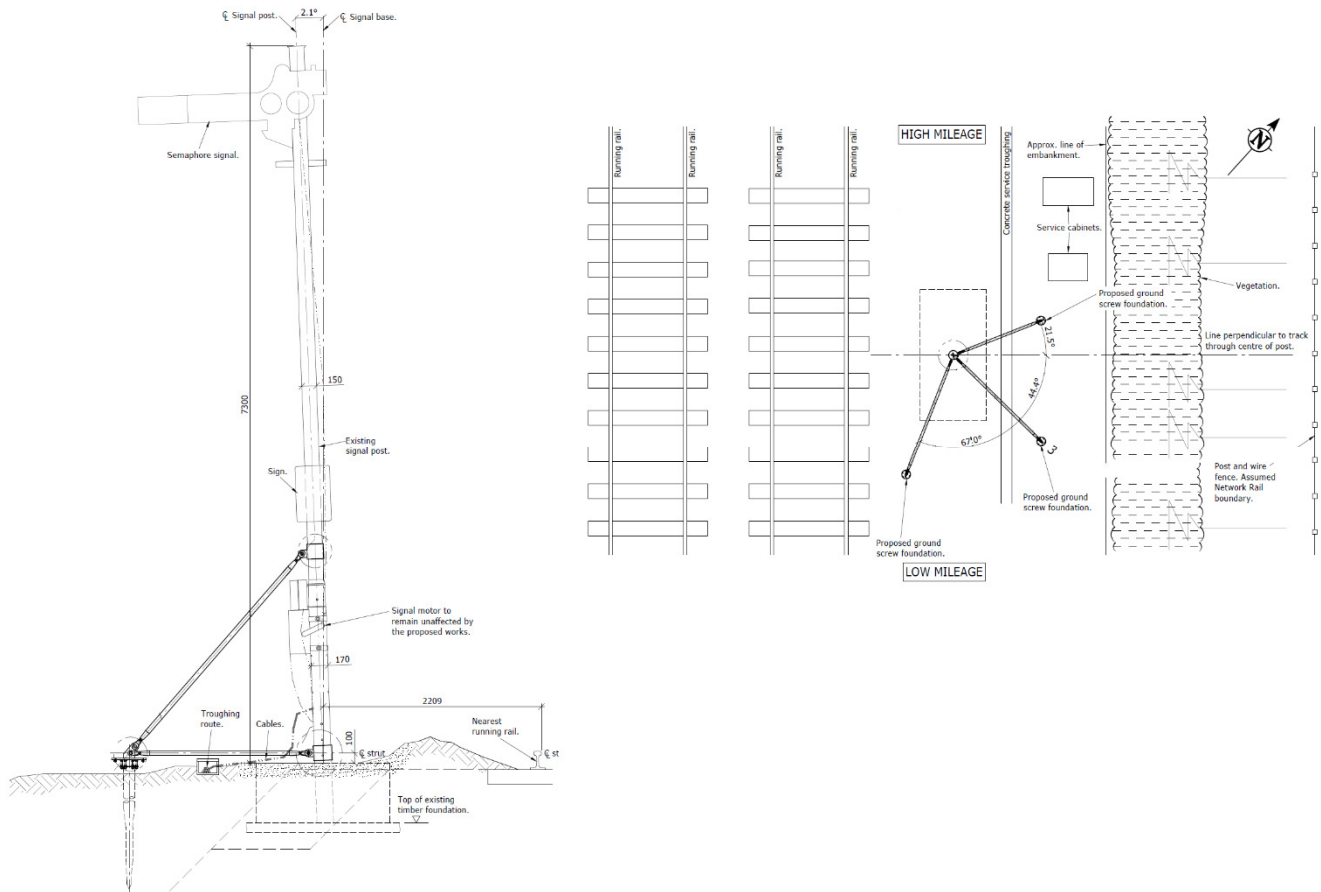


TRACK SCREW LTD

Case Study – Stabilisation of Semaphore Signal at M21 between Manea and Ely Stations



Brief Project Summary

The semaphore signal shown in the detail above was noted during an asset inspection and had been reported by passing drivers as falling outside acceptable tolerances for verticality.

