

CPM stepsafe modular platform



The stepsafe modular system



This brochure gives outline details and history of the Stepsafe platform system

The system can be used for new build and the extension of existing platforms.

It can be built on various types of pile or strip footings depending upon ground conditions and localised services. The system is manufactured and sold by the CPM Group Ltd, in association with Mott MacDonald Ltd, the original designers and part owners of the Intellectual Property Rights to Stepsafe.

Key staff at CPM have collaborated with MottMacDonald on the development and promotion of Stepsafe since its prototype manufacture.

The product experience within CPM Group Ltd combined with the ongoing support from the design team within Mott Macdonald Ltd, who have been involved with all applications of the system to date, brings a unique understanding and capability in platform design and manufacture to any project.

The association also brings CPM's extensive experience of precast concrete manufacture and Mott MacDonald's wide range of railway infrastructure design skills, knowledge, and project experience to any scheme.

Why use stepsafe modular platform systems



The CPM stepsafe solution

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MacDonald

A solution to the increasing demand for rail travel is the creation of extra capacity by the use of longer trains. Many existing station platforms are too short but provision of platform extensions is restricted by the requirement to:

- Work within existing train service patterns and passenger occupation
- Work in track possessions
- Minimise disruption

Following the success of the Warwick Parkway station platform construction, Laing Rail and Mott MacDonald developed and patented 'Stepsafe' to overcome these restrictions.

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Stepsafe principal advantages

- Foundations, either strip footings or piles, are constructed in 'Green Zone'
- Superstructure erection involves assembly of factory-made components and avoids 'wet' trades
- The assembled structure requires only the addition of lightweight copers, tactile slabs and fencing before being brought into use.
- Off-site component manufacture minimises site storage requirements.



Significant time savings can be achieved, with less disruption to rail users and operators, and reduced risk of cost and programme overrun. The system was developed initially for use on the Chiltern Line, but is applicable throughout the UK rail network. On the Chiltern Line, five platforms (at Haddenham & Thame, Bicester and Warwick) were extended to cater for 8 car trains, although platforms of any length can be constructed.

The flagship project for the Stepsafe system is at Tring, on the West Coast Main Line where track remodelling and the requirement for suburban stations to accommodate 12 car trains, led to extension of the five station platforms. Single sided and island platforms were required. The island platforms were redesigned to accommodate variations in alignment between the tracks and to incorporate drainage and extensive services requirements. The structural layout fits around the existing and future railway infrastructure with minimal variation to the modular system.

Recent work done by Franklin Andrews on alternative platform systems has indicated that Stepsafe compares very favourably with both traditional and more modern systems on outright costs, but scores very well in terms of the time required to install the system.

Construction of a new platform at Denham, on the Chiltern line



More recently, construction of a new platform at Denham, on the Chiltern Line, was completed in 2008 and a new platform extension at Stratford Station is currently underway.



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Generic stepsafe construction sequence



Install piles/foundations - undertaken in operational railway environment

The Stepsafe system can be supported on piles or strip footings depending on the geotechnical conditions and site specific constraints. Piles offer flexibility in avoiding existing infrastructure which might be required to remain in place for the operation of the railway during construction.

Pile caps are constructed on top of the piled or strip footing foundations.

A Macalloy bar is cast into the pile caps to secure the crossheads units into position.

Careful attention needs to be paid to the setting out of the Macalloy bars and levels of the pile caps as the geometry of the remaining precast units is dependent on the supporting structure.

A bearing material is cast on top of the pile cap to give a final level at the set figure but also to provide a better insulating layer for the attenuation of noise and vibration from the track to platform surface.

It also allows additional tolerance to achieve the required levels for the pile caps.

Construct pile caps - undertaken in operational railway environment



Formwork for pile caps



Applying bearing material to pile caps for precast concrete units



Finished pile caps for precast concrete units

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Install crosshead units - undertaken in engineering hours



The crosshead precast concrete units are installed on top of the pile caps. The units can be lifted on to the pile caps using road rail plant or lifting equipment. The cross heads are set at the correct lateral position and height to ensure the correct gauge is achievable when the coping is installed.

Install Longitudinal Beam - undertaken in Engineering Hours

The longitudinal precast concrete beams are installed between crosshead units in the preformed pockets. Technical rubber shims are used to bed and take up the fit when placing the longitudinal beams. This also helps to reduce transmitted noise and vibration into the platform. The units can be lifted into position using road rail plant or lifting equipment.



Installing longitudinal beams into the crosshead pockets



Install cable trays - undertaken in operational railway environment
The longitudinal precast concrete beams have sockets cast in to support cable trays between the longitudinal beams.



Cable trays being installed between longitudinal beams and along formed holes within crosshead

The longitudinal precast concrete beams have sockets cast in to support cable trays between the longitudinal beams.

