

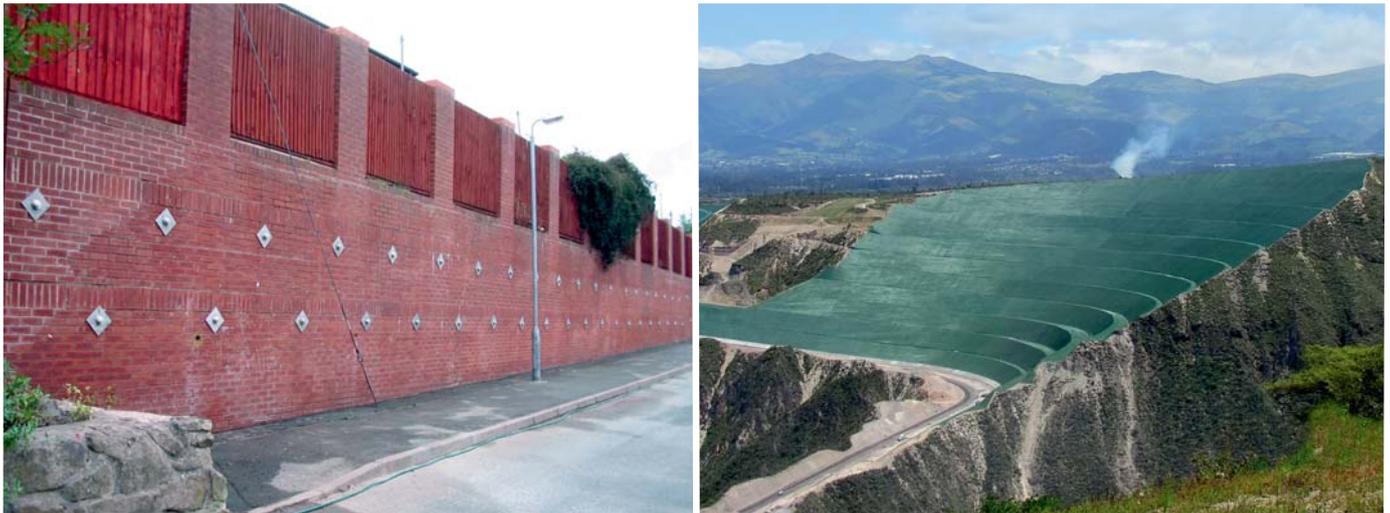


# Photovoltaic Applications

Brochure

# INTRODUCTION

Platipus® Anchors are market leaders in the design, manufacture and supply of mechanical earth anchoring products. The company is renowned for providing some of the most innovative and cost effective anchoring solutions for the Civil Engineering, Construction and Marine industries.



The percussion driven earth anchor (PDEA) is a unique, modern and versatile device that can be quickly installed in most displaceable ground conditions. It offers a lightweight corrosion resistant anchor that can be driven from ground level using conventional portable equipment. It creates minimal disturbance of the soil during installation, can be stressed to an exact holding capacity and made fully operational immediately. As a completely dry system it also has minimal impact on the environment.



