C254 – Archaeology West

Archaeological Works at Paddington

Building Recording - Paddington Station Milk Ramp

CRL Document Number: C254-OXF-T1-RGN-CRG03-50215rev3

~~Contract MDL reference CXX.XXX~~

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Contents

Introduction

1.1 Preamble

1.1.1 This building record of the Milk Ramp, which forms part of the London Street (Red Star Deck), Paddington Station, is submitted in response to a specification (Doc ref: CR-SD-WES-CN-AE-00005) prepared as a requirement of the Heritage Agreements between the Statutory Undertaker the City of Westminster and English Heritage. The purpose of the work is to create an accurate record and thorough understanding of the structural elements that will be affected by the scheme works.

1.1.2 The specification stated that the recording works were to be undertaken in two phases. The first, comprising preliminary observations and historical context, was to be carried out in advance of site works as a record of the structure as currently observed and visible. A second phase is to be carried out during works to record any features previously concealed. The present document represents the results of both these phases of recording. An interim report (C131-MMD-T1-RAN-B071-00001) was issued in 2011 covering the initial phase of recording by Scott Wilson and the 2011 report forms the main part of the current document. As part of the first stage. It builds upon works already carried out on the London Street Deck as part of an earlier programme of building recording (Paddington Station: Building Recording at the London Street Deck Doc ref: CR-DV-PAD-X-RT-00062 dated 31st March 2009). Appendix 3 of the current document presents the second phase of recording during the dismantling of the structure.

1.2 The Heritage Agreement

1.2.1 There are five Heritage Agreements between the Nominated Undertaker, the City of Westminster, and English Heritage. These documents detail the heritage requirement for the Crossrail works that affect listed buildings at Paddington Station.

1.2.2 These are:

- The agreement covering works affecting MacMillan House;
- The agreement covering the canopies in Departures Road attached to MacMillan House and railings between Departures Road and Eastbourne Terrace;
- The agreement covering works affecting the London Street Deck;
- The agreement covering works to mitigate settlement that may potentially affect parts of Paddington Station; and
- Works affecting Paddington Underground Station (Praed Street).

1.2.3 The Heritage Agreements set out the requirement for building recording works within Paddington Station and form an integral part of the overall works package. There are two agreements that require building recording. These are:

- The agreement covering the canopies in Departures Road attached to MacMillan House and railings between Departures Road and Eastbourne Terrace; Appendix 1, Schedule 1, Part 2, Sections 2 and 4; and
- The agreement covering works affecting the London Street Deck; Appendix 1, Part 2, 1e).

1.3 Requirement of Heritage Agreements

1.3.1 The requirements of the Heritage Agreements relating to building recording at Paddington Station's London Street Deck are set out in Appendix 1 Schedule 1, Part 2, and 1e of the Heritage Agreement. This details the requirement for the recording those parts of the deck which will be altered as part of the scheme, notably by the insertion of the vertical circulation link to connect the deck with the concourse level and by the insertion of new foundations to support the proposed deck canopy. Damage will also be caused by the creation of a ramp from Bishop's Bridge Road to the deck and deck strengthening works.

1.3.2 Section 1e requires a method statement to outline the recording strategy for the structure before and during the works. A specification for RCHME Recording of these works has been submitted and approved (City of Westminster Heritage Agreement – Paddington Station: Specification for RCHME (English Heritage) Recording at the London Street Deck Document Number: CR-SD-WES-CN-AE-00005). The specific requirement for the individual Level 3 record includes:

- Measured drawings (at 1:50) supplemented with a detailed photographic survey for the section of the London Street Deck affected by the works.
- Joints in steelwork will be recorded in detail photographically as well as being drawn at a scale of at least 1:5.
- There will also be a watching brief on the works to the deck to record any hidden fabric revealed by the works.

Scope

1.3.3 This document presents the results of the second stage of recording works on the London Street Deck ahead of construction works. It reports specifically on the Milk Ramp and should be read in conjunction with Document CR-DV-PAD-X-RT-00062 Paddington Station: Building Recording at the London Street Deck, dated 31st March 2009, which reports on the wider Red Star Deck area. Section 2 provides a brief historical background and chronology to Paddington Station. It is not intended to provide a full and detailed historic analysis of the station, but rather to place the Milk Ramp and the wider London Street Deck within its historic context. This is followed by a detailed analysis of the chronological development and structural history of the Milk Ramp, including a review of the documentary record.

1.3.4 The structure of the Milk Ramp is described in Section 3, and is based on on-site observations. This section details current site conditions, recording only that which was accessible and visible. The specification for the works detailed a watching brief on possession of the site and it is at this point that the present record will be enhanced and more detailed investigations made.

1.3.5 A photographic survey was undertaken using both black and white 35mm prints and colour digital images. These images have been collated and indexed in accordance with the requirements of Management of Research Projects in the Historic Environment (MoRPHE, 2006) and current best practise (e.g. Brown and Duncan 2007; Institute of Field Archaeologists 2008f). Prior to deposition the project archive will be organised to ensure that it is internally consistent and compatible with the specific archive requirements of the Museum of London.

1.3.6 Final reports, site plans and other illustrations have been prepared in accordance with the Employer's Information Management standards and procedures. The contents of the project archive will be deposited with the Greater London Historic Environment Record (GLHER) upon completion of the project to ensure a comprehensive archive.

1.3.7 The digital archive for the project shall be copied to CD-R or DVD (recordable laser disc) and submitted to the Project Archaeologist for archiving in the Employer's document management system.

1.3.8 The project archive will be submitted to the Museum of London for deposition in the London Archaeological Archive and Research Centre. A digital record of the project will also be uploaded onto the online database Online Access to the Index of Archaeological Investigations (OASIS).

1.4 Recording Procedure

1.4.1 The specification of works submitted and agreed by the several parties' sets out the methodology for recording. The level 3 record required for the Red Star Deck is an analytical record. This includes a measured survey of the building, which comprises a plan and elevation of the ramp, were compiled using a combination of laser scan survey and hand survey. This was then checked on site for accuracy and enhanced to illustrate archaeological features. The drawings were subsequently reproduced in AutoCAD for integration into the report. The plan is presented at 1:100 and the elevation at 1:50.

1.4.2 A comprehensive photographic record has been undertaken using manual SLR and digital cameras. Black and white 35mm photography was used to record the Milk Ramp with detail photographs of structural details. Colour digital images were used to replicate the 35mm record and record details of fixtures and fittings, and any detail of construction and phasing. A record of the photographs taken has been made of photographic archive sheets (Appendix 1). The photographic archive has been collated, and will be submitted to an appropriate archive for long-term storage upon completion of the project.

1.4.3 A written description of the buildings was produced using the measured and photographic survey information and notes taken during on-site observation. This has identified features of archaeological and architectural interest and evidence for the chronological and structural development of the area.

1.4.4 The written record was supplemented by documentary and historical research comprising an examination of the relevant documentary (primary and secondary), pictorial and cartographic sources. These sources were critically examined and integrated into the overall interpretation of the site. Sources were consulted at a number of locations including the Network Rail Archive (York), the National Railway Museum and Westminster Archives.

Documentary History

1.5 Chronological Summary

1.5.1 Paddington Station was planned and designed by Brunel, in collaboration with Matthew Digby Wyatt, as the London terminus of the Great Western Railway (GWR). It was constructed between 1851-4 by Fox Henderson and Co., who had previously overseen the building of the Crystal Palace in Hyde Park. The site chosen was at Westbourne Green in an area of undeveloped land to the south of the Grand Junction Canal (Plate A). The present station buildings are a replacement of an early temporary structure erected in 1838 further to the west of the current buildings, which was later adapted to become the Bishops Road goods depot.

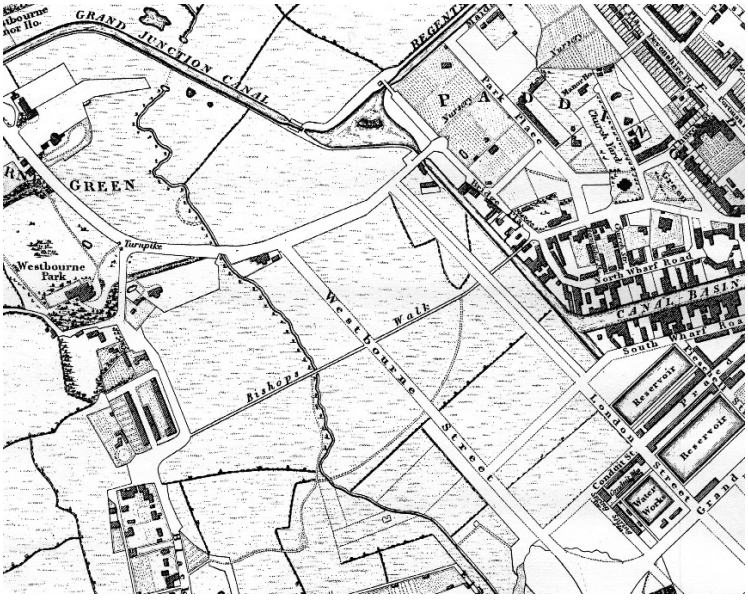

Plate A: Greenwood's map 1824

1.5.2 The building was orientated with arrivals located on the north side along London Street and departures located on the south side along Eastbourne terrace. The rail lines and platforms were sheltered beneath an ornate triple span glazed roof. The roof was constructed of wrought iron and glass and based on the Paxton Crystal Palace model. The platforms were set below the prevalent street level such that both arrival and departures were approached by means of ramped access, with both Eastbourne Terrace and London Street held by retaining walls.

1.5.3 Stanford's Map of 1862 (Plate B) shows that the associated railway infrastructure comprised a Goods Depot located to the west of Bishops Bridge Road, with a connection to a Rail Coal Depot constructed to the north of the passenger terminus. This linked to a coal wharf constructed on the south side of the Canal.

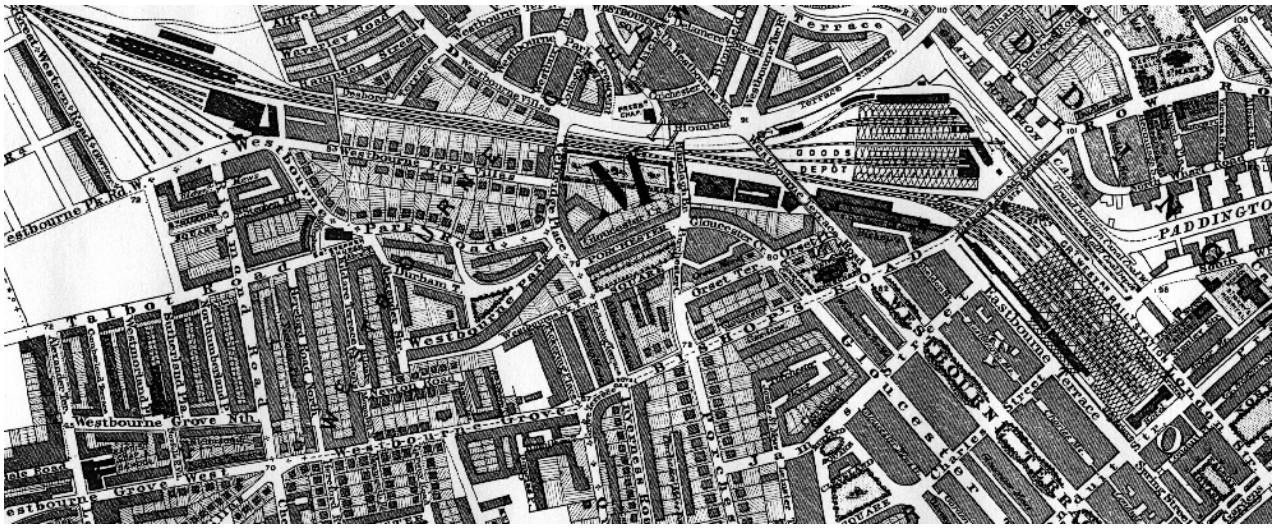

Plate B: Stanford's map 1862, showing Paddington station in context to the right of the picture.

