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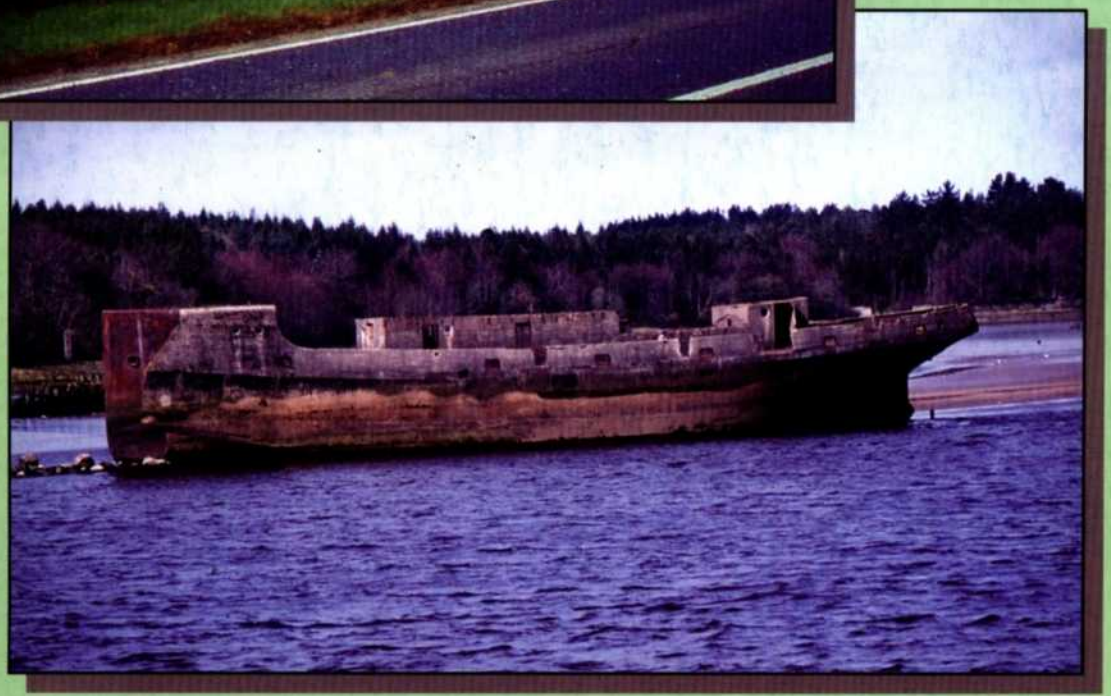

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SUSSEX INDUSTRIAL HISTORY

Journal of the Sussex Industrial Archaeology Society

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Cover photographs: Midhurst tollhouse 1825; concrete hulled ship 'Creteboom'

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HALSTED & SONS OF CHICHESTER

Engineers & Ironfounders

Alan H. J. Green

Fig. 1 A cast-iron flue cover for a kitchen range made by Halsteds. It sports the firm's "key" emblem. (Author-courtesy of Chichester District Museum)

Introduction

Chichester, as with most small nineteenth-century country towns, was home to light industry. In Chichester's case most of this was associated with the output from agriculture – woolstapling, tanning, malting, brewing, slaughtering etc. but there was also much in the way of cottage industry such as clock making. A notable exception to this, however, was the business known as Halsted and Sons. Founded in the 1840s, it expanded from being an ironmongers into a full-scale engineering manufactory, sited not only in the heart of the city but in the exclusive residential area known as the Pallants.

The business closed in the 1930s so, after a period of some 70 years, local memories of it have faded, tangible evidence of its products is scarce, the Chichester Halsted family long since dispersed[1] - largely to Africa and Australia - and the only company records to have survived are two memo books at West Sussex Record Office (WSRO). All this rendered researching this paper something of a challenge, but I hope I have been able to piece together a history which will show, albeit only in outline, what a diverse firm Halsted and Sons was, and how remarkable a character was Charles Townsend Halsted who founded it. If any readers are able to fill gaps in my researches, or know the whereabouts of other surviving Halsted products I would be very glad to hear from them via the editor.

The Chichester Halsteds

The 1839 Pigot and Co.'s *Royal National and Commercial Directory*[2] lists a Charles Halsted trading in East Street as "painter, plumber and decorator" and it is from him that the business of Halsted & Sons sprang. Charles Halsted had three[3] sons; Charles Townsend "CT" (1823-1891), Henry (1824-1911) and John (1825-1875), the first two of whom were involved with establishing the engineering firm.

C. T. Halsted

Fig. 2 C. T. Halsted and his family in the garden of Itchenor Park circa 1870 (Chichester District Museum)

C. T. Halsted was very much the controlling mind behind the business as we shall see. In the family picture* in Fig. 2 he looks the very model of a Victorian businessman, and he was indeed a pillar of Chichester society. He was a Justice of the Peace, mayor of the city in 1858 and 1865[4], a partner in Chichester Old Bank[5] and also, in the 1860s, treasurer† to the Trustees of the proprietary St John's Chapel[6].

C. T. Halsted had six sons[7] of whom two died in infancy, the survivors being Charles Edward (1865-1902), Walter Francis (1868-1918), Ernest Frederick

* This is one of a number of items donated to Chichester District Museum in 1983 by JMG Halsted, CT's great grandson. Other items include his seal – see Fig 3.

†This was something of a poisoned chalice (so to speak) – the finances of the St John's Trust were always perilous and treasurers tended not to last too long in office.

(1869-1936) and Alan Gordon (1876-1934). In the absence of company records it is not possible to deduce how many of the above followed their father into the firm to become the "& Sons".

C. T. Halsted's address is given in Chichester Directories as "North Street" but as the houses were not numbered until 1893 we do not know precisely where. However, after his death in 1891, his widow moved to "Fernlee House", now No. 40 North Street,* where she is listed as living from 1892.

Fig. 3 C. T. Halsted's seal (Author – courtesy Chichester District Museum)

Henry Halsted

Henry's role in the business, judging from the surviving evidence, seems to have been overshadowed by CT. He is listed as living at Slindon up to 1880 after which he moved to the firm's house at 1 North Pallant.

John Halsted

John seems not to have been involved with the family firm. He is listed in the 1862 *Post Office Directory for Sussex* as living at Itchenor Park, a large house on the shores of Chichester Harbour, where the photograph of C. T. Halsted in Fig. 2 was taken. A silver snuff box owned by him is part of the collection at Chichester District Museum.†

Beginnings

The earliest reference found to "Messrs Halsted" is in the court records for 1848 when a prosecution[8] was brought against one Henry Blunden for stealing a brass beer tap. Larceny struck the Halsteds again in 1857 and they had to bring another case to the bench, this time against George Puddick for stealing various articles, and in the proceedings[9] both Henry and C. T. Halsted, ironmongers, are cited as being the owners of the stolen goods. Halsteds are listed in the nineteenth-century Chichester Directories as trading from East Street (No. 80), a shop on the north-west corner of North Pallant, which we can assume the brothers acquired when their father, Charles, died in 1843. From 1852 the directory listings name the firm as "Halsted & Sons", the epithet that was used until their demise.

Halsted & Sons

By the 1870s Halsted & Sons had become well-established both as an ironmongery and a manufactory. Their invoice heading of this time lists their services as: "ironmongers, coppersmiths, tin-plate workers, whitesmiths, bell hangers, iron and brass founders and dealers in oils and colours" In actual fact this invoice heading is something of an under-statement: they carried out much more than this as C. T. Halsted's two memo books record.

The first of these[10] is a slim, bound pocket-book containing, inter alia, estimates, notes and drawings for items made by Halsteds between 1857 and 1870 which includes cast-iron window casements, ploughs, horse-hoes, carts, water bowsers, garden rollers, brass cocks, stationary steam engines, hot water apparatus, pumps, saw benches and kitchen ranges. They also supplied timber mouldings for green houses and strained-wire fencing. The drawings in the book are superb and samples, from a design for a portable steam engine, are given in Figs. 4 and 5.

The memo book reveals that for such engines major components were bought in: named suppliers included Welch & Glapan and Hayward & Co of Derby for boilers, Clayton & Co for fireboxes and Taplin and Co of Lincoln for cranks. The remainder of the parts, as the drawings show, were made by Halsteds. As well as designs and estimates the memo book contains typical rates; those of rivals are quoted but those of Halsted & Sons are written in code lest CT's book be lost and the information fall into enemy hands! The second memo book[11] commences in 1867 and overlaps the first. It contains notes and estimates but has no drawings. In July 1871 the book records the following fulfilment of an order for 14 cast-iron columns placed by the Chichester Corn Exchange Company for their New Corn Store* :-

* Now spelt "Fernleigh,"

† Also donated by J.M.G. Halsted in 1983

* This building is to the east of the Corn Exchange and now fronts on to St John's Street. Older Cicestrians will remember this building in its later usage as the Booth Rooms.

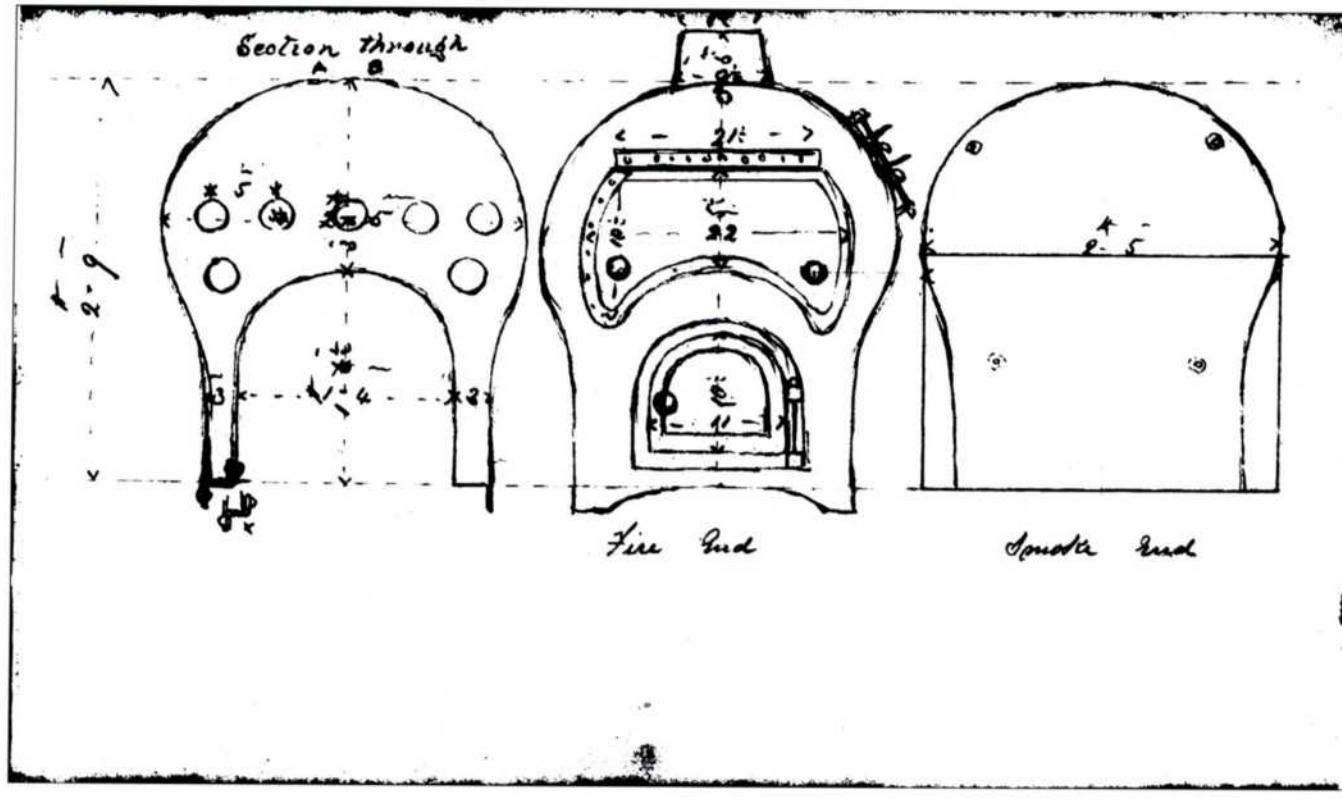

Fig. 4 An extract from CT Halsted's memo book giving a design for a "4HP Portable Engine", here showing details of the boiler. Construction of boilers was contracted out. The page is shown actual size. (WSRO)

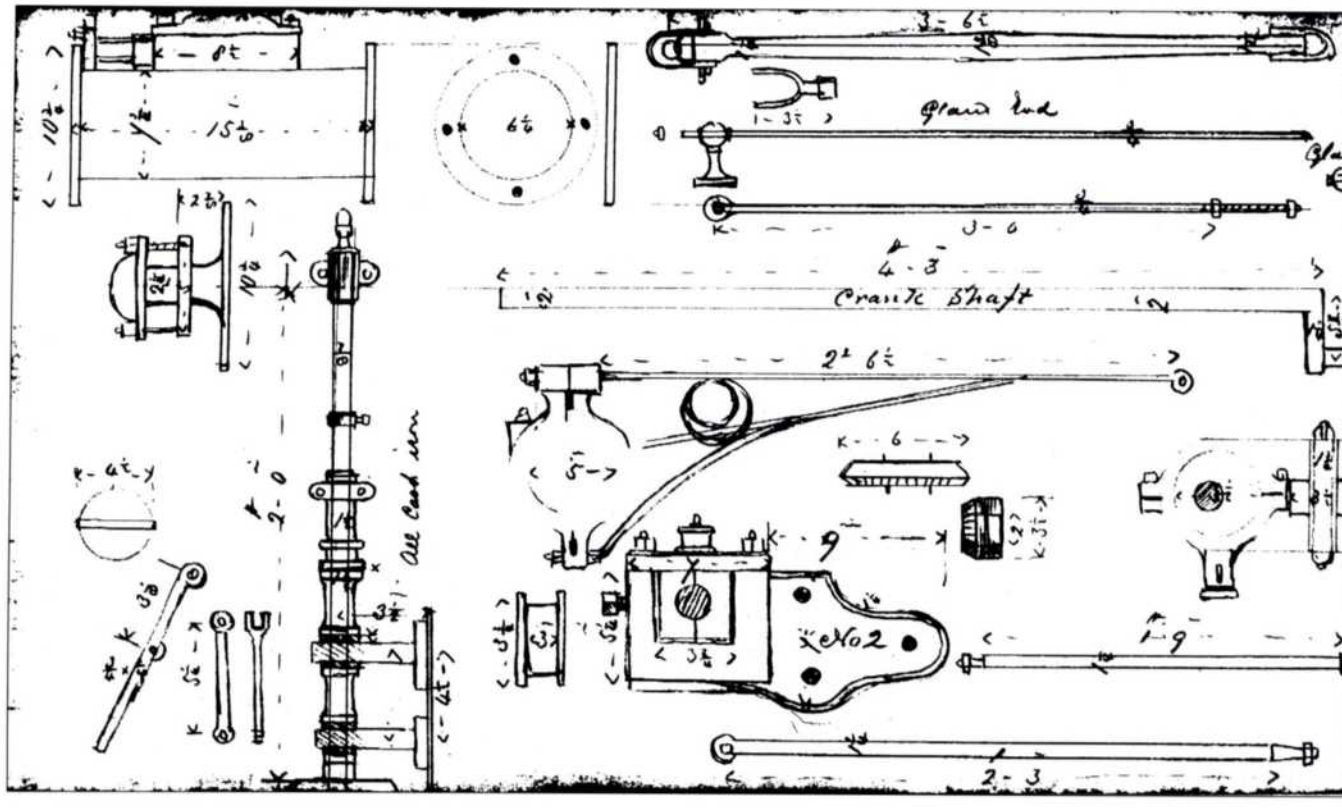

Fig. 5 Another extract from the design for a 4 HP portable engine, this time of various components to be made in-house by Halsteds. (WSRO)

"The pattern was taken into Foundry at 3. on Friday. 12 were made by Thursday night following, 2 were made – cash on Friday with about £4 of other castings."

Halsteds produced a range of farming implements and these were displayed, courtesy of the Corn Exchange Company[12], on the access road which ran along the east side of the Corn Exchange – a cunning ruse as there they would be viewed by farmers who, having sold their grain at market, might be tempted to part with the new-found contents of their wallets.

The North Pallant Foundry

J G Woodruff, in his article *History of St Pancras Engineering Works, Chichester*[13] refers to Halsteds and their expansion into a site behind their shop where foundry activities were developed. This site was 20 North Pallant: situated on the west side of the street, it is not given a directory entry separate from the shop until 1883 when it is listed as 'Halsted & Sons, iron foundry'. This cannot be taken as the date of the foundry's opening as nineteenth-century directories tended to list only a firm's business address, in this case East Street, and Halsteds were obviously making castings long before then. Between 1900 and 1902 there are no directory entries for the North Pallant site and interestingly the 1898 OS Map indicates no building there either, suggesting that it had been demolished or even burnt down. However from 1903 it is listed again but now only as 'Halsted & Sons stores'.

The East Pallant Works

The expansion of Halsted's business meant that a larger manufactory was required and this was solved by the purchase of 1 North Pallant, a large five-bay Georgian house on the east side of the street, conveniently situated opposite the existing foundry. However the attraction was not the house itself but its sizable garden which extended through to East Pallant – see Fig. 6 below.

Acquisition of 1 North Pallant enabled a large engineering works to be set up with most of the garden becoming covered with industrial buildings. The main entrance was in East Pallant but a passageway was created through the service wing of No. 1 (now a separate house, No. 1A) to provide pedestrian access and also give a quick route from the works to the shop.