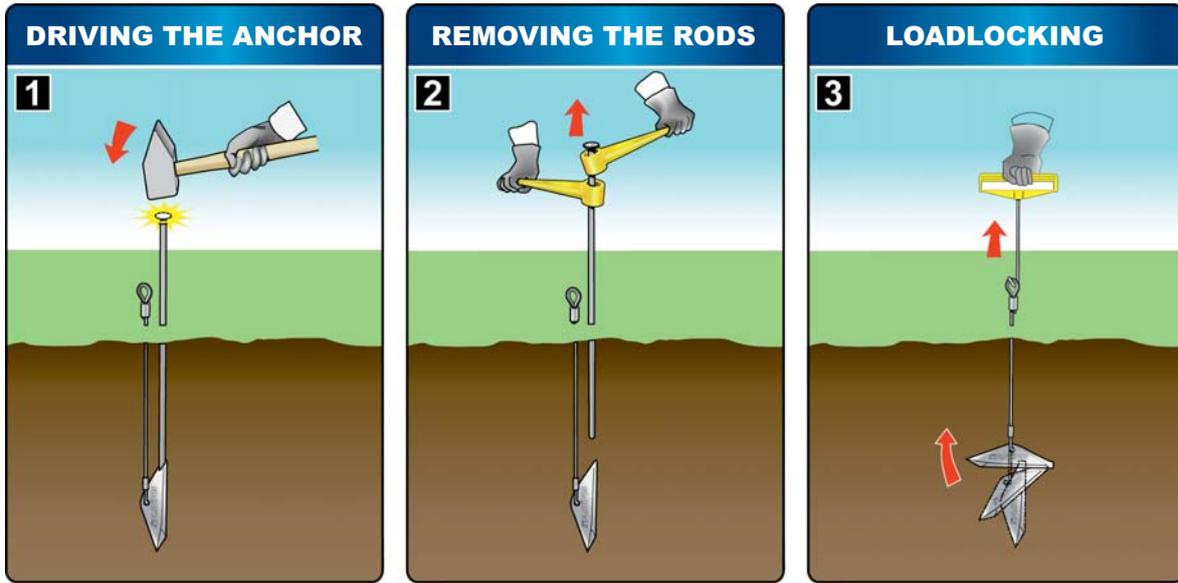
## KEY BENEFITS OF THE PLATIPUS® EARTH ANCHORING SYSTEM

- Over 30 years experience
- Low cost solution compared to concrete
- Fast & easy installation
- Immediate quantifiable loads
- Low environmental impact
- A 2kg anchor can provide up to 2.5 tonnes of resistance
- Bespoke installation equipment & tools
- Full training & support

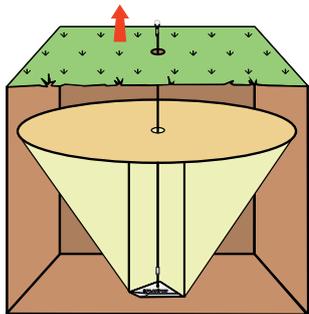


# 'SIMPLY' HOW A MECHANICAL ANCHOR WORKS

There are three steps to the installation of an anchor system:



## STRESS DISTRIBUTION & BEARING CAPACITY



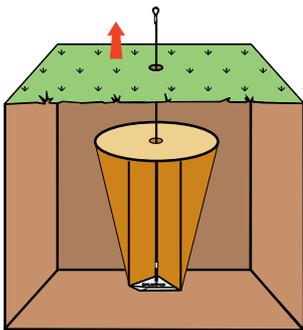
**Granular Soil**

(Based on Terzaghi's calculation)

The stress distribution in front of a loaded anchor can be modelled using foundation theory. The ultimate performance of an anchor within the soil is defined by the load at which the stress concentration immediately in front of the anchor exceeds the bearing capacity of the soil.

Factors that will affect the ultimate performance of the anchor include:-

- Shear angle of the soil
- Size of the anchor
- Depth of installation



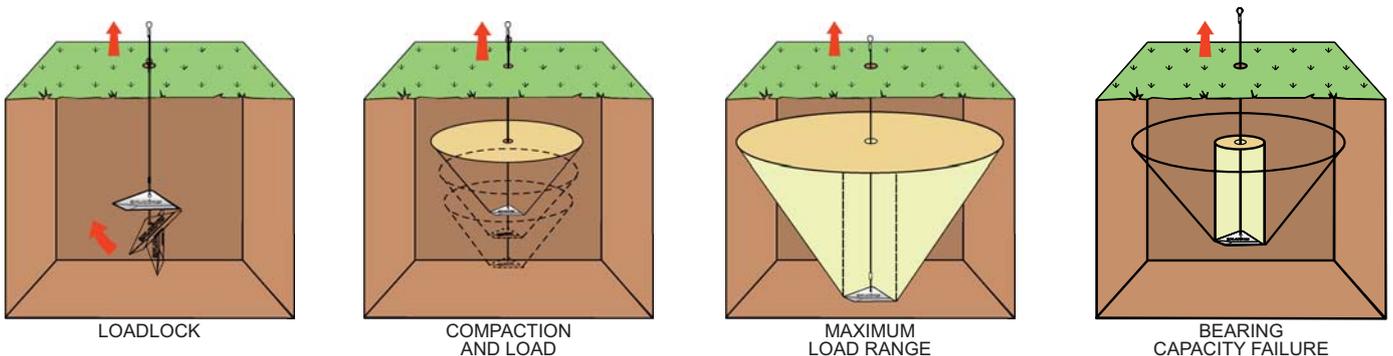
**Soft Cohesive Soil**

(Based on Skempton's calculation)

Platipus® anchors perform exceptionally well in a granular soil, displaying short loadlock and extension characteristics, a broad frustum of soil immediately in front of the anchor and extremely high loads.

