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24<sup>th</sup> January 2017

Ref:15027/AKn/005

[Francesca.Bianchi@multiplex.global](mailto:Francesca.Bianchi@multiplex.global)

**For the attention of: Francesca Bianchi**

Dear Madam,

**RE: CENTREPOINT – HISTORIC STAIR TREADS**

The staircases to the East & West elevations of CPT were dismantled from their original locations tread per tread and received at the PAYE storage yard in March 2015.

On arrival to the yard it was clear that half a decade of foot traffic, staining, carbon deposits, diesel fumes and reinforcement corrosion, had left the stair treads in a substandard condition.

It was agreed before any condition surveys could be undertaken the stair treads would require a thorough and consistent clean, samples were undertaken with non / ionic detergents and other cleaning agents, however it became evident these products could not dislodge the heavy deposits, so sampling was undertaken with fine abrasives and a suitable medium was found. The stair treads were cleaned, effectively removing all divisible deposits allowing visual assessments to be made.

Survey

Each stair treads was surveyed to identify defects, these included broken, cracked, crazed, spalled areas of terrazzo, also areas where ferrous metals are too close to the surface and corrosion staining had percolated through. Defective areas are as shown on the pictures 1-6 below:



1: Visible corrosion staining and ferrous fixing.



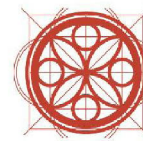
2: Visible corrosion staining, reinforcement too close.



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**PAYE Stonework & Restoration Ltd**  
Stationmasters House, Mottingham Station Approach, London SE9 4EL  
Tel: 020-8857 9111 Fax: 020-8857 9222  
[www.PAYE.net](http://www.PAYE.net) [www.PAYEconservation.net](http://www.PAYEconservation.net)  
Reg. No. 2743908 VAT No. 608 0053 77





*3: Breaks to faces of lead edge of stair tread.*



*4: Spalled area exposing reinforcement.*



*5: Spalled terrazzo.*



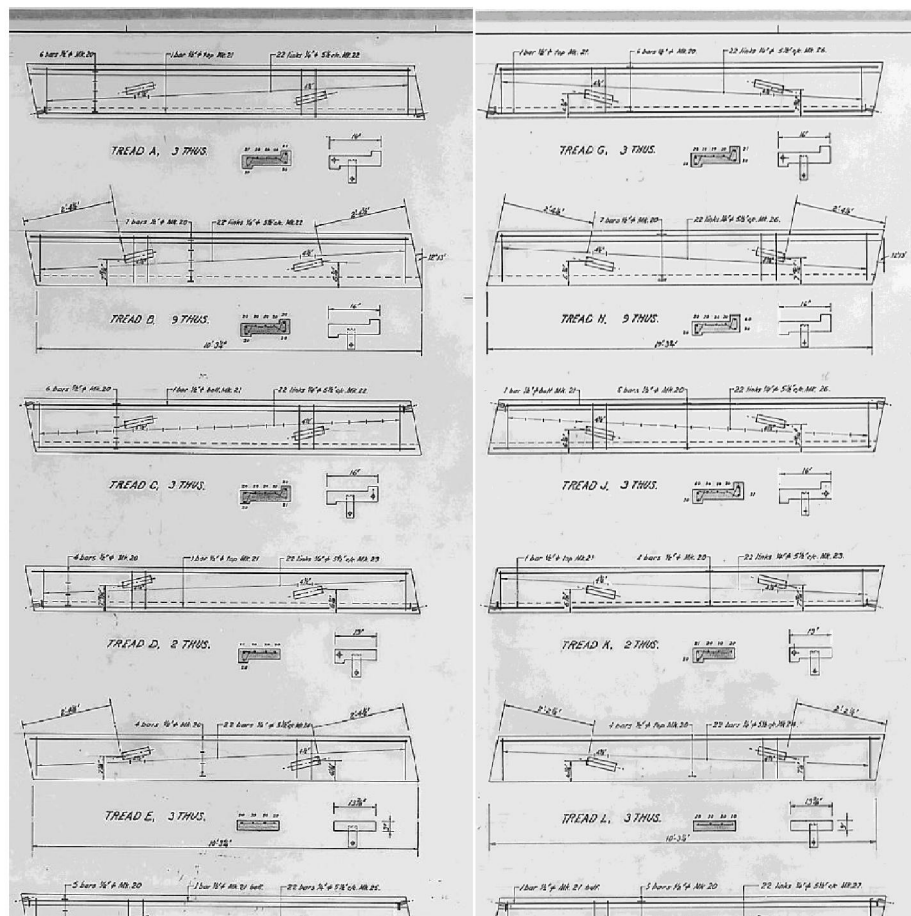
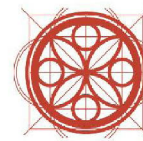
*6: Cracks to terrazzo.*

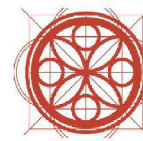
The survey of defects was undertaken to all surfaces of each stair tread, with each defect referenced with a specific number - relating to a repair schedule noting the type & size of the repair, a drawing showing the location of each defect and photographic schedule showing each individual defect (as shown above).

On a number of stair treads a survey assessment confirmed the defects found were non-repairable, meaning remedial repairs would be insufficient to provide the structural integrity required for the stair treads to work as their original design intention, thus making them unsafe for re-use. On 18<sup>th</sup> January 2016 MPX had these stair treads checked structurally by their design consultants Pell Frischmann and concluded 6no. were 'structurally unacceptable'.

#### Classification of Stair treads

A classification of the existing treads into original types was conducted after the defect - repair surveys. The Pell Frischmann's archive drawings made it simple to identify each tread against its design type as key information is provided: dimensions, position on the staircase, type of fixing to the tread, location of the fixing within the tread and the location of the balustrade fixings. These details can be seen on an extract from the archive drawings shown below: See figure1.





#### Stair Tread Types

- A, B, C, D, E, F for Western Relocated Staircase
- G, H, J, K, L, M for Eastern Relocated Staircase

On review of the classification of the treads and the design mark up, it appears the designers have retained the historic composition of the original staircases.

#### Repair Process, Procedures & Materials

The first stage of the repair process was to analyse the existing stair tread terrazzo constituents, this included selection of the aggregate types e.g. Carrara, botticino, black Zimbabwe marble. The aggregate shape angular or ground and sizes 1-4mm. Analysis of the cement binder selection and ratios.

Each stair tread was then inspected to assess the range of variation in the terrazzo, as a result four different areas were identified by either the colour of the base 'binder' mix, or the 'separation' of the black speck aggregate content.

The sampling process could then be undertaken to best match the variation as per the above. Gauging all sample mixes to mass an assortment of different base mixes and black speck differentiation samples were provided. The design team then choose which of the different mixes that would best match each stair tread.

The second stage is the repair procedure which involves marking out the defective area being careful only to remove original material as is necessary. The cutting is undertaken using masons hand tools and diamond tipped cutting wheels, masons being careful to reduce the potential of spalling whilst cutting out defective elements. All voids are then cleaned before receiving Terrazzo application.

Each different terrazzo mix is then applied to each individual stair tread with moulds to allow for casting to the correct shape and size.

Once poured the terrazzo repair is then left to cure for the required duration before it is polished back with a variation of fine abrasive pads to match the exiting historic fabric.

Yours Sincerely,



Andrew Knox  
Contracts Manager