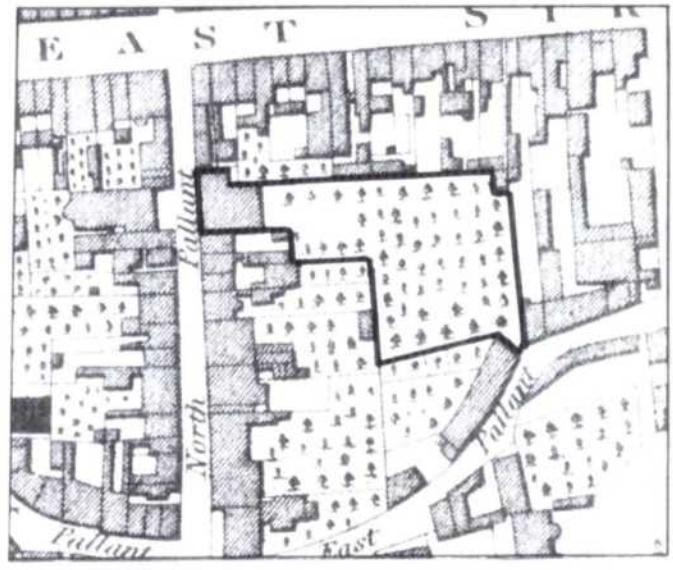

Fig. 6 An extract from George Loader's 1812 Chichester town plan. The curtilage of 1 North Pallant has been marked and it can be seen that the garden extended right through to East Pallant. (Author's collection)

The opening date of the East Pallant works is uncertain. It is indicated on the 1875 1:2500- scale Ordnance Survey map where it is designated 'Chichester Foundry – iron & brass' but was already very well established by 1872 for the annexed plan to a conveyance of 5 North Pallant of that year[14] shows its garden as being bounded by 'Messrs Halsted'. Once again the Chichester Directories provide no assistance as this site is also not listed separately from the shop until 1903, when it is given as '8 East Pallant - Halsted & Sons engineering works'.

Fig. 7 No. 1A North Pallant in 2005 showing on the right the entrance to the passageway to Halsted's works. To the left of the picture can be seen No. 1 – both buildings were once owned by Halsteds. (Author)

Fig. 8 An aerial view of East Pallant in 1958 looking west. Although Halsteds had by now long-since ceased trading their works buildings are still intact. The white-roofed building in the foreground is the rear section of the Corn Exchange. (Simmons Aerofilms Ltd)

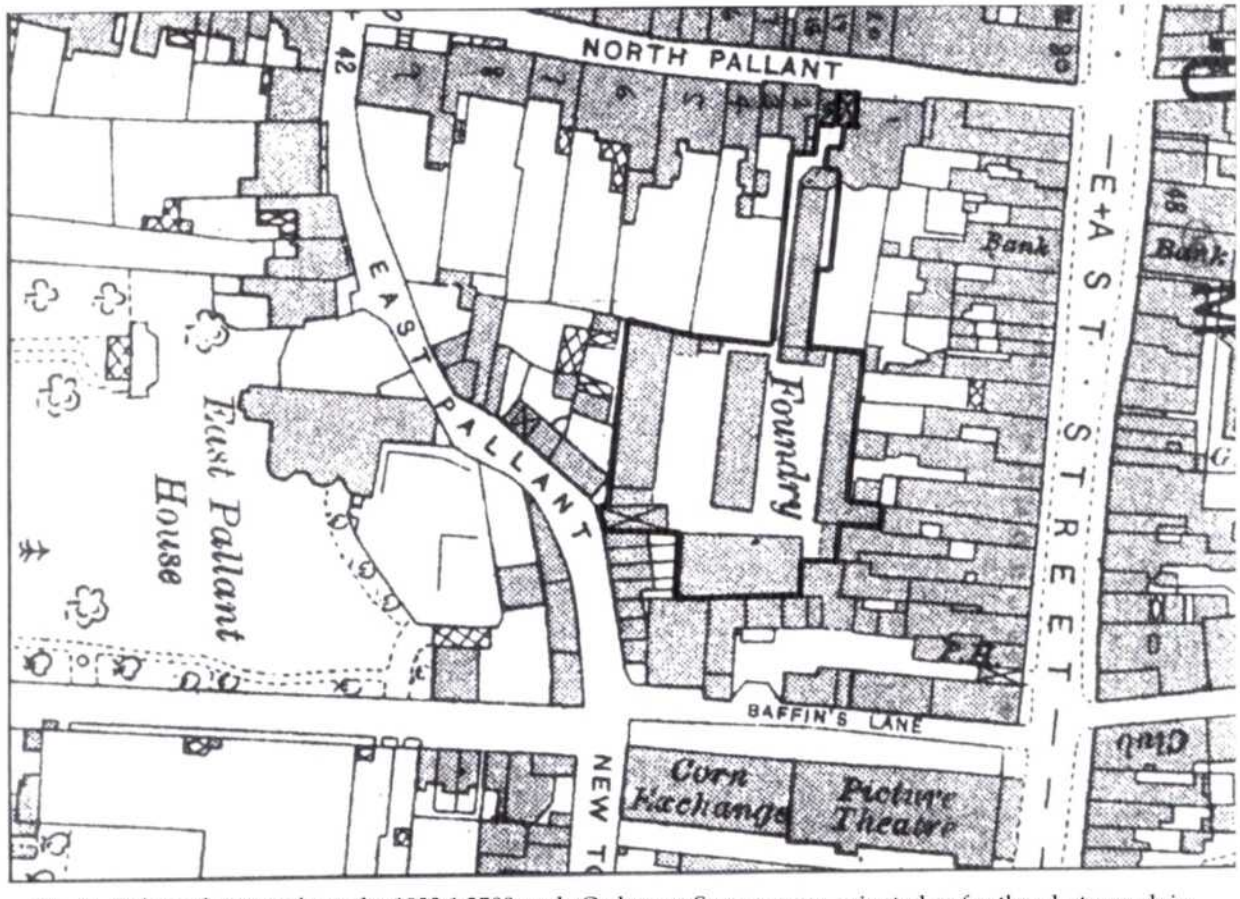

Fig. 9 Enlarged extract from the 1933 1:2500-scale Ordnance Survey map, oriented as for the photograph in Fig 8 above. The boundary of Halsted's East Pallant Works, then in its final form, has been marked.

The 1933 edition of the Ordnance Survey map shows the East Pallant site in its final form and, with the aid of photographs and the annexed plans to a conveyance of Nos 2-5 North Pallant dating from 1909[15], the boundaries of the site have been determined and marked on Fig. 9.

As can be seen, there were three parallel east-west ranges of buildings, with a further range at the east end of the site built on a north-south axis abutting the former Presbyterian Chapel (now Baffins Hall) in Baffins Lane. Over the entrance to the site from East Pallant was another building but by the time of the 1958 aerial photograph it had been demolished.

Without company records we cannot be certain about the uses to which each of the buildings was put, but from some photographs taken around 1953 by the City Engineer it can be seen that the square building at the east end of the northern range was obviously the furnace house, making this range the foundry proper.

Fig. 10 A hazy view across the former Halsted's site c1953. The square building with the chimney was the furnace house. (Chichester District Museum)

It will be noted that the foundry, which would have been the principal source of atmospheric pollution, was very close to the backs of premises in East Street. Indeed, looking at it now, one has to wonder how the City Fathers viewed the situation as there must have been many complaints from nearby residents, especially on washing day.

Interestingly though, Henry Halsted himself lived at 1 North Pallant from 1880 to 1895 so he cannot be accused of being a 'NIMBY' since he created this environmental disaster literally in his own back yard! However from 1895 his address is given as "The Warren, Lavant Road": by then he had obviously had enough, fleeing for relief to the Arcadian delights of Summersdale.

The East Street Shops

As has been stated, Halsted & Sons traded from a shop at 80 East Street which, in addition to being the head office, was also a comprehensively-stocked iron-mongers. This first shop was destroyed in a spectacular fire and explosion in the autumn of 1871 of which a graphic account exists in Willis's *Records of Chichester*[16]. Writing from the distance of 1928 Willis begins with the rather pompous observation that:-

> "The apparently simple fact that all the destruction was caused by an old and trustworthy assistant, fifty years of age, drawing half a pint of petroleum spirit by candle-light, is sufficient to prove the exceedingly dangerous nature of the employment, and the great care necessary in regulating the sale of explosive compounds."

He then goes on to quote a contemporary account given in a letter written by T. B. Wilmshurst, who traded adjacent to Halsteds, to his brother, which included this description of the climax of the conflagration:-

> "The explosion of a gunpowder barrel blew down the wall of the adjacent house and the explosions of cartridges could be heard two miles off."

It was obviously a momentous event but C. T. Halsted was quick to rebuild on the same site and business carried on as can be seen from the following invoice:-

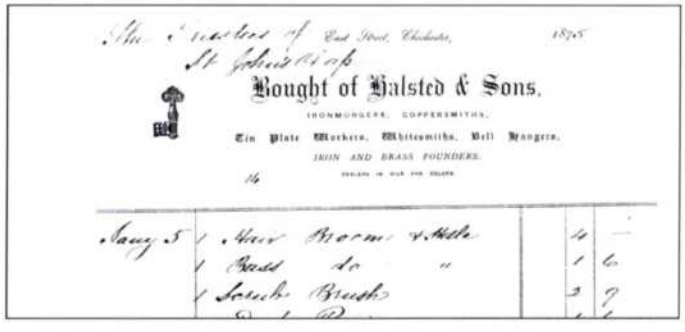

Fig. 11 1875 invoice heading for Halsteds for the supply of cleaning utensils to St John's Chapel. Note the "key" company emblem. (WSRO)

They continued trading there until 1903 after which something strange happens – they move to the premises next door[17] as can best be demonstrated in the following table :-

Year	80 East Street	81/82 East Street
1903	Halsted & Sons	Critchell & Co (boot-makers)
1905	(No entry)	Halsted & Sons
1906	International Stores	Halsted & Sons

What had obviously happened was that the International Stores, who had been trading from another site in East Street, needed bigger premises and so bought No. 80 from Halsteds who, in turn, relocated to the vacant site next door at 81-82. Both the former buildings were demolished and rebuilt in 1905-06 in the form that exists today. The new Halsted shop had a two-floor showroom with large plate-glass windows to both. The key emblem was proudly displayed in stucco over the first floor windows.

Fig. 12 Halsted's shop at 81/82 East Street with its two-floor displays. Note the key emblem over the centre window. (Chichester District Museum)

Working at Halsted & Sons

That C. T. Halsted was the brains behind the business in its nineteenth-century heyday is also amply demonstrated by the two memo books. In addition to the aforementioned designs he records in their pages useful information he had gleaned from elsewhere, such as these 'Rules for Calculating the Weight required on the lever of a safety valve to produce a certain pressure on the valve'[18]:

> "From the required pressure on the valve in lbs, subtract the weight of the valve – plus the effective weight of the lever – multiply the Remainder by the distance between the fulcrum and the valve, divide the product by the distance between the fulcrum and the weight and quotient is the weight in lbs – required to be placed on the lever."

And this formula 'To harden cast iron':

> "Heat the iron to a cherry red heat and immerse until quite cold in a solution composed of : –
>
> 1,000 Grammes of Sulphuric Acid
> 65 Grammes of Nitric Acid
> 10 Litres of water"

Note the use of metric units – in 1864! In those pre safety-conscious days the hazards associated with plunging a red-hot casting into a mixture of sulphuric and nitric acids seemingly did not need to be spelt out.

The memo books also served as C. T. Halsted's day-books, recording the goings on in the works and showing that he could be a hard man to work for. The following (undated) dispute arose over the production rates for cast-iron window casements:-

> "We have had 20 moulded in a day of the small Goodwood pattern – that is with a boy to help and fill in – or about the rate of this as there are not boxes enough to do the 20. After this the same man made 10 only – viz 4 small and 6 large ones – discharged him as the difference was too great – said he had no one to fill in – Mr Bastable made 10 only in a day, complained of this – said it was impossible for any man to make 20 - After had a new pattern (for Earwicker) made and a turnover board – he made 16 a day."

It is small wonder that under such tyranny the workforce in Fig 13 don't look terribly happy with their lot!

As there were no local supplies of either of the raw materials needed to run a foundry – iron and coal - these had to be imported to Chichester. The second memo book[19] lists such imports, which in the 1870s were, surprisingly, still coming in by sea rather than rail. The names of the vessels and their captains are all given but there is only one specific mention of a port (Bosham) so it is logical to assume that most of the vessels came into Dell Quay. It is not recorded how the materials got from thence to the works.

The Demise of Halsted & Sons

From 1908 a coach-builder, Arthur Bettesworth, had been listed in the directories as also working out of 8 East Pallant suggesting that Halsted's now had some spare space at the works which good business sense dictated should be let out. This may perhaps hint that business was beginning to fall away.

Fig. 13 The assembled workforce staff of Halsted & Sons. They are gathered with the main gates of the site as a backdrop; all are sporting waistcoats and most of them ties as well! Note the pier to the left supporting the cast-iron beam to the building which used to span the entrance – it is all that now remains of this scene. (Bernard Price collection)

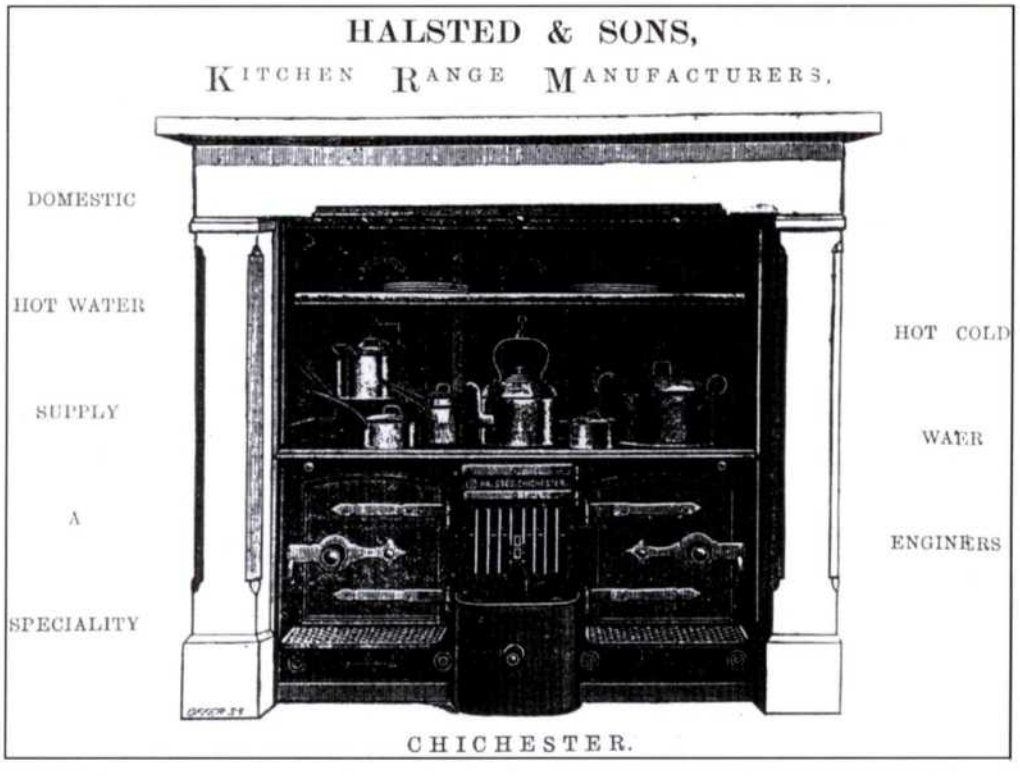

Fig. 14 A 1900 advertisement from *The Observer and West Sussex Recorder* for Halsted's kitchen ranges. (Chichester District Museum)

The closure of the East Pallant works must have occurred in 1932*, for after 1933 Halsteds are no longer listed in the Chichester directories as being on that site. Some of the employees transferred to the St Pancras Engineering Co.[20] which was founded just after the First World War.

The East Street shop, however, kept going as an ironmongers, seemingly without any further catastrophic incidents, until 1936. In 1935 they had placed an advertisement in *Kelly's Directory* in which they described themselves as "Agricultural, General and Furnishing Ironmonger" but by the following year they had closed down – the directory carrying no entries for either 81-82 East Street or 20 North Pallant. The reason for this sudden end is unclear, but around this time the last two of C. T. Halsted's sons died[21] - Alan in 1934 and Ernest in 1936. It is most likely that with the death of Ernest the business died too.

From 1933, following the withdrawal of Halsteds, 8 East Pallant continued to be occupied by Bettesworth, who had been joined by L. N. Wood, a "motor engineer" and William Noyce, a sheet metal worker. In 1940 the City of Chichester Electricity Dept joined the assembled throng when they moved their stores there. Its final use in the 1950s was as the garage and maintenance facility for the lorries of Sadler & Co, the Chichester corn merchants. In 1937 the 81/82 East Street shop was converted into two separate establishments – the Misses Holliday's café upstairs and Master & Co, clothiers, below, and at the same time 20 North Pallant became the well-remembered furniture shop of R. A. Triggs.

The Halsted Sites Today

The East Pallant works was demolished in 1960 and the site cleared to be converted into yet another car park. A set of photographs was taken by the City Engineer during the demolition[22] which provide our only detailed views of the buildings: two of these are given at Figs. 16 and 17 below. On site, only the tall gate piers in East Pallant, still sporting their hinge pins, and one pier behind them survive as a reminder of the site's former use. It is, however, still possible to negotiate Halsted's passageway through 1A North Pallant as it provides a well-used pedestrian access to the car park. One wonders how many motorists are aware of the historic significance of this twitten.

The former shop at 81-82 East Street still exists. For many years the upper floor was a Chinese restaurant but, at the time of writing, it is empty and undergoing yet another refurbishment for commercial usage. Fortunately, although the frontage at street-level has been destroyed, the distinctive first-floor windows with the key emblem survive as a souvenir of Halsted & Sons.

Round the corner in North Pallant the handsome frontage of No. 1 still exists and is now the headquarters of the Shipwrecked Mariners' Society, but when Triggs closed down in the 1960s, 20 North Pallant was demolished and replaced by a modern house.

Surviving Halsted Products

As the company ceased to exist over 70 years ago it is not surprising that few of their products are still in existence. One of their kitchen ranges has been installed in the cobblers shop at Amberley Chalk Pits Museum, whilst Chichester District Museum own a flue cover, sporting the key emblem, from such a range, (see Fig 1). Chichester District Museum also own a root-cutting machine* the cast-iron grille of which is branded "Halsted & Sons" This machine also carries on its hopper a plate for Allmans of Birdham and so it is quite possible that Halsteds only supplied castings to Allmans who actually made the machine.