1.5.4 Stanford's Plan also shows the new Metropolitan Railway terminus at Bishops Bridge which served the new underground railway between Paddington and Farringdon completed in 1863. In 1868 the Metropolitan Railway was extended to South Kensington which involved the construction of a new station opposite the Great Western Royal Hotel on Praed Street, connected to the Bishops Bridge Road station by a new line.

1.5.5 An additional arrivals platform was provided in 1878, replacing carriage sidings provided to the north. Further extensions and platforms were required on the north side. To facilitate these, the original brick arches of the Bishops Bridge Road were taken down and replaced by a new long-span girder bridge allowing the re-arrangement of the track. Between 1909 and 1916 three new platforms were provided, Nos. 10, 11 and 12. Platform 12 was set aside for the transport of milk and parcels. These works required significant engineering, including the re-alignment and cutting back of London Road and the provision of an additional span to the shed, as shown on the 1914 Ordnance Survey map (Plate C).

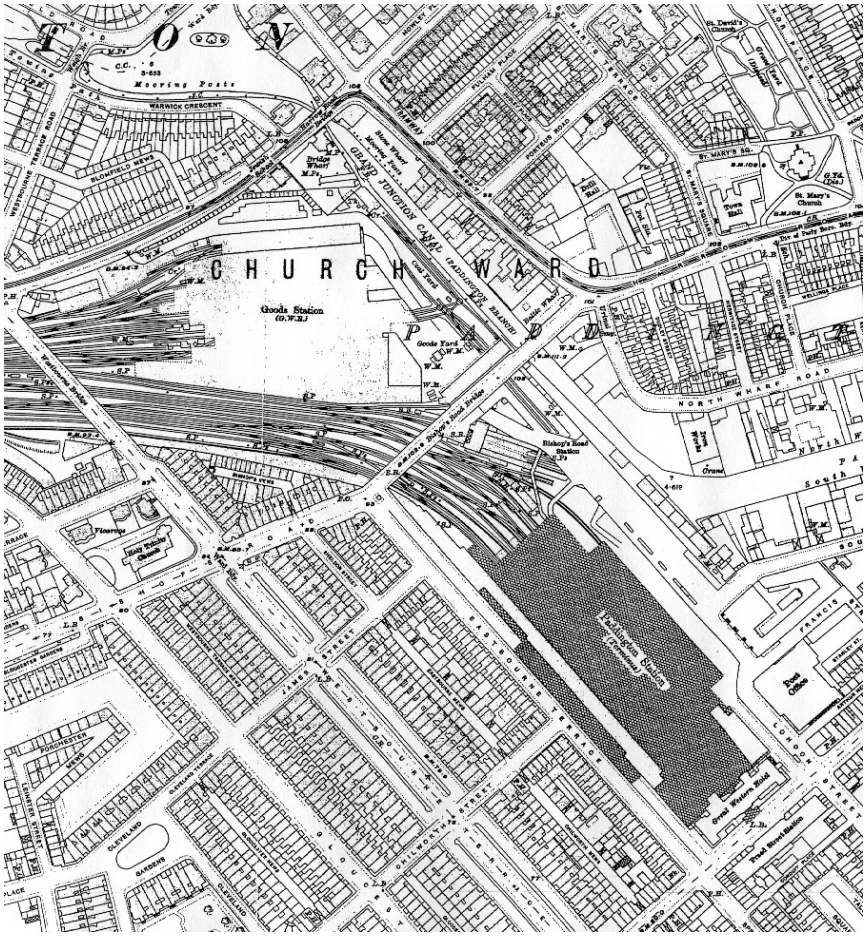

Plate C: 1914 Ordnance Survey map showing alterations to London Road

1.5.6 Further extensive works designed by P. A. Culverhouse and Raymond Carpmael were undertaken after 1929 and complete by 1934. These included a new parcels depot, a new footbridge link across all platforms and the lengthening of platforms under new canopies. The Bishops Road Station was also re-modelled to provide additional platforms. The Bishop Road Goods depot, the original terminus building of 1834-8, was demolished in 1925 and a new goods depot building beneath a single span erected.

1.5.7 During the Second World War Paddington Station was hit a number of times by enemy action and parts of the departures side buildings were destroyed, including parts of the departures side canopy. The buildings were partly rebuilt in the post war years but the original Paxton roof over the departures road was totally removed and replaced by the current metal clad roof.

1.5.8 During 1968-9 British Rail implemented numerous alterations to the station including substantial alterations, replacements and renewal of the train shed roof. In 1985 British Rail moved its Western Region headquarters to Swindon and, as a result, GWR's old offices were refurbished for commercial letting. The platforms during this period were also shortened to make the concourse more spacious. Further restoration works to the train sheds occurred between 1985 and 1993 and a new service yard was created

within the area of the redundant milk platform, separated from platform 12 on the north side of the station.

1.5.9 All taxi and other drop off traffic had been relocated to the south, departures side by 1985, by which time a paper handling and parcels depot (Red Star) was erected on the London Street deck (giving rise to the alternative name Red Star Deck).

1.6 Development of the London Street Deck Milk Ramp

1.6.1 London Street was an early street alignment, pre-dating the construction of Paddington Station. Greenwood's map of 1824 shows London Street running on a northwest to southeast alignment, joining South Wharf Road mid-way (Plate A). Following the construction of the station, London Street marked its northern boundary. Access was provided from the hotel building into the station on the south side of London Street, with the change in street level necessitating the insertion of an approach ramp. The northern boundary of Paddington Station was further defined by the Grand Union Canal with the Paddington Basin extending to the east, as shown on Greenwood's map of 1824 (Plate A). The relationship of the canal and railway was quickly exploited with the Great Western Coal Depot established as an extension to the goods depot to the west, as shown on the 1872 Ordnance Survey map (Plate D).

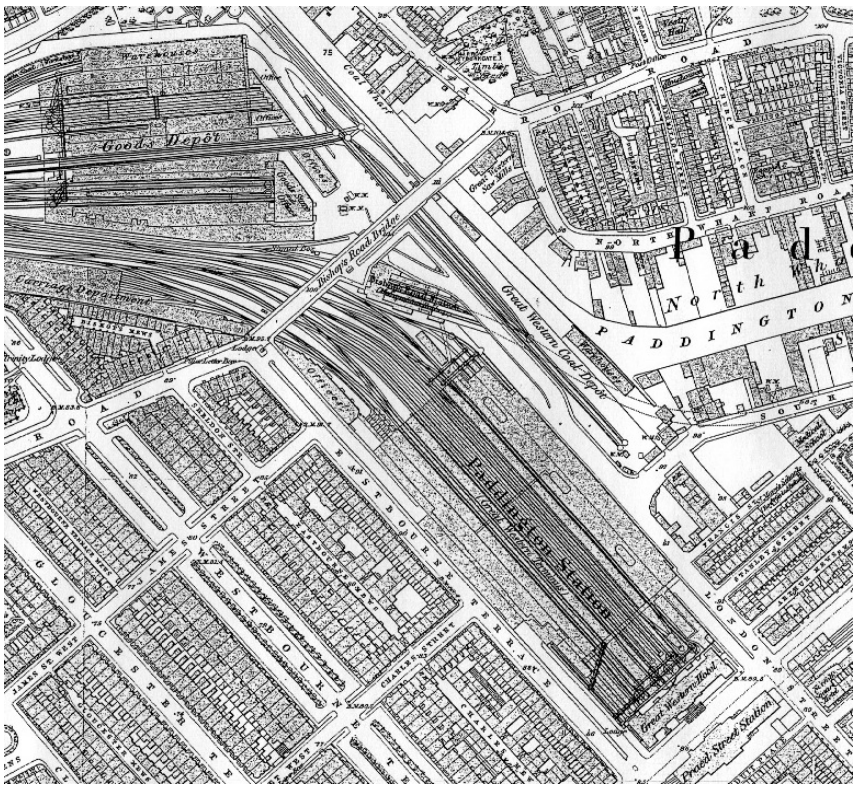

Plate D: 1872 Ordnance Survey map showing the coal depot to the east

1.6.2 As part of the extensive modifications to the station during 1909 to 1916 a series of new platforms beneath a new roof (the fourth span) were provided on the arrivals side of the station. These works necessitated the truncation and cutting back of London Street. The original arrivals ramp was removed and cab ramp access was moved to the west end of the platforms via two separate ramps; the first providing access to the

original platform area, the second giving access to the new platforms. Both ramps were accessed from the newly re-aligned London Street.

1.6.3 As part of the modifications on the north side of the station, new rail access for parcels and milk was provided alongside the new fourth span. These lines were set beneath London Street, with the road raised upon a steel frame with fire proof jack arch structure. At platform level a special sunken roadway was provided, to allow the easy loading of wagons with milk churns taken from the train, across the platform and onto the wagon without having to be lifted (Matthews 1917, 175).

1.6.4 Surface access from platform 12 was provided by a steel frame ramp, the Milk Ramp, which emerged along the north side of London Street at the junction with South Wharf Road. This was in-laid with channel irons to guide wagons, and a stone sett surface to provide foot-holds for horses (Matthews 1917, 175) (Plate E).

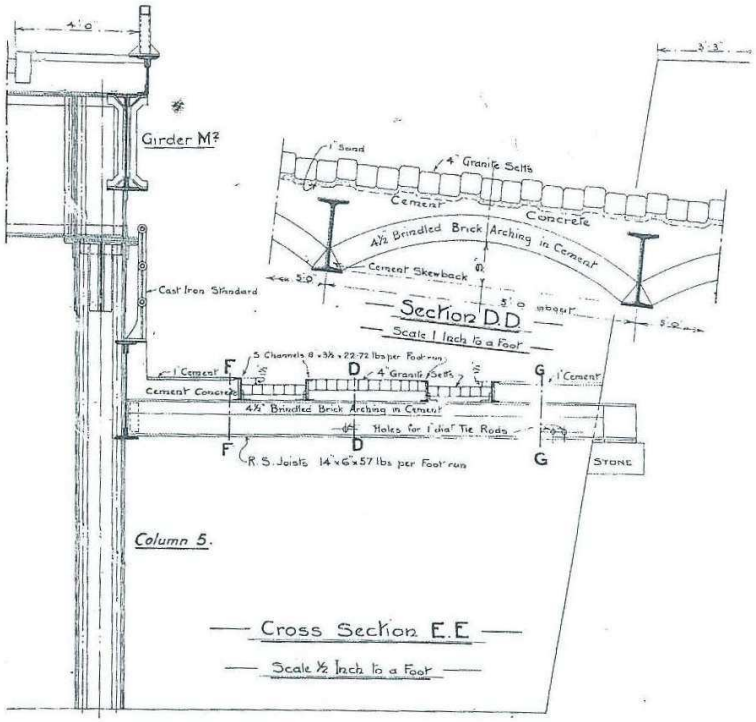

Plate E: Section through the Milk Ramp showing sett surface

1.6.5 A series of engineering drawings showing the construction and structural details of the London Street Deck are a useful source in providing a record of the structure.

