



DOVER HARBOUR BOARD

HERITAGE RECORDING THE TELFORD SLUICES AND ASSOCIATED SLUICE MECHANISMS TO THE DOVER WESTERN DOCKS, DOVER, KENT

Desktop Study



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Summary

In 2012, Dover Harbour Board (DHB) gained consent for Terminal 2 (T2), a major proposal for a new second ferry terminal and marina development in the Western Docks, via the Dover Harbour Revision Order 2012 (the HRO). DHB are now carrying forward the construction of certain elements of the HRO. The scheme being progressed lies within the consented development for T2 and is referred to as the Dover Western Docks Revival (DWDR).

A collection of historic building surveys and desktop studies have been completed by the DWDR team on behalf of the Port of Dover. These have been undertaken in order to create a record of historical assets which can be found within the Port of Dover and that will be subject to impact from the construction of DWDR. Research for these reports commenced before any of the planned construction work began on the revival scheme.

This report comprises a desktop study and historic record of the Telford Sluices and Associated Sluice Mechanisms.



1. Project Background

In 2012, Dover Harbour Board (DHB) gained consent for Terminal 2 (T2), a major proposal for a new second ferry terminal and marina development in the Western Docks, via the Dover Harbour Revision Order 2012 (the HRO). DHB are now carrying forward the construction of certain elements of the HRO. The scheme being progressed lies within the consented development for T2 and is referred to as the Dover Western Docks Revival (DWDR).

There are 11 Listed Buildings and two Scheduled Monuments within the Port of Dover. Neither of the Scheduled Monuments and only two of the Listed Buildings fall within the footprint of the DWDR scheme that will be directly affected by the overall works. Listed Building Consent has been obtained for work affecting the listed structures

In addition to the listed buildings, however, there are a number of non-designated historic structures which will be subject to impact from the DWDR scheme. A Level 1 photographic heritage recording of the entirety of the DWDR foot print was carried out by DHB, between 2nd September 2015 and 9th February 2016. The purpose of this recording was to log the current physical properties of the Western Docks and highlight select structures of historic importance.

Subsequent to this Level 1 photographic recording, desktop studies have been undertaken for the following structures of historic importance:

- Granville Dock, Tidal Basin, Tug Haven and the Wick Channel;
- The Telford Sluices and Associated Sluice Mechanisms;
- The Union Street Swing Bridge and Wellington Dock gates;
- Train Ferry Dock and the Dunkirk Jetty;
- The Prince of Wales Pier; and
- The Promenade.

This report presents the results of the desktop study for the Telford Sluices and Associated Sluice Mechanisms



2. Methodology

2.1 Aims and Objectives

The aim of the desktop study is to provide a detailed record of the Telford Sluices and Associated Sluice Mechanisms prior to impact from the construction of DWDR.

The objectives of the desktop study are:

- To clarify the impact from the construction of DWDR;
- To provide a description of the history of the site based on archive material and secondary sources;
- To provide a historic record of the structure through historic plans, maps, charts and photographs;
- To provide a current record of the structure through recent photographs, laser scanning or measured drawings if available; and
- To identify any further recording requirements or mitigation measures that may be required prior to the commencement of works for DWDR.

2.2 Approach

Work for this desktop study was undertaken in accordance with the Written Scheme of Investigation for DWDR prepared by Royal HaskoningDHV (2015). The methodology for the desktop study was carried out with consideration of available standards and guidance, including:

- CIfA, 2014, Standard and Guidance for the archaeological investigation and recording of standing buildings or structures; and
- Historic England, 2016, Understanding Historic Buildings: A guide to good recording practice.

This study comprises an account of the structure's origins, development and use, and includes evidence on which this analysis has been made. The research for this desktop study was undertaken using readily available sources to help understand the construction, development and historical context of the Telford Sluices and Associated Sluice Mechanisms. This study incorporates the findings and interpretations of this research.

2.3 Sources

Key primary sources for this report include historic Ordnance Survey maps in the DHB archive and historic newspapers sourced from the British Newspaper Archive Online (<http://www.britishnewspaperarchive.co.uk/>). Further use has been made of published secondary sources, including books and online research. To illustrate the development of the structure's appearance and form use has been made of the DHB archive, including



photographs, drawings and plans. Dover Museum has provided a valuable source for illustrations and photographs, all others are taken from the DHB Photographic Archive. Although some hard copies of these documents exist, in particular the historic Ordnance Survey maps, the majority of these are digital copies that can be found in the DHB archive. The historic maps can be found in the archives in Harbour House, Waterloo Crescent.

3. Description of the Site

The Telford Tunnels and associated Sluice Mechanisms are located throughout the port in multiple locations. The Telford Tunnels are no longer visible with the likelihood of them being buried under current structures highly probable. **Figure 1** in Appendix 001 shows their presumed position overlaid on a map of the contemporary Western Docks.

There are three different sluices currently in existence in the port, for ease and understanding they have been allocated a letter for reference, for use within the report. The sluice located next to the Swingbridge on Union Street is Sluice A (National Grid Reference: TR 31812 4078). The sluice further to the West on Union street, with exterior control box housed in a small brick building, is Sluice B (National Grid Reference: TR 31724 4078). The sluice present on the southern side of the Crosswall, close to the Tug Haven is Sluice C (National Grid Reference: TR 31769 4054). Their position in the port can be seen in **Figure 2** in **Appendix 001**.

As part of the DWDR scheme, the sluices, if not decommissioned already will be shut off with exterior control boxes removed and relocated into the new port development. **Figure 3** in Appendix 001 demonstrates the work that will be undertaken. This will result in the loss of the fabric and the original outline of the historic docks.

4. History of the Site

4.1 Telford Tunnels

In January 1834 the entrance to Dover Harbour, the channel between the South and North Piers, was substantially obstructed by a bar of shingle. This deposit of shingle was historically a significant problem at Dover and previous attempts had been made to keep the harbour mouth clear. Most significant were the works of James Moon, harbour master and resident engineer at Dover from 1792 until his death in 1832 (Hasenson, 1980). Plans from 1805 show one of Moon's proposals for clearing the harbour mouth (**Figure 4 in Appendix 001**) but this proposal appears to have been rejected. Further proposals were made by Moon in 1811 (**Figure 5 in Appendix 001**) and this time the works seem to have been accepted as work began on the wet and dry docks suggested by Moon in 1811 (for further information on this



refer to the Granville Dock, Tidal Basin, Tug Haven and Wick Channel Desktop Study, DHB, 2016).

There is a possibility that the 1811 plans were used to create a model showing the intended works. Dover Town Hall holds a very old, interesting model, with removable pieces, colloquially known as the *Moon Model* (**Plate 1**), referring to its supposed creator James Moon. The 1811 plan and the model both show a tunnel running the length of the South Pier (**Plate 2**), connecting three culverts at the pier head with the wet dock (**Plates 3 and 4**), which is in turn connected by a tunnel through to the Basin. Hasenson states that this scale model was built by Moon and exhibited to the Harbour Sessions in December 1815, although his evidence for this is unclear (Hasenson, 1980, p. 62). This model was found within the port of Dover and now owned and maintained by Dover Museum. It is currently stored in Dover Town Hall with the aim of one day getting it onto display in either Dover Museum or within the new port development.

However, this model differentiates from the 1811 layout by showing an extended South Pier head in comparison to the plan. This could possibly be a later addition and possibly reflective of later plans as will be discussed below. It is also difficult to date the model as the Crosswall (**Plate 5**) was not constructed to the form depicted until 1819 (Dovermuseum.co.uk, 2017). However this model could have been acting as a proposal rather than showing precisely what existed at the time. It would also appear that the labels present on the model were added at a later date, as the Granville Dock was not inaugurated as this until 1874.

Moon often worked alongside Sir Henry Oxenden, who was the harbour commissioner at the time, organising many meetings where the both of them would attend alongside the contemporary Duke of Wellington to discuss matter of the port.

Although Hasenson states that the proposed 1811 plan by Moon was realised by 1824, when the tunnel between the wet dock and the Basin was finished (Hasenson, 1980, p. 63), it is unclear what his evidence for this is. An 1833 survey of Dover (**Figure 6 in Appendix 001**) does show 3 culverts on the South Pier head, indicating a tunnel through the South Pier. Unfortunately there is little visual evidence from drawings or maps that indicate the full extent of the works as built by Moon.

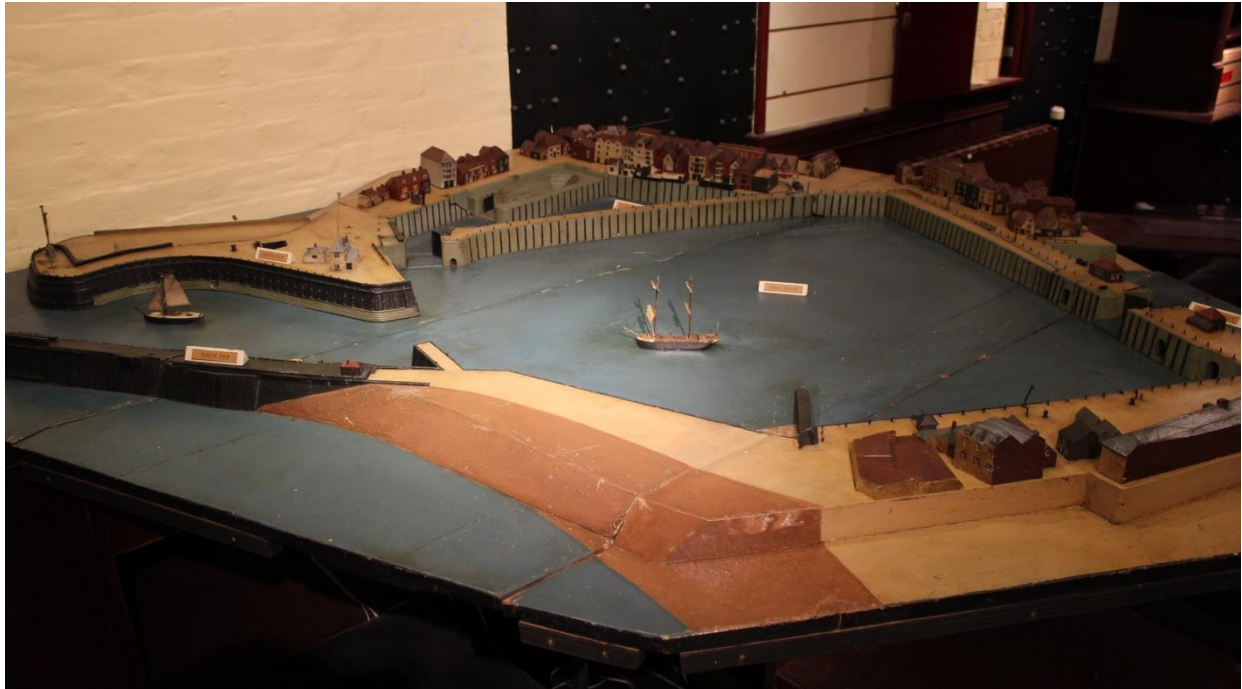


Plate 1- *The Moon Model over looking the Western side of the Dover harbour, built c.1811, held at Dover Town Hall, image taken 21/11/16, DHB.*