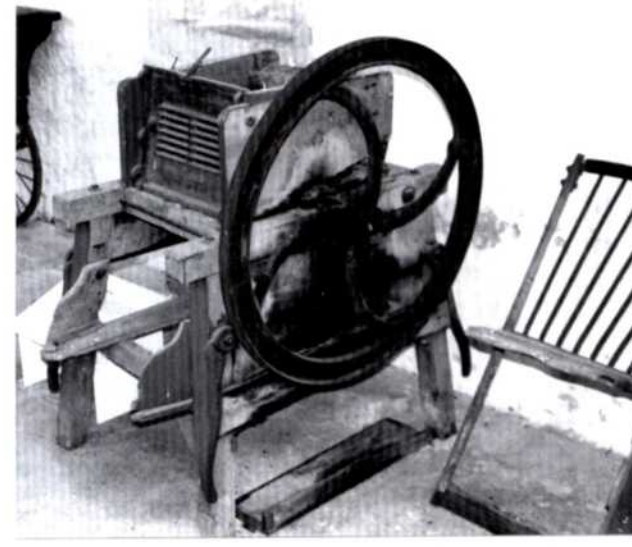

Fig. 15 The root-cutting machine at Chichester District Museum. The cast-iron grille bears the legend "Halsted & Sons, Chichester". (Author, courtesy CDM)

* Halsteds are shown as being there in the 1931 directory but, tantalisingly, there is no copy of the 1932 edition at either WSRO or Chichester District Museum!

* Awaiting restoration at the time of writing

Fig. 16 Demolition of the north range of buildings in 1960. Only the north wall and the furnace house are still standing. In the foreground the piles of flints mark the site of the middle range. (WSRO)

Fig. 17 Demolition of the south range in 1960. The flint and brick buildings were quite substantial – and not unattractive. To the left of the building can be seen the entrance from East Pallant: the building over the top of it had already gone.(WSRO)

Chichester's streets sport a goodly variety of cast-iron covers to delight the spotters of such. Particularly distinctive are the stop-cock covers installed by the City Engineer and made at Grist's foundry in Horsham. A few of them* carry the Halsted name and these may well have been made as replacements for broken originals. On the west side of Broyle Road, opposite the Barracks, is a Halsted hydrant cover. Halsteds also made coal-hole covers, and an example of one of these can be seen at Chichester District Museum – your author has, so far, failed to locate a living specimen, but lives in hope! In the 1970s a new circulatory system was installed at Eastgate Square which involved the creation of a number of traffic islands. Adjacent to one of these islands is, somewhat surprisingly, a Halsted gully grating which has obviously been recycled and thus a rather remarkable survivor. Another gully grating of this pattern can be seen adjacent to the Basin Road level crossing.

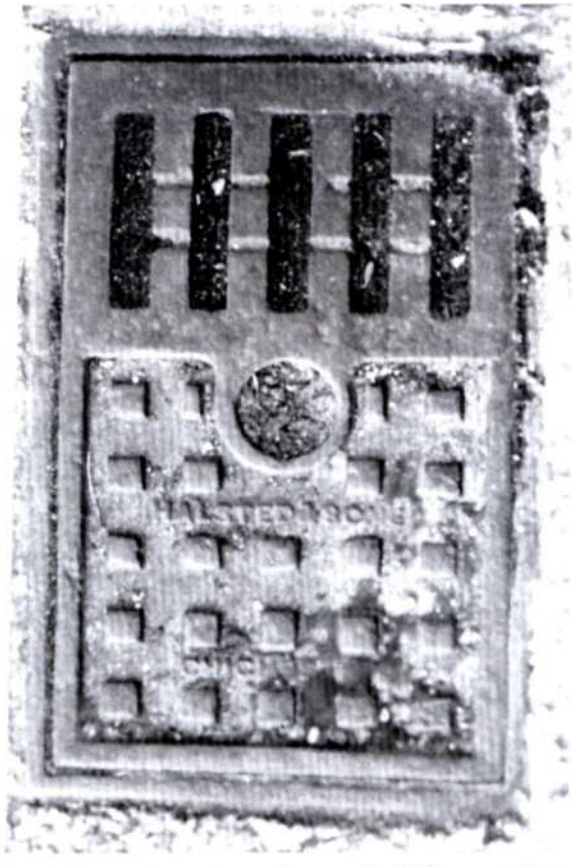

Fig. 18 A cast-iron stop-cock cover in St Pancras. These were originally supplied by Grist's Horsham Foundry, but a few, such as this one, were by Halsteds, possibly made as replacements. (Author)

* These are still being found by the author – there are specimens in St John's St, South Pallant, St Pancras and Oving Road.

East Street Rivals

As has been intimated, few Cicestrians are aware of Halsteds and ironically, despite the striking impression their shop must have made in East Street, it is the rival business that faced them across East Street which is so fondly remembered today. As such, no account of Halsteds would be complete without a mention of "the opposition".

As early as 1869[23] Frederick Adames was trading as an ironmonger and he occupied the premises later to be numbered 7&8 East Street. He at first traded with a partner, Thomas Grant, as "Adames & Grant"[24] and a valuation of their premises[25], carried out on 4 May 1875, listed the contents of the workshops as including three forges and an iron-store. However there was no furnace so it is clear that Adames & Grant were not in the foundry business. By 1880 Thomas Adames was trading alone: in his advertisement in the *Chichester Directory* of that year he describes himself as "FREDERICK ADAMES – Late Adams & Grant, Wholesale, Retail, Furnishing and General Ironmonger". His listed services include the supply and installation of every kind of heating apparatus and pumps for deep wells, as well as supplying lawn mowers and "Flavel's Prize Kitchener" – all in direct competition with the firm across the road!

Frederick Adames died in 1885[26] and his ironmongery business was taken over by the splendidly-named Adolphus Ballard who, in his earliest advertisements, describes the business as "Late Frederick Adames" and included the stocking of agricultural implements in his services – the competition was obviously intensifying. By 1905 the directories shew that Ballard had sold the business to T. E. Jay under whose name the shop was to become so legendary. The high-street battle was handsomely won by Jays who managed to outlast Halsteds by 23 years in not closing until 1959[27]. Nos. 7&8 East Street were then rebuilt as a Tesco supermarket which, in turn, closed in 2004.

Acknowledgements

I must begin by thanking the ever-patient staff of West Sussex Record Office where most of the research for this paper was carried out, and then the Curator and staff of Chichester District Museum for granting access to photograph the Halsted items in their collection. At the museum, Simon Kitchin, the authority on past Chichester businesses, provided

much help and support. It just so happened that the day I first went to consult him on Halsteds he was investigating some old photographs, which he wished me to see. These had been taken in the 1950s of potential car-park sites,* one of which we were able to verify from a site visit as being Halsteds – giving us our first "view" of the buildings. I must also thank Simmons Aerofilms for locating and supplying a copy of the 1958 aerial photograph of Chichester, and kindly granting permission for its publication here.

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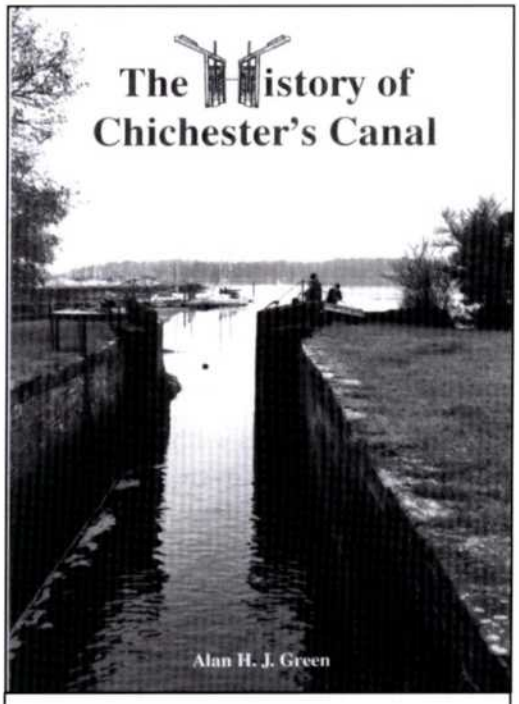
26. WSRO AddMS 41259 a collection of election material containing a printed notice canvassing for a vacancy on the City Council "in consequence of the death of the lamented Mr Frederick Adames"
27. The *Chichester Observer* of 22 March 1984 refers to Jay's closure in its "25 years ago" column.

* See Fig 10 above.



Chichester's connection to both the canal network and the sea was made in 1882 with the opening of a branch from the Sussex line of the new Portsmouth and Arundel Navigation. Although never a commercial success, the remaining part of the canal has undergone a resurgence over the last twenty five years and once again boats ply its waters, this time for leisure rather than trade. This book tells the extraordinary story of this canal.

by Alan H. J. Green

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SWANBOURNE PUMP HOUSE, ARUNDEL - AN ARCHITECTURAL APPRAISAL

Ron Martin

In *Sussex Industrial History No. 34*, Tony Baxter[1] covers the history of the site and the description of the machinery of the Swanbourne Pump House. This article is concerned mainly with the building and its environment and the possible design of the water wheel, which preceded the turbine. For the purpose of description in this article the side of the pump house facing the tail pond is deemed to face due east.

The pump house, located at TQ 018077, was built in 1846 to the design of Robert Abraham and was converted for the use of a horizontal turbine in 1902.[2] It is a single storey building two bays, 11.15m (36′ 7″) long, and one bay, 4.78 m (15′ 8″) wide, with entrance doors at both south and north ends, the latter being set behind a projecting porch. The building is divided into two equal parts with a 340 mm (1′ 1½″) wall. The floor level is 1.17 m (3′ 10″) below ground level with a flight of stone steps leading down from the south door. At the north end there was a cast iron gallery with flights of winders at each end, now replaced by the viewing gallery.

The floor is mainly paved with 75 mm (3″) York stone flags with the voids covered with steel chequer plates on steel joists. Below floor level to the southern part there are chambers 1.68 m (5′ 6″) deep housing the pumps and associated pipework. In the northern part there is a void under the whole of the floor, the stone slabs being supported on brick walls or steel joists. Immediately to the north of the division wall there is a pit the full width of the pump house, 1.91 m (6′ 3″) wide and 2.74 m (9′ 0″) deep below floor level and divided into two parts, with the turbine pit to the east 2.21 m (7′ 3″) long, and the turbine cistern to the west 1.14 m (3′ 9″) long. The walls of the latter are taken up to ground level and the division wall between the pit and the cistern is stepped from 225 mm (9″) thick to 450 mm (1′ 6″) thick. The turbine cistern is covered with steel chequer plates.

The walls of the pump house are 380 mm (1′ 3″) thick of red brick in Flemish bond, faced externally with tabular field flint random rubble with flint flake galleting (see Appendix note 1) above a grey granite plinth. Dressings are all in limestone, probably Bath Stone, with pilasters at each corner and a parapet set projecting and supported by a corbel table to simulate machicolations (see Appendix note 2). At each end, the walls are taken up to form a gable finished with a stone coping. The roof is covered with natural slates on timber rafters, with lead lined parapet gutters.

The east side windows, facing the tail pond, are two-light, square headed in Tudor style and both door openings have semicircular headed arches, all with chamfered limestone dressings. The two windows in the west side and the blank outer opening to north porch are in Romanesque style, with semi-circular arched heads and attached columns. It is interesting that the side of the building away from the present public road, Mill Road, is built in the more elaborate style and this can be explained by the fact that the original road from the Castle, Mill Lane, ran along the west side of the pump house as shown on the 25″ OS map.[3]

The header pond, which is currently being used as a fish pond by Chalk Springs Fisheries, is located at the north-west side of the pump house. It is an oval shaped structure with straight ends and has an area of 0.04 ha (480 sq. yds.) It is surrounded by a stone wall with a possibly later raised random rubble parapet and has a stone floor. It draws water from Swanbourne Lake by way of a wide culvert, the level of water in the lake being controlled by a weir. Another culvert connects the south end of the pond to the pump house to discharge into the turbine cistern and a 750 mm (2′ 6″) diameter pipe connects the turbine cistern to the turbine. There is a vertically lifting timber sluice cutting off the water entering the turbine cistern, operated by a rack and pinion and worm drive system from a location above the top of the cistern. A similar sluice shuts off the water at the tail race of the turbine. This is also operated by a rack and pinion, with a shaft running horizontally, just below floor level, along the south side of the pump house and is controlled by a right-angle gear with a removable turnkey at the south-east corner of the pump house. These sluices were probably installed to enable maintenance work to be carried out to the turbine in the dry. There was a fountain jet in the centre of the header pond served by a 125 mm (5″) diameter pipe. This is noted in instructions for working of 1895[4] and was not removed until 1966. It is not known whether this

was installed in the original installation of 1846 or when the second pump house of 1895 was erected.[5]

A spillway from the header pond leads directly into the tail pond through a culvert, by-passing the pump house, and this is equipped with a vertically pivoted butterfly sluice comprising cast iron sectional vanes operated by a crank and worm gear. The vanes are bolted together to achieve the desired water level in the header pond. Another overflow spillway also leads directly from Swanbourne Lake by way of a culvert into the tail pond. It is probable that this sluice and the walls of the header pond were all contemporary with the 1902 installation.

The tail pond has an area of 0.168 ha (0.41 acres) and is surrounded, for the most part, with battered retaining walls in red brick in English bond, surmounted by a random rubble flint cobble parapet wall capped with a stone coping. The tail pond connects directly to the drainage channel leading to the River Arun at TQ 023078 at which point there is a sluice to prevent tidal water flooding the tail pond. The outlets from the tail race and from the culvert from the header pond each have two-ring segmental headed brick arches over.

The spring (drinking) water supply to the pump house is by a 150 mm (6") diameter pipe running in a subway feeding the south pump. It is this subway which carries the water which currently floods the floor of the pump house. The overflow running under the pump discharges through a 380 mm (1'3") diameter pipe into the tail pond.

When the pump house was inspected by John Haselfoot and Alan Allnutt in 1973 there was no roof, but the end gable walls had been partly cut down and a coping fitted with, presumably, half-hips. Since the restoration by the Trustees of the Arundel Estate, the gable walls have been restored to full height and these now incorporate bullseye vents, although the original ones were tall openings with semi-circular headed arches over as shown on an old photograph.[6] The restoration also reinstated the slated roof on timber rafters.

The Water Wheel

There is no evidence on site of the location and size of the waterwheel installed in 1846[7]. However, as the opening through the east wall of the pump house for the tail race appears to be unchanged it is reasonable to assume that the location of the wheel and the width of the wheel pit at 1.9 m (6'3") is approximately the same as the later turbine pit and cistern. The lowest level of the wheel would have been at about the same level as the sill of the tail race aperture. When the turbine was installed, the wheel pit would have had to be deepened by some 0.9 m (3 ft) to accommodate it, and this would have entailed underpinning the walls of the wheel pit, or possibly even re-building the north wall.

The 2.29 m (7'6") wide blank opening between the two halves of the pump house was widened in 1902, as can be clearly seen on site. It can be assumed that

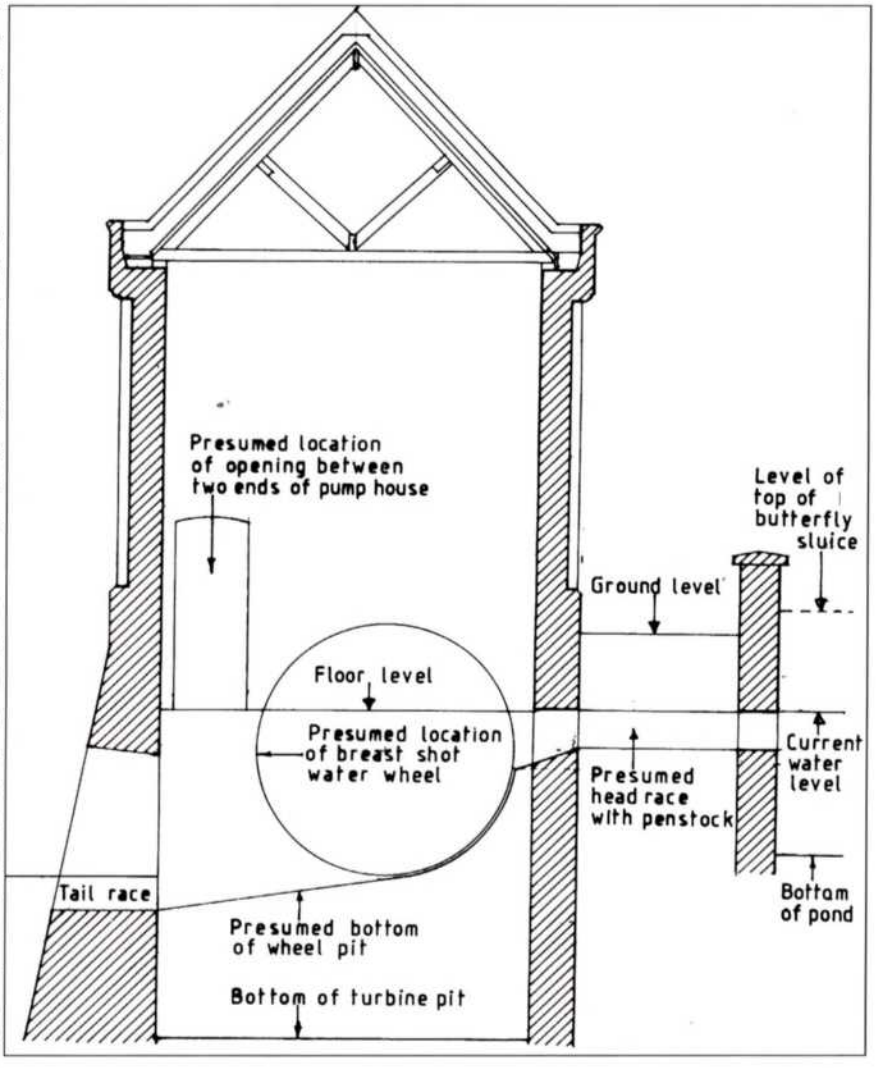

Fig. 1 Section through Wheel Pit showing suggested location of water wheel

when the wheel was extant the access between the two halves of the pump house was by a much narrower opening over the top of the east side of the wheel as shown on the sketch Fig 1. This suggests that the sill of this opening was at floor level. However, if the sill of this opening was higher, with one or more steps up, the wheel could have been slightly larger and higher. After the present pump and turbine system was installed access was no longer limited by the waterwheel and so the opening was enlarged. The sketch, Fig 1, shows the possible location of the wheel which would probably have been low breast shot, about 3 m (10 ft) diameter with the shaft about 300 mm (1 ft) below floor level.