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Install Slab units – undertaken in Engineering Hours



Installing slab units on top of longitudinal beams using a road railer

The slab units are lifted into position using road rail or lifting equipment and are supported on the longitudinal beams. The slabs units are installed on a bearing material applied to the longitudinal beams. The slabs are secured into position using steel plates beneath the slab which fit into formed recesses in the longitudinal beams..

Miscellaneous items - undertaken in Operational Railway Environment

Items such as fencing, signage and lighting columns can be installed on top of the slab units. The acid etched surface of the platform slabs provides slip resistance to comply with Network Rail Standards, but further surface finishes can be applied if required.

It is believed that none of these items are required to be installed for Platform 4 works.

However examples of fencing are supplied for information.

Installing items such as fencing, lighting columns and signage



Installing miscellaneous items such as fencing, lighting columns and signage

Installed fencing at back of platform



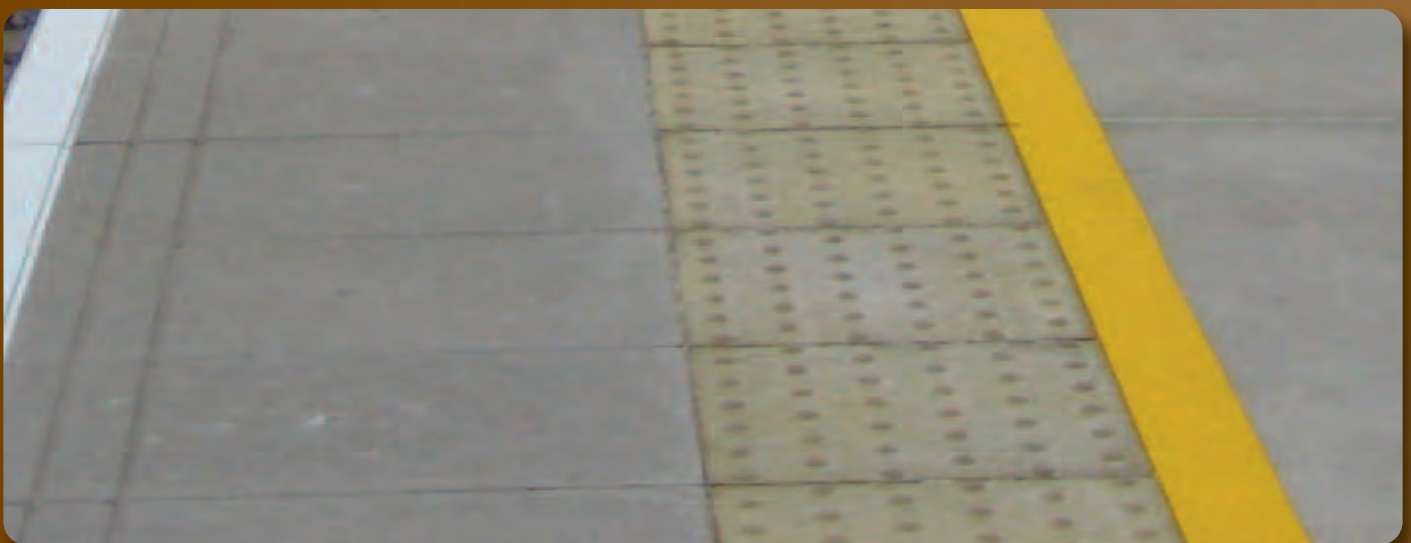
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Install Lighting columns and sealants

Lighting columns and sealants between the slab joints are installed during engineering hours, due to the size of the lighting columns, and also due to the requirement of sealing up to the platform edge of the slabs. However cabling for the lighting columns can be undertaken during the normal operation of the railway. Lighting columns are not required for the Whitechapel Platform 4 widening project.

Install tactile slabs, copers and platform lining

Copers are installed using a track gauge to ensure the required offsets and heights are achieved. Mortar is used to provide some construction tolerance in setting the copers and they are also mechanically held in position by a stainless steel fixing which passes through a pre-drilled hole in the copere.