1.6.6 The drawings show the road supported on a steel frame comprising longitudinal beams and cross girders with intervening brick jack arches. The whole structure was supported on a grid of steel girder stanchions. The Milk Ramp is a separate structure which cuts through the north side of the deck. The Contract plan of the steel frame shows a section of beams running at right-angles to the main, north-south arrangement of jack-arches, intended for the inclusion of a 'light-space', over the area adjacent to the milk-ramp (Plate F). In addition it also depicts railings at street level to enclose the void.

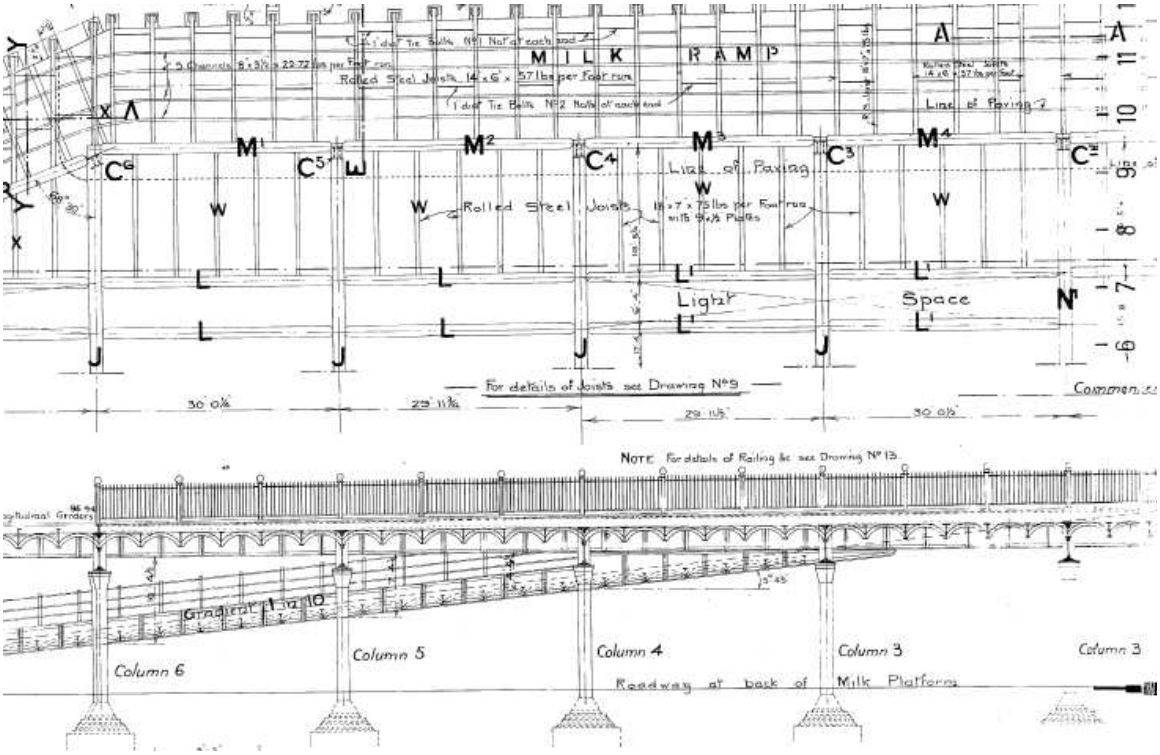

Plate F: Plan and section of London Street Deck showing Milk Ramp

1.6.7 Modifications and extensions to the Bishops Road Station in between 1929 and 1934, and the extension of the Metropolitan lines, brought further changes to the London Street Deck. The more significant being the large Bowstring Girder that was erected at the west end of the station to carry London Street over the re-aligned and extended Bishops Bridge tunnel (Plate H). The provision of better freight facilities at the new Bishops Bridge goods depot made the milk platform redundant and the Milk Ramp was consequently closed and truncated, the lines being converted to use for new suburban passenger services. The void was infilled with concrete and a new road surface created. Following the covering of the Milk Ramp, the area above was used for the 'New Transport Service Station', which sat on the London Street Deck. This long, single-storey building housed a Washing Shed and a Repair shop, presumably relating to the provision of motorised wagon services from Paddington Station, as shown on the 1932 contract drawings (Plate I). An inspection pit was added within the repair shop, cut into the brick arches over the ramp and through the existing retaining wall.

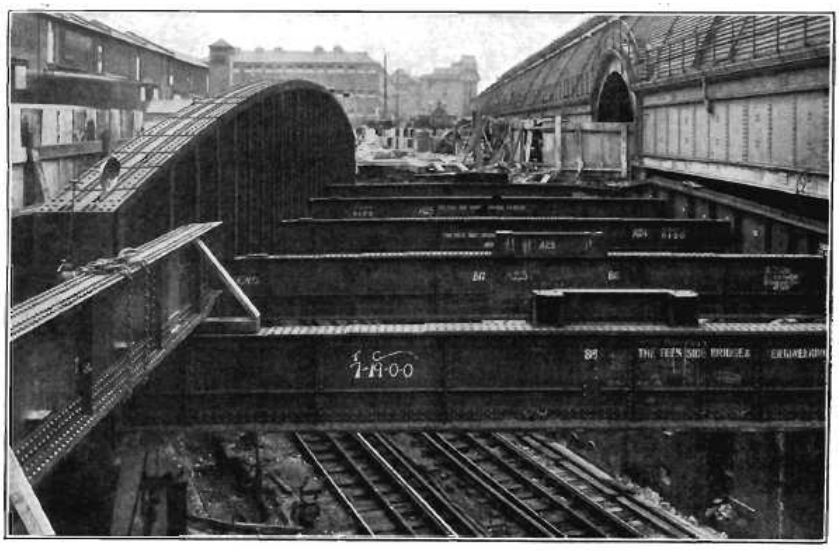

Plate H: Photo of showing bow string girder over the Bishops Road tunnel at the west end of the London Street Deck

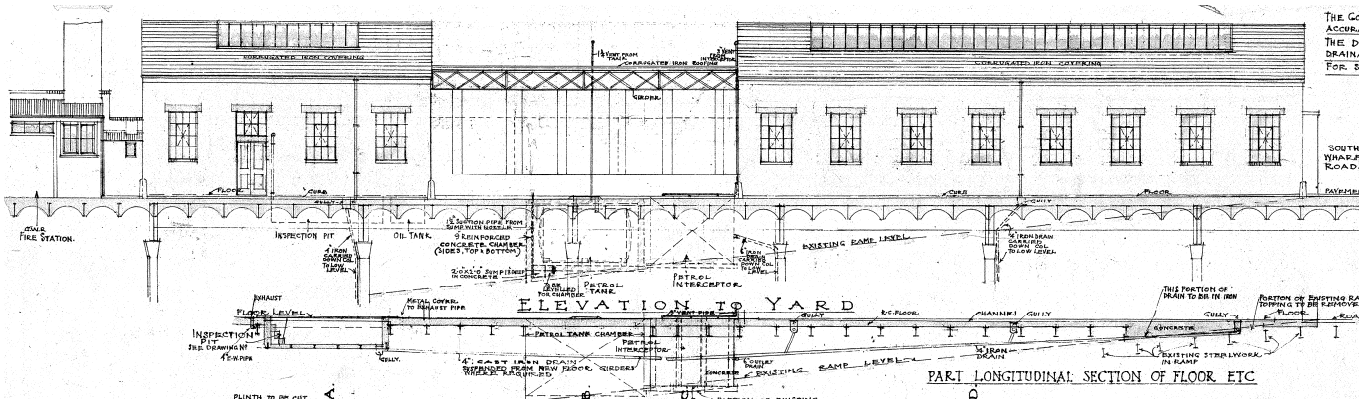

Plate I: Extract showing detail of section and elevation of 'New Transport Service Station'

1.6.8 These alterations included the siting of a petrol tank on the Milk Ramp, accessed from the building above via a manhole cover. This necessitated the reinforcement of the central element of the Milk Ramp, to support the additional loads of the tank and its contents. Similarly the guttering from the new building ran into downpipes which continued through London Street Deck and were attached to the stanchions below.

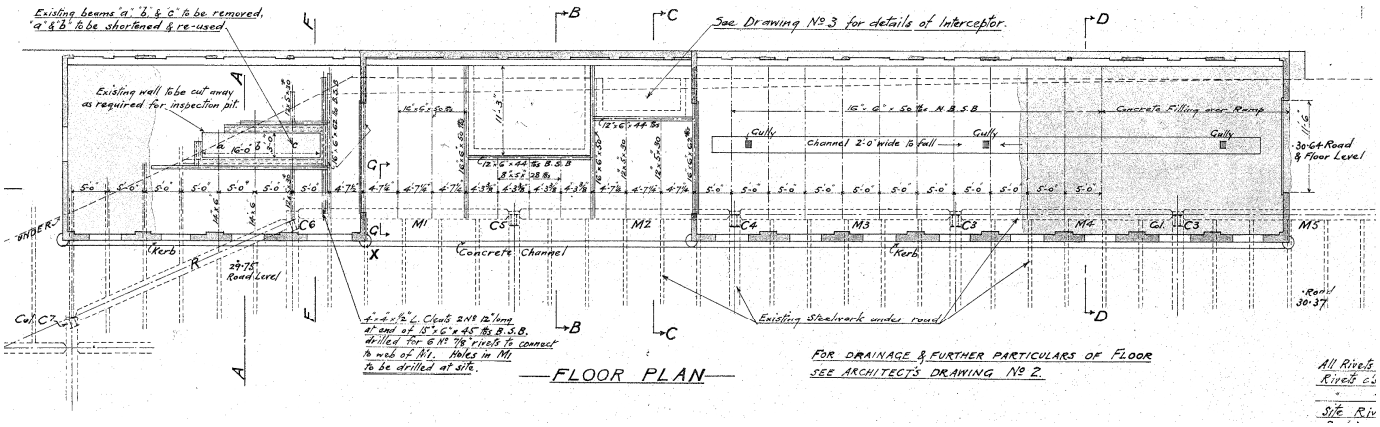

Plate J: Extract showing detail of plan of 'New Transport Service Station' including supporting structure below London Street Deck

1.6.9 The contract drawings also make reference to the removal of 'the existing office below ramp'. Archive drawings have been found which depict a small brick office below the Milk Ramp (Plate K); however, it is unlikely that this was ever constructed. The position marked between the second and third stanchion would not have provided adequate headroom or allowed for the architectural features depicted, even allowing for an apparent subsequent raising of the floor level. It is possible that the position was altered; however, there is no physical evidence surviving on site to suggest a brick structure was erected. Evidence of a timber office has been identified (see discussion below).

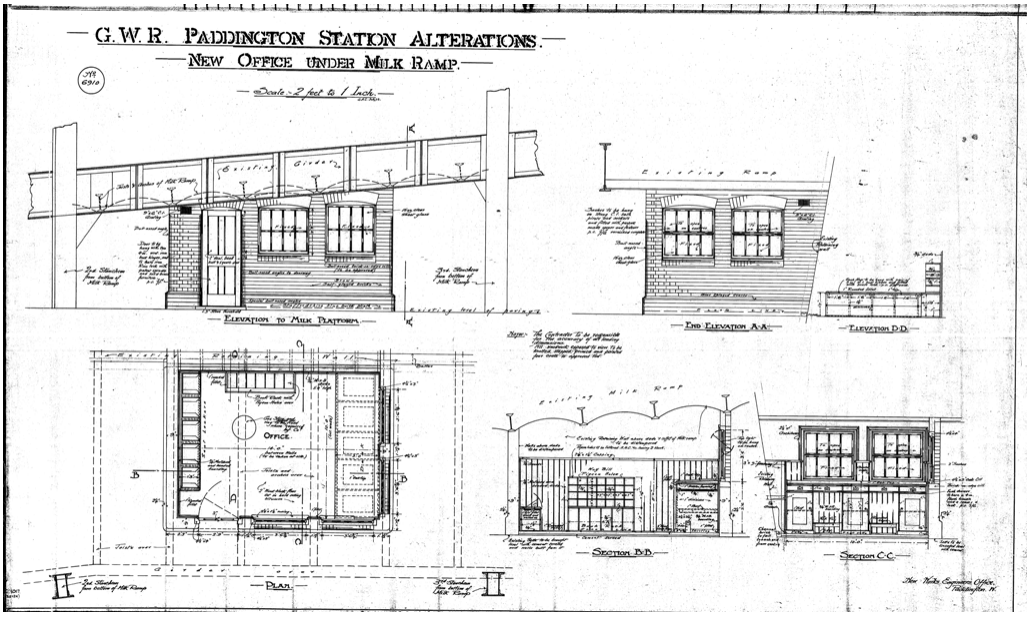

Plate K: Contract drawing for a new office below the Milk Ramp

1.6.10 With the Milk Ramp now redundant, the sunken roadway between the ramp and platform 12 was infilled to provide more general purpose space.