On the 1st Edition of the OS map[8] there is no evidence of any obstruction on the outlet from the tail pond. The tidal range in 1836 was 2.7 m (9 ft) at spring and 1.93 m (6.34 ft) at neap tides between Arundel Bridge and the Black Rabbit [Inn at Offham].[9] Thus, it is probable that in 1846 the tail pond was tidal and the wheel was submerged for part of each tide.

The 1837 Constable painting of the earlier corn mill, which shows the levels of the ground around the tail pond substantially as at present, clearly show the wheel partly submerged. It is appreciated that artistic licence would mean that the painting would be at its most picturesque with a higher water level but the implication is to be inferred. Also, a photograph, probably taken in the interwar period, shows the tail pond full of water to a depth of about 2 m (6 ft).[10]

When a water wheel is partly submerged it will not operate efficiently and pumping would have been interrupted during part of each tide, but the 1846 installation was probably sufficient for the supply then required. (See Appendix note 3.) When, in 1871, the demand was increased to include the town,[11] this situation would have been intolerable. The 1895 pump house was installed to alleviate this situation, but to relieve these pumps from some of their duties and to save fuel, and with the continually increased demand for water, further improvements to the system were required. The 1902 turbine installation was far more powerful than the water wheel system but it also had the advantage of being able to operate continuously around the clock. The 6" OS map of 1896 shows a weir at TQ 0196 0773, which was probably installed to control the water supply to the adjacent watercress beds, but would also have had the desired effect of maintaining the level of the water in the tail pond sufficiently high to keep the turbine submerged, which is necessary for its efficient operation. The remains of this weir are still to be seen.

Appendix

1. Galleting is a method of filling the joints of random stonework with flakes or pieces, often of a different material, to assist in the laying of rough stones by acting as wedges and by reducing the amount of mortar exposed to the weather. This was also sometimes used in a decorative manner.

2. Machicolations are openings at the top of a fortified wall formed by setting the parapets forward in front of the wall face and carrying this on corbels; the spaces between the corbels being left open so that unpleasant things could be dropped on attackers. This form of decoration has been much used as a decorative feature but without the apertures.

3. There is a system for use in tidal situations whereby the paddles of the water wheel are hinged to avoid backwater. This was an unusual practice and it is not known if it was used at Swanbourne.

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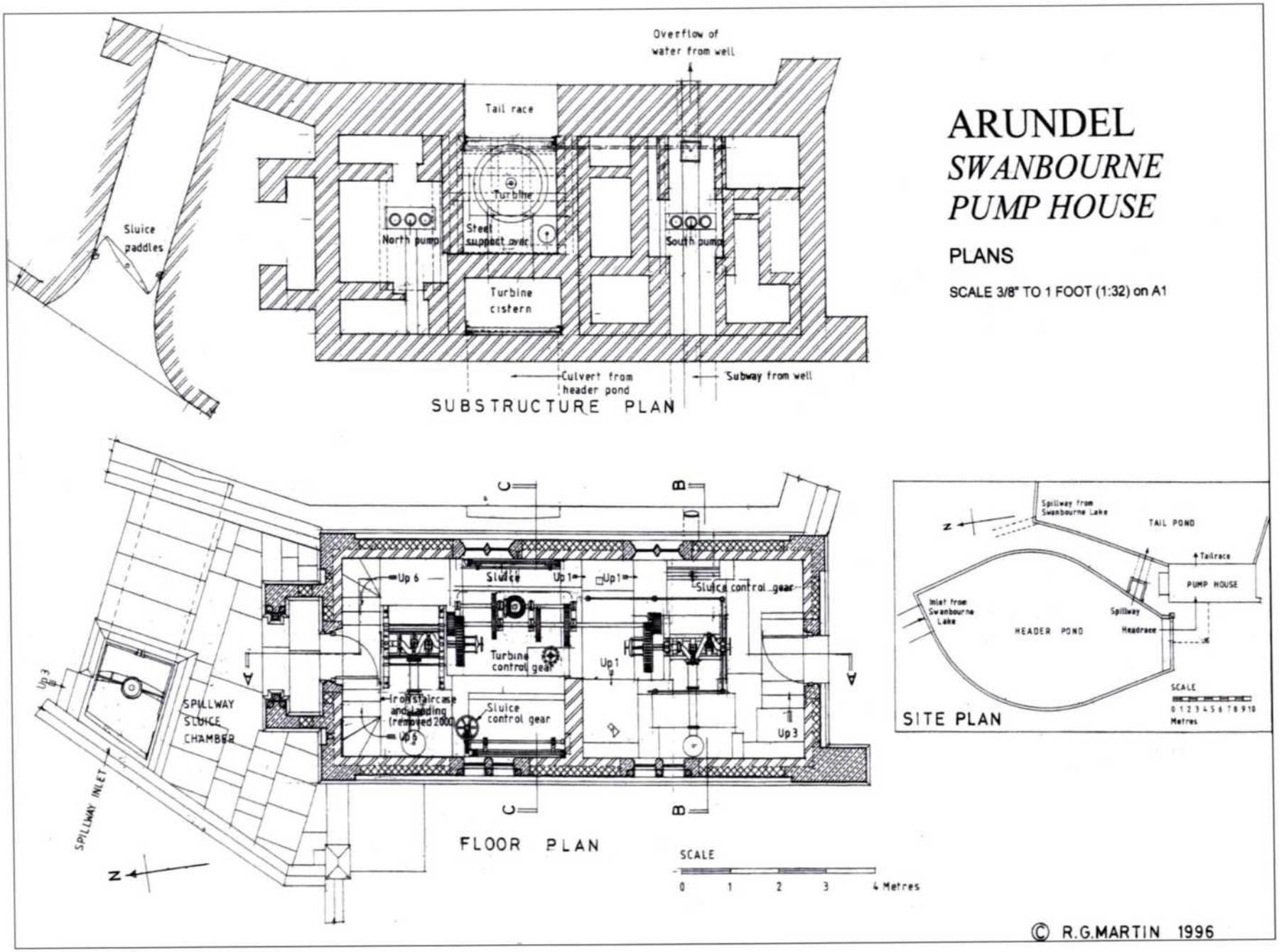

Fig. 2 Swanbourne Pump House—Plans

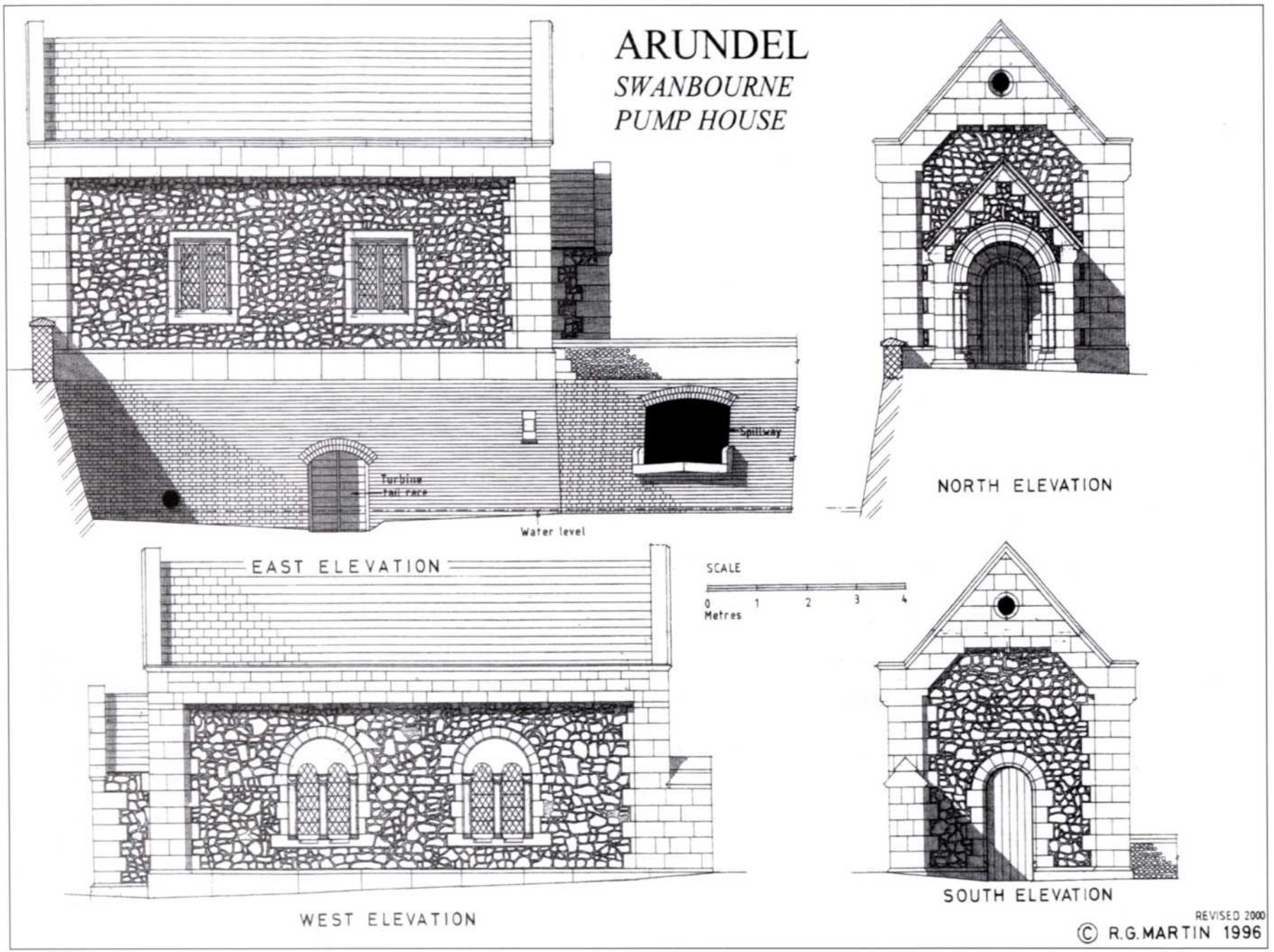

Fig. 3 Swanbourne Pump House—Elevations

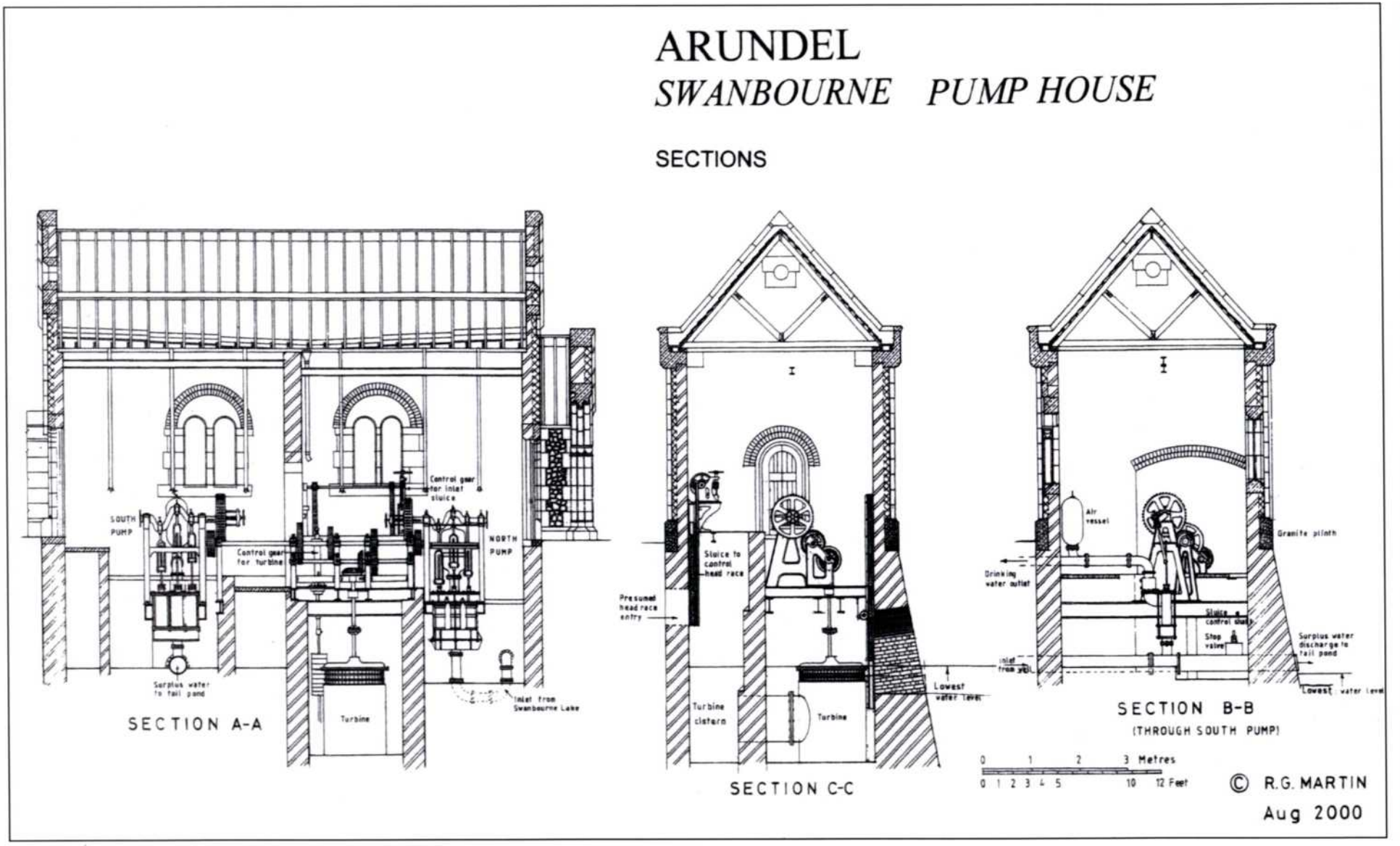

Fig. 4 Swanbourne Pump House—Sections

THE "CRETESHIPS": CONCRETE SHIPBUILDING AT SHOREHAM 1918 - 20

N. Kelly

By the end of the nineteenth century shipbuilding at Shoreham in West Sussex had declined to the point of extinction, leaving only a residual yacht and boat building industry; it appeared at that time very unlikely that substantial shipbuilding would ever resume at the port.

However, due to the extreme situation brought about by the First World War shipbuilding, operations at Shoreham were to enjoy a brief, if somewhat unusual, revival between 1918 and 1920. Following the declaration of war in August 1914 the use of U-boats by Germany put an ever increasing strain on British and other Allied shipping; this was particularly felt during the period of unrestricted submarine warfare that was waged by the enemy. As a result of the shipping losses incurred by U-boats attacks, the British Government embarked upon a large programme of shipbuilding with vessels being laid down to a series of standard designs. This programme also envisaged the building of fleets of experimental ships made from timber in North America and of ferro-concrete in the British Isles.

At first thought, the use of a material such as concrete to build ships sounds implausible and even slightly comical, but as early as 1840 a Frenchman named Joseph Lambot had constructed a rowing boat using concrete and this vessel, together with a second example, still survives to-day. By 1910 a number of concrete barges and lighters had been built but it was not until 1917 that the first seagoing concrete ship was completed. This was the small motor ship M.V. *"Nansenfjord"* which was constructed to the designs of N.K. Fougner in Norway. The following year two more motor ships, the *"Steir"* and the *"Oddfrid"* were launched at the same yard as the first, and were also constructed to Fougner's design.

The first large concrete vessel to be built in this country was a 200 ton lighter for use on the Manchester Ship Canal, whilst the first British built sea-going concrete ship was the *"Armistice"* built at Barrow-in-Furness in 1919. The success of all these vessels had proved the viability of the concept of the use of ferro-concrete in shipbuilding.

During 1917 the Ministry of Munitions devised a scheme to import quantities of high grade iron ore from Northern Spain using a fleet of tugs and barges. The British Government and the Admiralty, mindful of both the chronic shortages of suitable tonnage due to enemy action and the very heavy demands on the available steel supplies generated by wartime conditions, saw the need to use alternative materials to rectify the situation. These two factors suggested the use of ferro-concrete for the new project. Winston Churchill and The Admiralty had been in correspondence with N. K. Fougner and enthusiastically backed the project and it was decided quickly to implement the programme. Construction of 154 vessels totalling some 200,000 tons was commenced at a cost of £4 million. By using ferro-concrete about 70,000 tons of valuable steel would be saved. To build these ships eight new shipyards were opened and others were expanded or modified to allow for the construction of the largest fleet of concrete vessels ever planned.

In all, 21 firms received contracts to build the concrete ships and some of these were developed by large, well established shipbuilders like Swan Hunter who owned the Wear Concrete Shipbuilding Co. (Fig. 1). Because of the Armistice, and the ensuing premature cancellation of the programme, only eighteen yards actually launched vessels and, even then, only those units that were sufficiently advanced were finally completed.

At the time of the Armistice, on 11 November 1918, only one vessel, the barge *"Creteacre"* had been completed at Poole, but by the following July nine units had been finished and a further fifteen had been launched. By the time the last ship, the Shoreham built tug *"Cretewheel"*, was completed in the late summer of 1920 some 66 units were finished and of these 12 were tugs.

The remaining 54 vessels were barges. It also appears that at least 20 partially built barges were scrapped or otherwise destroyed and that only 52 barges seem to have been named and registered.