Using stepsafe over traditional platform construction methods



Storage, logistics, delivery and crange of materials

Stepsafe has numerous advantageous over traditional platform construction techniques which are detailed below;

There are less materials required for a typical platform construction using the stepsafe system over traditional methods which results in the following being reduced;

- Site storage space,
- Movement of materials on site,
- Craning materials into the site

The approximate amount of units / materials required to be craned or railed into a site requiring a 140m long new platform is illustrated below;

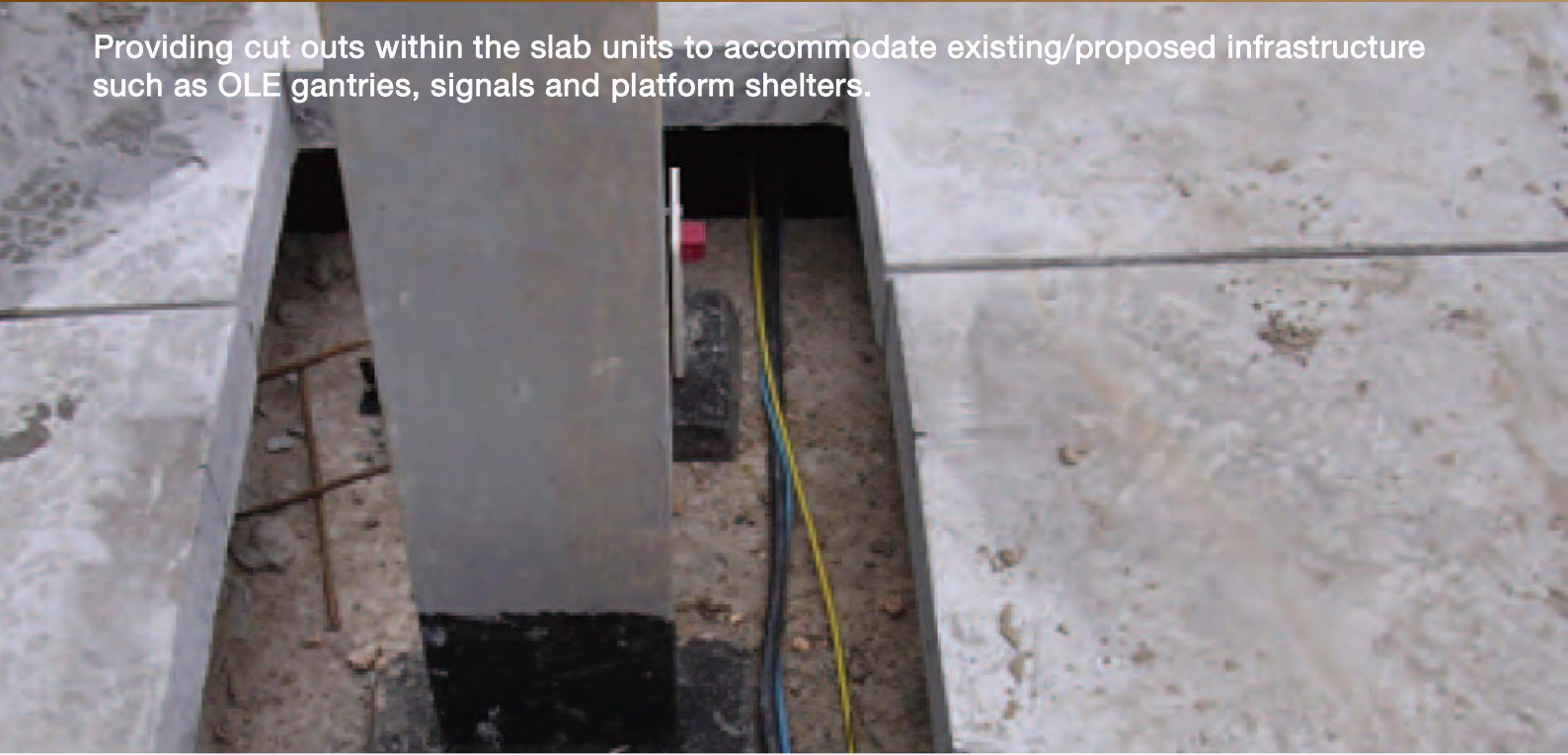
	Stepsafe Platform	Traditional Platform
Weight of materials	320 tonnes	1060 tonnes
Volume of materials	135m ³	585m ³

The Stepsafe platform requires less tonnage into the site and takes up less space than traditional platform construction materials.

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Using stepsafe over traditional platform construction methods

Providing cut outs within the slab units to accommodate existing/proposed infrastructure such as OLE gantries, signals and platform shelters.



Using piled foundations allow existing services/infrastructure to be avoided such as cable routes.



Units can be placed adjacent to traditional platform constructions to extend existing platform lengths.



Built in lighting sockets and cable voids

If lighting column cradles are cast in, then a conduit is also provided to run the lighting power cable from the side of the cross head to the centre of the lighting column cradle.

Lightweight copers

The Stepsafe system uses lightweight copers that are more readily man handable compared with traditional coping stones on platforms.

No Additional Surface Finishes Required

The slab units are installed with the platform surface pre finished, apart from the fixing of the copers and tactile slabs. The platform surface is acid etched and provides a minimum slip resistance value of 45 both in dry and wet conditions for 4S rubber. No additional maintenance is required on this surface unlike bitumen surfacing.

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