1.6.11 It is not clear when the Transport Services Building was demolished, but it presumably became obsolete when transport services from the station were curtailed. In 1982 the Red Star Parcel Depot was constructed on London Street Deck. This depot, latterly known as the Lynx Building was demolished in 2007.

Fabric Record

1.7 Site Description

1.7.1 This document should be read in relation to the building recording report undertaken on the London Street Deck (Doc ref: CR-DV-PAD-X-RT-00062). The numbering of individual elements follows that used in the earlier report. Where overlap exists the

same reference has been used for ease of integration. New elements are numbered sequentially.

1.7.2 No remains of the Milk Ramp are visible at street level. This is due to the blocking of the ramp and subsequent construction of the Transport Services Building. The following discussion provides a description of the surviving physical fabric at platform level. The area of works is aligned northwest-southeast; however, for the purposes of this report an arbitrary north-south alignment has been used with north orientated towards Bishop's Bridge Road.

1.8 Fabric Description

1.8.1 The Milk Ramp comprises a short ramp following the eastern boundary of the station (Plate 32). It rises to the south, being closed off at street level and truncated to the north to form a floating surface. The ramp is constructed on a simple grid with short east-west girders supported on a large north-south girder to the west and brick retaining wall to the east (Plate 45).

1.8.2 The Milk Ramp is formed by two longitudinal steel girders (G3 & G4) set at a 1 in 10 slope and supported on Rolled Steel Joists (RSJs) running west, away from the ramp (Figure 1). Support is also provided by four stanchions which make up the steelwork of the London Street Deck as a whole (Figure 2). That to the north is set at an angle to follow the line of the ramp as it turns northwest. This stanchion now marks the end of the ramp after its truncation in the 1930s (Plate 30). The stanchions continue to full height of the London Street Deck, supporting a substantial north-south girder (G2).

1.8.3 Girder G2 represents an 'I' beam braced by a series of flange plates (Plate 26). The base of the 'I' is formed by a series of overlapping plates riveted to the upright. Projecting at regular intervals are a series of perpendicular RSJs, attached by means of short brackets riveted in place (Plate 15). These form the basis of the jack arches which extend to the east. To the north, where they extend over the ramp, the jack arches have been replaced with concrete (Plate 25).

1.8.4 Girders G3 and G4 form the Milk Ramp proper. The connection between G2 and G3 is created by a series of rivets with both girders supported on stanchion S4, in contrast to the rest of the stanchions which only provide support to G2 (Plate 46). G3 and G4 represent a continual structural element, both tied into Stanchion S5 (Plate 47). Girder G3 forms a single element deepening to the north to follow the slope of the ramp (Plate 72). G4, in contrast, represents a simple 'I' shaped girder set at an angle (Plate 78). Running off from G3 and G4 are a series of RSJs. These are connected to the main girder by a small narrow 'L-plate', visible in the west elevation (Plate 76). The RSJs provide support to the brick jack arches which run under the ramp, continuing into the retaining wall to the east where they sit upon an embedded pad stone (Plate 66). Variation exists at the northern end of the ramp where it turns towards the northwest. The change in angle is created by a steel plate flanked by horizontal RSJs (Plate 75).

1.8.5 The arches are seen throughout the London Street Deck; however, they were never installed above the ramp which remained an open space to allow the flow of traffic. The ceiling of this area has been infilled using narrow 'I' beams (Plate 4). These are partly encased in concrete with concrete infilling between. The brick aches appear again at the original termination of the ramp; however the area beyond stanchion S7 has been significantly altered to provide an inspection pit for the former repair works, added in the early 20th century (Plate 23). Associated with the pit is a small sump with connecting pipework continuing to the south running centrally along the ramp.

1.8.6 Running along the top of G3 are cast iron railings, originally running the full length of the ramp, but now truncated to both the north and south. The railings are formed by three iron tubes, supported on cast iron standards (Plates 17 and 18). The standards are attached to the top of the girder by means of a riveted flange plate.

1.8.7 The supporting stanchions are structurally and architecturally similar. The shaft of each consists of double layered flange plates joined by rivets located either side of the plate (Plate 40). The north and south elevations are slightly recessed and consist of web plates, on each side of which are attached narrow riveted plates up to the capital. The capitals are connected to the shafts by means of narrow riveted 'L-shape' plates and to the girders above by further 'L' plates with a cap plate above. The capitals are formed by two gusseted plates on the east and west elevations, widening to the top. These are attached to the shaft by means of a regular pattern of rivets (5:3:4:3:5). Projecting from each gusted plate are two, centrally placed triangular plates formed by two pieces bolted together. Where the stanchions meet girder G3 they are connected by means of an 'L-plate', riveted in place (Plate 46). Variation is found at S7 which is provided with a more substantial gusted plate (Plate 30).

1.8.8 The ramp itself is formed by a sett surface with flanking concrete pavements, edged with iron (Plate 21). Running through the centre of the sett surface are two rails 1m apart (Plate 20). The surface is interrupted half way along by a large metal petrol tank with adjacent brick interceptor added in the 1930s (Plate 1). Running adjacent to this is a large iron pipe, a continuation of that associated with the inspection pit. Also extant on the ramp is the remains of a former stanchion, situated adjacent to the western edge (Plates 11 and 12). This is formed from two inverted gusted plates encasing a squared timber column which has been cut off at the height of the plate. The function of the column is unclear and there are no other structural elements associated with it.

1.8.9 Below the ramp, the area is defined by a concrete floor surface with the brick jack arches above. One feature of note is an additional iron beam inserted to support the petrol tank. This represents a simple girder with regular brace plates corresponding to the RSJs of the jack arches (Plate 50). The girder is supported on stanchions of decreasing height as they follow the slope of the ramp. The stanchions are simple RSJs with gusseted plates affixed with rivets (Plate 52). That to the north has subsequently been encased in concrete (Plate 61). Flanking the area are inserted timber partitions creating a small office space (Plate 56). This function is suggested by a surviving angle-poise lamp located on the south internal elevation (Plate 55).

1.8.10 Creating the eastern elevation of the office is the brick retaining wall which continues across the London Street Deck. Within the area of the Milk Ramp the wall is constructed from blue brick and slopes out towards the base (Plate 22). Below the ramp, the RSJ padstones are visible with the joists themselves continuing into the wall (Plate 49). To the north the wall angles to follow the alignment of the former ramp extension. Within this area the construction changes with glazed white tile to the upper levels to provide reflected light to the platform (Plate 68). The blue brick continues below in a stepped pattern to follow the slope of the ramp. Within this area is surviving evidence of the ramp itself with concrete infill highlighting the position of the ramp surface and a further five jack arches, including the padstones (Plate 65). In some cases the cut off ends of the RSJs are visible.

Analysis

1.8.11 London Street Deck was constructed between 1911-1916, as part of the extensive modifications and expansion that Paddington underwent during the early 20th century. As part of these works, new rail access was required for importing dairy produce into the city. Rail allowed fresh milk to be brought in at a time when its expansion was pushing agriculture further away from the centre. This access was provided by London Street Deck which incorporated a ramp which allowed the movement of milk churns directly from the train to the cart and out onto the streets of the city. Its location on the periphery of the station, alongside the goods yard, also meant that the movement of goods could be completed away from the main passenger concourse.

1.8.12 The decline of the milk train and the provision of new, improved freight facilities at the Bishop's Bridge goods depot marked the end of the Milk Ramp. The infilling of the road surface opened up this area for development, marked by the erection of the new transport building in the 1930s, subsequently replaced by the Red Star Parcels Depot in 1982. The truncation of the ramp at concourse level also allowed this area to be used as a passenger platform with the conversion of Platform 12. Following this move, the area under London Street Deck has largely been used for general storage. This has necessitated little in the way of alteration to the structural fabric, leaving the vast majority of the steel framework in situ.

1.8.13 The construction of the Milk Ramp is typical of its date with a simple grid pattern of girders and RSJs. Of greatest interest is the ramp surface which retains its setts and iron rails to allow the smooth movement of horses and carts. The use of white glazed tiles also allowed reflected light to enter the area, removing the need for artificial lighting. There is evidence to suggest that an office was installed beneath the deck; however, the viability of this space is uncertain due to the restricted headroom achieved. Certainly the office depicted in the contract drawings (Plate K) could not have been achieved without a substantial change in floor level, for which there is no physical evidence.

1.8.14 The infilling of the space has had

1.8.15 A significant impact on the historic fabric of the ramp. Much of the ceiling has been infilled with concrete, obscuring the structural elements. The introduction of the inspection pit has caused considerable disruption with the breaking through of the retaining wall. However, the most substantial damage has been caused by the insertion of the petrol tank and interceptor which necessitated the removal of both the sett surface and the brick jack arches.

Reference Document

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1.11 Cartographic Sources

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1872 Ordnance Survey map 25" sheet xxxiii.

1894-96 Ordnance Survey map 25" sheet xxxiii.