Both the tugs and the barges were made to a general standard design which varied slightly from yard to yard. Twelve of these vessels were built at Shoreham by John ver Mehr whose yard was situated on the southerly bank of the River Adur on Shoreham Beach some ¾ of a mile from the harbour entrance. Six units were tugs and the remainder sea-

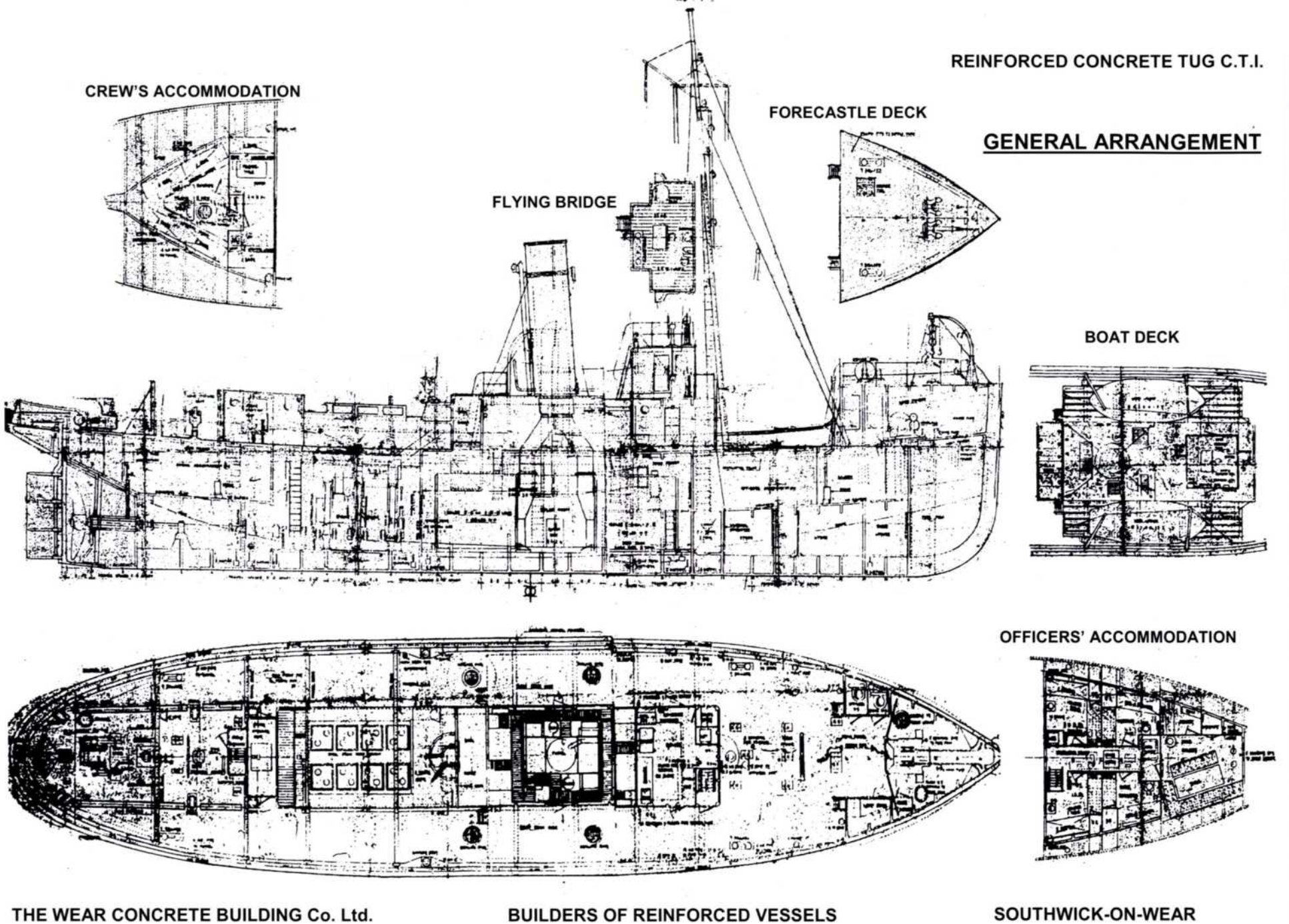

Fig. 1 Blueprint used by the Wear Concrete Shipbuilding Co., of Southwick, Co. Durham, in connection with the building and fitting out of concrete hulled ships

going barges of 1,000 tons deadweight. Details of the tugs are given below:-

Hull Number	Official Number	Call-sign	Name	Year completed
CT31	143794	KCFS	*Cretemast*	1920
CT32	143956	KDHJ	*Creteyard*	1920
CT33	144653	MJSY	*Creteboom*	1919
CT34	144632	MKCB	*Cretegaff*	1920
CT35	144666	KDNG	*Creteblock*	1920
CT36	145008	KDNP	*Cretewheel*	1920

These 6 vessels were all of 267 G.R.T. with dimensions as follows:-

Length Overall— 125 feet.
Beam – 27 feet 6 inches.
Moulded Depth—14 feet 10 inches
Draught—13 feet 4 inches (Fig. 2).

The weight of these tugs was a considerable advantage for it enabled the tug to hang onto its tow even in difficult weather conditions. Towards the stern a powerful towing winch was mounted aft of the concrete deckhouse which also housed the steering engine. The stern post had a forged steel rudder post with a built up stern frame which, apart from the rudder post itself, was encased within the concrete hull. Also encased by the hull were the engine bed frames, and the foc'sle had a turtleback deck which allowed excess water to run off easily whilst protecting the windlass and the anchor from the elements. Originally the foc'sle was designed to mount a gun but as the war was over the armament was never fitted. There was accommodation for a crew of 17 hands. The galley and the officers' quarters were situated between the funnel and the foc'sle, being adjacent to the saloon and the pantry. While the deckhouse itself was made of concrete, the bridge, chartroom and a portion of the boat deck were wooden; the boiler top casing and the engine room skylights were steel. All twelve of the tugs had similar 750 i.h.p. triple-expansion steam engines which were manufactured by seven companies. The engines for the six Shoreham built vessels were supplied by four of the engine builders, viz. Davey Paxman & Co. of Colchester, Essex who engined the *"Cretemast"* and the *"Creteyard"*; Grant Ritchie & Co. of Kilmanock, Ayrshire, Scotland who engined the *"Cretewheel"*; J. Milne & Son, Edinburgh, Scotland who engined the *"Cretegaff"*, and Newton Bean & Mitchell of Bradford , Yorkshire who engined the *"Creteboom"* and the *"Creteblock"*. Other engine manufacturers involved in the programme were as follows: McColl & Pollock Ltd of Sunderland, The Central Marine Engine Works, West Hartlepool and J. Abernathy & Co. of Aberdeen, Scotland. Two Scotch boilers using the Howden forced draught system worked at a measured pressure of 180 p.s.i. and were 11 feet long by 9 feet 6 inches in diameter.

Fig. 2 *Creteboom* at Southampton in the 1920's

Bunker capacity was 80 tons of coal.

At John ver Mehr's yard the tugs were built on slipways (Fig. 3) whilst the barges were constructed in excavated basins which were flooded when the vessels were completed (Fig. 4). The raw material for the construction of the ships came from local sources with the aggregate coming from the site itself, for the yard was built on a shingle spit. The cement was obtained from the British Portland Cement Co. (later A.P.C.M. & "Blue Circle") Beeding Cement Works some three miles upstream from the yard. This cement was delivered by river barge and the sand came from pits around Storrington. The concrete manufactured from these raw materials was mixed from the following constituents, viz. 1 part shingle/gravel; 1⅔ parts sand and 1⅔ parts cement. Construction of the vessels began in a conventional manner with the laying down of pre-cast concrete frames in groups of six to form the skeleton of the ship. These frames were then covered with steel reenforcing rods and the other steel work which formed the basis of the decking, bulkheads and the machinery beds. Once all of the steelwork was in place and secured, the outside of the hull was fitted with shaped wooden shuttering which was carefully set in place and then shored up and thoroughly well supported. Meanwhile the inside of the hull was covered with loose shuttering which was braced internally to timber fillets which were then bolted to frames. Once all this shuttering was in place and secure the concreting could commence. The infilling of the concrete had to be done extremely carefully for it would easily find all of the weak points in the shuttering and, therefore, be wasted.

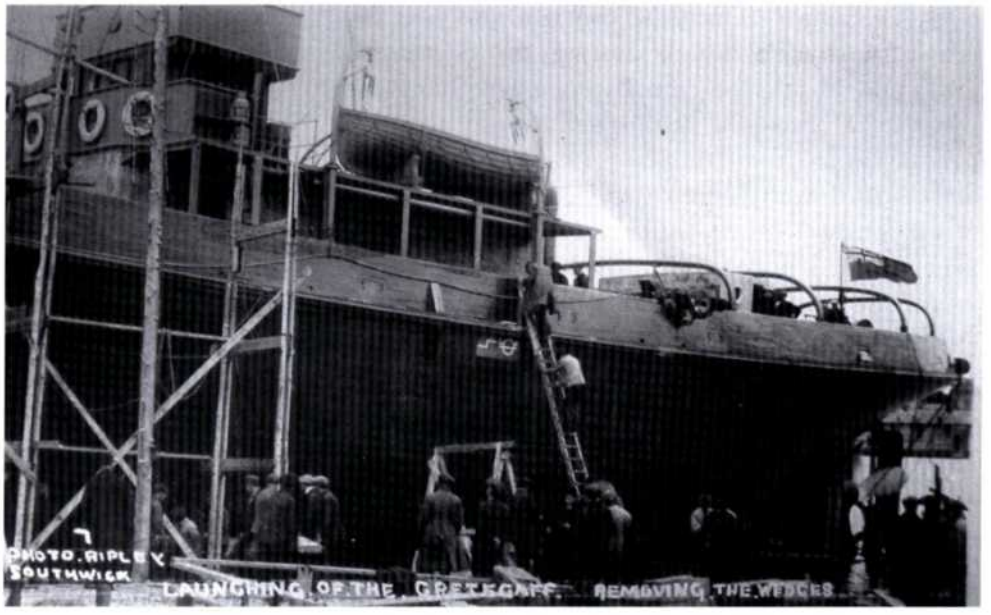

Fig. 3 *Cretegaff* on the slipway at John ver Mehr, Shoreham

In order that transportation of the raw materials was done in an efficient manner a special narrow-gauge railway was laid and this was worked by petrol locomotives. The shingle was specially graded and cleaned and then the concrete was mixed in large powered mixers which were supplied by Ransome of Ipswich. It was important that the concrete was free of air bubbles and mixed completely to obviate separation of the components, whilst the application of the material was done using pneumatic hammers in order that it packed tightly to expel air and to increase its density. Hammers also pressed inwards on the outer shuttering to produce a dense watertight covering

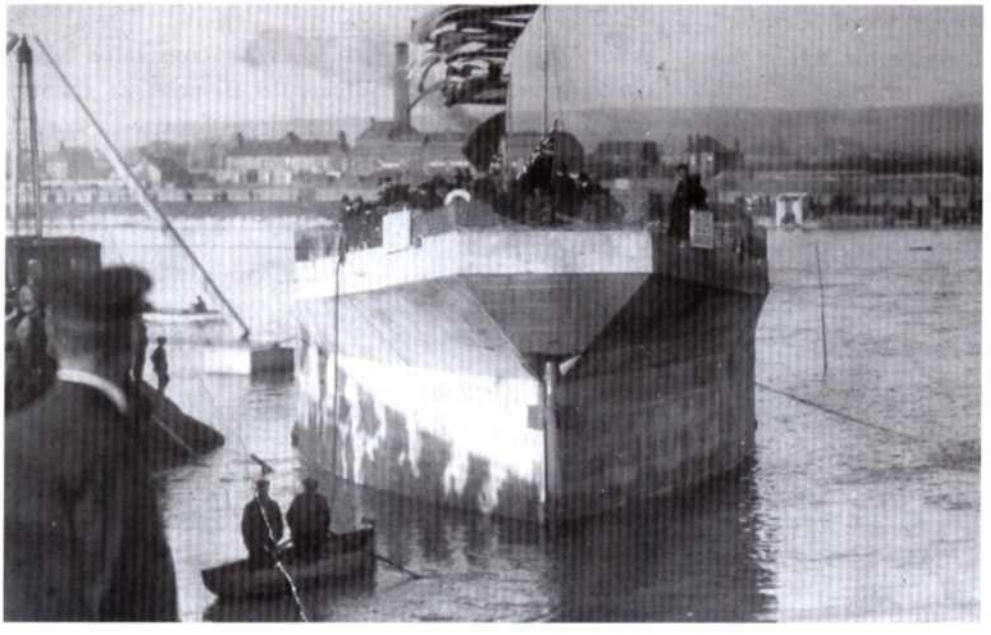

Fig. 4 Stern view of the barge *Cretestile* being floated out of its basin 18 January 1919

over the frames. Once the concrete was laid the cement hydration began, causing the crystals to grow and to interlock rapidly together giving the concrete its strength. Hydration would continue over a very long period of time, (many years in fact), and thus the strength of the concrete increased continuously as time went by, albeit at a slower and slower rate. The Board of Trade laid down strength requirements by means of crushing tests commencing at 1600 p.s.i. and increasing to 3200 p.s.i. between one and four weeks. In reality these requirements were considerably exceeded, for results of 2250 p.s.i. were recorded after one week, and 3500 p.s.i. after four weeks. It was crucial that the concreting was done in dry, mild weather to avoid setting problems, for all of the yards were out in the open, and frosty weather held up the work whilst high winds and strong sunlight could cause overly rapid setting. It was also essential to ensure that the steel re-enforcing was completely protected for even a minor fault in the concrete hull would allow corrosion and deterioration to begin. Such deterioration was potentially extremely hazardous as it was very difficult to detect and could lead to disintegration of the hull. The water resisting qualities of the concrete were further enhanced by adding a waterproof compound whilst in the mixing stage.

When the hull was set, the shuttering was removed and cement mortar was rubbed into the pores before a special black bitumen coating was applied; after the coating was dry the hull was painted in the normal manner.

The tugs were given names with the word *"Crete..."* suffixed with a word of a nautical flavour, whilst the barges had a more general suffix.

The six barges built by John ver Mehr at Shoreham were as follows:-

Hull No.	Name	Gross tonnage	Year of completion
PD 130	*Cretestile*	658	1919
PD 131	*Creteshade*	660	1919
PD 132	*Cretestream*	659	1919
PD 133	*Cretestreet*	658	1919
PD 134	*Creteshore*	658	1919
PD 135	*Cretesurf*	658	1919

The tonnage of these barges varied slightly but all had the following dimensions, viz:-

Length overall—170 feet.
Beam— 33 feet.
Hold Depth—16 feet.
Depth of keel—18 feet (moulded).
Draught— 18 feet 6 inches

As with the tugs previously mentioned, the barges were all constructed to a standard design; however, each of the fifteen yards that built the vessels produced slight differences. Each barge had three cargo holds whilst forward of these holds were storage areas and chain lockers. Above, on the foc'sle deck, a steam winch, bitts and bollards and other associated machinery were installed, and aft of the holds was a small boiler room, a pump room, and various tanks and coal bunkers. On deck there were the crew's quarters, lamp and paint lockers and an open bridge which spanned the deckhouses; a life-boat was also to be found on that level. The vessels built by John ver Mehr were the smallest in size of the "Crete" barges.

Upon completion both tugs and barges were registered in London being classified to Lloyds Register as being 'experimental' and subject to an annual survey. The tugs were classified as A1 for towage, coasting United Kingdom but excluded from the West Coast from Cork to the Pentland Firth. Included in other areas of operation was the Continental Shelf from Brest to Hamburg with the Baltic Sea from April to October. Regarding service in the Baltic Sea they encountered bad conditions in commercial use experiencing heavy ice.

After this series of ships was completed the Government moved quickly to dispose of them, merely retaining a few of the barges for use as store-ships etc.

They sold 11 of the tugs and at least 38 of the barges to the London based firm of Stelph & Leighton who formed the Crete Shipping Co. The twelfth tug, the *"Cretegaff"* (Fig. 5) was sold to S.A. Portus of London.