Stiff cohesive soils, such as boulder clays, can also give outstanding results. However, weaker cohesive soils, like soft alluvial clays, can result in long loadlock and extension distances and a small frustum of soil in front of the anchor. Consequently these conditions require a larger size of anchor and if possible a deeper driven depth to achieve design loads.

## TYPICAL ANCHOR BEHAVIOUR



# STEALTH ANCHOR



The 'Stealth' anchor is designed to cover a wide range of lightweight anchoring. Its chisel drive point and streamline shape makes installation easy, in most cases, using simple hand or power tools. This also makes it an ideal choice when working in areas with restricted access.

Each anchor can be supplied with either wire tendon or rod.



ANCHOR TYPE	EYE VERSION	DIMENSIONS L x W x H (mm) (L x W x H - inches)	PROJECTED SURFACE AREA SQUARE MM (SQUARE INCH)	MATERIALS	TYPICAL LOAD RANGE*	MINIMUM DRIVEN DEPTH		
							Wire	Rod
S4		121 x 41 x 34 (4.76 x 1.61 x 1.33)	4,127 (6.39)	Aluminium Alloy	1 - 10 kN (220 - 2200 lbs)	0.6 - 0.75m (2' - 2.5')	✓	✗
S6		171 x 58 x 50 (6.73 x 2.28 x 1.96)	8,200 (12.71)	Aluminium Alloy; SG Cast Iron;	5 - 25 kN (1100 - 5500 lbs)	0.8 - 1.2m (2.5' - 3.5')	✓	✓
S8		263 x 90 x 76 (10.35 x 3.54 x 2.99)	19,555 (30.31)	SG Cast Iron	10 - 40 kN (2200 - 8800 lbs)	1.1 - 1.5m (3.5' - 5')	✗	✓

# BAT ANCHOR



The 'Bat' anchor is designed to achieve higher loads and also enhance anchoring in soft cohesive soils. Its ability to accept the T-Loc lower termination allows flexibility with regard to on-site anchor system assembly. It also means it can accept a wide range of solid rods.

Installation requires more powerful hand-held hydraulic breakers or, in some cases, a wheeled or tracked excavator with a percussive breaker attachment.



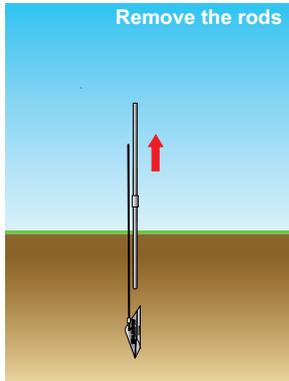
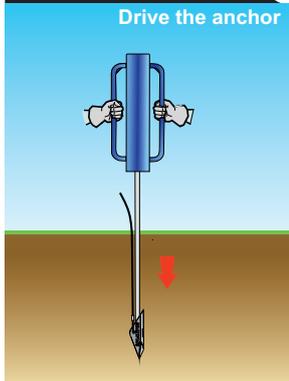
ANCHOR TYPE	T-LOC VERSION	DIMENSIONS L x W x H (mm) (L x W x H - inches)	PROJECTED SURFACE AREA SQUARE MM (SQUARE INCH)	MATERIALS	TYPICAL LOAD RANGE*	MINIMUM DRIVEN DEPTH		
							Wire	Rod
B4		310 x 110 x 93 (12.2 x 4.3 x 3.6)	28,600 (44.33)	SG Cast Iron	20 - 60+ kN (4400 - 13200 lbs)	1.5 - 2.5m (5' - 8')	✗	✓
B6		336 x 206 x 91 (13.22 x 8.11 x 3.58)	45,500 (70.52)	SG Cast Iron	30 - 100+ kN (6600 - 22000 lbs)	2 - 3m (6' - 10')	✗	✓
B8		423 x 259 x 105 (16.65 x 10.19 x 4.13)	71,500 (110.82)	SG Cast Iron	50 - 150+ kN (11000 - 33000 lbs)	3 - 4m (10' - 13')	✗	✓
B10		541 x 335 x 110 (21.29 x 13.18 x 4.33)	115,800 (179.49)	SG Cast Iron	75 - 200+ kN (16500 - 44000 lbs)	4 - 5m (13' - 16')	✗	✓

\*The typical load range of an anchor is dependant on the engineering properties of the soil.

