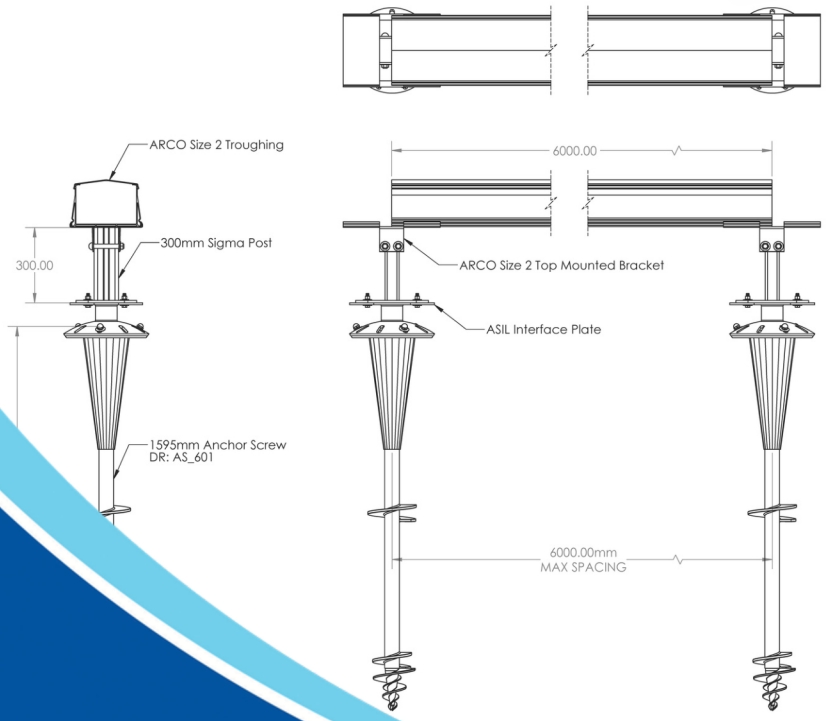
INSTALLER
J Murphy & Sons Ltd

Issue

The Castleford section of the Transpennine Route Upgrade (TRU) required a durable, lightweight cable troughing system that could be installed efficiently on a steep embankment near the River Aire. Traditional concrete foundations were impractical due to installation time, environmental impact, and accessibility constraints. A sustainable solution was needed to reduce disruption and carbon emissions while ensuring long-term structural reliability.

Testing

To ensure the feasibility of the proposed solution, extensive material assessments and system trials were conducted. The ARCOSYSTEM®, made from pultruded glass fibre reinforced polymers (GRP), underwent durability and environmental testing to verify its resistance to extreme weather conditions, from -40˚C to +80˚C. The screw pile anchoring system, supplied by Anchor Systems, was evaluated for load-bearing capabilities and stability, particularly on uneven terrain. The testing phase confirmed that this combination would offer enhanced flexibility, reduced installation time, and superior longevity compared to traditional alternatives.



Solution

The Rapid Route ARCOSYSTEM® installation was successfully implemented, utilising Anchor Systems' screw piles to eliminate the need for traditional concrete foundations. The elevated ARCOSYSTEM® cable containment system, supported on posts spaced up to six metres apart, significantly streamlined installation. The system's bespoke steel bracketry provided adjustable height and directional flexibility, ensuring smooth navigation along the embankment. This solution not only optimised installation efficiency but also contributed to reducing carbon emissions by minimising material waste and site intervention.

Castleford TRU

Rapid Route ARCOSYSTEM® Installation

Result

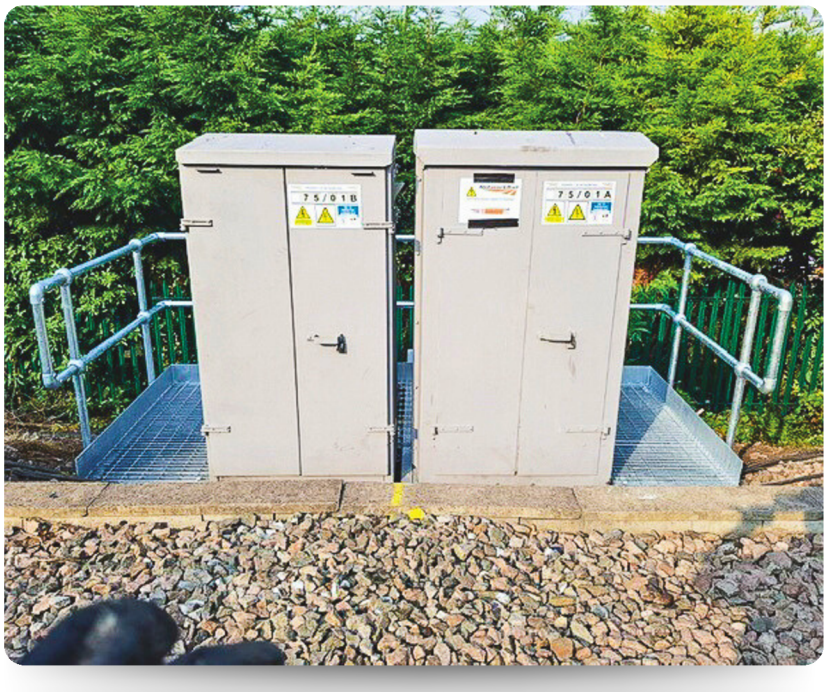
The 1,000-metre installation was completed on time with minimal disruption. The lightweight and adaptable system significantly cut down installation hours and carbon footprint, receiving positive feedback from J Murphy & Sons Ltd. By integrating innovative materials and efficient anchoring, the project successfully met all structural, environmental, and operational objectives, reinforcing Anchor Systems' commitment to sustainable railway solutions.