1914 Ordnance Survey map 25" sheet xxxiii.

Appendices

Appendix 1: Plates and Photographic Register

Plate 1: View south along ramp – north end

Plate 2: View south showing west elevation of railings

Plate 3: View south along ramp –south end

Plate 4: View south along ramp – south end showing concrete cap

Plate 5: View of southern end of ramp

Plate 6: Detail of junction between G4 and S6

Plate 7: Detail of concrete infill to G3 west elevation

Plate 8: View south along ramp – south end

Plate 9: View of junction between G3 and G4 at S5 – west elevation

Plate 10: Junction between retaining wall and petrol inceptor

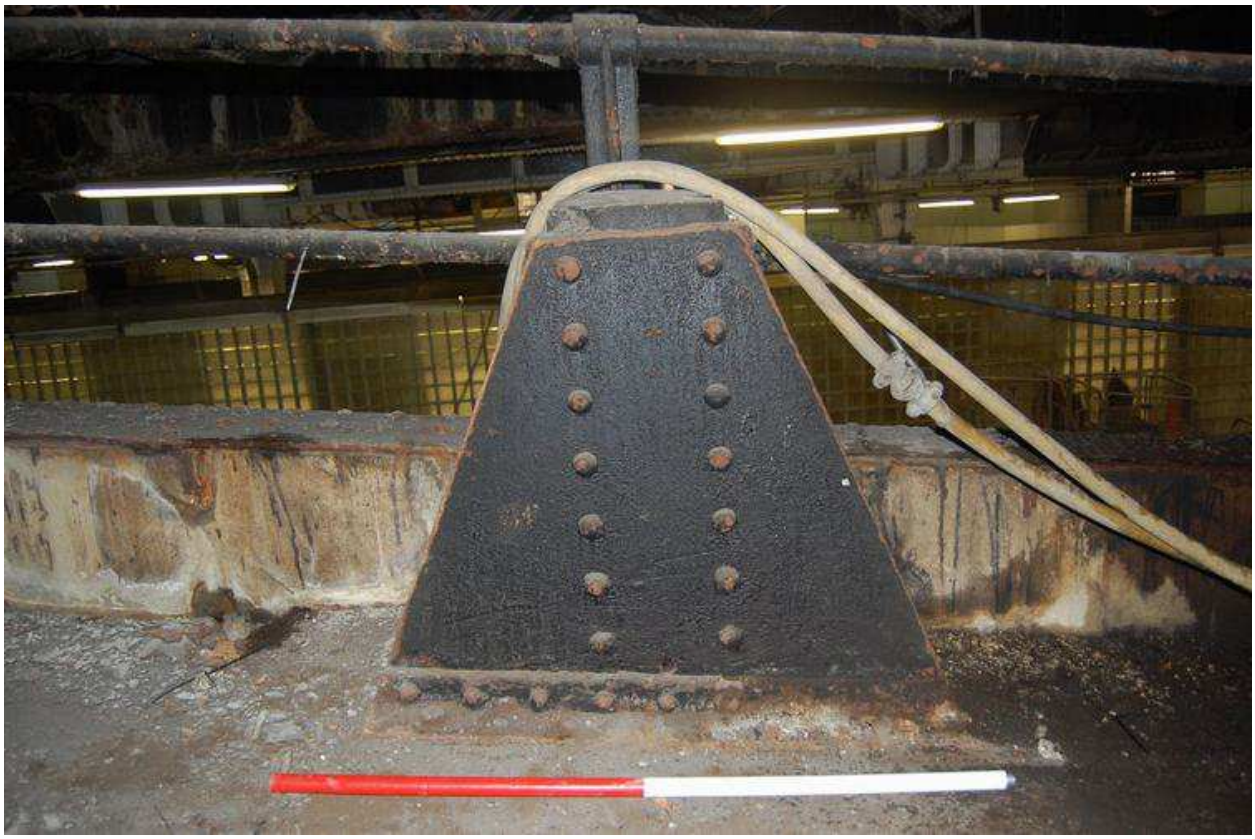

Plate 11: west elevation of inverted stanchion on ramp

Plate 12: South and west elevations of inverted stanchion on ramp

Plate 13: West elevation of S6 capital

Plate 14: South view of stanchion S6 capital

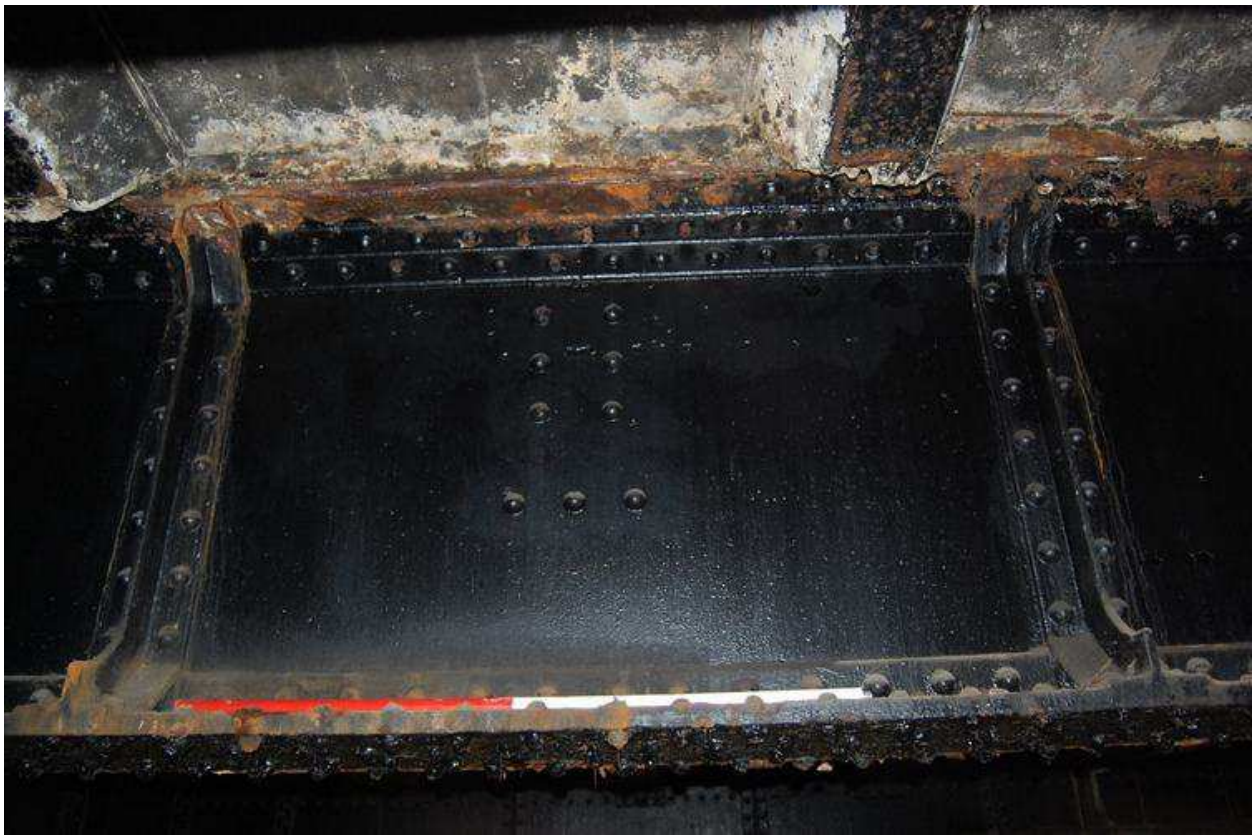

Plate 15: Detail of G2 west elevation

Plate 16: Underside of G4

Plate 17: Detail of railings

Plate 18: Detail of railing post

Plate 19: Detailing of sett surface

Plate 20: Detail of ramp sett surface – centre

Plate 21: Detail of sett surface - edge

Plate 22: Detail of angle in retaining wall

Plate 23: Detail of inserted inspection pit

Plate 24: Detail of inserted inspection pit – south end

Plate 25: detail of concrete reinforcement of jack arches over ramp

Plate 26: G2 west elevation

Plate 27: View south along ramp – south end

Plate 28: Detail of iron rail to edge of sett surface

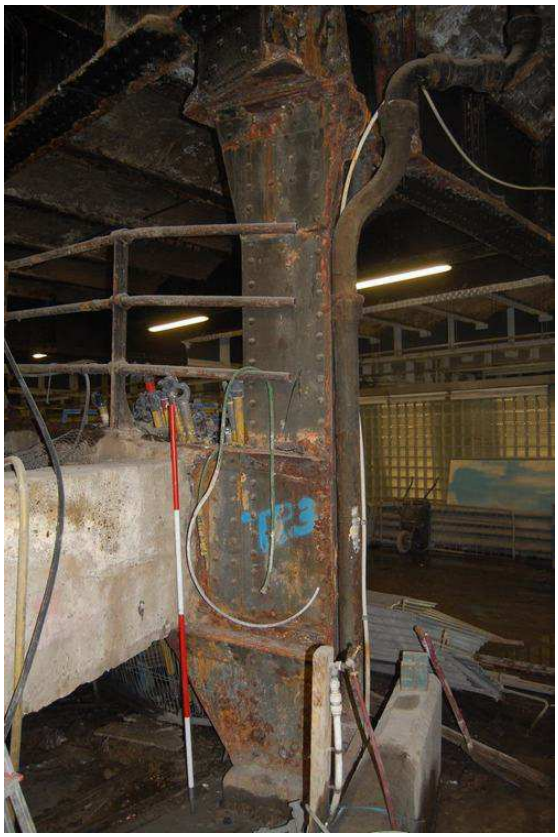

Plate 29: Detail of truncated ramp end

Plate 30: S7 viewed from southeast

Plate 31: S7 viewed from east

Plate 32 – general view of ramp from southeast

Plate 33: General view of ramp showing truncation

Plate 34: S5 south and east elevations

Plate 35: S5 capital detail

Plate 36: S5 south and east elevations

Plate 37: S5 junction with G4

Plate 38: S5 west elevation

Plate 39: S5 west elevation

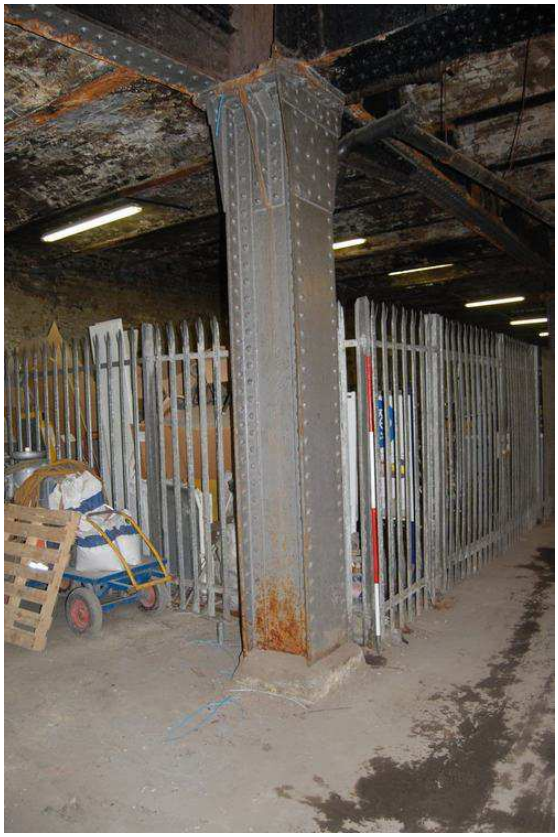

Plate 40: S4 south and east elevations

Plate 41: S4 south and east elevations

Plate 42: Plate 40: S4 capital detail

Plate 43: S4 west elevation

Plate 44: S4 capital west elevation

Plate 45: View south under ramp – south end

Plate 46: S4 junction with G3

Plate 47: Termination of G3 viewed from east

Plate 48: View of retaining wall below ramp – south end

Plate 49: View of retaining wall below ramp – south end

Plate 50: View of office below ramp – south end

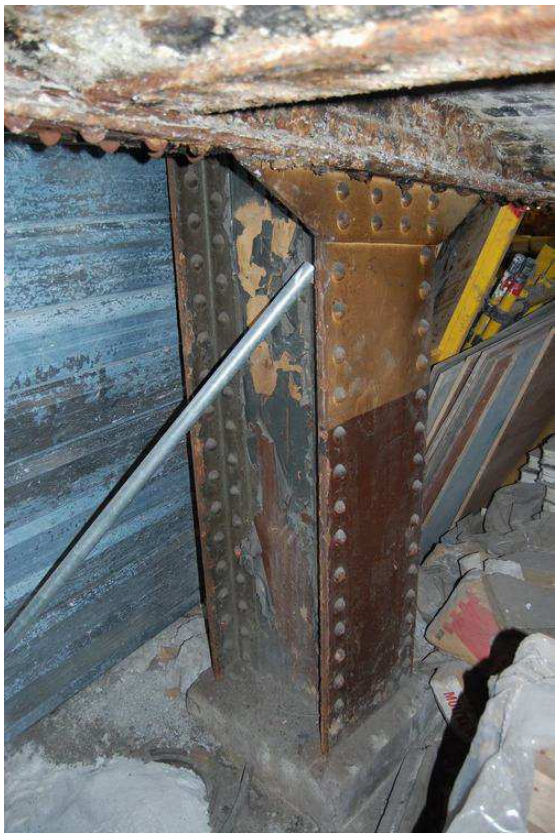

Plate 51: S6 west elevation within office space

Plate 52: Stanchion at south end of office space

Plate 53: Stanchion capital at south end of office space

Plate 54: Stanchion capital at south end of office space

Plate 55: Angle-poise lamp within office

Plate 56: View south within office space

Plate 57: Central stanchion within office space – west elevation

Plate 58: Central stanchion capital within office space

Plate 59: Central stanchion within office space

Plate 60: Southern elevation of office

Plate 61: southern stanchion within office space, encased in concrete

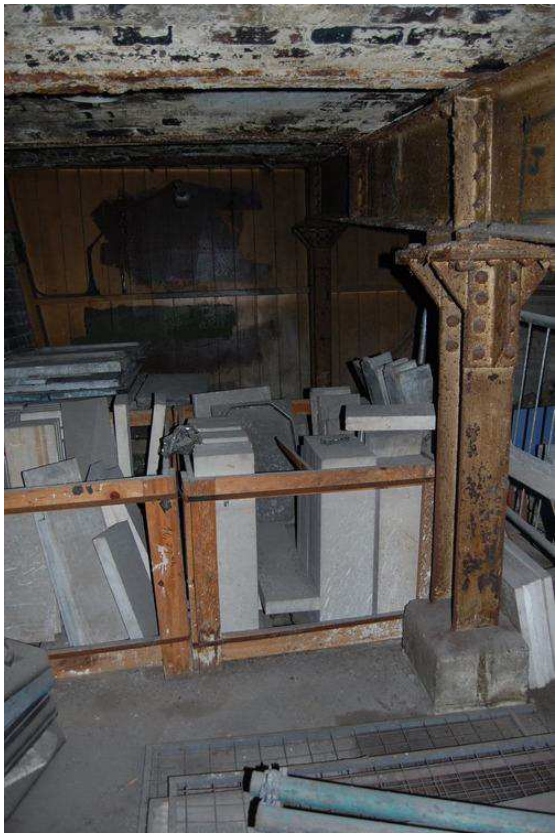

Plate 62: View south inside office space

Plate 63: Southern end of office space

Plate 64: View below ramp – south end

Plate 65: Detail of scar for continuation of ramp

Plate 66: View below ramp towards the south

Plate 67: View below ramp towards the south

Plate 68: Detail of scar for continuation of ramp

Plate 69: Detail of truncated end of ramp

Plate 70: View of inserted inspection pit to south of ramp

Plate 71: East elevation of ramp between S5 and S6

Plate 72: East elevation of ramp between S4 and S5

Plate 73: East elevation of ramp between S6 and S7

Plate 74: Detail of junction between G4 and S7

Plate 75: Underside of ramp showing change in angle

Plate 76: Detail of panel in east elevation of G4

Plate 77: Detail of junction between G4 and S6

Plate 78: East elevation of G4 between S6 and S7

Plate 79: Detail of G2 over ramp

Photographic Register

PHOTOGRAPHIC REGISTER						
FILM NO.	1	NGR		FILM TYPE	35mm	
PROJECT	Crossrail RSD	B&W/COLOUR	B&W	ISO	400	