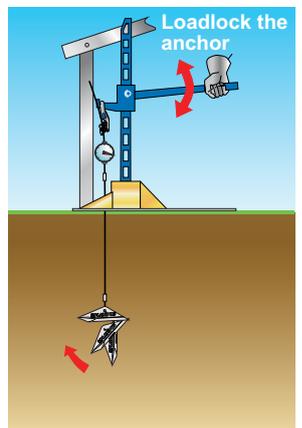
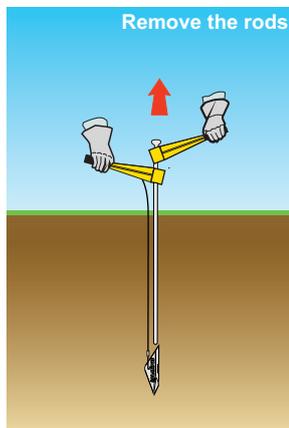
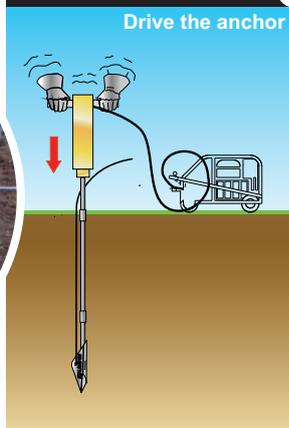
# INSTALLATION

Anchor systems can be installed using a range of light, medium or heavy installation equipment. As the requirement for anchor size and placement depth increases it may be necessary to utilise more powerful equipment.

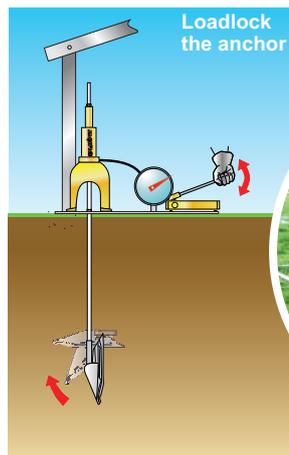
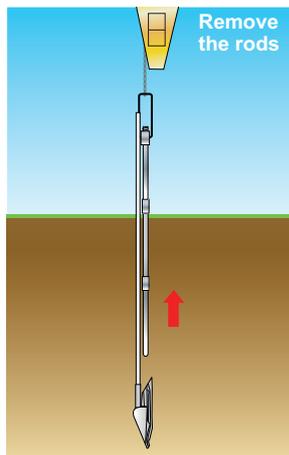
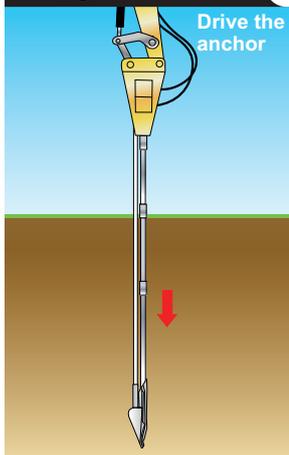
## Light Installation



## Medium Installation



## Heavy Installation



# SITE ANALYSIS & LOAD TEST REPORT



With the correct soil information we are able to predict holding capacities of our earth anchors. In circumstances where soil information is not readily available we recommend that a site analysis and load test report is completed.

The information recorded on this report will create an accurate picture of the site's condition and the exact capabilities of the anchor system. It will also identify other important considerations such as accessibility and installation times.

# INSTALLATION EQUIPMENT & TOOLS



Basic equipment and tools are essential in the installation process. Other pieces of equipment make the general procedure easier and quicker. Where multiple anchor installations are required we recommend you consider using powered equipment to install the anchors. All of our equipment is supplied by the market leading manufacturers and hand-held hydraulic breakers and power packs deliver the lowest vibration and noise levels available.