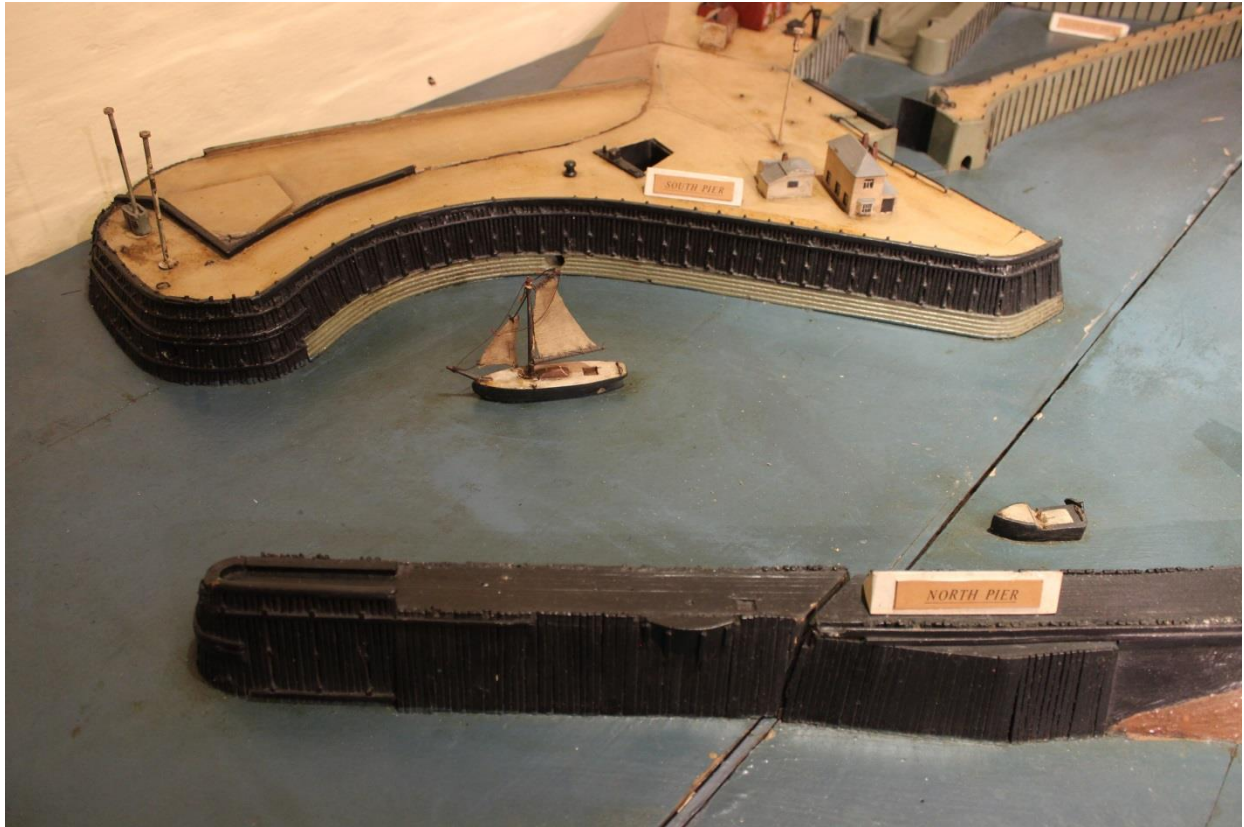


Plate 2: *The Moon Model showing North and South Piers, built c.1811, held at Dover Town Hall, image taken 21/11/16, DHB.*

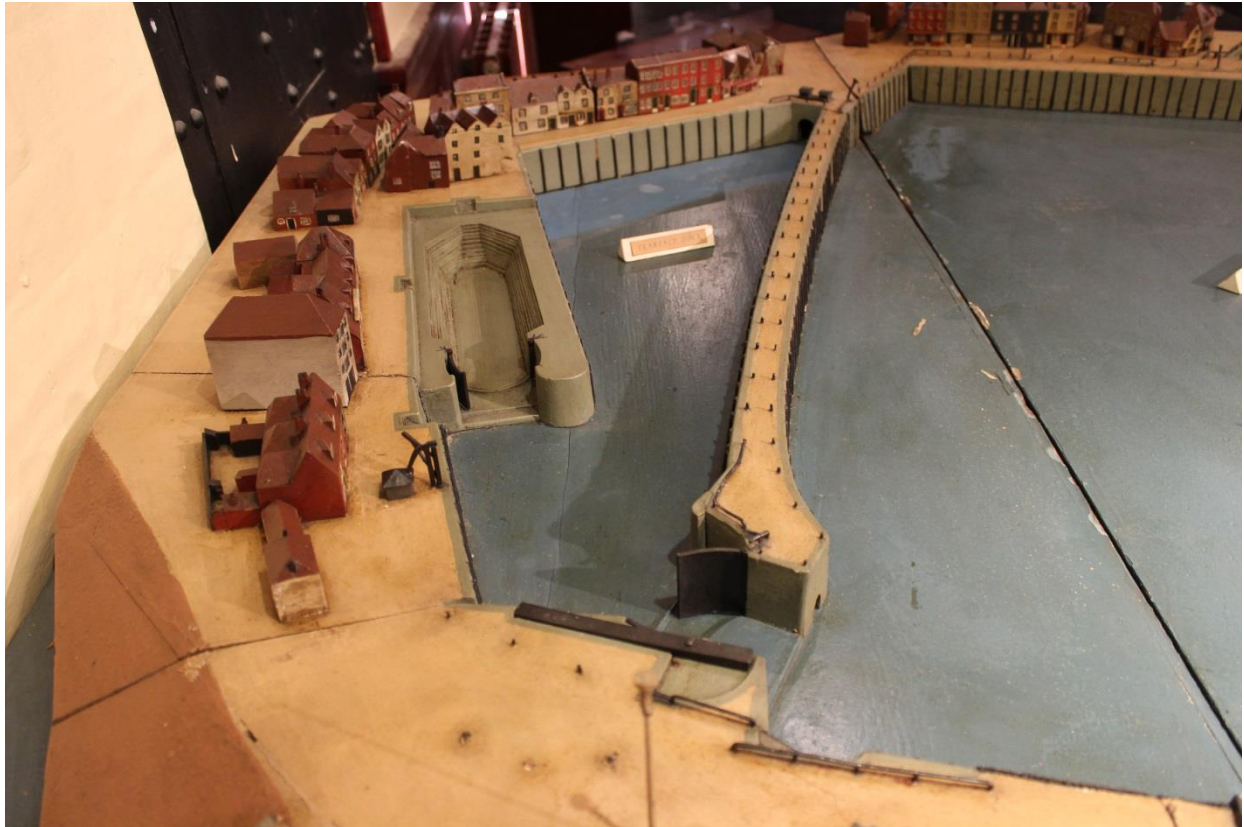


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Plate 4: *The Moon Model showing the wet and dry dock, built c.1811, held at Dover Town Hall, image taken 21/11/16, DHB.*

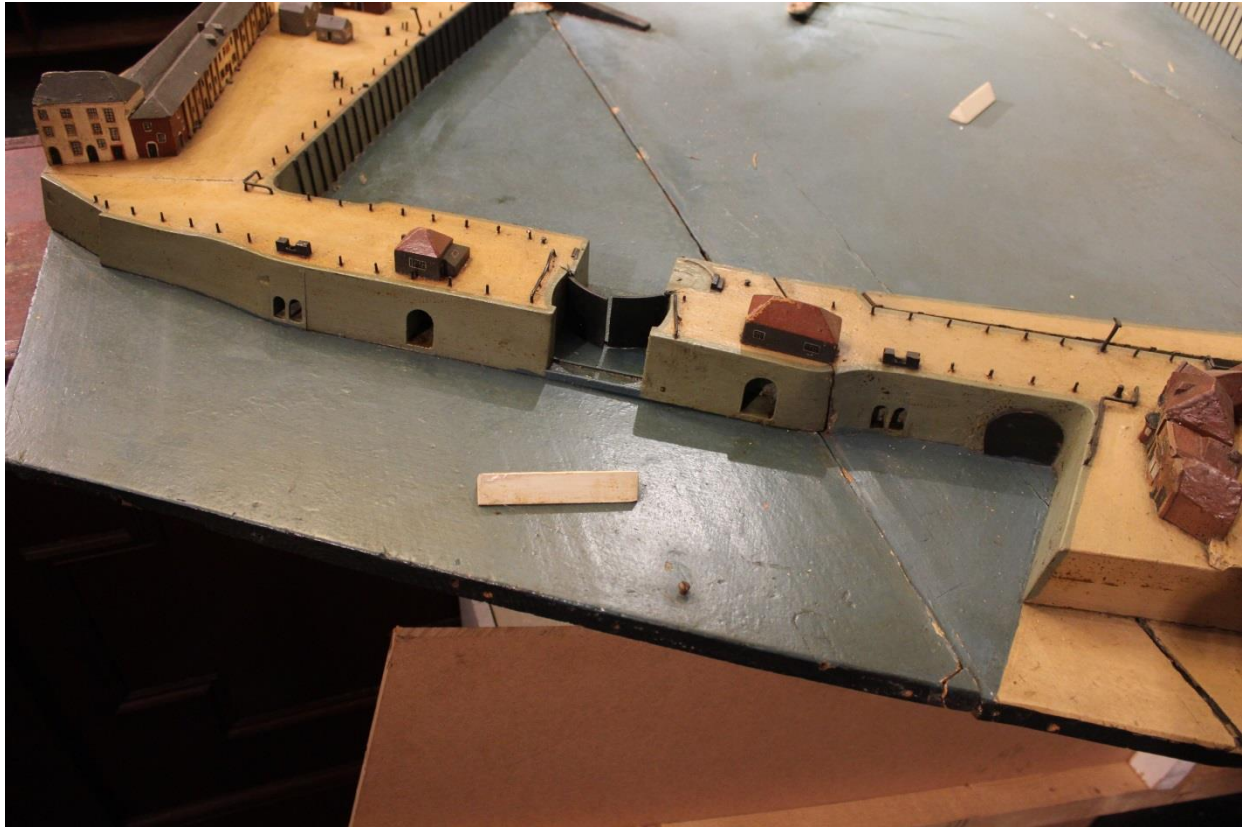


Plate 5: *The Moon Model showing the Crosswall, built c.1811, held at Dover Town Hall, image taken 21/11/16, DHB.*



The work of Moon was clearly only slightly beneficial and the extent to which the shingle deposit had accumulated in 1834 was far greater than had been seen before. This obstruction of the harbour-mouth was seen as an intolerable 'national inconvenience', considering that Dover Harbour had become more important, now internationally dealing with trade ships; since the peace of 1815 marking the end of the Napoleonic Wars (Murray, 1839). A deputation of the inhabitants of Dover appealed to Dover Harbour Board and the government on the 22nd of January to remedy the situation and an appeal was forwarded to the Duke of Wellington, the Lord Warden of the Cinque Ports and the Chairman of the Harbour Board (Maidstone Journal and Kentish Advertiser, 28/01/1834).