Frame No.	**Building**	**Description**		**Direction**	**Date**	**Photographer**
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2	Milk Ramp	General view of east elevation - south end		NW	13.07.10	SH
3	Milk Ramp	General view of S5 and retaining wall		NW	13.07.10	SH
4	Milk Ramp	S5 east elevation		W	13.07.10	SH
5	Milk Ramp	S5 south and east elevations		NW	13.07.10	SH
6	Milk Ramp	S5 west elevation		E	13.07.10	SH
7	Milk Ramp	View south along ramp (south end)		S	13.07.10	SH
8	Milk Ramp	West elevation of G4 between S5 and S6		SE	13.07.10	SH
9	Milk Ramp	Ceiling over ramp at south end		S	13.07.10	SH
10	Milk Ramp	South elevation of inspection pit		S	13.07.10	SH
11	Milk Ramp	General view of inspection pit		SW	13.07.10	SH
12	Milk Ramp	Junction in retaining wall		SW	13.07.10	SH
13	Milk Ramp	Detail of paved surface		-	13.07.10	SH
14	Milk Ramp	Detail of paved surface		-	13.07.10	SH
15	Milk Ramp	Detail of paved surface		-	13.07.10	SH
16	Milk Ramp	Detail of paved surface		NE	13.07.10	SH
17	Milk Ramp	Detail of paved surface		-	13.07.10	SH
18	Milk Ramp	Detail of paved surface		S	13.07.10	SH
19	Milk Ramp	Detail of railing post		E	13.07.10	SH
20	Milk Ramp	Detail of railing post		E	13.07.10	SH
21	Milk Ramp	Detail of underside of G4		S	13.07.10	SH
22	Milk Ramp	Detail of G4 west elevation		E	13.07.10	SH
23	Milk Ramp	Detail of railing at S6		SE	13.07.10	SH
24	Milk Ramp	Detail of west elevation of S6 capital		E	13.07.10	SH
25	Milk Ramp	South elevation of inverted capital on ramp		S	13.07.10	SH
26	Milk Ramp	General view of inverted capital on ramp		SE	13.07.10	SH
27	Milk Ramp	East elevation of inverted capital on ramp		E	13.07.10	SH
28	Milk Ramp	Detail of junction between G3 and G4		NE	13.07.10	SH
29	Milk Ramp	Detail of corrosion to jack arches in ceiling		N	13.07.10	SH
30	Milk Ramp	View south along ramp from south end		S	13.07.10	SH
31	Milk Ramp	View south along ramp from south end		S	13.07.10	SH
32	Milk Ramp	Detail of inserted pipe at south end of ramp		NW	13.07.10	SH

33	Milk Ramp	Detail of south end of ramp	N	13.07.10	SH
34	Milk Ramp	Detail of concrete infill to west elevation of G3	NE	13.07.10	SH
35	Milk Ramp	View south along ramp - south end	NW	13.07.10	SH
36	Milk Ramp	View of west elevation of G3	NE	13.07.10	SH

PHOTOGRAPHIC REGISTER							
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PROJECT	Crossrail - RSD	B&W/COLOUR	B&W	ISO	400		
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6	Milk Ramp	Detail of junction between S6 and G2			-	13.07.10	SH
10	Milk Ramp	Detail of junction between jack arches and G4			W	13.07.10	SH
11	Milk Ramp	East elevation of G4 - south end			SW	13.07.10	SH
12	Milk Ramp	Detail of junction between G4 and S6			NW	13.07.10	SH
13	Milk Ramp	Detail of G4			W	13.07.10	SH
14	Milk Ramp	Detail of underside of ramp at termination			W	13.07.10	SH
15	Milk Ramp	Detail of underside of ramp at termination			W	13.07.10	SH
16	Milk Ramp	Detail of junction between S5 and G4			SW	13.07.10	SH
17	Milk Ramp	Detail of junction between S5 and G5			SW	13.07.10	SH
18	Milk Ramp	Detail of unction between S5 and G2			NW	13.07.10	SH
19	Milk Ramp	Detail of unction between S5 and G3			SW	13.07.10	SH
20	Milk Ramp	East elevation of S5			W	13.07.10	SH
21	Milk Ramp	East elevation of ramp - south end			NW	13.07.10	SH
23	Milk Ramp	East elevation of G3 between S5 and S4			NW	13.07.10	SH
24	Milk Ramp	East elevation of G4 between S5 and S6			NW	13.07.10	SH
25	Milk Ramp	Detail of G2 between S5 and S6			NW	13.07.10	SH
26	Milk Ramp	Detail of truncated south end of ramp			NW	13.07.10	SH
27	Milk Ramp	General view of inspection pit			NW	13.07.10	SH
28	Milk Ramp	General view of inspection pit			NW	13.07.10	SH
29	Milk Ramp	General view of retaining wall showing ramp scar			SW	13.07.10	SH
31	Milk Ramp	View under ramp towards office			NW	13.07.10	SH
32	Milk Ramp	View under ramp - south end			NW	13.07.10	SH
33	Milk Ramp	General view of retaining wall showing ramp scar			SW	13.07.10	SH
34	Milk Ramp	General view of retaining wall showing ramp scar			SW	13.07.10	SH
35	Milk Ramp	General view of retaining wall showing ramp scar			W	13.07.10	SH
36	Milk Ramp	General view of retaining wall showing ramp scar			W	13.07.10	SH