All our tools have been tried and tested over many years. A full twelve month warranty is offered (subject to inspection) should any tools fail in a normal installation process.

Installation equipment and tools can be purchased directly from Platipus. Most installation equipment is also available worldwide from most plant hire companies.

## OFF-GRID APPLICATIONS

Platipus Anchors are perfectly suited for most off-grid and standalone systems. These anchors can be easily installed by hand with simple tools and unskilled labour, removing the need for specialised equipment. The anchors are available in a range of system configurations to suit all design life requirements:

- Galvanised steel for temporary applications
- Stainless steel for permanent applications

As the anchor system and installation equipment are lightweight and compact, transportation costs are also greatly reduced.



## RETRO-FIT SOLUTIONS

In situations where traditional foundation solutions have failed or are failing, due to incorrect installation or unsuitable ground conditions, a selection of bespoke wire stay solutions are available to help stabilize the array and provide additional support to uplift. These standard retro-fit systems can quickly connect the array to a Platipus Anchor. This typically consists of a stainless steel wire tendon and a simple tensioner which can be tailored to suit most frames, soil conditions and design life.



# Case Study

## CROSSWAYS SOLAR PARK (5MW) RETRO-FIT - DORSET



**Consultant:** Paul Carpenter Associates  
**Installer:** British Solar Renewables

### PROJECT SPECIFICATION

This large 5MW array was completed using a single pile mounting system. Due to the varied ground conditions on this landfill site, the pile system originally specified was unable to provide the required pull-out loads. The Consultant determined that additional support was needed to prevent the uplift effects of high wind on this exposed rural site.

### SOLUTION

Tests were carried out at 10 locations across the site to determine the anchors performance in these challenging ground conditions. The Consultant calculated a required load of 7.5kN which was comfortably achieved using the small S06 anchor, making it the specified choice for the project. The anchors were rapidly installed, loadlocked and proof tested to 9kN using a combination of piling-rigs, already on site, and handheld hydraulic breakers. A variety of bespoke stainless steel single, double and triple post solutions, including a unique Revolution tensioner, were used to secure the frame to each anchor point.

**Anchor System:** S06EA aluminium alloy anchor c/w 2m x 6mm Ø stainless steel wire tendon and hard eye plus various lengths of End Post Solutions.