By the 25th of January 1834 Thomas Telford, the most distinguished civil engineer of the time and President of the Institution of Civil Engineers, was in receipt of a letter from Wellington. Wellington requested the assistance of Telford to report upon the state of Dover Harbour and to suggest ways in which the obstruction of the harbour mouth may be remedied. Telford accepted Wellington's request and visited Dover on the 30th and 31st of January. Dover Harbour, as it was at the time of Telford's visit can be seen in **Figure 7 in Appendix 001** Telford recorded his visit to Dover and his subsequent thoughts and his full report can be found in **Appendix 002**.

At the time of Telford's visit the channel through the harbour-mouth had been sufficiently cleared but Telford was still able to observe the effectiveness of the existing sluice operations. Telford's comments support that the work proposed by Moon in 1811 was to some extent completed. Telford witnessed the effect of opening the three culverts on the South Pier head as well as the sluice gates in the Crosswall between the Outer Harbour (now Tidal Basin) and the Basin (now Granville Dock). Telford stated the defects of the sluice operations were as follows:

1. "The Culverts in the Pier Head are too few in number, and of too great length;
2. Nor are they fully supplied with water, the archway through which the backwater current reaches them, not being adequately large; and
3. Besides these defects, the distance from the sluices in the Crosswall to the Harbour entrance is such that the current loses much of its force before it is brought to bear upon the external bar of shingle."



Telford believed that if the effect of the backwater extending behind the Crosswall was exerted under more favourable circumstances, the shingle could be cleared and the harbour-mouth kept open. In order to remedy the existing defects Telford recommended:

1. "That the culverts be shortened, and the iron lengths of tube thus obtained be applied in increasing the number of culverts;
2. That a tunnel 30 feet in diameter be constructed in the body of the Pier from the culverts quite to the wet dock;
3. And that a similar tunnel be made from the said wet dock to the Basin, thereby also communicating at pleasure with the Inner Pent."

Telford also recommended that once the new culverts in the South Pier head were completed that an apron or granite pavement, thirty feet in breadth, should be placed around the Pier head in order to prevent the force of the current discharged from the culverts scooping pits in the chalk. The plans submitted with this report that show the intended work are signed by Telford (**Figure 8-9 in Appendix 001**). The total cost of the works was estimated by Telford to be £20,000. There is, however, no indication on the plans drawn by Telford, of the existing works thought to have been carried out by Moon.

At the beginning of April 1834 the contract for works was put to tender, to be submitted directly to Telford. It was noted that the works were to be executed under the superintendence, and to the satisfaction, of Mr. Fordham, Engineer of Dover Harbour (Kentish Gazette 15/04/1834). The plans submitted by Telford are also undersigned by Fordham, probably at a slightly later date, showing his approval of the plans. By the end of April 1834 the contract for the works had been awarded to a Mr. Burge of Herne Bay (Kentish Chronicle, 29/04/1834). Mr. Burge had previously worked with Telford on the construction of St. Katharine's Docks, London, and also a new pier at Herne Bay. Through the works in Herne Bay Mr. Burge was also associated with Sir Henry Oxenden.

Under Mr. Burge the works quickly commenced and newspaper reports of the time note the 'spirit and rapidity' in which the works were carried out (Kentish Gazette, 20/05/1834). By this time the plans had been altered slightly to include a larger reservoir on the South Pier. No plans showing this alteration of the reservoir survive, however it is recorded in newspaper reports of the time as the earliest portion of work carried out. A dam was erected at the South Pier in order to construct the new reservoir and on the 25th of June 1834 the foundation stone of the reservoir was lowered.

Sir Henry Oxenden and the Mayor of Dover descended 40 feet to the bottom of the dam and laid the stone. A pint glass bottle was inserted into a cavity of the stone, containing a parchment on which was written the following: "The first stone of this reservoir was laid on the



25th day of June, in the year of our Lord, 1834, by Sir Henry Oxenden, baronet, one of the Commissioners of Dover Harbour, and Joseph Webb Pilcher, esq. Mayor of Dover; Arthur Duke of Wellington, being Lord Warden of the Cinque Ports; Elias Pym Fordham, engineer." (Kentish Gazette, 01/07/1834).

In September 1834 Telford died after falling ill in August although the works at Dover progressed under Fordham. A good record of the works is provided in an account of the life of Telford, written by him and completed by John Rickman, Clerk of the House of Commons, after Telford's death. Rickman writes that at the time of Telford's death "the greater part of the brick-tunnels was made; part of the excavation for the reservoir-dam, and a small part of the wall built; but none of the drawings prepared, or work done, towards the sluices or machinery" (Telford and Rickman, 1838). An extract of this narrative of Telford's life can be found in **Appendix 003**. The last plan he signed off for the works in Dover was a plan showing proposed alterations of Wharves, 1834 (**Figure 10 in Appendix 001**).

By the time the biography was being concluded by Rickman (March, 1838) the works were "completed under contracts (by Mr M'Intosh, and by Messrs. Hunter and English for machinery, under Messrs. Walker [James Walker, President of the Institution of Civil Engineers] and Burge, the engineers, and Mr Howkins, resident engineer), without any alterations to affect materially the design; three of the new sluices were opened on 25th October 1837, and the success has quite equalled the expectation..." (Telford and Rickman, 1838). The works as completed can be seen in **Figure 11 in Appendix 001**, entitled *Plan of Dover Harbour showing the recent alterations of the South Pier Head*.

In February 1838 after the completion of the works, the harbour master John Iron wrote to Walker confirming that there had been no obstruction to vessels going into or out of the harbour and that the channel into the harbour had been kept open (Telford and Rickman, 1838). A very early photograph of the wet dock, circa 1848 (**Plate 6**), shows the entrances to both the tunnels connected to the wet dock, they are not the clearest in the image below and therefore have been circled in red. Another version of the image does exist which shows the same view in a much clearer quality; it has, however, been cropped differently and therefore both have been included in this desktop study in **Plate 7**.

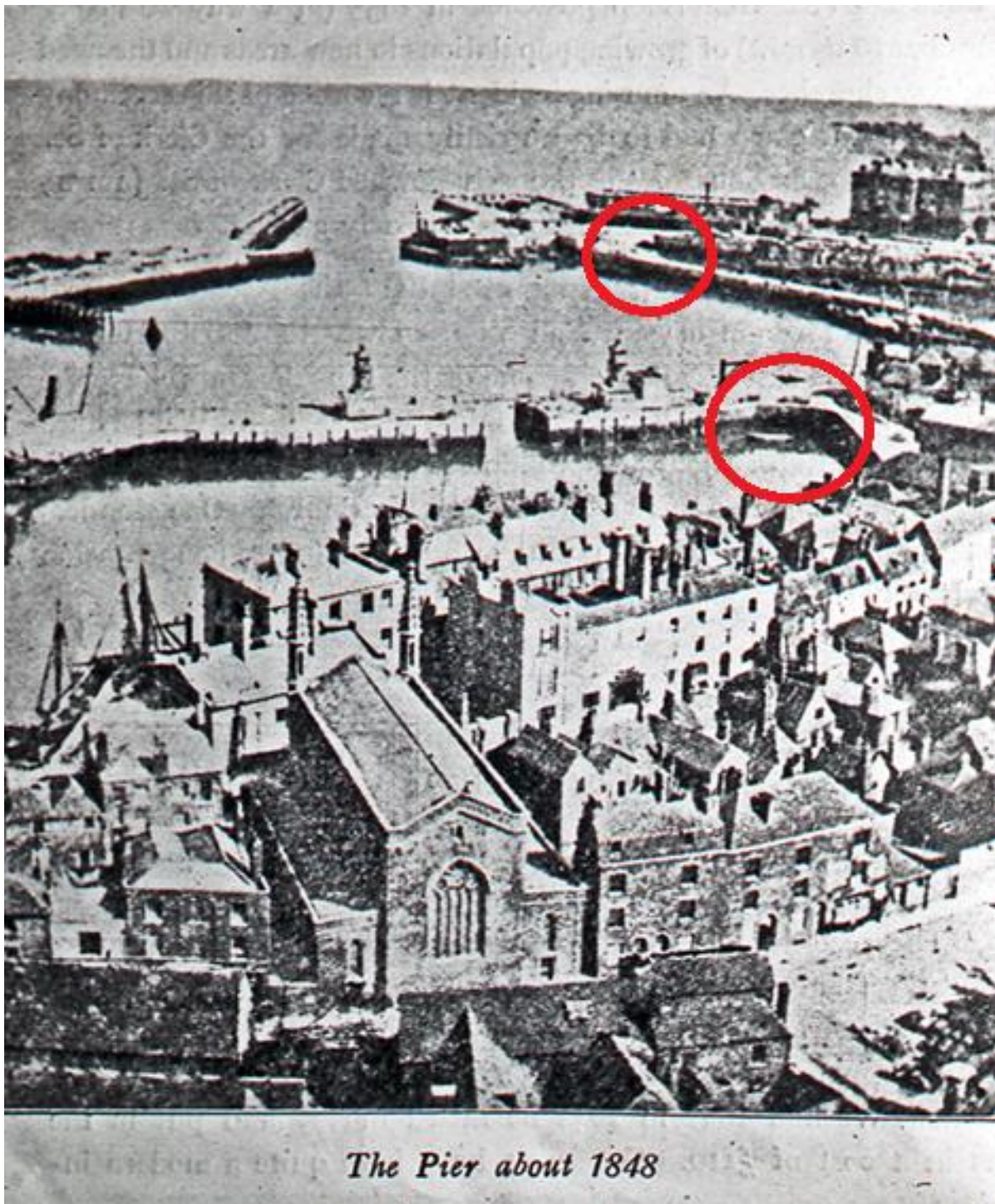


Plate 6: A photo of the old pier district taken c.1848, the two tunnel openings have been highlighted in red, Dover Museum d25746.



Plate 7: *The same photo as Plate 6 but slightly cropped with a much clearer quality, c.1848. Courtesy of Paul Wells.*

The tunnel system devised by Telford is believed to have remained untouched and in operation until circa 1862 when the London, Chatham and Dover Railway (LCDR) proposed to cross the harbour with a tramway connecting to the Admiralty Pier. The initial suggestion would require crossing the wet dock by means of a 'bridgeway' or viaduct, which would leave the quay walls untouched and a small pool left in the dock. However, another plan was proposed to remove the existing wet dock quay walls and extend the quay wall known as Clarence quay (Dover Express, 08/03/1862).