The Crete Shipping Co. used the barges and tugs to export coal from the North East coal field to the south coast, the near continent, the Baltic and very occasionally to the Iberian peninsula and the Mediterranean. Crete Shipping Co. owned the largest fleet of concrete vessels in private hands ever to exist and the five John ver Mehr built tugs in their ownership had varied careers. The *"Cretewheel"*

which was the last to be completed was lost on 14 October 1920 being wrecked on the rocks at Newbiggin en route to Amble after less than four months service. The *"Creteyard"* was partially dismantled in 1924 when Stelph & Leighton removed her engines for use in a new collier. The *"Cretemast"* was scrapped in 1930 and the *"Creteboom"* was sold to the South Stockton Shipbreaking Co. (Teeside) in 1935, who removed her engines and boiler and re-sold the hull to the Ballina Harbour Commissioners of Co. Mayo, Eire. This latter vessel arrived in the River Moy on the 22 September 1937 having been towed from the Tees by the United Towage tug *"Pressman"*. It was planned to utilise her as a 'river training mole' but while she was being maneuvered into position she sprang a leak and was abandoned where she lay. She was moved slightly in 1970 and today lies forlornly in the River Moy (Fig. 6). It is hoped that she can be re-floated and brought up to the quay at Ballina where a small group of interested people are planning to conserve her hull and convert the vessel into a small museum. The *"Creteblock"* was sold for scrap in 1934 going to the Whitehall Shipyard at Whitby, Yorks where she lay derelict until 1947 when she was to be towed out to sea for sinking. Eluding this fate she broke loose from the tow and ran aground below the Coastguard Station where she became a hazard to shipping; she was subsequently blown up and her remains are still visible at very low tides. The *"Cretegaff"* owned by S.A. Portus had a better fate than the others, for she was sold in 1937 to the Irish Oil & Cake Co. of Drogheda, Co. Louth, being converted into a wheat storage barge during 1938 and re-named the *"Lady Boyne"*. Later this vessel became derelict lying in the River Boyne but, happily, she was towed to Carlingford Lough where she was refurbished and converted to the local marina clubhouse, being fitted out with accommodation, a lounge, showers, and changing rooms, etc. Following this revival her original name *"Cretegaff"* was restored to her. The locally built concrete barge, the *"Cretefield"*, which

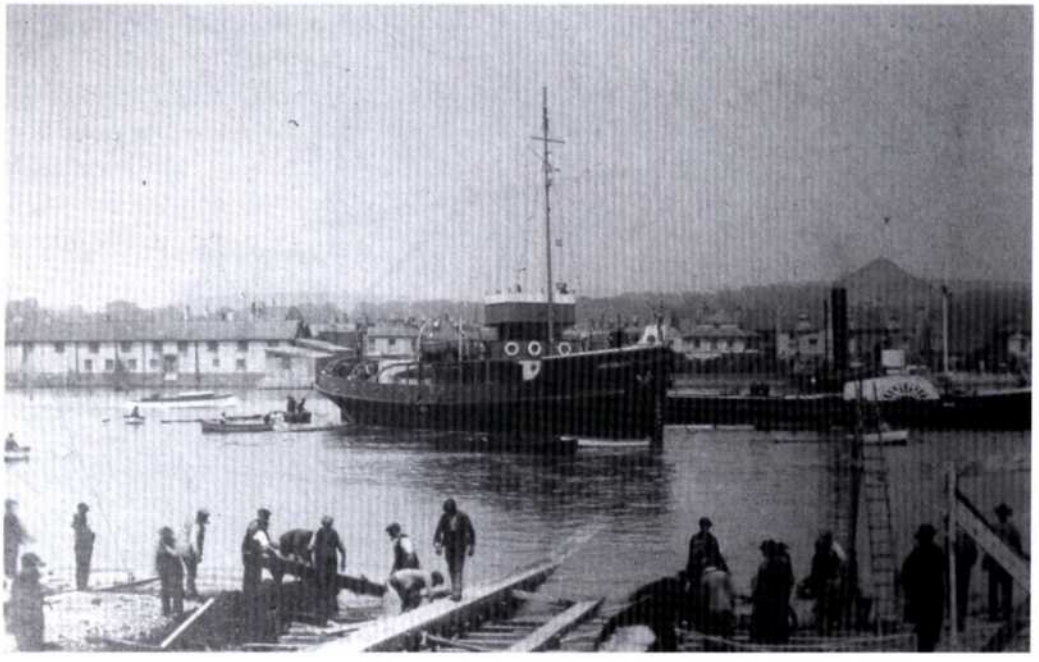

Fig. 5 *Cretegaff* afloat in the River Adur with the Shoreham harbour paddle tug, P. S. *Stella*

Fig. 6 The *Creteboom* in the River Moy at Ballina, Co. Mayo, Eire, in June 1996

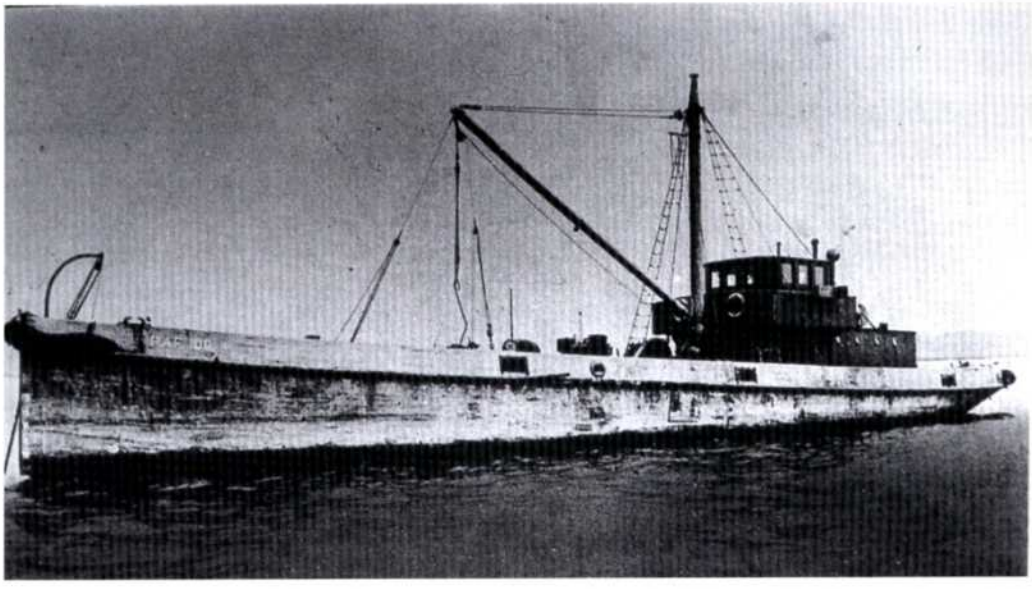

Fig. 7 RFC 109 (RAF 109) concrete motor barge which the RFC (later the RAF) used as a sea-plane tender and recovery vessel in Shoreham during World War I, later motor barge *"Rutter"*

was constructed by J. & R. Thompson of Warrenpoint, situated on the Co. Down side of the Carlingford Lough, also survives at this location. Thompson built four of these concrete barges all of which passed into Crete Shipping Co. ownership.

All six of the barges made by John ver Mehr found their way into the hands of the Crete Shipping Co. and the history of their careers is given below:-

The *"Cretestile"* was wrecked at Gorleston, Norfolk on the 15th of December 1919 when loaded with coal from the Tyne. The *"Creteshade"* and the *"Cretestream"* were sold in 1927 to Dutch interests. The *"Creteshore"* had become a cable barge in 1923 but was removed from the Register by 1928. The *"Cretesurf "* was sold to Scandinavian interests in 1924, being re-named the *"Skogland II"* – she was deleted from the Register in 1930. While it is possible that the latter four, the *"Creteshade"*, *"Cretestream"*, *"Creteshore"* and the *"Cretesurf"* may still be in existence, the only John ver Mehr built barge that definitely survives to the present day is the *"Cretestreet"* which sank in a dock at Hull on 10 February 1920, being abandoned where she lay. Today, covered in green seaweed, she forms part of a jetty near Hull Container Terminal.

The Admiralty had hoped that these concrete ships would be a cheap option, but this idea was unfounded, for the average cost of a concrete barge was some £27,000 whilst the equivalent steel barge could be made for £17,000. Also the use of unskilled labour to construct these vessels was envisaged to alleviate any drain on the limited availability of skilled men at that time. Once again this observation was found to be erroneous, for when work began at the John ver Mehr yard many problems were encountered with the concrete and, as a result, staff from Beeding Cement Works had to be drafted into the yard to assist with construction.

Apart from the Shoreham-built surviving tugs, only the *"Cretehawser"* built by the Wear Concrete Shipbuilding Co. is known to exist today. She lies abandoned on the River Wear above Sunderland at

Fig. 8 House boat *Aquarius*, ex 'F.B. 36', on the river bank at Shoreham in 2004. She is the only ferro-concrete vessel in Shoreham at present.

Hylton in sight of her birthplace at Southwick-on-Wear. Also, remarkably, the *"Creteravine"* built by the Gloucester Ferro-Concrete Shipbuilding Co. as Yard No. PD 140 remains still afloat and in service in Norway. It is quite possible that 'Crete' hulls may still be lying in rivers and creeks or doing duty as breakwaters, quays or pontoons, etc.

The only other concrete ship to see service at Shoreham was the seaplane tender RFC 109 (later RAF 109) (Fig 7). This vessel is believed to have been built at Whitby in 1916. It was based at Shoreham, being discarded at the end of the Great War. It was then acquired by the Brighton & Hove Gas Co., being used to transport tar from the gas works at Portslade to Lennard & Co. Tarworks (latterly South Western Tar) at Shoreham Beach. The 73 G.R.T. iron ketch *"Mavis"* which had been motorised in 1927 was also used for this purpose. *"Mavis"* was sold to R. Lapthorn in 1956 being scrapped in 1973. RAF 109 was renamed *"Rutter"* after the Rutter family, concerned with the management of the Brighton & Hove Gas Co. It survived until the early 1960s when it was broken up on Shoreham Beach. The remains of the hull were then used to strengthen the quay-side on the north bank of the River Adur, just up-stream of the E.S.R. scrap metal wharf (formerly the Railway Wharf), the upper parts of the hull being visible until c.1969 beside the A259 in Kingston Buci.

There is still a ferro-concrete vessel in Shoreham Harbour. This is the houseboat *"Aquarius"* formerly "FB 36" (Fig. 8). This vessel was built as a ferro-concrete tank lighter, being one of the 273 barges designed by L.G. Mouchel and Partners during the Second World War. There were several types of these barges designed and built for W.D. use. Large numbers of them survive today in use as breakwaters, mooring pontoons and houseboats, all over the U.K. coastline. In all, nearly 500 of all types of ferro-concrete barges were built between May 1940 and the end of the war.

"FB36" remained in Military Service until the late 1980s, then in September 1994 she was one of eight similar vessels to be offered for sale by the M. O. D. at Plymouth for £3,750 each. She arrived at Shoreham three years later in August 1997 and she is to be found at 37, River Bank, Shoreham Beach. Her dimensions are as follows:-

Length	Beam	Draught empty	Draught loaded	Gross Tonnage	Dead Weight
84'	22' 6"	3' 9"	8'	140 Tons	346 Tons

To sum up, the concept of the concrete ship was proved to be technically viable and they were found to be robust, seaworthy and long-lasting. Their major disadvantage was their very high construction costs which inhibited any further development in this field once hostilities had ceased and the wartime emergency was over with the Armistice in 1918. It would not be until the outbreak of the World War II in 1939 that interest in concrete shipping would be revived. However, in the U.K. construction was mainly limited to un-powered lighters and barges. Several firms were involved in the construction of these vessels including Wates Ltd of Barrow-in-Furness, Tarrans Ltd and J. Lowe and Sons, both of Liverpool, and W. C. French and Co. who had yards at Grays, Essex and Newport, Monmouthshire. At the Grays yard they built six special 192 G.R.T. barges for F. T. Everard of Greenhithe. They were named *"St Anne"*, *"St Asaph"*, *"St Austell"*, *"St Bees"*, *"St Mawes"* and *"St Michael"*. Whilst at the Newport yard they built the only significant powered vessel the 1,883 G.R.T. *"Lady Woolmer"* of 1941 and her sister the 1,857 G.R.T. *"Lady Kathleen"* of 1943. Both were diesel motor ships with engines aft. However, following the end of World War II, interest in concrete ships and shipbuilding has waned permanently and today it is very unlikely that there will be a resumption of concrete ship building.

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TURNPIKE ROADS TO CHICHESTER, MIDHURST AND PETWORTH

Brian Austen

Introduction

An interest in structures and artefacts of the age of the turnpike was shown from the inception of the Sussex Industrial Archaeology Study Group in 1968, and at a meeting held at Ardingly College on 13 July of that year it was resolved to compile "a list of all known surviving tollhouses in the county, to photograph them, and wherever possible to prepare a ground plan to indicate their size". An interest in milestones was also shown.[1] More than 37 years later, a full survey has yet to be completed. This is not to say that no progress has taken place. A survey of the milestones of East Sussex was completed and published by 1973.[2] The first field guide compiled by the Society featured 39 road structures, mainly tollhouses[3] and a full chapter concerned with road transport appeared in the extended edition of 1985.[4] Since then progress has been slow.

Within the past twelve months new impetus has been evident and a survey team established which hopefully will materially advance the survey. It is intended to record all tollhouses and milestones and any other turnpike structures starting in the west of the county. A hub town will be identified and all turnpike roads serving this place will be examined. A brief history of each of the trusts will be followed by a list of the sites of the tollhouses, and if there are any structures still present these will be described. Surviving milestones will be located and their nature indicated. The first hub city covered in this article is Chichester with the two smaller towns of Midhurst and Petworth also included. It is hoped that the survey will progressively move east until all the roads have been covered. Turnpike trusts were no respecters of county boundaries and where these are crossed, the road will be followed through to its termination. Thus material concerned with Hampshire and Surrey is included in this first article and, later on in the series, material relating to Kent will be included.

The Turnpike System

In medieval times the responsibility for repairing roads rested with the parishes through which they passed and this was the principle behind the first Highways Act passed by parliament in 1555.[5] Repair was to be effected by the compulsory labour, without payment, of those living within the parishes. The church wardens were obliged to appoint a surveyor responsible for enforcing this statute labour, initially four days a year but rising to six once a further Act had been passed in 1563.[6] Parishes failing to maintain roads in good condition could be indicted before the magistrates in quarter session and be punished. Repair was apt to be slipshod and enforcement difficult. As the economy grew, road use increased and with it the problems caused to farmers, industrialists and traders in getting their goods to market.

So serious had the position become by the time of the Restoration of Charles II that a new approach was deemed necessary. Where local resources were ineffectual in repairing important roads, they must be supplemented by payments extracted from the road users. The first turnpike Act was passed by parliament in 1663 covering sections of the Great North Road passing through the county of Hertfordshire. Early turnpike Acts made local justices of the peace responsible for administration, but soon responsibility was placed in the hands of local boards of commissioners empowered to raise funds for the initial road repair, on which annual interest was to be paid. The sums thus raised would be used to put the road in good order and tolls taken from road users to pay the interest due and ensure future maintenance. Powers were usually granted for 21 years but usually renewed on expiry by a new parliamentary Act. The idea was slow to take off; by the end of the seventeenth century only four trusts had been set up in the whole country, and opposition to them was widespread.

The half century to 1750 was, however, a different story, with 418 turnpike Acts covering most of the main roads from London to the most important provincial towns. Progress was slower in Sussex. Although the first turnpike roads edged over the county border as far as Crawley in 1697 and to Highgate just south of Forest Row in 1717, Chichester was not connected to London by turnpike until 1749, Lewes in 1752 and Hastings in 1753. Brighton had to wait until 1770, by which time its reputation as a marine bathing resort had been established. Turnpikes were a recognised part of the transport scene from the second half of the eighteenth century, and their number was to

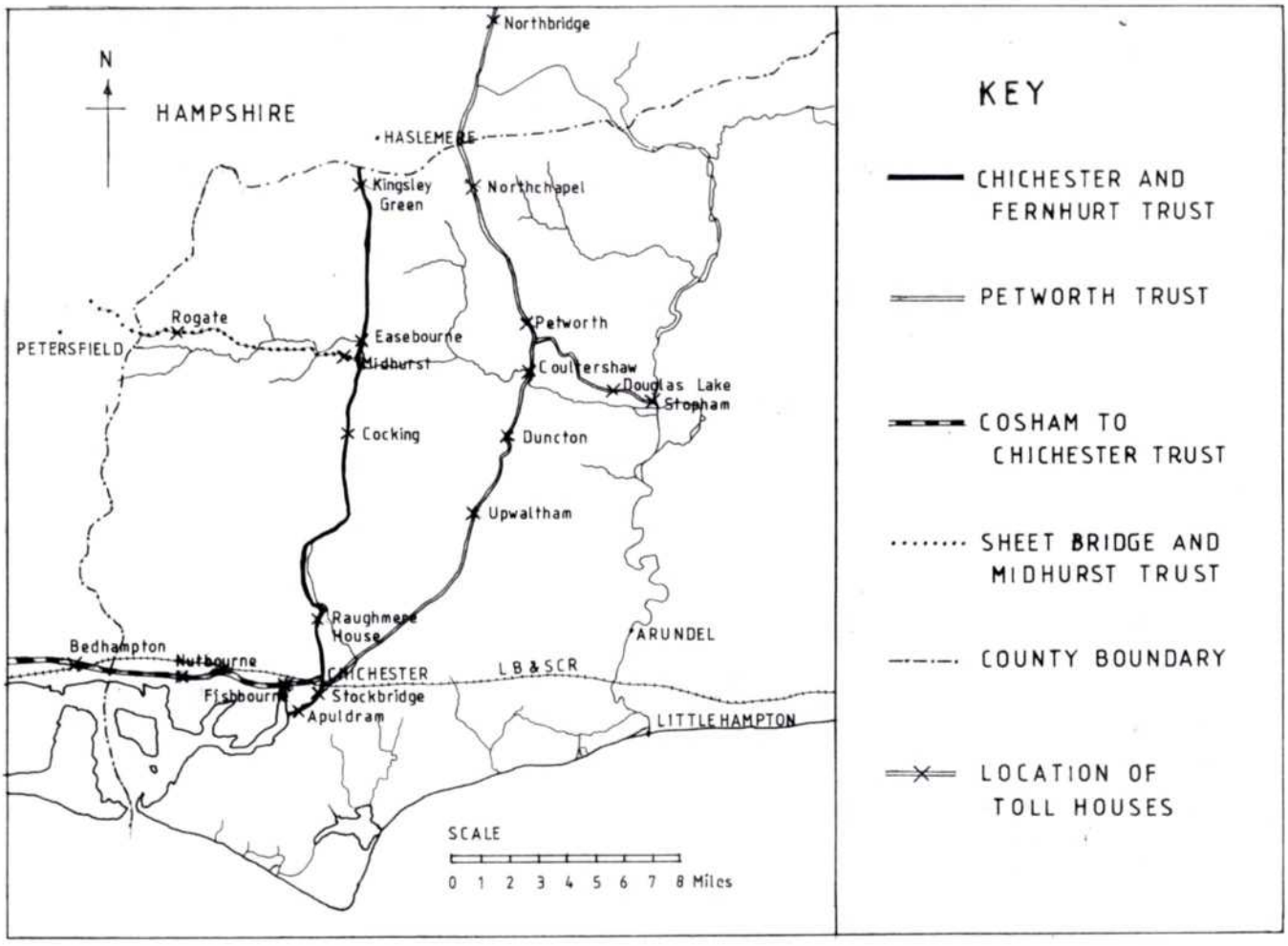

Fig. 1 The Turnpikes of the Chichester area (Ron Martin)

continue to grow until competition from railway development from the 1840s. The last Sussex trust was established in 1841 and progressively from then onwards as their powers expired, authority for their renewal was no longer sought from parliament. The last turnpike tolls in Sussex were collected in 1885. Local highway boards took over responsibility for road maintenance until the passing of the County Councils Act in 1888. Roads within corporate towns were the responsibility of the corporation and were never under turnpike control.[7]

The Turnpikes of the Chichester, Midhurst and Petworth Region

The Chichester and Fernhurst Trust (1749)

The early history of this trust is bound up with that of the London to Portsmouth Road from which it branched. The southern end of the route to Portsmouth was the first section to be turnpiked by an Act passed in 1709.[8] The turnpiked section extended from Portsmouth to Sheet Bridge near Petersfield. With its role as a naval ship-building and repair works it was important that supplies reached Portsmouth from its hinterland, which probably accounts for the early date of the establishment of the trust. Nine years later in 1718 the Surrey & Sussex Trust[9] was set up and this included the road from London to Kingston-upon-Thames. The gap between Kingston and Sheet Bridge was not closed until an Act of 1749[10] which also covered the branch road from Hindhead Heath through Fernhurst and Midhurst to Chichester which subsequently became the Chichester and Fernhurst Trust. In 1780[11] came the only major change to this route when the two mile section between Hindhead Heath on the Portsmouth road and Fernhurst was abandoned. Sixteen years earlier a new trust had been formed to take over the road from Haslemere north to a junction with the Portsmouth road at Milford[12] which now attracted the Chichester traffic, making the connection at Hindhead unnecessary, and allowed it to revert to the maintenance of the parish. The same Act that

abandoned the northern section also gave powers for a southern extension to Dell Quay, enabling cargoes brought by sea to be carried more easily to Chichester. From this date the powers were renewed by subsequent Acts with little material change. The line of the road at West Dean was, however, changed in 1810 to take it further to the west and away from West Dean House.[13]

Fig. 2 Cocking tollhouse c1910

Coaching traffic along this line of road from Fernhurst to Chichester was never substantial and in 1836 only one daily service connected London and Chichester. Even this alternated its route, travelling one day via Midhurst and the next by Petworth, thus providing three weekly journeys each way.[14] This ceased with the building of the coastal railway route from Brighton to Portsmouth, which arrived in Chichester in 1846, and that from Havant to London, opened in 1859, which siphoned off traffic. Midhurst was connected to the rail network in 1864 from Petersfield, and two years later by the extension of the line from Pulborough to Petworth. When the powers of the trustees expired on 1 November 1867 they were not renewed.