**Quantity:** 2629

**Anchor Design Life:** 25 yrs

**Soil Type:** Landfill rubble



# Case Study



## REDBRIDGE ROAD SOLAR PARK (7.2MW) - DORSET

**Client:** British Solar Renewables  
**Main Contractor:** Corbin Industries Ltd  
**Anchor Installer:** Drillcorp

### PROJECT SPECIFICATION

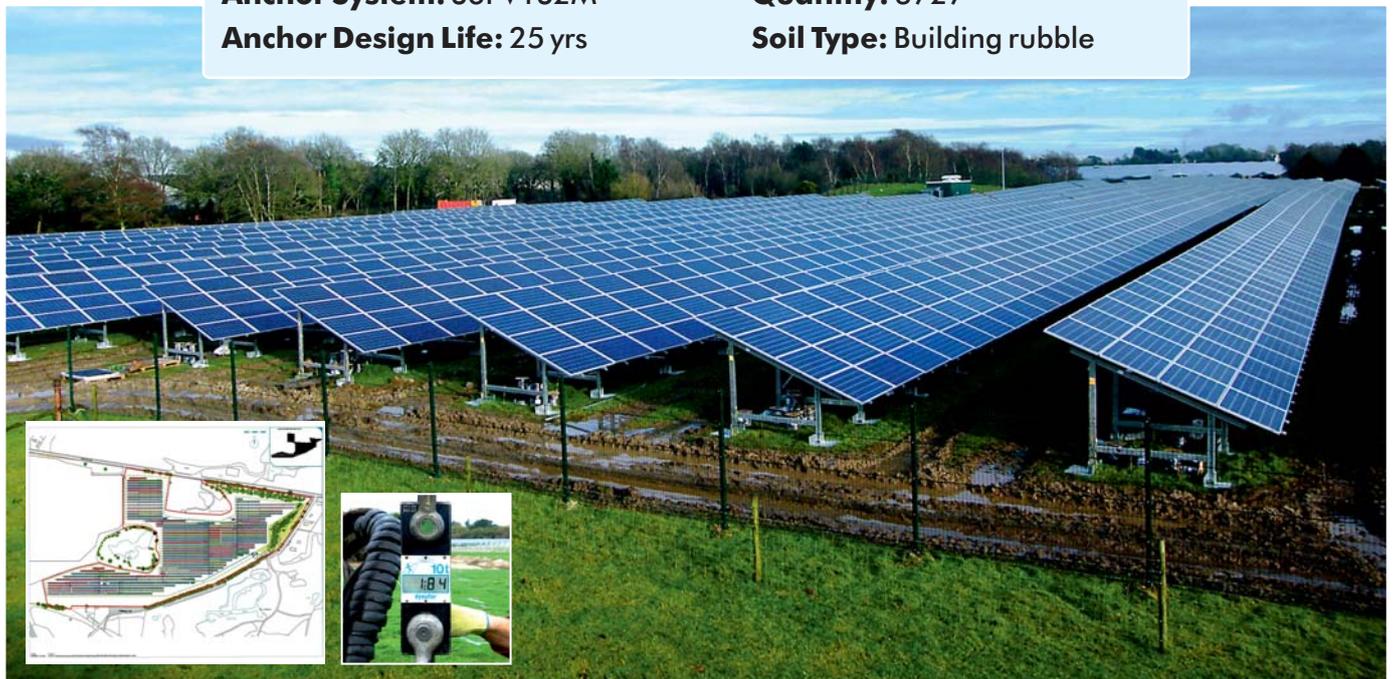
This large 7.2MW solar park was to be constructed on an old landfill site in Dorset as an extension to an existing 5MW park. The single pile mounting system used during the construction of the first 5MW site proved ineffective and initial pile investigations on the new site revealed similarly poor performance. The challenge was then to find an alternative foundation solution to make the project viable in these challenging ground conditions.

### SOLUTION

Anchor tests were carried out across the site which proved the small S6 anchor was ideally suited to provide a load of 10kN making it the Contractors preferred choice. Using tracked drilling rigs, the 2 Drillcorp installation teams were able to rapidly install, loadlock and proof test each of the 3727 stainless steel anchor systems within the required 15 working days. The unique H-Frame mounting system produced by Corbin Industries halved the overall anchor quantities required making it the perfect choice to complete this expansive array.

**Anchor System:** S6PV1S2M  
**Anchor Design Life:** 25 yrs

**Quantity:** 3727  
**Soil Type:** Building rubble



# Case Study

## KINSHAM PV (4kW) - GLOUCESTERSHIRE

**Client:** Private  
**Installer:** Genelex



### PROJECT SPECIFICATION

A ground mounted array was to be installed in a private garden with very restricted access. A foundation solution was required which would be easily transportable into the garden as well as provide the necessary loads preventing the uplift effects of high winds.

### SOLUTION

Two steel beams were used either side of the array to replace traditional concrete foundations and also help spread compression forces. These were anchored down using 3 x S06 anchors each providing a minimum of 5kN each. The anchors were quickly installed using a hydraulic breaker and loadlocked using a Manual Stressing Jack. The frame (Schletter PV Max 3) was then mounted onto the steel beams followed by the installation of the 12 PV panels, ready to produce electricity.