This plan would have blocked the tunnel entrance between the wet dock and the Basin, but would leave the tunnel between the wet dock and the South Pier open. From a newspaper report of July 1863 it appears that the LCDR decided to adopt the former plan of constructing a viaduct over the wet dock. The newspaper states that the Inspector of Nuisances had reported the "great inconvenience and annoyance experienced from the effluvia arising from the dock immediately in front of Clarence Place, and into which some neighbouring houses were drained... the London, Chatham, and Dover Railway Company having erected their viaduct over the dock, and kept in the water, were the cause of the inconvenience" (Dover Express 11/07/1863).

Although this suggests that the wet dock was still in existence at this time, it seems there was no flow of water within the dock, indicating that the tunnels decided by Telford were not used at this point. With the construction of the Admiralty Pier in the 1840s it was unlikely that the



system of tunnels and culverts would have been necessary to clear the harbour mouth at this time. The newspaper goes on to discuss the difficulties of the case as it was unclear whether the LCDR or Dover Harbour Board had responsibility for resolving the issue. Eventually it was decided to serve notice to both parties to remove the nuisance.

LCDR plans held by DHB (**Figures 10-11 in Appendix 001**) show a proposed alteration to the wet dock and Clarence Quay and are dated circa 1860. It is possible that this indicates the alternative 1862 plans for the dock that were put into reality following the nuisance matter. This shows the removal of the wet dock quay wall and the filling in of the dock. This plan would seem to indicate that the entrance to both the tunnels between the wet dock and the Basin, and the wet dock and the South Pier would have been blocked off. Interestingly there is no indication of the tunnel entrance to the South Pier, but the outline to the Basin tunnel is clearly marked. Here there is noted the construction of a brick wall and 'puddle'. Puddling, or the use of puddle clay, was a very common method of creating a water-retaining element for dams. There is no suggestion here that the entire tunnel was filled in, indeed there is no mention of whether the tunnel entrance was blocked at the Basin end. An ordnance survey map of 1871 confirms that these proposed works went ahead (**Figure 12 in Appendix 001**), although there is still no indication of the tunnels.

Circa 1880 Clarence Quay was once again altered and the quay straightened all the way to the South Pier (**Figures 13-15 in Appendix 001**). A note on **Figure 13** (likely added after 1899) gives a little more information. This states:

"See British Association (Dover 1899) Handbook page 50 Plan of Dover Harbour 1838 which shows that the Gates to the Basin & Wet Dock were closed to impound the water ready for sluicing at low tide – At other times (except when required to provide water bearing for large vessels) the gates referred to, were always left open so that the water level in the Basin & Wet Dock became restored. When the Wet Dock was abandoned & the Quay straightened, the new Quay (now the south west Quay of the Outer Harbour used by L.C. & D.R. Goods Department) cut off a portion of the arched opening at DE."

This would suggest that the tunnel between the wet dock and the South Pier had not been cut off completely during the work on Clarence Quay during the 1860s or the 1880s when Clarence Quay was straightened. It is possible that, rather than closing the tunnel; it was merely shortened in length by the line of the new quay wall and cut off by the line of the quay wall and a new set of steps. A photograph circa 1880/1890 (**Plate 8**) seems to show a small portion of a tunnel entrance although the photo quality is not clear enough to say for certain. No definitive evidence for the infilling or continued existence of either tunnel can be seen from the late nineteenth century works, and this is an acknowledged gap in the record.

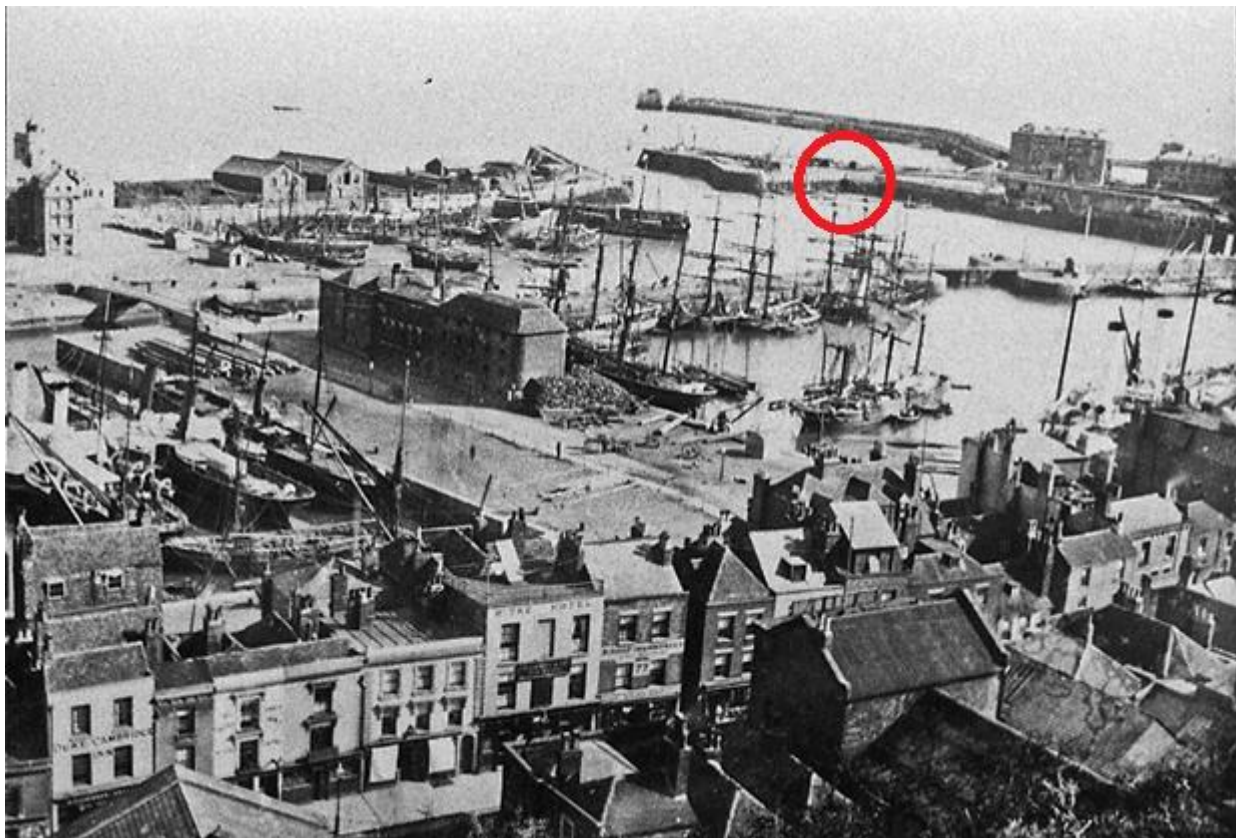


Plate 8: *A photo of the old pier district taken c.1874, the remaining tunnel opening has been highlighted in red, Dover Museum d25746.*

In the 1930s work began on creating the Train Ferry Dock on the South Pier (**Plates 9-10**) (further information can be found in the Train Ferry Dock and Dunkirk Jetty Desktop Study prepared by Dover Harbour Board, 2016). This would have necessitated the infilling of the reservoir and the culverts were most likely destroyed (**Figure 16** in **Appendix 001**). There is no indication whether a tunnel was discovered, but if there had been any remains of a tunnel it would probably have required infilling as there were significant structures and train lines above its location.

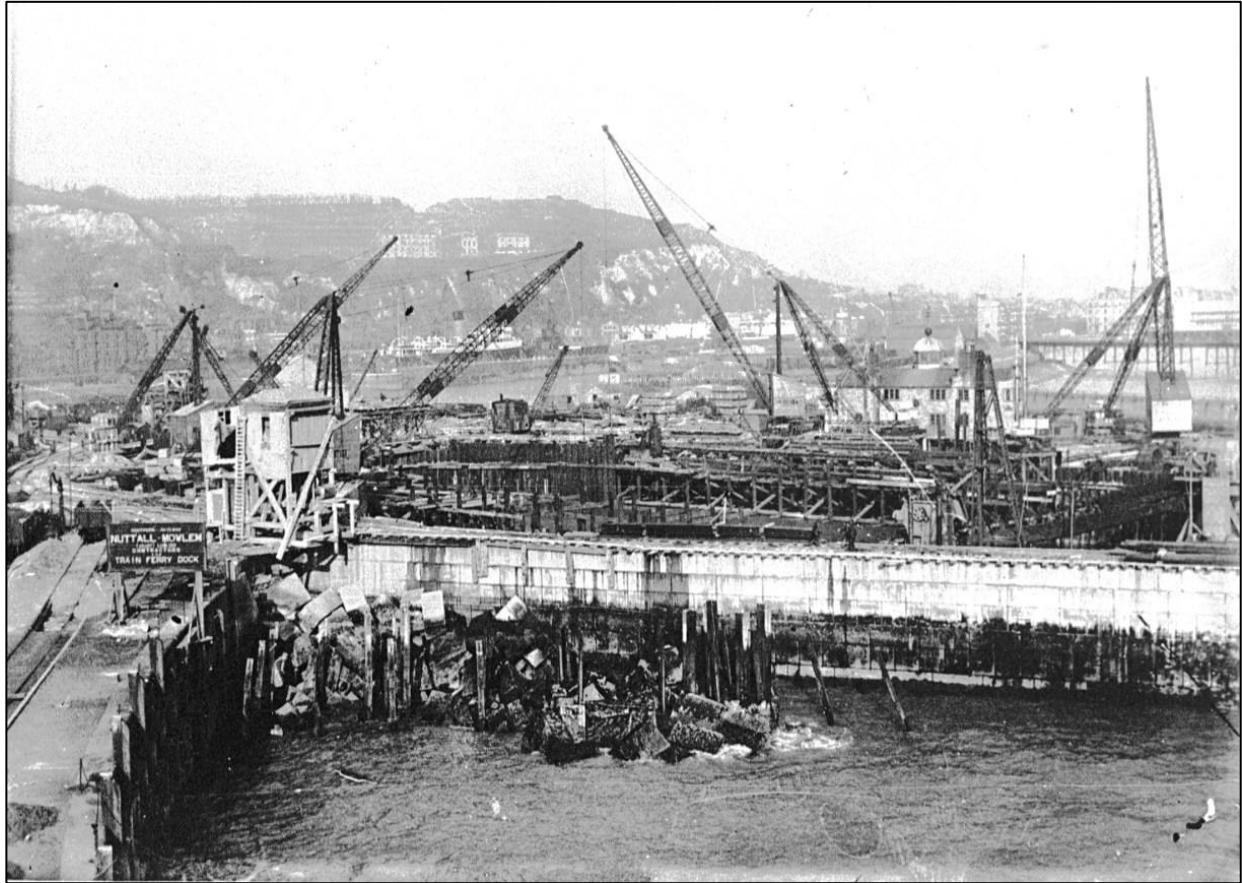


Plate 9: Train Ferry Dock, c.1933, Dover Museum d02172.



Plate 10: *Entrance to Western Docks, View of the Train Ferry Dock, Tidal Basin Entrance, The Granville and Waterloo Dock, 1950, DHB.*



4.2 Associated Sluice Mechanisms

This section of the report describes the various sluice mechanisms around the Tidal Basin and Granville Dock. These are not thought to be the work of Telford and were installed slightly later but they are associated with the effective sluicing of the Harbour in general. Sluices were used in the control of water levels within the dock, allowing water to be stored within one harbour or basin in order to keep ships and boats afloat. They were also often used after surges of water from the Dour or after heavy rainfall to reduce the water levels slightly.