Tollhouses

A parliamentary return in 1829 recorded six gates and in 1840 and 1852 five gates and three sidebars.[15] The gates and associated tollhouses were at the following locations:-

Kingsley Green, Fernhurst SU 895305

On the west side of the A286 immediately south of the junction with a minor road, there is a substantial two-storey cottage which for many years has been named the "Toll House". This property was never the tollhouse, however, which was a small cottage on the opposite side of the road and set back into the bank. This probably was demolished at, or soon after, the winding up of the Trust. The 1851 census records the toll keeper as James Heath aged 73, a widower living with his daughter, a dressmaker. Ten years later a widow, Lydia Earwicker, aged 63, was the gate keeper, living in the cottage with her son.[16]

Easebourne SU 891228

The 1847 tithe award map[17] shows a tollhouse at the junction of the A 286 and the road leading east to the A 272 with gates across both roads. The house had a projecting centre bay and was to the south side of road leading eastwards to the A 272.

Cocking SU 878177 (Fig. 2)

Brick built tollhouse immediately north of the turning to Cocking Church, close to the road. Subsequently enlarged by the Rev. H. L. Randall for use as a men's reading room. Later the building became derelict and was demolished in 1965.[18]

Raughmere House, near East Lavant SU 857079

The tollhouse stood on the west side of the A286 just to the south of the turning to East Lavant village. Currently a pair of Victorian cottages stuccoed and painted blue occupy the site together with a single storey brick and flint building formerly a blacksmith's shop. The cottages date from soon after 1867 when the tollhouse was sold by the turnpike commissioners on the winding up of the Trust. When they were sold in 1918 on the death of the then owner, W. Irish, they were described as "2 messuages & blacksmith's shop for many years past used as a Turnpike Gate".[19]

Stockbridge, Chichester SU 858040 (Fig. 3)

On the east side of the A286 south of Chichester railway station. Until its demolition in the late 1930s it consisted of a flint walled single story cottage with

Fig. 3 Stockbridge tollhouse c1937 (WSRO)

brick quoins and window surrounds with a tiled roof. The interior probably consisted of two rooms.

Apuldram SU 842027

The toll gate was immediately west of the junction between the road leading east from Dell Quay to the A286 and Apuldram Lane. The gate is shown on the 1838 tithe award map, but not a tollhouse. A property facing Apuldram Lane is described in the tithe schedules as "cottage & garden north of the toll bar" and it may have been at this property that the gatekeeper lived. The cottage was owned by the Trust and no longer survives.

Milestones

The milestones along this trust are fragmentary and what remains is not in a good state of maintenance. The following were noted:-

SU 896273

On the east side of the A286 one mile south of Fernhurst. It bears the inscription

"TO / LONDON / 45 MILES /
TO / CHICHESTER / 16"

and the stone is 3' 1½" (95.5cm) tall, 1' 2½" (36.6cm) wide and 6" (15.3cm) deep.

SU 878176 (Fig. 4)

On the east side of the A286 on the forecourt of the Milestone Garage which takes its name from the stone. During World War II it was removed, as were all place identification signs, and was returned from the Midhurst depot of West Sussex County Council c1947 and put in its present location. Its placement at the front of the garage forecourt may have helped preserve it but it has also suffered from vehicles which have collided with it and it is currently broken and lying on its side. It bears the inscription:

Fig. 4 Milestone at Cocking SU 878176 (John Blackwell)

"CHICHESTER / 9 / MILES /
LONDON / 52"

It stands 2' 11" (89cm) high, is 13" (33cm) wide and 5" (12.5cm) deep.

SU 857084

On the east side of the A286 at Mid Lavant, 100 yds north of the "Earl of March" public house. The stone stands 2' (61cm) high, is 13" (33cm) wide and has a depth of 6½" (16.5cm). No inscription visible.

SU 858068

A blackened stone on the east side of the road in north Chichester between Broadway and The Avenue and opposite Tudor Close. No visible inscription. Has an Ordnance Survey bench mark at the foot. Stands 2' 3" (68.5cm) high, 12½" (32cm) wide and has a depth of 6" (15.3cm).

All of these stones have similar dimensions and half round tops. They are all on the east side of the road and have distances to London and Chichester where these survive. North of Fernhurst and within Surrey there are three surviving stones of the Haslemere Trust at SU 929386, SU 932390 and SU 941413. The inscriptions are, however, of a different pattern with the words "HYDE PARK CORNER" within the rounded top and distances to Midhurst, Godalming and Haslemere.

***The Petworth Trust* (1757)**

With the completion of the London to Portsmouth turnpike road in 1747, the project for a branch turnpike to serve the town of Petworth was possible and an Act for this purpose was passed in 1757.[20] It left the Portsmouth Road at Milford two miles south-west of Godalming. The Act authorised the Trust to continue its line south from Petworth to the top of Duncton Hill. At this point the clay of the Weald was behind the traveller who could pass over well-drained chalk to within a few miles of Chichester. The kilns at Duncton were also an important source of lime for Wealden farmers.[21] A branch from the main turnpike was also authorised from the town of Petworth to Stopham Bridge on the River Rother to service barge traffic conveying goods upstream from the mouth of the River Arun. The Rother had been navigable for such traffic as far as Stopham from the mid-sixteenth century.

The original Act authorised toll gates at North Bridge Hill, the north end of North Street, Petworth, Rotherbridge and Stopham, but subsequently additional gates were set up at Duncton in 1763 and on the Stopham branch at Douglas Lake, authorised by a parliamentary Act of 1765.[22] The Duncton gate

had a relatively short life as it proved unprofitable and was removed in 1792. It may have been part of a programme to reduce costs as the Trust was by then in financial difficulties. The accounts published in 1779 showed toll income as £582 7s 1½d (£582.36) with road maintenance costs of £1,054 18s 4½d (£1,054.92). It was suspected that not all the tolls collected were being paid over by the gate keepers and from 1795 the tolls were farmed by auction with very satisfactory results, boosting income to £920 in 1798 and £1,102 in 1801. One gate was however still giving cause for alarm. This was the one at Rotherbridge. It was suspected that Mr Warren, the miller at Coultershaw water mill, was not keeping access to his property secure and that travellers were crossing over the Rother at this point, thus avoiding the toll on the parallel turnpike road. To stop any chance of this happening in future, a new Act was passed in 1800[23] permitting the deviation of the road via Coultershaw and the establishment of a tollhouse at this point. The old bridge and tollhouse were to be demolished and the materials used for the new bridge and tollhouse at Coultershaw. New approach roads were to be constructed, the Trust being responsible for the section north of the new bridge and the 3rd Earl of Egremont funding the road southwards until it intercepted the existing line.[24]

A further change came in an Act passed in 1820.[25] This provided for improvements at the top of Duncton Hill and the extension of the turnpike towards Chichester as far as "Seebage Gate" (Seabeach near Halnaker). A tollhouse was established along the line of the new road at Upwaltham. Although the new line would have been used by traffic from Petworth towards Chichester, the route from Milford for traffic from London was already served by the Chichester and Fernhurst Trust and this factor may have been why the road was not turnpiked the whole distance to Chichester. The Petworth trustees also had their eyes on a new source of revenue. The delights of sea-bathing were well established at Brighton by 1780 and were attracting the eyes of entrepreneurs to other places along the Sussex coast. Sir Richard Hotham, who had made his money as a London hatter, visited Bognor for the first time in 1784 and bought his first property there two years later. By the time of his death in 1799 he had invested considerable sums in developing a select sea-bathing resort.[26] The trustees of the Petworth Trust, meeting in April 1801, recognised the value of attracting Bognor travellers away from the rival turnpike through Midhurst and Chichester[27] and authorised the addition to the directing arm at Milford Heath of the wording "To Bognor Rocks and Chichester through Petworth".[28] When plans were drawn up in 1818 and submitted to parliament for the extension from Duncton, a branch was envisaged to Westergate[29] though this was never authorised in the 1820 Act or built.

The Petworth Trust did not suffer such direct rail competition as that from Fernhurst to Chichester. The railway did not reach Petworth until October 1859 and the station was inconveniently placed nearly two miles south of the town. Vehicles picking up passengers and goods at the station would have to pass Coultershaw toll on the way to the town, a useful source of revenue to the Trust. The powers of the Trust had been extended in 1855 for a further 21 years and it was not until May 1877 that it was finally wound up.[30]

Tollhouses

Parliamentary returns in 1829, 1840 and 1852 all record seven gates on this Trust. These were Northbridge, Northchapel, Petworth, Coultershaw and Upwaltham on the main line of the road and Douglas Lake and Stopham on the branch. Two other tollhouses at Rotherbridge and Duncton had been discontinued before the date of the first return.

Northbridge SU 960372

One of the tollhouse locations mentioned in the original 1757 Act which authorised the Trust. The tollgate was not appreciated by all the local residents and in June 1757 a reward of £10 was offered by the Trustees for information on who had removed the gate. There was considerable concern in the late eighteenth century about the effects of heavy loads on road surfaces and a number of general road Acts were passed to restrict weights carried. In March 1785 a weighing engine was set up at Northbridge together with a board listing the penalties for overweight loads.[31] This gate appears to have operated throughout the life of the Trust.

Northbridge tollhouse survives and is located two miles north of the village of Chiddingfold in the county of Surrey. The two-storeyed house is of brick, originally with a slate roof although now tiled, and has been extended to the rear. The front is only a single bay wide with a central doorway and above a panel for the painted toll board, now covered by a pair of louvered shutters. The canted side walls on

either side of the door have windows on both floors though the present ones are later insertions and larger in size. The building looks early nineteenth century in date, possibly replacing an earlier structure, and bears the name "The Toll House".[32]

Northchapel SU 952297 (Fig. 5)

Fig. 5 Northchapel tollhouse (John Blackwell)

Situated on the east side of the A283 just north of the village green. A single story brick building in Flemish bond with a red tiled roof, three bays wide and one deep. The central bay of the front projects forward and contains a window though which the tolls would have been collected. This projecting bay also has an observation window to the south but not to the north. Above the central front window is a brick filled inset circular panel possibly purely decorative. The frontage to the road is 31 feet (9.4m). The northern bay incorporates a milestone, recently restored, giving a distance of 44 miles from London. In shape and size the tollhouse appears to differ little from that shown on the tithe award map of 1837.[33] The board listing the rates of toll survives but not in situ. It was presented to the Haslemere Educational Museum of Mr A.W. Waterlow King and is at present displayed at the Weald and Downland Open Air Museum at Singleton attached to the preserved tollhouse from Upper Beeding.[34]

Northchapel was not included in the list of tollhouses authorised by the 1757 Act and the earliest record of the gate is in April 1765 when the trusties ordered that one be erected there. A cost of £10 17s 0d (£10.85) is mentioned in October 1776 for the erection of Northchapel gate so it is possible that the initial order was not immediately implemented. No tollhouse may have been built initially for in July 1783 it was agreed that the building of such a house "on the same plan as that at Petworth gate be considered at the next meeting". This may not have been implemented either and tolls may have been collected from an existing house occupied by the gatekeeper. In November 1795 it was recorded that Noah Mann had been dismissed because of fraud and it was suggested that the gate be moved to the house of John Upperton, the new keeper.[35] A local history of Northchapel states that the date of the building of the present house was not until 1801 and that the bricks were sourced from Colhook brick kilns.[36]

Petworth SU 976225

Located on the western side of the A283 just north of the junction with the A272. One of the tollhouses specified in the Act of 1757. In June 1759 the trustees ordered that William Pullen be instructed to build a tollhouse of brick and stone at a cost of £36 10s (£36.50). The toll was also known as Union House. It survived until the end of the Trust but was probably demolished soon after the winding up.

Rotherbridge SU 968194

Situated close to the medieval two arch bridge which carried the road over the River Rother. One of the gates specified in the 1757 Act and in June 1759 the trustees commissioned a Mr Sharp to build a tollhouse at a cost of £36 10s (£36.50). Tolls continued to be collected here until 1800 when authority was given for the abandonment of both the tollhouse and the existing line of road. Both the tollhouse and the bridge were to be demolished and the materials recovered transferred to the line of the new road.[37]

Coultershaw SU 972195 (Fig. 6)

Fig. 6 Coultershaw tollhouse, photographed soon after the closure of the Petworth Trust (1877)

A replacement for the one at Rotherbridge and dating from 1800 or soon after when the road was diverted. The plan for the diversion had the support of the 3rd Earl of Egremont who had backed the building of the Rother Navigation to Midhurst, which was opened in 1795. A road already existed to Coultershaw Mill from Petworth and Lord Egremont offered to fund the building of a road south to meet the line of the turnpike at Heath End, an offer which the trustees accepted in November 1798. Parliamentary authority was received in March 1800 for the road diversion and a new bridge and tollhouse was built at Coultershaw.[38] The house was on the north side of the A285 beside the bridge which spanned the lock over the River Rother. It would seem likely that the gate keeper was also responsible for the collection of navigation tolls. The single story tollhouse was of three bays with a central door flanked by matching latticed windows. It was of stone construction with a tiled roof and weather-boarded at the front. The cottage survived the closure of the Trust in 1877 for a number of years.[39]

Duncton

The exact location is uncertain. The gate was established in October 1763 "adjoining to the house of Sarah Steer" who was appointed gate keeper. This seems to suggest that no purpose-built house was erected by the trustees. The gate was discontinued on 1 August 1792, no doubt because revenue was insufficient to justify its continuance.[40]

Upwaltham SU 941135 (Fig. 7)

Fig. 7 Upwaltham tollhouse (John Blackwell)

On the east side of the A285 about a half a mile south of the turning to the church. The single story building is of coursed flint with a central doorway and two flanking windows with brick surrounds. It must date from c1820. It has been enlarged to the south and adjoins a substantial two-storey cottage to the north. The whole is set back from the existing road alignment behind a flint rubble wall. This tollhouse is on the extension of the road from the top of Duncton Hill to Sebbage Gate which was authorised in 1820. Despite its name, Sebbage (Seabeech) Gate was not a turnpike gate and no tolls were collected here.

Douglas Lake SU 999198

The first gate on the branch from Petworth to Stopham Bridge (A283).

The earliest mention of this gate was in April 1765 when the erection of a gate was authorised and Thomas Young named as the gatekeeper.

Subsequent repairs to the gate were approved in October 1776 and August 1799. It would appear, however, that the Trust never erected a tollhouse but leased an existing building named in 1765 as "Staymate". This was costing two guineas (£2.10) per annum and the house leased in November 1798 was the property of the 3rd Earl of Egremont. The income from tolls on the branch was never large and in 1795, when the gates were first offered for farming, no lessee could be found though those on the main line were let. The reluctance to take on the branch tollhouses may have been connected with the completion of the Rother Navigation to Coultershaw in 1793 and Midhurst two years later. Wharves provided at Coultershaw were now the main source of coal and other traffic for Petworth. There was still traffic on the branch, however, and in subsequent years the tolls were let.[41] Douglas Lake gate has also been referred to as Egdean or Fittleworth.

Stopham TQ 027186

On the north side of the A283 to the east of the turning to Stopham Church. In June 1759 James Somersfield was commissioned to build a brick and stone tollhouse at Stopham at a cost of £36 10s 0d (£36.50). At the same meeting of the trustees houses at Rotherbridge and Petworth were ordered to be built at exactly the same cost, suggesting that a standard pattern of house was being used.[42] The tollhouse appears to have survived until the winding up of the Trust in May 1877, when it was demolished. A pair of semi-detached cottages, each three bays wide and named "Turnpike Cottages", exist on the site. A stone set in the face reads "W.B.B./1877" referring to the Bartelott family of Stopham House who exercised their right as the owner of adjoining land, to purchase the tollhouse on the expiry of the Trust.