**Anchor System:** S6PV1  
**Anchor Design Life:** 25 yrs

**Quantity:** 6  
**Soil Type:** Stony clay mix



# Case Study



## BILTMORE ESTATE PV FARM (1.2MW)

**Client & Approved Installer:** SunEnergy1  
**Consultant:** Max Daetwyler Corp

### PROJECT SPECIFICATION

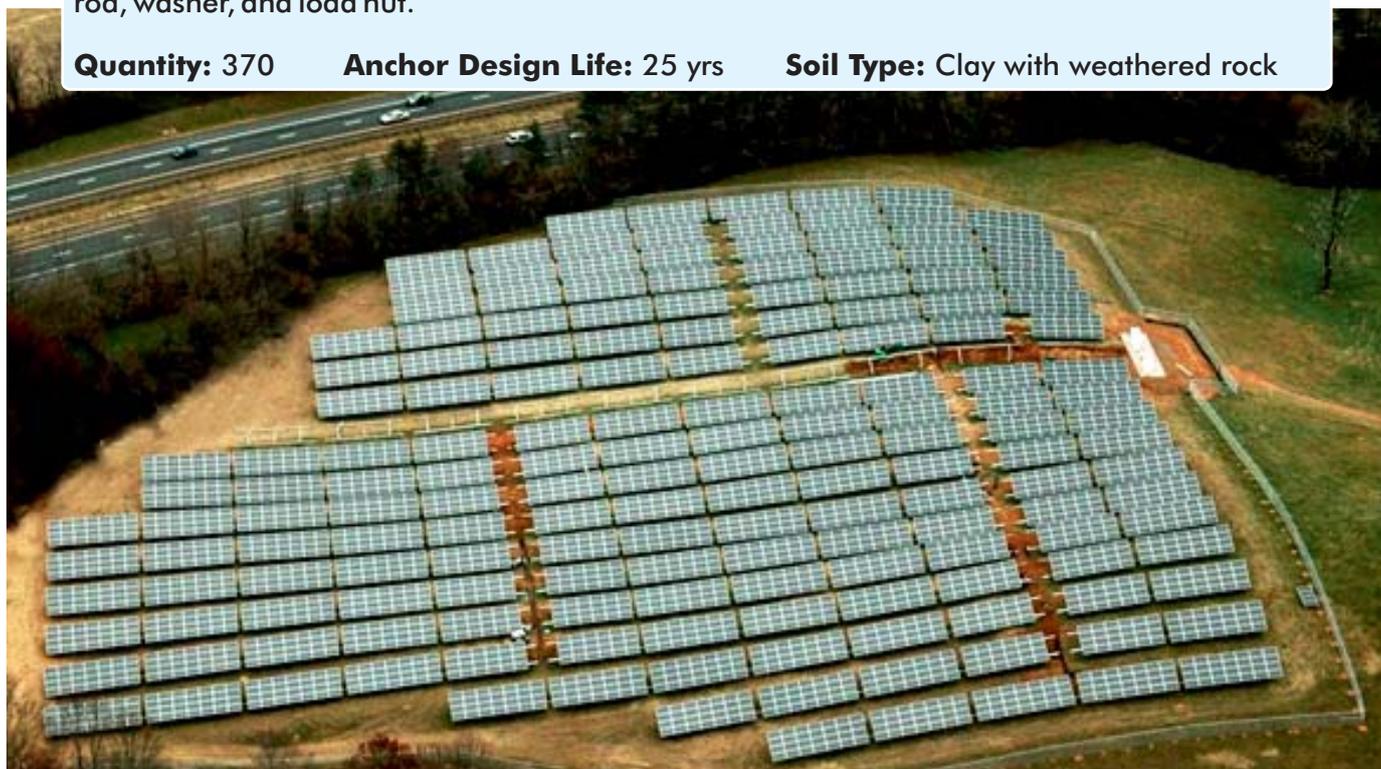
To establish a 1.2 MW ground-mounted solar array on a six-acre area on the Biltmore Estate in Asheville, NC. The main focus of the project was to rapidly install the anchors with minimal land disturbance in a short amount of time.

### SOLUTION

The anchors were selected in lieu of the traditional foundation systems in order to eliminate the time, cost, and construction associated with concrete foundations, driven piles, and helical anchors. The 370 anchor assemblies were installed and load locked over 4 day period using a mini excavator equipped with a hydraulic hammer attachment. The S8 anchor achieved the required load of 7200 lbs (32kN), offering a comfortable factor of safety for the engineer. The installation was completed and ready to produce electricity by constructing the Daetwyler Modu-Rack and securing the 5,000 PV panels onto the structure.

**Anchor System:** S08TC galvanized spheroidal graphite iron anchor with 5/8" UNC threaded rod, washer, and load nut.

**Quantity:** 370      **Anchor Design Life:** 25 yrs      **Soil Type:** Clay with weathered rock





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