By definition a sluice is a water channel controlled by a gate, this gate allows water to be trapped or released depending on the circumstances and the desired outcome. There are also associated sluice mechanisms, the machinery that allow the gates controlling the water level to be open and closed. The tunnel work that channels the water out of the dock is known as a culvert and will be positioned between, either the wall of two docks or a dock and a basin. There are three sluices and associated mechanisms around the port.

The sluice mechanism located at position **A** in **Figure 2** in **Appendix 001** is positioned on the more southern end of Union Street, next to the Swingbridge and labelled with the date 1845. A bridge has been present in this location since its initial installation in 1844, suggesting that they coincide with one another and that the sluice mechanism present is associated with the original bridge installation. A drawing of this bridge and the sluice mechanisms installed alongside it can be seen in **Figure 17** in **Appendix 001**. The drawing is dated 1877 but suspected to show the original structures from 1844-5. This sluice controlled the levels of the water between the Wellington Dock and the Tidal Basin in order to address an issue with the beaching of ships within the dock. A tracing was also made that shows the mechanism much clearer; this can be seen in **Figure 18** in **Appendix 001**.

This sluice is now decommissioned and no longer in use, a steel sheet gate was dropped and then the mechanism partially removed so that it cannot be used and therefore opened again.

In 2022, the tunnel containing this sluice was permanently filled with concrete. Images of the sluice mechanism can be seen in **Plates 11-14** below, with the date of installation clearly marked on the side (1845). These images were taken as part of the Level 1 Heritage Recording, Area 002, Swingbridge, Zone 1, Photo Set 010 (Dover Harbour Board 2016). Images of the culverts which operated alongside the sluice mechanisms can be found in **Plates 15-16**.

As part of the DWDR scheme, the mechanism will be removed and the site levelled for redevelopment as a port-centric logistics facility. Although the mechanism has already been decommissioned, due to ongoing leakage, the culvert channel was blocked off in 2022. Although this is not a listed structure, it has been recognised that this element of mechanical

engineering is important and significant to the history of the port. Following removal, therefore, the mechanism and its casing will be relocated along with other recognised heritage items, where appropriate, within the setting of the DWDR scheme, or within a similar maritime setting within the Western Docks.



Plate 11: Side view of sluice A with crank mechanisms to the right, looking West, 2m Scale, DHB.



Plate 12: Front view of sluice A showing date of 1845, looking North, 2m Scale, DHB.



Plate 13: Back view of sluice A with visible crank mechanisms, looking North, DHB.



Plate 14: Side view of Sluice A showing date from 1845, looking north-east, DHB.



Plate 15: *The culvert that operated with the mechanisms of Sluice A, controlling the water within the Wellington Dock, dating to 1845, looking North, DHB.*



Plate 16: *A look inside the culvert that is associated with Sluice A, which would have controlled the water within The Wellington Dock, looking North, DHB.*



The sluice mechanism located at position **B** in **Figure 2** in **Appendix 001**, commonly referred to as the Pent Sluice, is contained within a small brick building in the current Union Street Car Park,. There is evidence of a sluice being present on this location dating back to 1641 where it can be seen on a map drawn by William Eldred (**Figure 19** in **Appendix 001**), this has been highlighted with a red circle. The detail is shown on **Figure 20**, in another map drawn by Eldred which shows the labelled sluice house and the bridge present on Union Street. These maps by Eldred form a collection of 6 different drawings, all showing different areas of the Port of Dover in varying detail.

It has been suggested that a bridge was present on site of Sluice B since at least 1732, although not confirmed with existing drawings, with the earliest drawn record being that of Eldred's 1641 (*Reclamation History of the Western Docks*, drawing by DHB). The Annals of Dover describes work being carried out to create an entrance to The Pent between 1727 and 1732. It details that a gateway was built with stones and fitted with a sluice and a drawbridge, in order to give ships access to the Pent without interfering with the public thoroughfare along Union Street (J.Bavington Jones, 1907). Sluice B can be seen in these maps being next to a drawbridge, this bridge changed position in 1844 to be further East along Union Street where a further sluice mechanism was added (Sluice A). A drawing for the layout of the area around the sluice and its mechanisms can be found in **Figure 21** in **Appendix 001**. . Both bridges were in place for some time until the original bridge, which ran with the control of Sluice B, was removed in c.1871. The culvert which works with Sluice B were subsequently extended to coincide with Union Street being widened in 1888 as the culverts which supply water to the sluice mechanisms also had to be made longer. It is unclear if the sluice mechanisms have been changed since but it is assumed that they are original.

Sluice B is still functioning today and occasionally is turned on when the water levels within the Wellington Dock need to be adjusted, especially after periods of heavy rain or a surge of water coming in from the River Dour. As for sluice A, as part of the DWDR scheme, the mechanism will be removed and the site levelled for redevelopment as a port-centric logistics facility. The culvert will be blocked and the mechanism relocated along with other recognised heritage items within the DWDR scheme or within a similar maritime setting within the Western Docks.

Images of the sluice can be seen in **Plates 17-20** below, with the dated of installation clearly marked on the side. These images were taken as part of the Level 1 Heritage Recording, Area 002, Swingbridge Carpark, Zone 004, Photo Set 06 (Dover Harbour Board 2016).



Plate 17: *The small brick building which holds sluice B, looking West, 2m Scale, DHB.*



Plate 18: *The two mechanisms which form sluice B, DHB.*



Plate 19: *One half of the two mechanisms that form sluice B, DHB.*



Plate 20: *One half of the two mechanisms that form sluice B, DHB.*



+The sluice located at position **C** in **Figure 2** in **Appendix 001** has been present since alterations to the Crosswall gates in 1871. However there has been a variety of different sluice mechanisms present on the Crosswall since its installation in 1689.

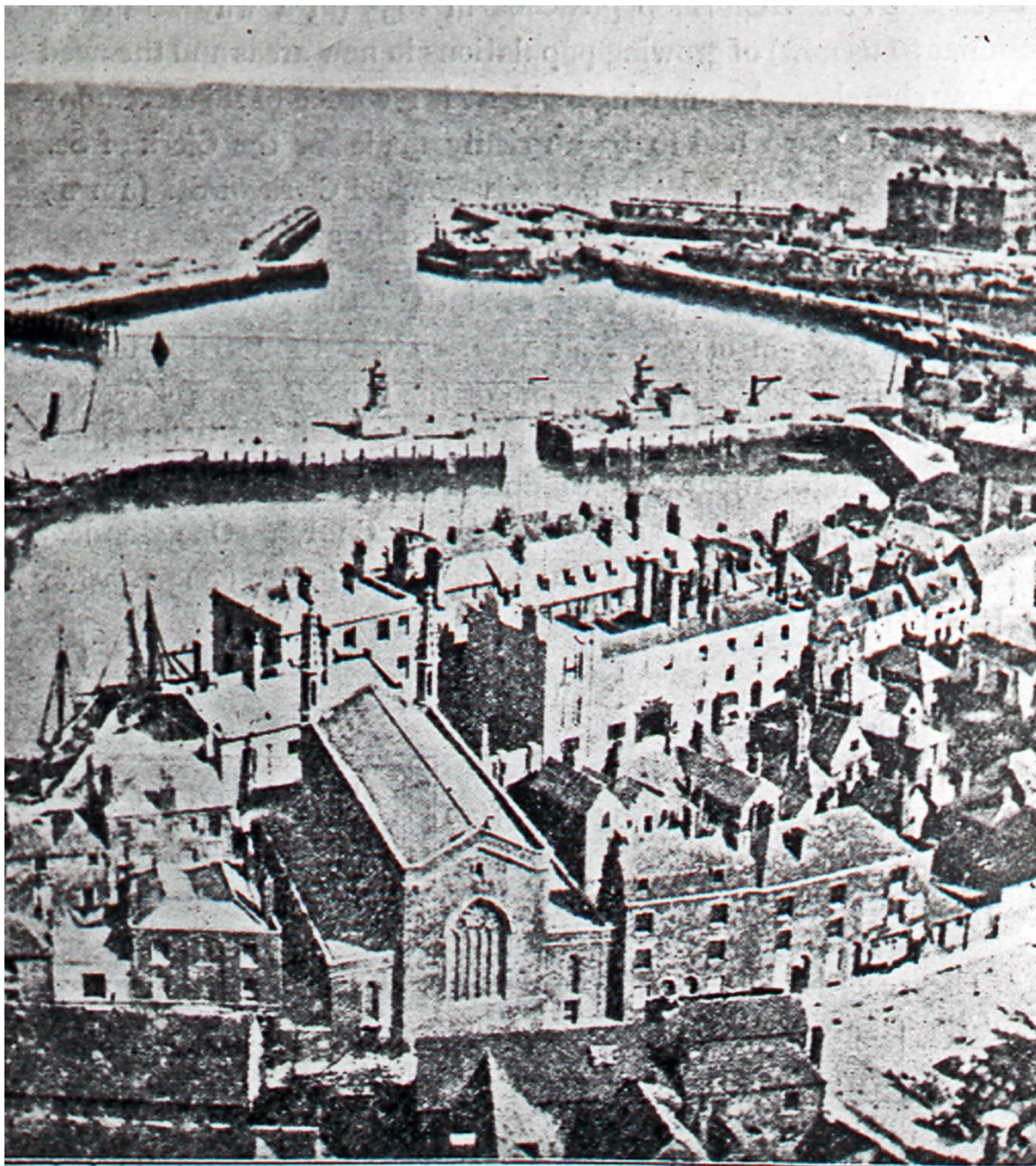
Originally the Crosswall was constructed out of wood with fitted gates and sluice mechanisms, this design was built under the control of Henry Sheers, acting on behalf of master Carpenter Ockam (J.Bavington Jones, 1907). It was hoped that the build up and the release of water from these gates on the Crosswall would help in the reduction of the shingle bar that often blocked the mouth of the harbour. It had little effect on the bar but its design remained untouched until 1727. Being made of wood, the structure was very slippery being described as 'treacherous' even in dry weather. Between 1727 and 1732 it was refaced in stone to make it safer to walk on and more substantial, with the gates allowing access for ships still being described as too narrow and often dangerous (Dovermuseum.co.uk, 2017).

In 1738 a swingbridge was added to the Crosswall and this encouraged pedestrians to use it as a short cut across the harbour from the Union Street to Clarence Place, this led to multiple stalls being put up and quickly a small fish market began to run from the most Western side of the wall.