Milestones

North of the Sussex border, within the county of Surrey, four milestones were recorded:-

SU 945412 Milford

"HYDE PARK CORNER / 34 MILES /
PETWORTH / 13 MILES /
GODALMING / 2 MILES /
CHIDDINGFOLD / 4 MILES"

SU 952382 Outside Milestone Cottage (Fig. 8)

"HYDE PARK CORNER /
36 MILES /
PETWORTH / 11 MILES /
GODALMING / 4 MILES /
CHIDDINGFOLD 2 MILES"

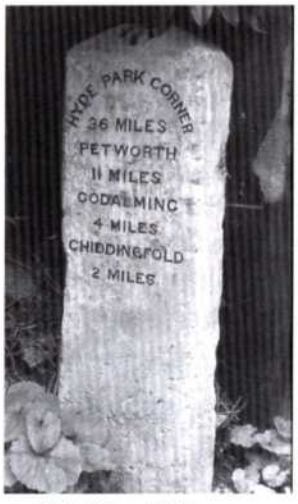

Fig. 8 Milestone north of Chiddingfold, Surrey SU 952382 (Brian Austen)

SU 961355 Opposite the Green, Chiddingfold

"HYDE PARK CORNER / 38 MILES /
PETWORTH / 9 MILES /
GODALMING / 6 MILES /
CHIDDINGFOLD"

SU 953342 Cherfold

"HYDE PARK CORNER / 39 MILES /
PETWORTH / 8 MILES /
GODALMING / 7 MILES /
CHIDDINGFOLD / 1 MILE"

All are of a common pattern with a rounded top and the words "HYDE PARK CORNER" curved to fit, Heights vary from 2′ 2½″ (67.3cm) (Milford) to between 2′ 10½″ (87.6cm) and 3′ 1″ (94cm) depending on the depth they are set in the ground, 1′ 0½″ (31.8cm) to 1′ 3″ (38cm) wide and 6″ (15.3cm) to 7½″ (19.1cm) deep. The pattern is identical to the stones located on the Haslemere Trust and this might suggest that they were installed by the Surrey County Council following the passing of the County Council Act in 1888.

On the Sussex section of the Trust the stones are more simple and were usually incorporated into the fronts of cottages.

SU 952297 Northchapel, incorporated in the tollhouse on the east side of the A283. (Fig. 9)

"44 / MILES /
From / LONDON /
5 / To / PETWORTH"

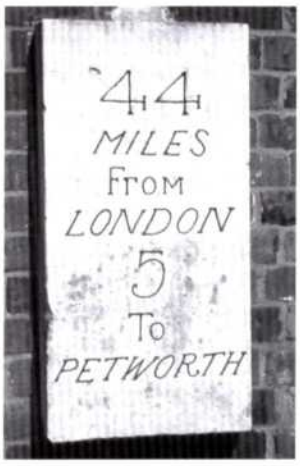

Fig. 9 Milestone incorporated into the front of Northchapel tollhouse (John Blackwell)

SU 974208 on the west side of the A285. A rectangular stone set in the middle of the front of a cottage at first floor level.

"50 / MILES / TO / LONDON"

SU 966237 A three bay two storey cottage with the milestone at first floor level. The stone is 2′ 6″ (76.2cm) high and 1′ 1½″ (34.3cm) wide. The cottage is named "Mile Cottage".

"40 / MILES / From / LONDON /
to / PETWORTH / 4"

SU 963181 at Duncton. Above the door of a three bay cottage is a rectangular stone inscribed:-

"52 / MILES TO LONDON /
MILES TO PETWORTH / 2½"

Creepers are growing over the stone obscuring the inscription.

No milestones have been traced on either the extension to Seebeach or the branch to Stopham though these would have been a legal requirement.

An additional stone is located within the town of Petworth in New Street set into a gate pier of a cottage named "Milestones". It is 1′ 2″ (35.6cm) wide and 2′ 9″ (83.8cm) high and bears the inscription

"49 / MILES / From / LONDON"

It appears to have been recently restored. It is unlikely that this section of road within the town would have been the responsibility of the Petworth Trust and the stone may have been the responsibility of the town authorities. New Street was developed from c.1800.[43]

Four additional stones exist, three within the grounds of Goodwood House and one close to the House beside the public road leading north from Westerton to Goodwood Racecourse. The latter is at SU 880084 and is set well back from the road verge

west of Goodwood House though not at the drive entrance. It measures 3' 5" (1.04m) high, 1' 2" (0.35m) wide and 10½" (0.26m) deep and bears the inscription:-

"III / MILES FROM / CHICHESTER / CROSS".

Within the grounds of Goodwood House are three further stones flanking the drive from the Chichester entrance to Pilleygreen Lodges. These are smaller in size.

SU 886085 2' 6½" (77cm) high with a triangular top 1' 0½" (31.5cm) wide and 7½" (19cm) deep. The inscription reads:

"3½ / MILES FROM /THE CROSS AT / CHICHESTER"

Two further stones are to be found at SU 893100 near Molecomb and at SU 893107.

The first of these three stones is situated immediately in front of the House and visitors may inspect it on days when the House is open to the public. The other two are on a private part of the Estate with no public access.

The 3rd Duke of Richmond rebuilt Goodwood House from the late eighteenth century and it has been stated that he diverted the public road from Petworth to Chichester "to improve the prospect from the windows" and as proof of this "some of the original milestones are still in situ in the park".[44] No documentary evidence has been found to support the statement that the public road has been diverted. The present line of the Petworth to Chichester road corresponds with that shown on Richard Budgen's map of 1724 and Thomas Yeakell and William Gardner's surveys of 1778 and 1795. It is also significant that the milestones associated with the Goodwood Estate list only distances to Chichester. A much more likely explanation for these stones is that they were installed as part of the improvements to the House and grounds, possibly early in the nineteenth century. The use of milestones to emphasise the extent of land ownership and influence was advocated by Humphrey Repton as early as 1791 and another group of estate milestones is to be found in the grounds of Ashburnham Place flanking the carriage drive to the house.[45]

SU 964218 A further milestone in the form of a cast iron plate is to be found at Tillington in the base of the wall of Tillington Cottage on the south side of the A 272, 100yds to the east of the junction with Upperton Road, with the inscription:-

"PETWORTH / M.H. / 1 MILE
MIDHURST / M.H. / M.F.R. 5 5 4"

"M.H." refers to Market House and "M.F.R." to Miles, Furlongs and Rods. It measures 29" (73.7cm) by 17" (43.1cm). The A 272 at this point was never turnpiked and it is likely that the Petworth Estate was responsible for its provision. In style it appears to be early nineteenth-century in date.

Apart from the erection of milestones, turnpike trusts were required to place "direction posts" at cross-roads and turnings and boards including the name of each town and village at its entrance. As these were usually of timber they do not survive.[46] The Petworth Trust also sanctioned in May 1774 the erection of notices "to direct persons where they may obtain additional horses to draw up hills and where they should be taken off". Five locations were identified for such notices including Duncton where the steep ascent of the scarp slope of the South Downs would have made such usage a necessity.[47]

***The Cosham and Chichester Trust* (1762)**

The initial pattern of turnpike development in Sussex involved the connection of the main towns of the County with London. The turnpiking of roads feeding traffic from west to east either along the coast or inland did not develop to any degree until the first decades of the nineteenth century. The line of road from Cosham to Chichester is an exception, and probably owes its early development,[48] like the Portsmouth to Sheet Bridge road, to the needs of timber and provisions for the naval base.

Traffic along the road appears to have been substantial particularly at the Portsmouth end. The Bedhampton gate was yielding a return of £722 in the year to 1808, £600 in 1816 and £539 in 1828. By comparison the tolls in 1828 for the Nutbourne gate were only £437 and Fishbourne £461. Regular coach services were in operation and in 1836 there were three stages between Chichester and Portsmouth daily. Traffic declined dramatically after 1847 with the completion of the coastal railway through Chichester to Portsmouth and by 1850 the total toll income for all three gates was little different from the income of the Bedhampton gate alone in the year to June 1809.[49] The powers of the trust expired on 1 November 1867.

Tollhouses

Parliamentary returns show three gates on this Trust in 1829, 1840 and 1852. These are:-

Bedhampton (in Hampshire) SU 705067

No remains of this house survive. The Bedhampton tithe award map of 1842 shows that it was about 100 yards (91.4m) west of the present railway crossing. A small house, of three bays, on the south side of the road immediately to the west of the crossing has been suggested as the tollhouse.[50] This is not the case and the dwelling may have been built by the railway, possibly for a gatekeeper.

Nutbourne SU 844048

The tollhouse no longer survives.

Fishbourne SU 844047

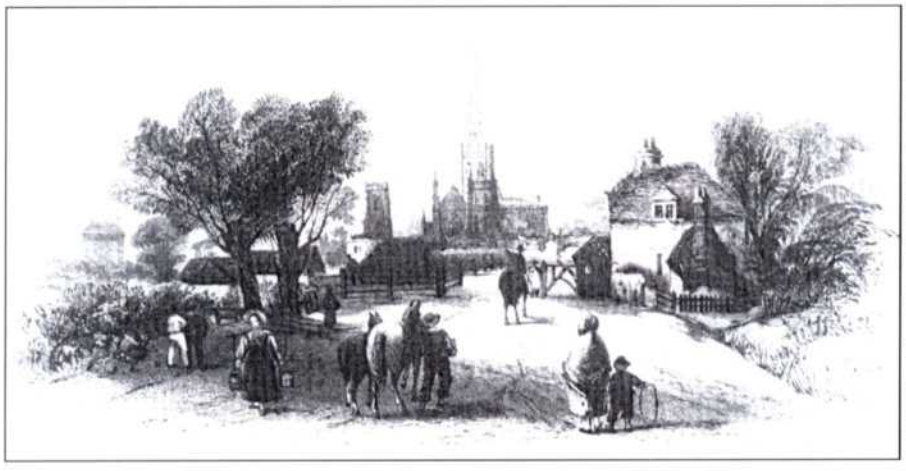

Fig. 10 Steel engraving of 1842 "Chichester from Fishbourne" showing the turnpike gate and on the left the tollhouse (WSRO)

Illustrations of this tollhouse exist in the form of an engraving dated 1842 (Fig. 10) and an oil painting of early nineteenth-century date. The object of the artist in both cases was to provide a distant view of Chichester Cathedral from the west.[51] The tollhouse stood at the junction of Apuldram Lane and the main Chichester to Portsmouth road but the alignment of the latter has been extensively changed and the tollhouse is now on a residential road on the outskirts of Chichester known as Fishbourne Road East. The property now on the site is a pair of semi-detached houses named "Old Toll House" and "Turnpike Cottage" respectively. Whether any of the old tollhouse survives is open to doubt. The present building is many times the size of the original tollhouse, of recent build and shows no discernible early features.

Milestones

The survival of milestones along the A27 is disappointingly low. The 1" OS. map of 1960 (sheet 181) marks seven milestones but the widening and realignment of the road has resulted in their virtual disappearance in recent years. The survivors are few and fragmentary.

SU 700065 West Street, Havant. (in Hampshire)

In 1980 a milestone was recorded set into the wall of a shop formerly in the occupation of Charles Herington, draper and then by McIlroys Ltd. This appears to be no longer present but a replica has been inserted into the front wall of "New Look" above the shop facia. It incorporates three pointing fingers and shows distances to "PORTSMOUTH/ 8 Miles, "EMSWORTH/ 2 miles" and "CHICHESTER/ 9 miles".

SU 733060 (approximately)

A large "engraved milestone standing on the grass verge" on the north side of Emsworth Road near the entrance of "Milestone Cottage" was reported in 1980 but no longer appears to be there.[52]

SU 825048

On the north side of the A259 within Fishbourne are a pair of cottages named "1 & 2 Milestone Cottages". An inaccurate replica stone with a large brass number "2" exists.

The Sheet Bridge and Midhurst Trust (1825)

Authorised in 1825 to control the road from the Market House, Midhurst to connect with the London to Portsmouth road near Sheet Bridge, between the 52nd and 53rd milestones on that road.[53] The Act gave powers to purchase lands in the parishes of Trotton, Terwick and Rogate to improve the road alignment[54] and provide sites for tollhouse erection. With no direct railway competition until 1864 the Trust continued in existence to serve local needs until its powers expired on 1 November 1871.

Tollhouses

Parliamentary returns in 1829, 1840 and 1852 list two tollhouses along this road. Both were built at the opening of the Trust to a common design and both survive.

Midhurst SU 875218

On the north side of the A272 road about a mile west of Midhurst and just beyond the junction of an unclassified road leading to Woolbeeding. Of

sandstone construction with brick surrounds to the windows and quoins. The house is three bays wide with a central bay canted forward to allow observation in both directions along a straight section of road. A central door would have been in this bay but has been replaced by a window. The door would have been flanked by a pair of two light casement windows which exist. The frontage to the road is 29′ 3″ (8.915m). It would originally have had three rooms, the one with the centre bay for toll collection. A modern brick extension to the rear provides for a kitchen and a bathroom. The house is below the level of the existing road because of recent improvements.

Rogate SU 781235 (Fig. 11)

Fig. 11 Rogate tollhouse of 1825 (Brian Austen)

On the south side of the road immediately to the east of an unclassified road leading to Durford Bridge. The road has been realigned at this point and the tollhouse is beside the old road just to the south of the present A272. In essence a duplicate of the Midhurst Tollhouse with sandstone walls and a tiled roof. It has been extended to the rear to double its original size. Now used as a hairdressing salon.

Milestones

A common style of milestone of triangular cross section was used on this Trust.

SU 869218

In situ on the south side of the A272 400 yards to the west of Midhurst tollhouse. The inscription on this milestone reads:-

"36 / MILES TO / BRIGHTON
1 / MILE TO / MIDHURST
8 / MILES TO / PETWORTH"

on the west face and

"27 / MILES TO / WINCHESTER
9 / MILES TO / PETERSFIELD"

on the east face.

The stone stands 2′ 10″ (86.4cm) from the ground and the angled sides are 11½″ (29.2cm) deep. An Ordnance Survey arrow appears below "PETERSFIELD".

TQ 977218 (Fig. 12)

Fig. 12 Milestone, Stable Yard, Petworth House, prior to World War II at Stedham (John Blackwell)

Two further stones of the same pattern survive but not in situ. These are to be found flanking the inner arch to the Stable Yard at Petworth House. They were placed here in World War II when all place name and direction signs were removed to deny any German invading force vital information. The Stables of Petworth House were used as a military depot during the War and the milestones placed there to protect the stonework of the arch leading to the public road from damage that might be inflicted by military vehicles. One of the stones has the sloping face at the top inscribed "STEDHAM" and :-

"37 / MILES TO / BRIGHTON
2 / MILES TO / MIDHURST
9 / MILES TO / PETWORTH"

on one face and

"26 / MILES TO / WINCHESTER
8 / MILES TO / PETERSFIELD"

on the other.

The other is inscribed "ROGATE" and lists

"41 / MILES TO / BRIGH'TON
6 / MILES TO / MIDHURST
13 / MILES TO / PETWORTH
22 / MILES TO / WINCHESTER
4 / MILES TO / PETERSFIELD"

Both stones are mounted on a plinth 5"(12.7cm) high. The second stone described is 4′ 3½″ (130.8cm) high at the rear and 3′ 9″ (114.3cm)at the front and has also an Ordnance Survey arrow carved into it.

SU 841223 (Fig. 13)

Another wayside stone is to be found on the south side of the A272 50 yards (50 m) to the east of the turning to Chithurst. Although roughly the same shape as the others described, the style of the wording is different and the stone smaller in dimension, being only 2' 9" (83.8cm) high at the back, 1' 7" (48.2cm) at the front and with sides 1' (30.5cm) wide. On the sloping triangle at the top is the word "TROTTON" and one face:-

Fig. 13 Milestone at Trotton SU223841 (Brian Austen)

"36 / BRIGHTON /
3 / MIDHURST /
10 / PETWORTH"

and on the other:-

"25 / WINCHESTER /
7 / PETERSFIELD"

This stone may be a later replacement.

Turnpike Development

The establishment of turnpikes in the Chichester area in many ways followed the national pattern and the city of Chichester and the town of Midhurst were connected to London by these improved roads in 1749, closely followed by Petworth in 1757. Where development differed to some extent from the national pattern was the early introduction of a westerly turnpike from Chichester to Portsmouth in 1762 paralleling the coast. This would have provided an additional means of conveyance to coastal shipping for supplies of timber, naval stores and provisions to the dockyard and military garrisons at Portsmouth. The wide coastal plain through which the road passed was rich agricultural land noted for its production of wheat. Chichester and Emsworth developed as important centres of milling as a consequence. East to west routes in the County of Sussex were uncommon until the early nineteenth century.

The only other development was the 1825 turnpiking of the road from near Petersfield to Midhurst. This fed the London to Portsmouth road and may have been connected with the trade to the military facilities also.

The routes of a number of roads regarded as important today were never turnpiked. Most notable was the line of the present A27 which was only subject to turnpike control as far as Chichester. No turnpike connected the City with Arundel and its crossing over the River Arun. Its population of 2,803 inhabitants in 1831 was little more than a third of that of Chichester. Nor did the coastal route to Bognor and Littlehampton invite turnpike development. Bognor had but 588 inhabitants in 1831 though the number would have swelled with the summer visitors, and at Littlehampton the route to the east would have been blocked by the unbridged River Arun. Further north the turnpiking of the A272 stopped at Midhurst and the lands of the Cowdray and Petworth estates between here and the town of Petworth were not regarded as important enough to warrant attention. The 3rd Earl of Egremont was indeed interested in transport improvement and it may have been because of Petworth House interests that the branch to Stopham was turnpiked. Later interest was, however, directed towards the Rother Navigation and the Midhurst Canal.

Had railways not developed along the Sussex coast in the 1840s, further east to west developments may have taken place but by the 1830s the threat of the railway was sufficient to inhibit investment.

One final observation is required. It seems strange that the Petworth Trust, when it extended its route in 1820, terminated at Seebage Gate, five miles short of the Cross at Chichester. A possible explanation might be Goodwood Estate opposition. They may either have regarded roads passing through their estates as their responsibility or feared that turnpiking might result in London to Chichester traffic being diverted to this road from the Midhurst route passing close to their house. Anyway, if the Richmond family wanted to travel to London they could reach the turnpike by means of the carriage drives passing through their own grounds.

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Acknowledgement

This survey was carried in the summer of 2004 by the Author, John Blackwell and Peter Holtham.

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