The signal foundation was investigated, and only timbers were located, it is assumed that the foundation comprises of timbers only, of unknown condition. No evidence of any other foundation type was found.

Based on this investigation and other anecdotal evidence, it is thought the foundation consists of a timber sleeper foundation, with timbers placed side by side, surrounding the post, with transverse timbers below acting in a similar way, although this could not be confirmed. The post was leaning away from the track by 2.1° in a perpendicular direction and 3.5° towards low mileage in a parallel direction to the track.

TRACK SCREW LTD

A request was made to MLM Group, NWR approved civil engineers, to provide a temporary works propping scheme, in order to facilitate the installation of the proposed permanent works concrete foundation.

MLM proposed a Track Screw solution. MLM have some experience with Track Screw Anchors from the exploratory work completed with Thales on 4LM in 2015/16 and the design of a Track Screw supported pedestrian walkway at Romford Station.

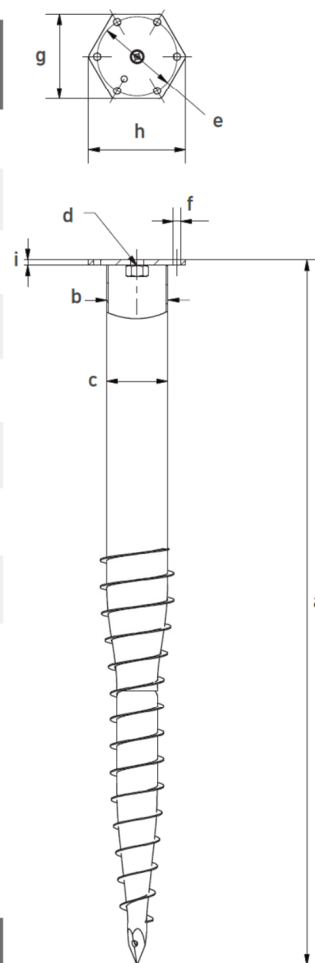
After initial discussions and review of predicted loading Track Screw issued MLM product details on the Krinner KSF M series screw and MLM proceeded with their calculations.

Screw Information Technical Information – Krinner KSF M



Technical Data

	KSF M 140x2100- M24	KSF M 114x2100- M24	KSF M 114x1600- M24	KSF M 114x1300- M24
a	Length (mm) (±25 mm)			
	2070	2075	1575	1325
b	Shaft outer diameter (mm)			
	139.70	114.30	114.30	114.30
c	Inner diameter (mm)			
	132.50	107.10	107.10	107.10
d	Thread			
	M24	M24	M24	M24
e	Pitch circle diameter (mm)			
	180	150	150	150
f	Pitch circle holes (mm)			
	6 x Ø 14	6 x Ø 14	6 x Ø 14	6 x Ø 14
g	Flange wrench size (mm)			
	200	160	160	160
h	Flange outer diameter (mm)			
	225	182	182	182
i	Flange thickness (mm)			
	10	10	10	10



Online Service

KSF M 140x2100- M24	KSF M 114x2100- M24	KSF M 114x1600- M24	KSF M 114x1300- M24
------------------------	------------------------	------------------------	------------------------



e: enquiries@trackscrew.co.uk
t: 0844 798 1211

TRACK SCREW LTD

Design Process

Following receipt of the technical information on the KSF M product from Track Screw, MLM independently completed the calculations, CAT1B checking, all required drawings, completed and submitted NWR Form 2 & 3, which received NWR approval. Copies of the F002 & F003 are in the appendix of this Case Study.

The Track Screw selected was the KSF M 140x2100-M24.

Installation

The installation of the screws was completed in a single night shift by Track Screw trained operators from ALMA Rail using the 18V battery powered TSL-DA1 driving tool capable of producing 5400Nm of torque.