In 1819-1821 it was demolished and rebuilt under the contemporary Harbour Master, James Moon, mentioned previously regarding sluices and culverts. The Crosswall was given new gates and sluices which were much more powerful than previously installed, because of this they also increased in size of the mechanisms they had to be housed in a small building. It was decided to build a clock tower around the sluice mechanism, and to equal out the symmetry a matching building with compasses was also constructed on the other side of the quay (Dovermuseum.co.uk, 2017). Drawings of this tower can be seen in **Figure 22** in **Appendix 001**, it has also been annotated at a later date that it was removed in 1870. These were officially opened c. 1830. A drawing of the harbour taken just before the development of the Crosswall, c.1830 can be seen in **Plate 18** with the added symmetrical buildings visible in **Plates 19-20** below. Two OS maps of the time, showing the layout of the harbour in 1861 can be seen in **Figures 23-24** in **Appendix 001**.



Plate 21: *The Pier and Harbour Dovor from the heights of the town, 1830, Dover Museum.*



The Pier about 1848

Plate 22: *The old pier district showing the Crosswall quay with symmetrical sluice housing, c.1848, looking north-east, Dover Museum d25746.*

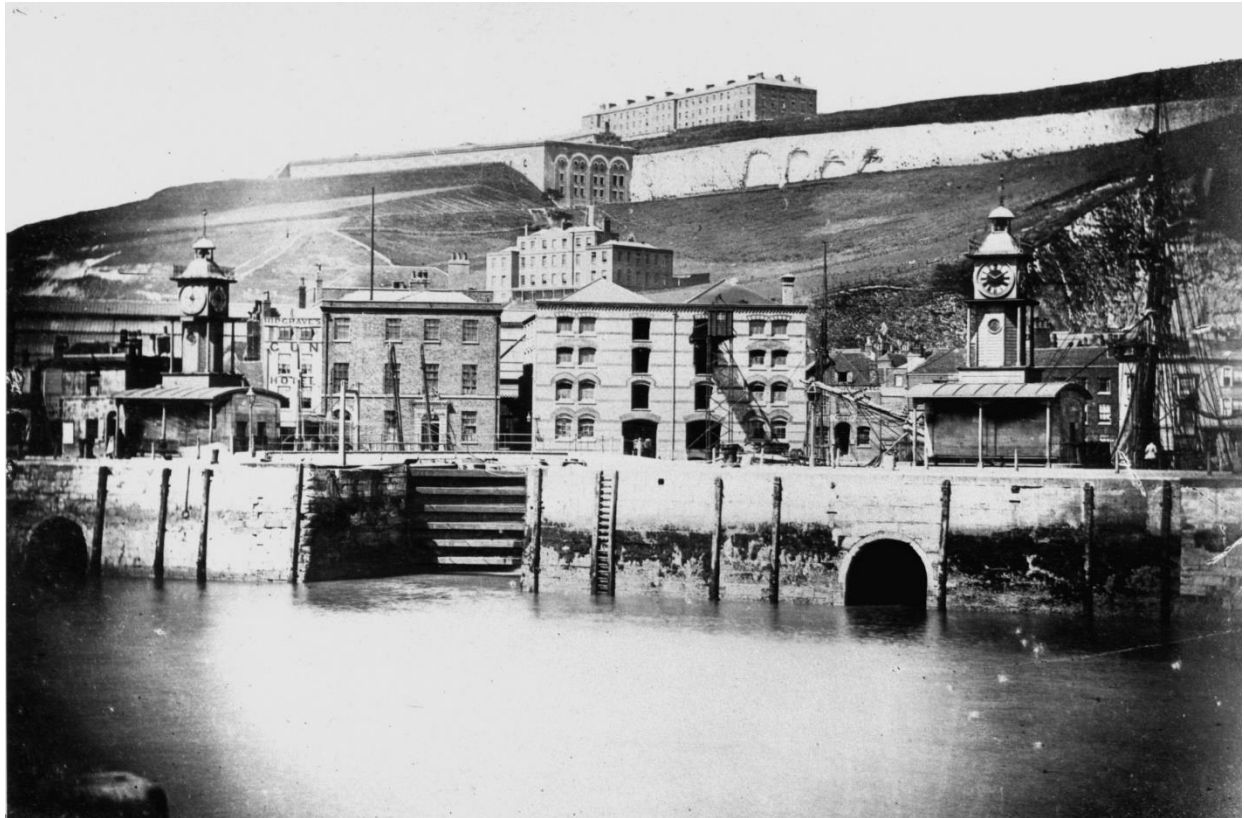


Plate 23: *Entrance to the Granville Dock built in 1870, Dover Museum.*

The gates were altered in 1870 and then the dock inaugurated by the Earl of Granville in 1874 with his position being Lord Warden of the Cinque Ports, giving his name to the dock. To give access to pedestrians a swing bridge was also quickly put back into place over the gates; this is visible in **Plates 24-25** below. Drawings of these new gates can be seen in **Figure 25-26**, and are dated 1884, however this looks like a later annotation with some added illegible script. The drawings would be far too early to show the new sluices installed alongside the new gates in 1943, and are also not the sluice mechanisms from 1819 as they do not show the added clock housing.



Plate 24: *Photograph showing Union Quay and the Crosswall, c.1875, Dover Museum d30089.*



Plate 25: *Photograph showing Union Quay and the Crosswall, c.1890, Dover Museum d00221.*



The current Granville Dock Gates date back to 1943 when they were replaced after being significantly damaged in the war, this work was carried out by Head Wrighton and Co Limited. Further general maintenance took place on the gates in 1982 and in 1998 some of the steel structure which was positioned on top of the gates was removed, making them much shorter. This was needed to reduce the overall amount of water that can be held in the Granville Dock, this also affected the buoyancy, height and hydraulics of the gate and all were adjusted accordingly. The sluice mechanisms often changed alongside the gates on the Crosswall as the harbour often altered the angle of the entrance as well as the gates themselves. Images of the sluice box can be seen in **Plates 26-29** below, there is no externally marked date on this sluice and it also appears to be much larger, with four crank mechanisms rather than two, when compared to that of Sluice A. These images were taken as part of the Level 1 Heritage Recording, Area 005, Fuel Berth, Zone 3, Photoset 012 (Dover Harbour Board 2016). **Figure 27** in **Appendix 001** shows the layout of the current Crosswall drawn originally in 1858 but then updated in 1945.

Plate 30 shows the culvert that would have once been connected to Sluice C, but is now no longer attached or working. **Plate 31** shows the position of the other culvert which would have been present on The Crosswall, this is no longer connected to a sluice mechanisms, nor is there one remaining as it has been totally removed. These would have been the culverts connected to the sluice mechanisms clock and compass houses present in the 1870 (see **Plate 23**).



Plate 26: *Sluice C positioned on the Crosswall, 2016, Scale 2m, looking North, DHB.*



Plate 27: *Sluice C positioned on the Crosswall, 2016, Scale 2m, looking West, DHB.*



Plate 28: *Sluice C positioned on the Crosswall, 2016, Scale 2m, looking South, DHB.*



Plate 29: *Sluice C positioned on the Crosswall, 2016, looking East, DHB.*



Plate 30: *The culvert connected to Sluice C, present on The Crosswall, 2016, looking north-east, DHB.*



Plate 31: *The culvert present on The Crosswall, no longer in use or attached to sluice mechanism, 2016, looking north-east, DHB.*



5. Current Photographs

There are three different sluices which have been recorded in this report that remain in the Port of Dover today, images to show their design have been included in their relevant history section.

Sluice A- **Plates 10-13**

Sluice B- **Plates 14-16**

Sluice C- **Plates 23-26.**

Locations of where these current photographs have been taken can be found in the relevant drawings in **Figure 28-30** in **Appendix 001**. Further photographic recording can be found in the corresponding Level 1 Heritage Recordings produced by Dover Harbour Board (2016) which details more images of the sluice mechanisms and their immediate surroundings.

6. Conclusions and Recommendations

This desktop study details the development of the Telford tunnels, sluices and associated sluice mechanisms. It provides a detailed historic record ahead of planned reclamation and



demolition works. Although these structures are of historic importance they are not under any statutory listing designation, and the works affecting them do not require Listed Buildings consent. However a sympathetic approach is always favourable and any item considered of historic relevance to the port will be safely removed and will be relocated along with other recognised heritage items, where appropriate, within the setting of the DWDR scheme, or within a similar maritime setting within the Western Docks.

Based upon the significance of the structures and items and with the consultation of the Heritage Steering Group (HSG), the level of existing information as presented through this desktop study is expected to be sufficient to provide a record of the impacted structures prior to the commencement of works.

The HSG has been consulted in the completion of this series of desktop studies and their recommendations included. Ultimately this desktop study will form part of the DWDR archive and will be made publically available.

7. References

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Telford, T. and Rickman, J. (1838). Life of Thomas Telford, civil engineer. 1st ed. London: Printed by J. and L.G. Hansard and Sons, and sold by Payne and Foss, p.653.

The Dover Express, 08/03/1862.



The Dover Express, 10/07/1863.

8. Appendices

Appendix 001 – Figures

Appendix 002 – Report of Dover Harbour by Thomas Telford, Civil Engineer.

Appendix 003 – Extract from Telford and Rickman, Life of Thomas Telford containing a descriptive narrative.