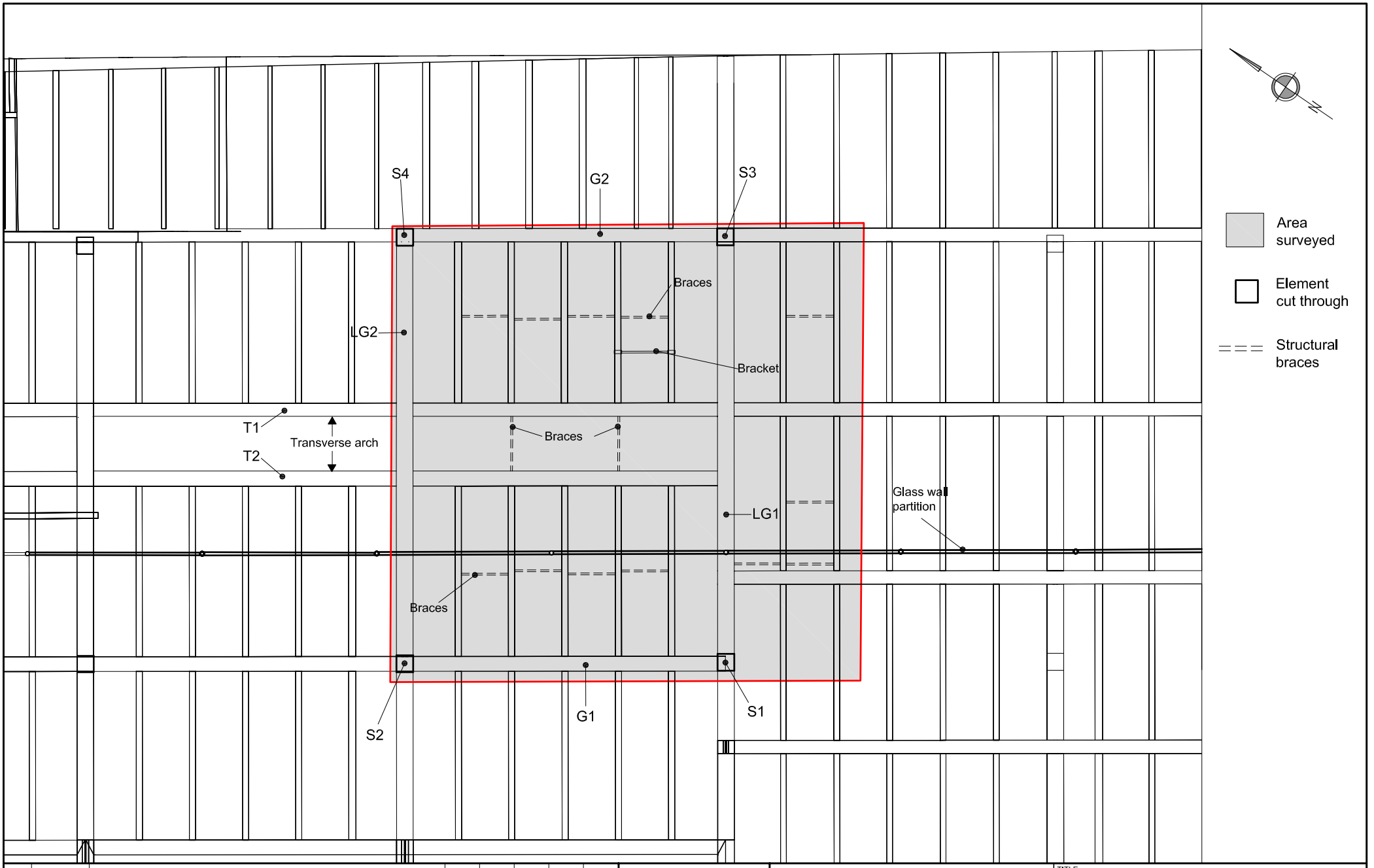
PHOTOGRAPHIC REGISTER

FILM NO.	3	NGR		FILM TYPE	35mm
PROJECT	Crossrail - RSD	B&W/COLOUR	B&W	ISO	400

Frame No.	Building	Description	Direction	Date	Photographer
1	Milk Ramp	View of office under ramp - south	SW	13.07.10	SH
2	Milk Ramp	View of office under ramp - south	NW	13.07.10	SH
3	Milk Ramp	View of stanchion at south end of office	SE	13.07.10	SH
4	Milk Ramp	Central stanchion within office	NW	13.07.10	SH
6	Milk Ramp	Central stanchion within office	SE	13.07.10	SH
7	Milk Ramp	Central stanchion within office - capital detail	-	13.07.10	SH
9	Milk Ramp	Central stanchion within office - capital detail	NW	13.07.10	SH
10	Milk Ramp	Stanchion detail at south end of office	-	13.07.10	SH
12	Milk Ramp	Stanchion detail at south end of office	NE	13.07.10	SH
13	Milk Ramp	Angle-poise lamp in office space	NW	13.07.10	SH
14	Milk Ramp	Stanchion detail at south end of office	NW	13.07.10	SH
15	Milk Ramp	Stanchion at east end of office	NW	13.07.10	SH
16	Milk Ramp	Detail of S6 under ramp	SE	13.07.10	SH
17	Milk Ramp	View of office under ramp - south	SW	13.07.10	SH
18	Milk Ramp	View of office under ramp - south	W	13.07.10	SH
19	Milk Ramp	View under ramp - centre	W	13.07.10	SH
20	Milk Ramp	View under ramp - centre	W	13.07.10	SH
21	Milk Ramp	View under ramp - centre	W	13.07.10	SH
23	Milk Ramp	Detail of termination of G3	W	13.07.10	SH
24	Milk Ramp	Detail of junction between G3 and S4	SW	13.07.10	SH
25	Milk Ramp	View under ramp - south end	S	13.07.10	SH
26	Milk Ramp	Detail of junction between S4 and G3	NE	13.07.10	SH
27	Milk Ramp	West elevation of S4	E	13.07.10	SH
28	Milk Ramp	Detail of S4	E	13.07.10	SH
29	Milk Ramp	South and east elevations of S4	SW	13.07.10	SH
30	Milk Ramp	South and east elevation of S4	NW	13.07.10	SH
31	Milk Ramp	Junction of S5 and ramp	E	13.07.10	SH
32	Milk Ramp	Area under ramp between S4 and S5	NE	13.07.10	SH
33	Milk Ramp	Junction between S5 and G4	S	13.07.10	SH
34	Milk Ramp	South and east elevation of S5	SW	13.07.10	SH
35	Milk Ramp	Detail of S5	W	13.07.10	SH
36	Milk Ramp	South and east elevation of S5	NW	13.07.10	SH

PHOTOGRAPHIC REGISTER							
FILM NO.	4	NGR		FILM TYPE	35mm		
PROJECT	Crossrail - RSD	B&W/COLOUR	B&W	ISO	400		
Frame No.	**Building**	**Description**			**Direction**	**Date**	**Photographer**
1	Milk Ramp	View south along ramp - south end			N	13.07.10	SH
2	Milk Ramp	View along railings between S5 and S6			N	13.07.10	SH
3	Milk Ramp	View south along ramp, including petrol tank			N	13.07.10	SH
4	Milk Ramp	View south along ramp, including petrol tank			NE	13.07.10	SH

Appendix 2: Figures



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CLRL LTD
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BRESSENDEN PL.
LONDON
SW1E 5BH
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www.crossrail.co.uk

Scale 1:100

0,0m 1,0 2,0 3,0 4,0 5,0

CONTRACT No. / CONSULTANT : SCOTT WILSON

SCALE : 1:100

TITLE :

Figure 1: Plan

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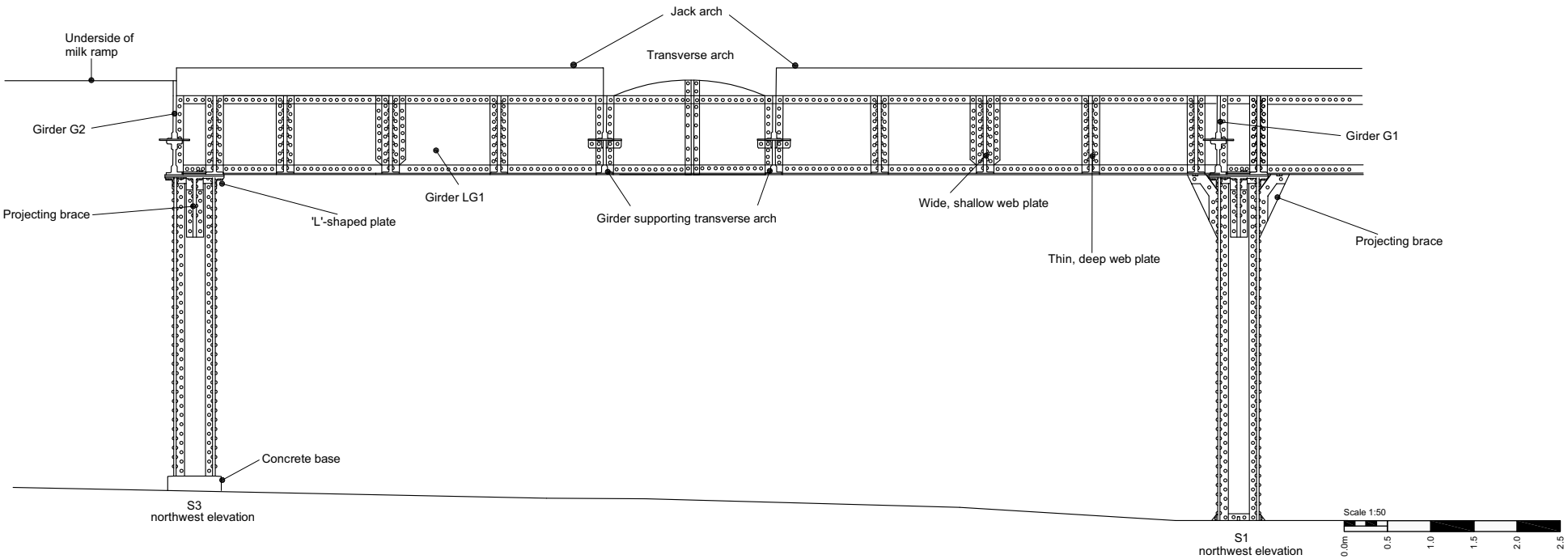

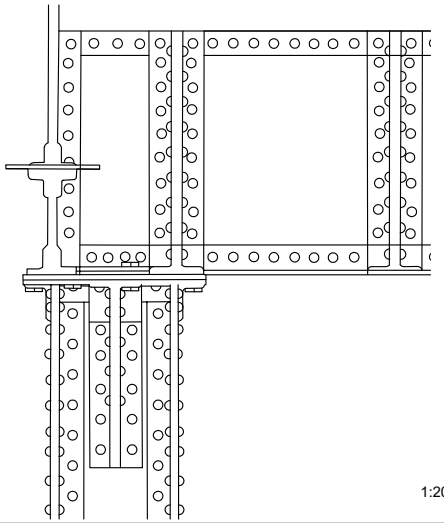

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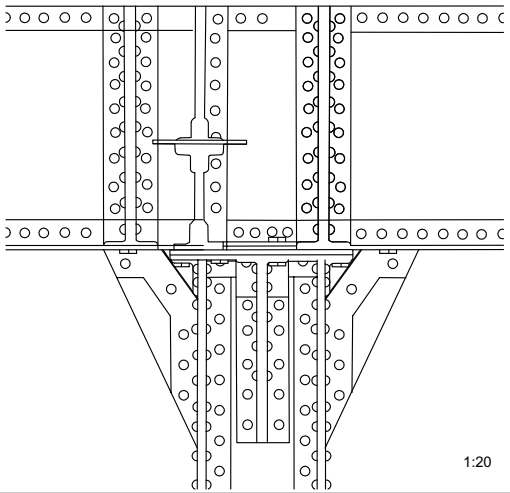

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REV	DATE	DESCRIPTION	BY	CHKD	APP	CAD	ACC
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CONTRACT No. / CONSULTANT : SCOTT WILSON

SCALE : 1:50

TITLE :

Figure 2: Long Section Northeast-Southwest

DRAWING AND CAD FILE No : D117398/AR/LSD/02

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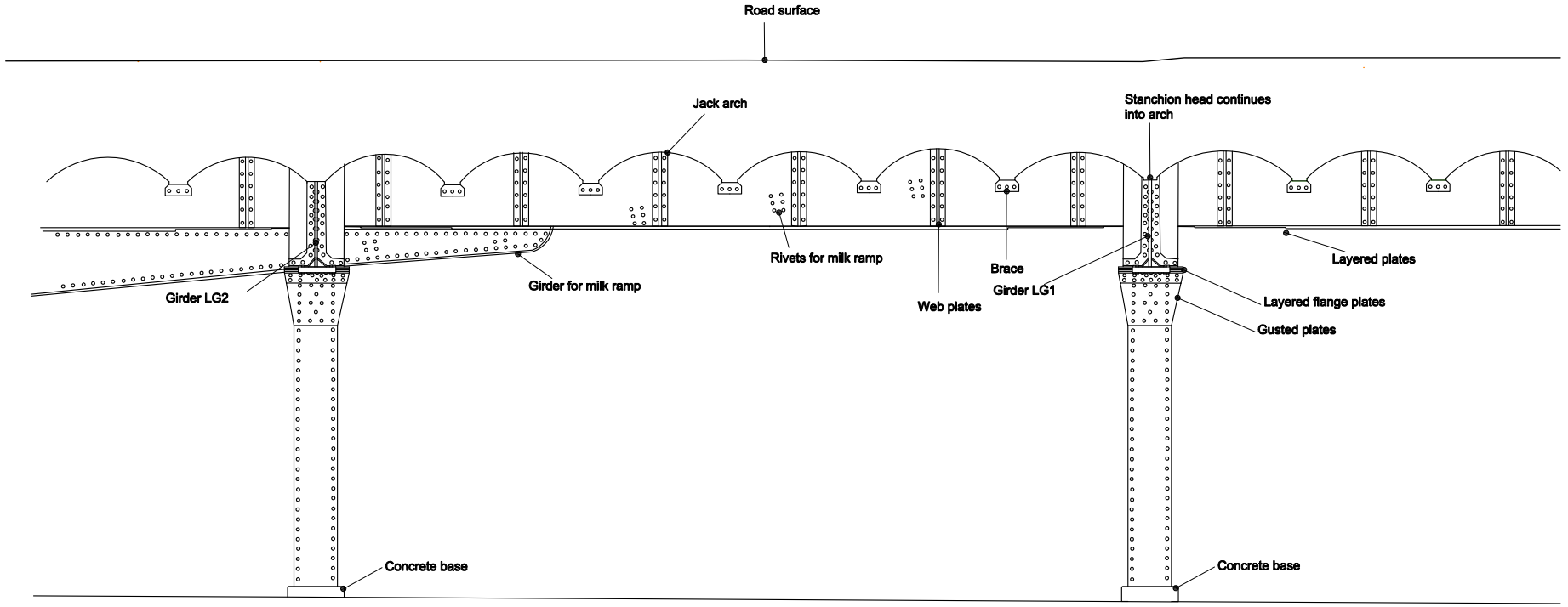