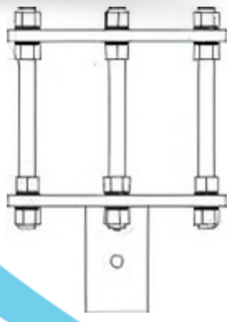
Have any questions?
01342 719 362

System Examples

Platform Foundation

Anchor Systems were contacted by KN Circet to help when the platform for this cabinet needed to be replaced as the base and foundations were failing. The cabinet was located on a slope to the side of a Network Rail line. A design for an extra long Anchor Screw was created and the installation was quick and simple. As soon as the Anchor Screws were installed the base of the platform could be fitted as no drying time is needed like there is with concrete.



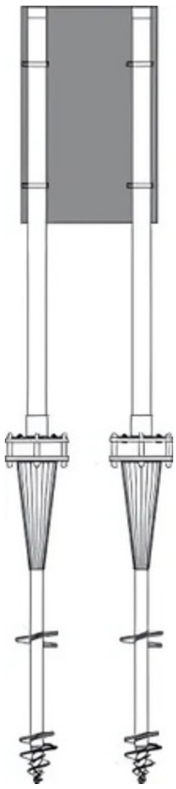


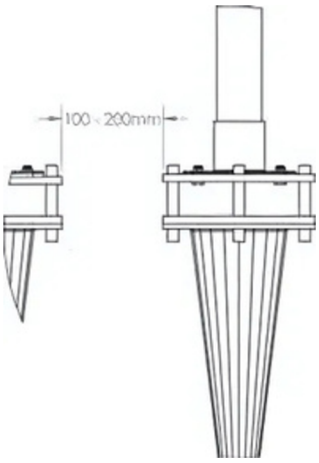
System Examples

Signage Foundation

Anchor Screw foundation systems for use on rail or highway signage.

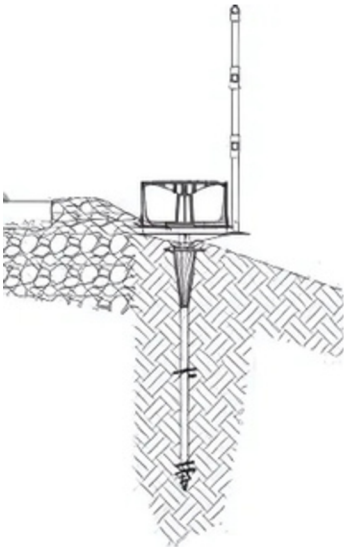
- No excavation
- No concrete
- Removable
- Reduce the need for GI
- Rapid installation
- Hand held installation
- Low noise and zero HAVS





Elevated Walkway

Cable management system within a walkway with handrail used for Network Rail.



Have any questions?
01342 719 362

Installation Service & Equipment

Platform Foundation

When you purchase a product through Anchor Systems there's no need for you to shop around trying to find installation equipment or specialist installers. We can supply you with all the tools and training you need or if you require a complete supply and installation service, we have our very own list of approved and experienced contractors who have undertaken specialist training to install our specialist products.

Site Testing

The chosen anchor system should always be proof tested on site prior to starting work. Site tests are vital, especially when soil test reports are not available as they allow the confirmation of maximum loading achievable in the areas that the ground anchors are to be positioned and also allow for creep testing.

Site Preparation

Before any anchors are installed it is always recommended to use a CAT scanner to the required depth to check for buried services.

Personal Protective Equipment

At Anchor Systems (International) Ltd we strongly recommend that before you install any type of below ground system that the proper safety equipment is worn. Please see below the recommended personal protection equipment:

- Hard Hat
- Safety Boots
- Goggles
- High Visibility Clothing
- Ear Defenders
- Gloves

Plant

Anchor Systems (International) Ltd have created specialist installation equipment that are fit for the purpose of efficiently installing our Anchor Screws. All of our equipment is available to either hire out for the length of time you require it for or to purchase. If you would like to know more about our equipment specifications then we will happily provide you with this on request.

Benefits

- Lightweight
- Zero HAVS
- Zero excavation
- Almost silent Equipment is portable on track trolleys
- Speed of installation
- Low wear and tear on equipment
- Works in very dense and compact ground conditions
- All equipment is bespoke and calibrated
- Recommended and approved installers for the Rail industry to guarantee installation efficiency

Torque Head

Torque (Reaction) Arm

ANCHOR SYSTEMS (INTERNATIONAL) LTD

Anchor Screw Foundation Solution

Design, Performance, Applications & Services

ANCHOR SYSTEMS (INTERNATIONAL) LTD
Unit 39, Hobbs Industrial Estate, Felbridge, Lingfield, Surrey,
England, RH7 6HN

Tel: +44 (0)1342 719 362
Email: info@anchorsystems.co.uk
Web: www.anchorsystems.co.uk