Appendix 001 – Figures

***This document is to be read in conjunction
with The Telford Sluices and Associated
Sluice Mechanisms Desktop Study***

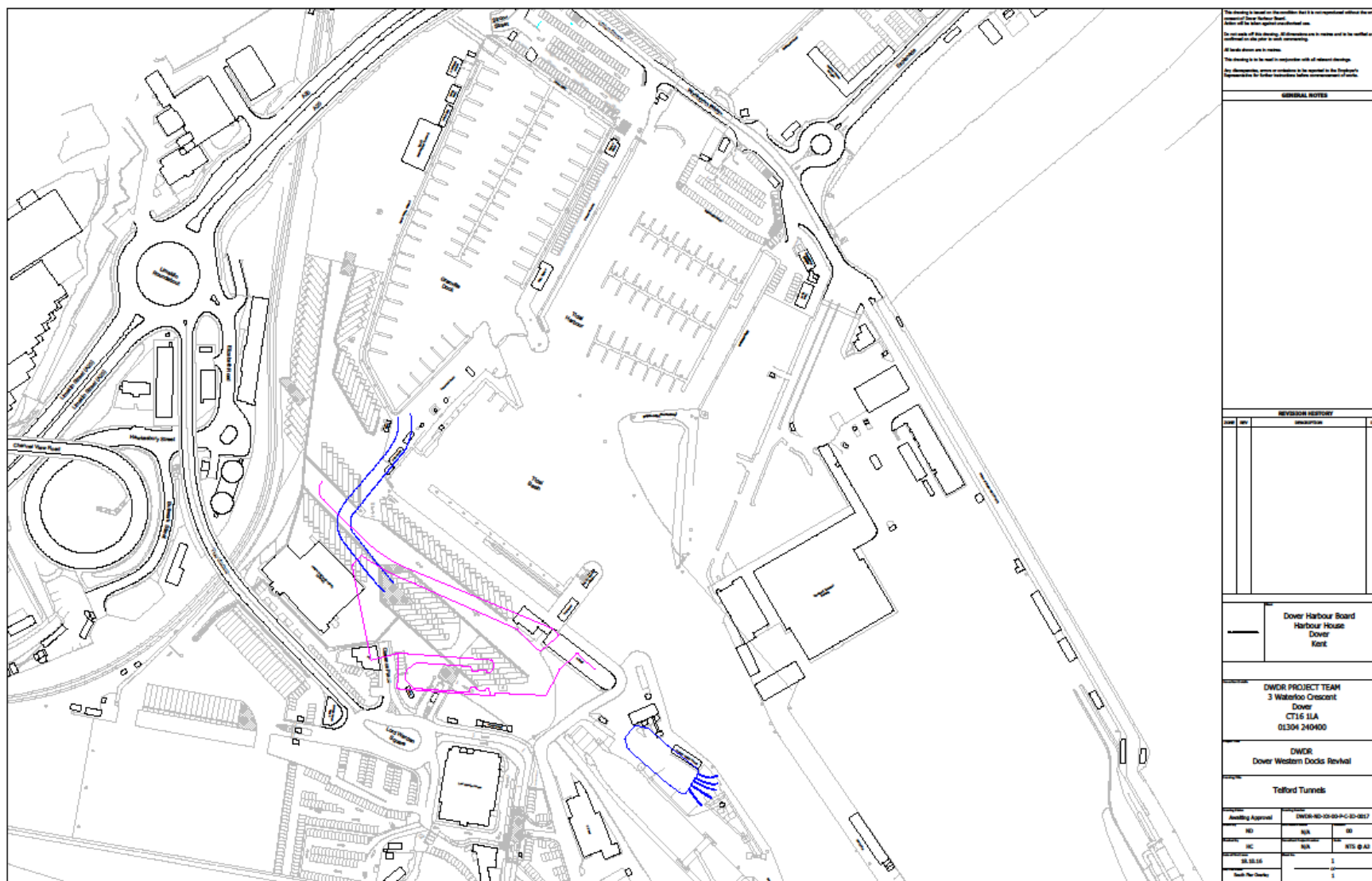


Figure 1: Proposed locations for the Telford Tunnels, built circa 1834, shown in blue, original wet and dry dock shown in pink, 2016, DHB.

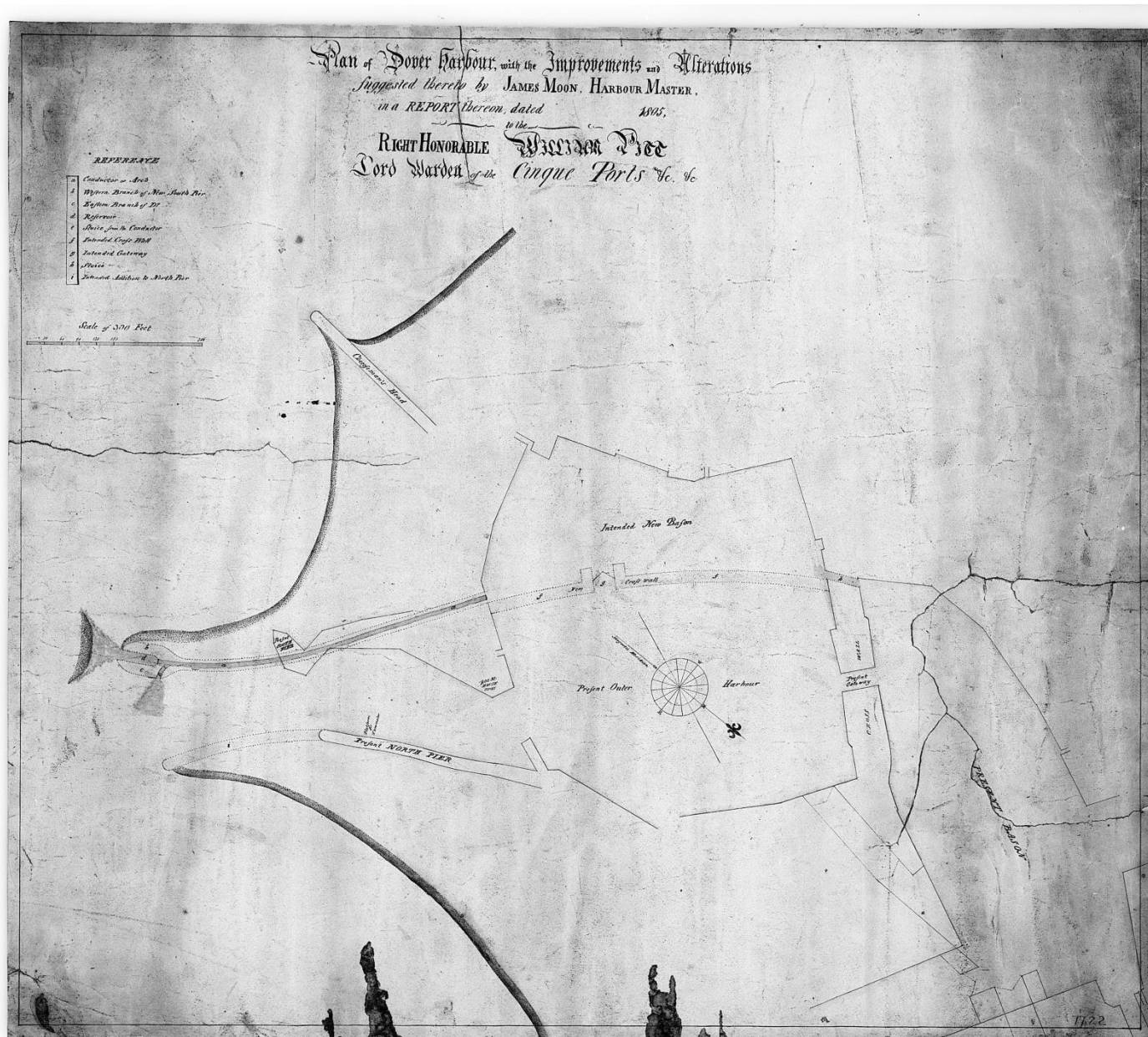


Figure 4: Plan of Dover Harbour with the improvements and alterations suggested by James Moon, Harbour Master, 1805, DHB Historical Drawings Archive 7722.

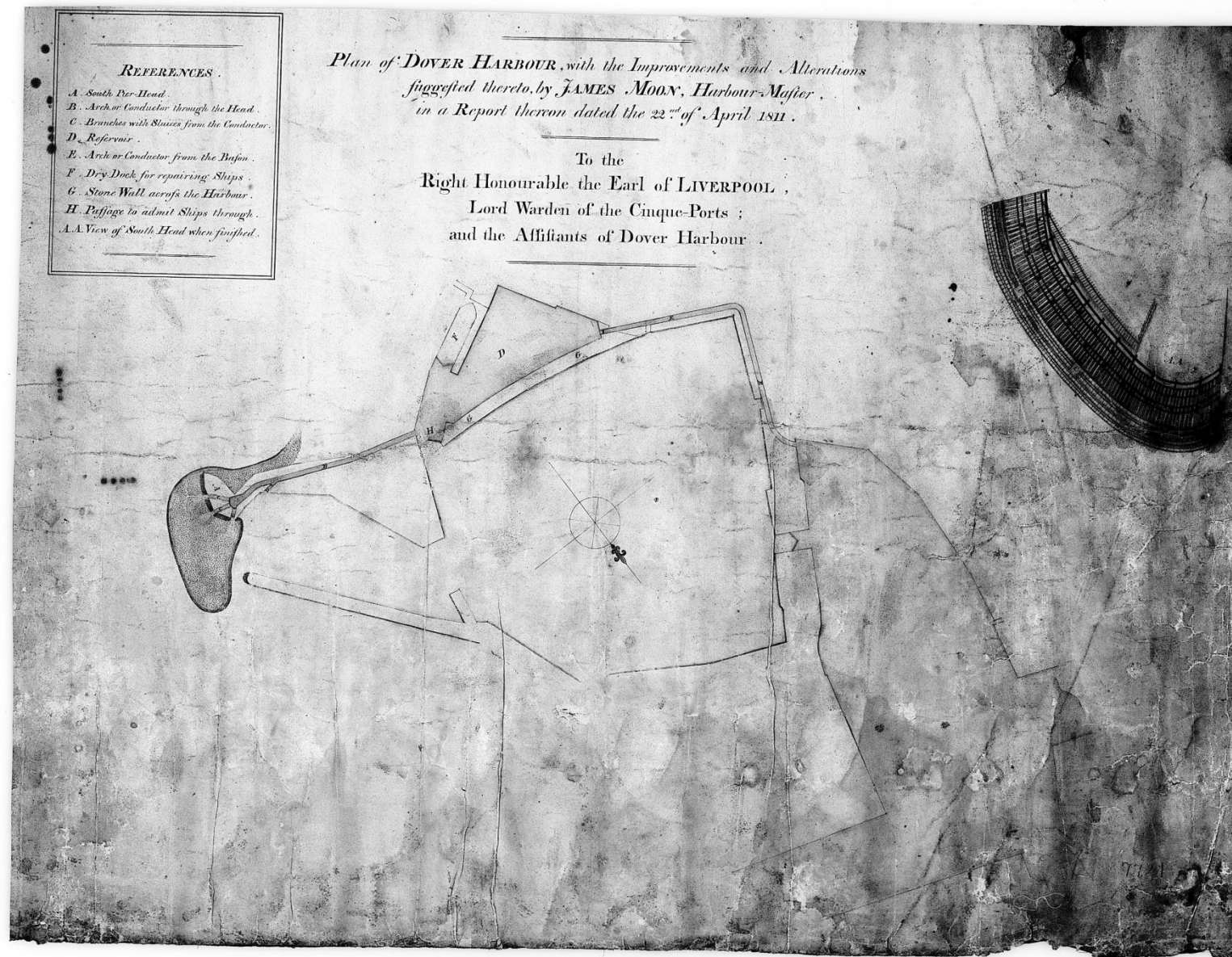


Figure 5: Plan of Dover Harbour with the improvements and alterations suggested by James Moon, Harbour Master, 1811, DHB Historical Drawings Archive 7721.



Figure 6: Plan of Dover Harbour drawn by John Scott Tucker, 1833, DHB.