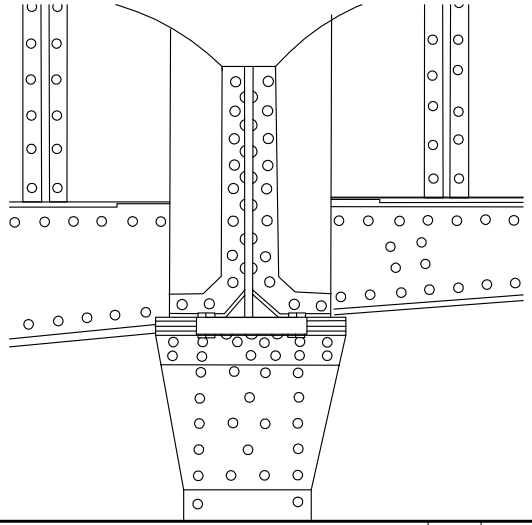

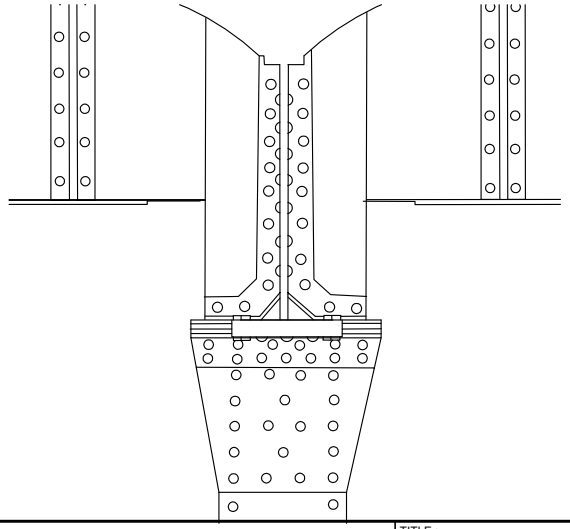

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REV	DATE	DESCRIPTION	BY	CHKD	APP	CAD	ACC
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CONTRACT No. / CONSULTANT : SCOTT WILSON

SCALE : 1:50

TITLE :

Figure 3: Short Section Northwest-Southeast

DRAWING AND CAD FILE No : D117398/AR/03

REV : 1

Appendix 3: Additional Recording of Milk Ramp at Paddington Station

Introduction

1.11.1 This document forms an appendix to an existing building recording report on the Milk Ramp at Paddington Station (Document No: C131-MMD-T1-RAN-B071-00001) which was produced in 2010 as part of the Crossrail development at the station.

1.11.2 The background to the recording and the wider project is detailed in the main document and is not reproduced here in full here but the recording was undertaken as part of a Heritage Agreement (listed building) covering Crossrail works affecting the London Street Deck at Paddington Station.

1.11.3 The overall recording required by the Heritage Agreement at the London Street Deck was detailed in method statements (CR-SD-CAM-CN-MS-00001 - dated 08/08/08) and CR-SD-WES-CN-AE-00005 dated 26/6/08.

1.11.4 The recording detailed in this appendix is the final phase of recording on the Milk Ramp required by the Heritage Agreement. The main pre-demolition recording of the Milk Ramp was undertaken in 2010 (*Building Recording: Paddington Station Milk Ramp* (C131-MMD-T1-RAN-B071-00001- dated 21/12/10).

1.11.5 In addition the overall London Street Deck, which includes the Milk Ramp, had also been subject to an earlier phase of recording with a particular focus on the location of a new vertical circulation core (VCC) through the deck: *Building Recording at the London Street Deck* (CR-DV-PAD-X-RT-00062 - dated 31/3/09).

1.11.6 The previous phases of recording were undertaken prior to the start of construction works and the current appendix details the further recording undertaken during the construction works (detailed further below).

1.11.7 The aim of the current investigation was to record features or parts of the structure that were obscured when the previous recording was undertaken.

Methodology

1.11.8 The current phase of recording has focused on the Milk Ramp which forms part of the London Street Deck at Paddington Station. It was undertaken as part of a wider programme of archaeological watching brief works at the station related to the Crossrail Development. These investigations included drainage works in the area of the London Street Deck as well as in the lower area by Platform 12 and although these works are adjacent to the Milk Ramp they are not detailed here. The current report purely covers the Milk Ramp which was recorded as part of the Heritage Agreement while the other investigations formed part of the general archaeological mitigation for Crossrail and will be reported on separately.

1.11.9 As outlined elsewhere the overall recording of the Milk Ramp was undertaken at English Heritage Level 3 and in accordance with the City of Westminster Heritage Agreement and Specification (CR-SD-WES-CN-AE-00001). This specification principally focused on the main pre-demolition recording but in relation to the watching brief it states:

> *'There will be a watching brief on the works to the deck to record hidden fabric revealed by the works. The watching brief will record the construction of the deck. Photographs will be made in plan and section and drawings will also be made (where Health and Safety considerations permit).*
>
> *During the breaking out works on both the deck and the concourse level structures and surfaces a watching brief will be undertaken on the works to record any features and the road structure in section'.*

1.11.9.1 The recording was undertaken during March 2011. The overall programme of archaeological works at the London Street Deck area have the site code XSE10.

Historical background

1.11.10 The main historical background to the Milk Ramp is detailed in the main body of the report and is not reproduced here although a short summary would be of use.

1.11.11 The Milk Ramp at Paddington Station forms part of the London Street Deck which was constructed between 1909 and 1916 as part of a phase of substantial development works on the north side (the arrivals side) of Brunel's great mid 19th century train shed. In this period three new platforms were added beneath a new fourth span to the shed and one of these platforms, Platform 12, was set aside for the transport of milk and parcels. The platforms were sunken beneath the surrounding road level and the realigned London Street was set on a new steel-framed deck

1.11.12 The London Street Deck incorporated a new ramp to allow easy transhipment between the trains on Platform 12 and horse-drawn milk wagons. The ramp emerged along the north side of London Street at the junction with South Wharf Road. This was in-laid with channel irons to guide wagons, and a stone sett surface to provide foot-holds for horses (Matthews 1917, 175).

1.11.13 In the first half of the 20th century there were a series of improvements made to the station and among these was the provision of better freight facilities at the new Bishops Bridge goods depot. This made the Milk Ramp in the London Street Deck redundant and it was consequently closed (by 1934) and blocked by the extension of the road surface in this area. The line to Platform 12 which had been used by the milk trains were converted to use for new suburban passenger services.

1.11.14 Following the covering of the Milk Ramp, the area above was used for the 'New Transport Service Station', which sat on the London Street Deck. This long, single storey building housed a Washing Shed and a Repair shop, presumably relating to the provision of motorised wagon services from Paddington Station, as shown on the 1932 contract drawings. An inspection pit was added within the repair shop, cut into the brick arches over the ramp and through the existing retaining wall.

1.11.15 These alterations included the siting of a petrol tank on the Milk Ramp, accessed

from the building above via a manhole cover. This necessitated the reinforcement of the central element of the Milk Ramp, to support the additional loads of the tank and its contents. Similarly the guttering from the new building ran into downpipes which continued through London Street Deck and were attached to the stanchions below. With the Milk Ramp now redundant, the sunken roadway between the ramp and platform 12 was infilled to provide more general purpose space.

Description of observations

1.11.16 The main area where the Milk Ramp was exposed by the works was towards its southern (upper) end where a large vertical circulation core (VCC) was created by the removal of a large section of the 1930s concrete infill deck and of the earlier Milk Ramp deck immediately beneath. The VCC breach was approximately 4m x 4m and it allowed a closer examination of the relationship between the two structures (Plates 2 & 3).

1.11.17 The surface of the Milk Ramp was largely formed from squared granite setts, smaller and quite different to those of the main road surface above[1]. The setts on the Milk Ramp are bedded directly onto a concrete foundation set on the east-to-west RSJs and brick jack-arches. The east-to-west RSJs were riveted to the main north-to-south girder. The cobbles in the central 'spine' of the ramp were laid in clear east-to-west rows, with every third row across the ramp slightly raised (by c.5 cm), and these would have helped give footholds for the horses climbing the ramp (Pl. 14, 15, 18 and Fig 1). Either side of this there were two further long strips up the ramp where the cobbles were set in slightly irregular concentric rings (Pl. 13, 16) and clearly these strips were for the wheels of the wagons (or drays). The pattern of setts in these areas would have allowed for a smoother surface for the wagon wheels rather than the central walkway for the horses. To either side of these strips were smooth, slightly raised concrete pavements along either edge of the ramp.

1.11.18 The structure of the ramp also incorporates four C-section RSJs marking the junction between each of these five strips and bolted to the larger I-section RSJ's beneath the ramp (Pl. 8-11). The two strips of concentric granite setts for the wagon wheels were slightly lower than the pavements and the central horse walkway and thus the inset C-section channel irons would have slightly projected above the surface and acted as guides to prevent the wagon veering off to one side of the ramp or the other.

1.11.19 The guide rails/channel irons were integral to the construction of the ramp and the flat faces of each C-section face into the strips for the wheels. It may have been that on the ramp the dray was sometimes unmanned to reduce the weight being hauled up the ramp and the rails in the floor would have helped guide the wagon.

[1] The setts on the main road surface above were like tapered teeth around which liquid pitch was brushed before embedding them in a base of sand

1.11.20 The RSJs were seen to rest on stone pads in the brick east wall that were regularly spaced in the dip of the arches (Pl. 21). It was interesting to note that the areas of the wall exposed by the removal of the jack-arches revealed red brick behind, distinct from the finer yellow stock bricks (English bond) which formed the main visible face of the wall (Pl. 20-21).

1.11.21 Although the granite setts were very hard there was evidence of wear from the presumably metal lined wagon wheels. This was particularly seen as a worn groove to the side of the iron rail.

1.11.22 The surface of the ramp was truncated by two later features; a large metal petrol tank in a 1930s brick bund / interceptor tank and an inspection pit (Pl. 5, 22, 23). These were associated with the construction of a new transport building on the London Street Deck in the 1930s which then became the Red Star Parcels Depot in 1982, finally demolished in 2007.

1.11.23 The lower (northern) section of the ramp was removed prior to the current project and this left a clear sloping imprint against the eastern retaining wall. This wall has a dado rail with white glazed tiles above and scars were noted on this tile surface probably caused by the upper corners of vehicles scraping along the wall. These gouged striations were roughly parallel with the ramp surface (Pl.19).

Conclusion

1.11.24 The additional watching brief recording during the Crossrail works to the Milk Ramp have enhanced our understanding of this structure and allowed a fuller record to be made.

1.11.25 A clearer understanding has particularly been gained of the construction of the ramp surface itself with the granite setts laid differently to the central section, where horses would have trod, to the sides where wagon wheels would have turned. The different sections were divided by guide rails and a clear sectional view of this construction was exposed by the creation of the Vertical Circulation Core in the current project. Further photographs were also taken of the steelwork exposed by the dismantling works.

Bibliography

Matthews, EC 1917 *The Development of Paddington Station* - IV in Great Western Railway Magazine Vol XXIX No. 2 (Feb 1917)