TRACK SCREW LTD

Testing

Following the installation, the PC employed the services of an independent testing company attend site and complete 150% SWL tests (compression & tension) one of the working screws. The screw tested passed with minimal deflection under the test loading and showing good recovery of deflection after the test loading was removed.



Sacrificial reaction piles were installed to allow the test rig shown in the image above to allow the testing.

Removal

With the Track Screw supported struts the main contractor was able to fully excavate and remove the subsiding timber foundation and replace it with a concrete foundation. Following the completion and curing of the new foundation the struts and Track Screws were removed.

Both the screws and struts are completely reusable for similar situations in future.

Cost Comparison to Traditional Construction

ALMA Rail who completed the Track Screw installation were asked to produce an estimate for the cost to complete this project using traditional construction methods.

Including all labour, plant materials and possessions this would have totalled £24,195.00 and taken 8-days of on site work with an average team size of 6-men, plus 14-days of curing time for the concrete.

The Track Screw installation, testing and removal cost a total of £8,096.00 and was completed in only 3-days of on site work with a 4-man team. **This is a cost saving of 66% and a labour saving of 75%.**



e: enquiries@trackscrew.co.uk
t: 0844 798 1211

TRACK SCREW LTD

Summary of the Benefits of Track Screw Over Concrete Foundations

Quicker & Safer – **Up to 90%+ savings in Labour**

Lighter Installation Equipment & Lighter Materials – **Nothing over 25kg in weight**

Less Manpower Required

No Excavation, No Spoil, No Wet Trades, No Curing Time

Quieter, No Generator, No Fumes, No Fuel, No Vibration

Environmental Savings, 1m³ of Concrete = 250kg of CO₂, 1 Track Screw = 20kg CO₂ – **Up to 85% less CO₂**

- **Survey Requirements**

- Traditional ground survey, e.g. bore holes, cost £1k+, require heavy plant & take 1-week+ to book
- For Track Screw, you only need soil density numbers & soil classification to 1.5m depth. This can be taken on the day of install using a hand held CBR probe and hand auger

- **Speed & Manpower**

- 1m³ concrete pad will take a 4-man team a day to construct and 1-week to cure
- One Track Screw can give same capacity, be installed in 10-mins by 2-men & loaded immediately
- 5m³ concrete pad will take a 6-man team 3-days to construct and 1-week to cure
- 4 No Track Screws with a transfer grillage installed by a 4-man team in 2-hrs & loaded immediately

- **Tooling**

- Installation contractors can hire TSL's unique 18V Lithium Ion battery powered screw installation tool, the kit includes all parts required to install screws from 600mm to 1800mm long in to any ground conditions
- Even installing the longest screws into the hardest ground, the tool will complete multiple screws with a single battery, shorter screws into softer ground will allow significantly more installs per battery, each tool is hired out with 4-batteries & a charger, each battery weighs less than 1kg
- The tool itself weighs less than 20kg in its transport box. All other elements of the installation kit weigh less than 18kg and so can be easily carried & handled
- TSL have exclusive licence from the global patent holder of the tooling for the UK rail sector
- TSL offer a full training course for installers and a technical assistance team to provide installation advice

- **Track Screw Anchors**

- Single piece screws, lengths from 600mm to 2100mm, final diameters from ø60.3 to ø139.7
- Maximum capacities from single screw 45kN tension & compression, 20kN shear & 15kNm moment
- Rail Spec screws have 110µm galv coating giving assumed service life of 40-years, 25-year warranty
- TSL can also offer screws made from 304 Stainless Steel giving 70+ year lifespan
- TSL offer a fully technically assured service, calcs & warranties
- TSL can offer on-site testing of installed screws or train operatives to complete testing
- TSL have exclusive licence from 2 largest manufactures for screw supply for the UK rail sector

- **Savings**

- Recent install of 56 screws in place of concrete showed 94% saving in labour & 85% saving in CO₂