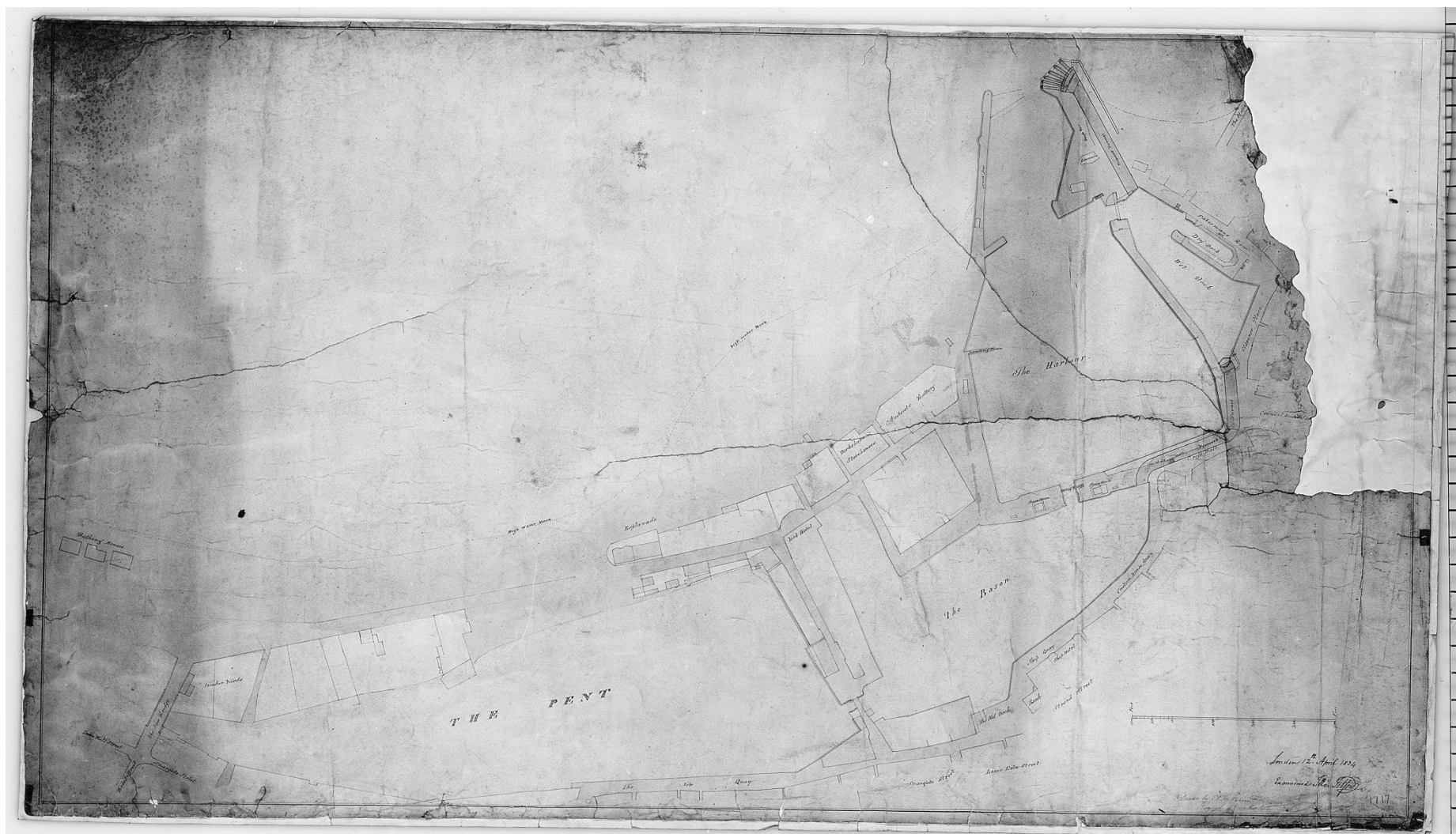


Figure 7: Culvert recommendation for South Pier, Thomas Telford, 1834, Kent Library and History Centre 7717.

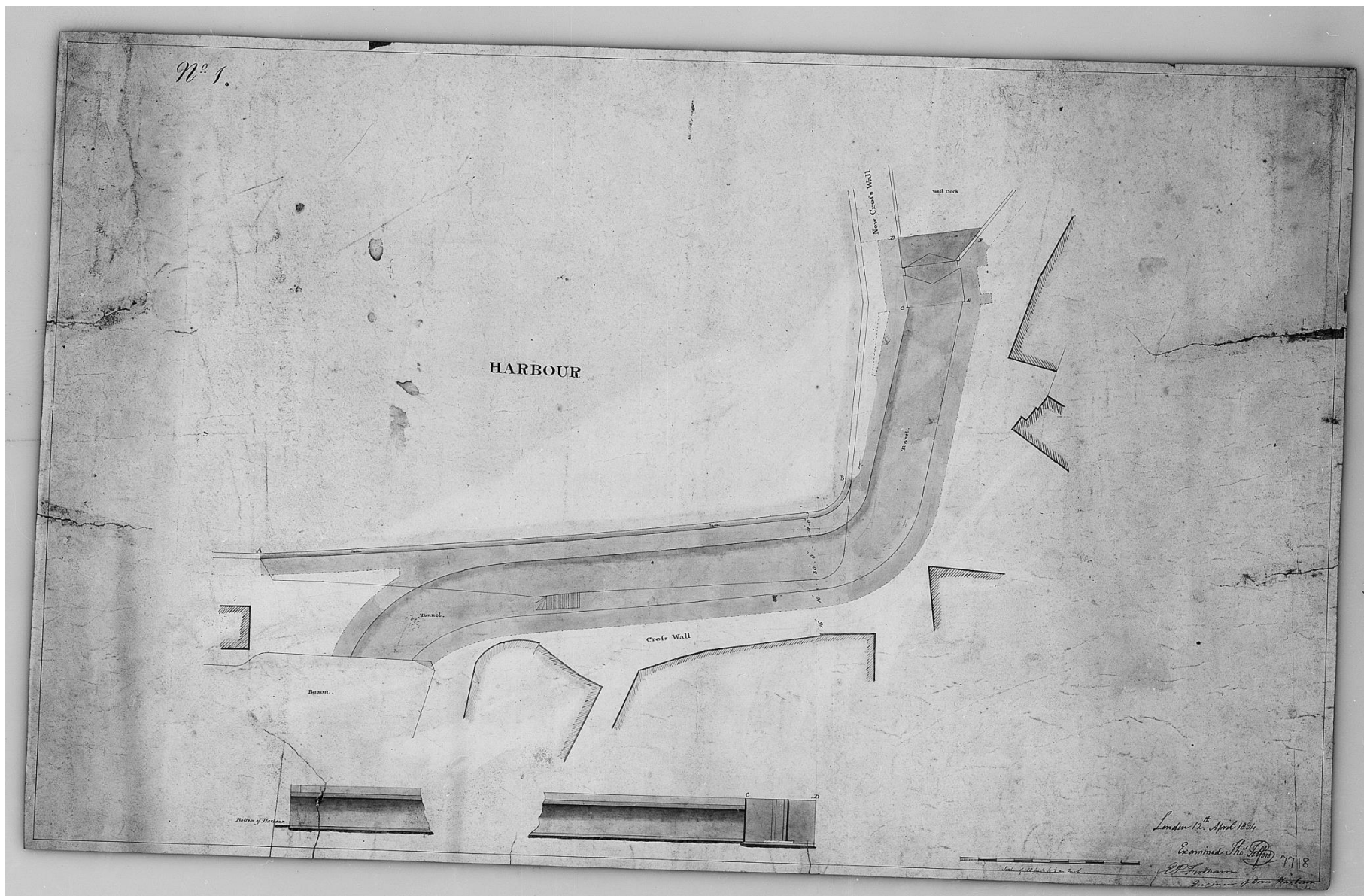


Figure 8: Culvert recommendation for South Pier, Thomas Telford, 1834, Kent Library and History Centre 7718.

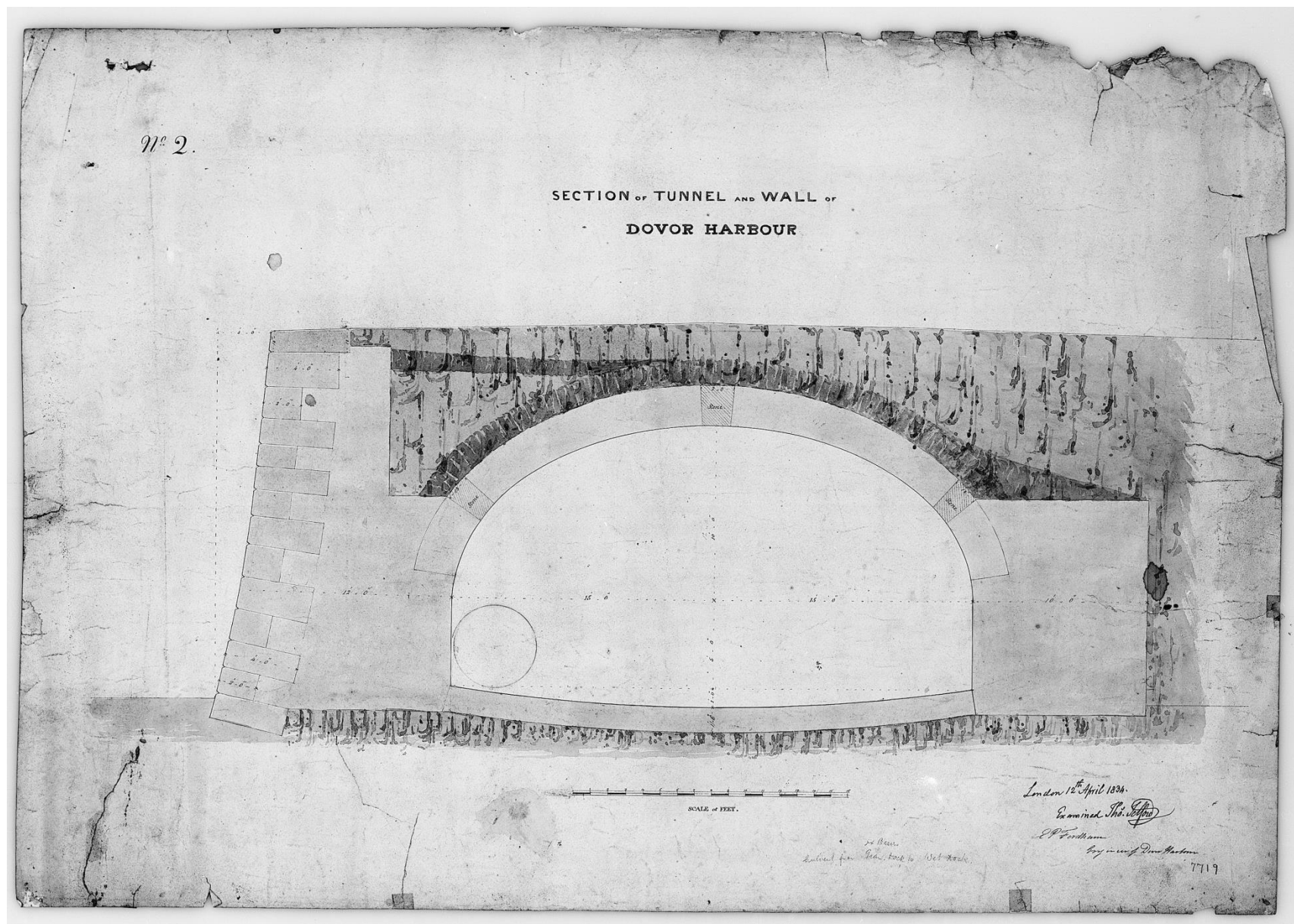


Figure 9: Section of Tunnel and Wall in Dover Harbour, Thomas Telford, 1834, Kent Library and History Centre 7719.

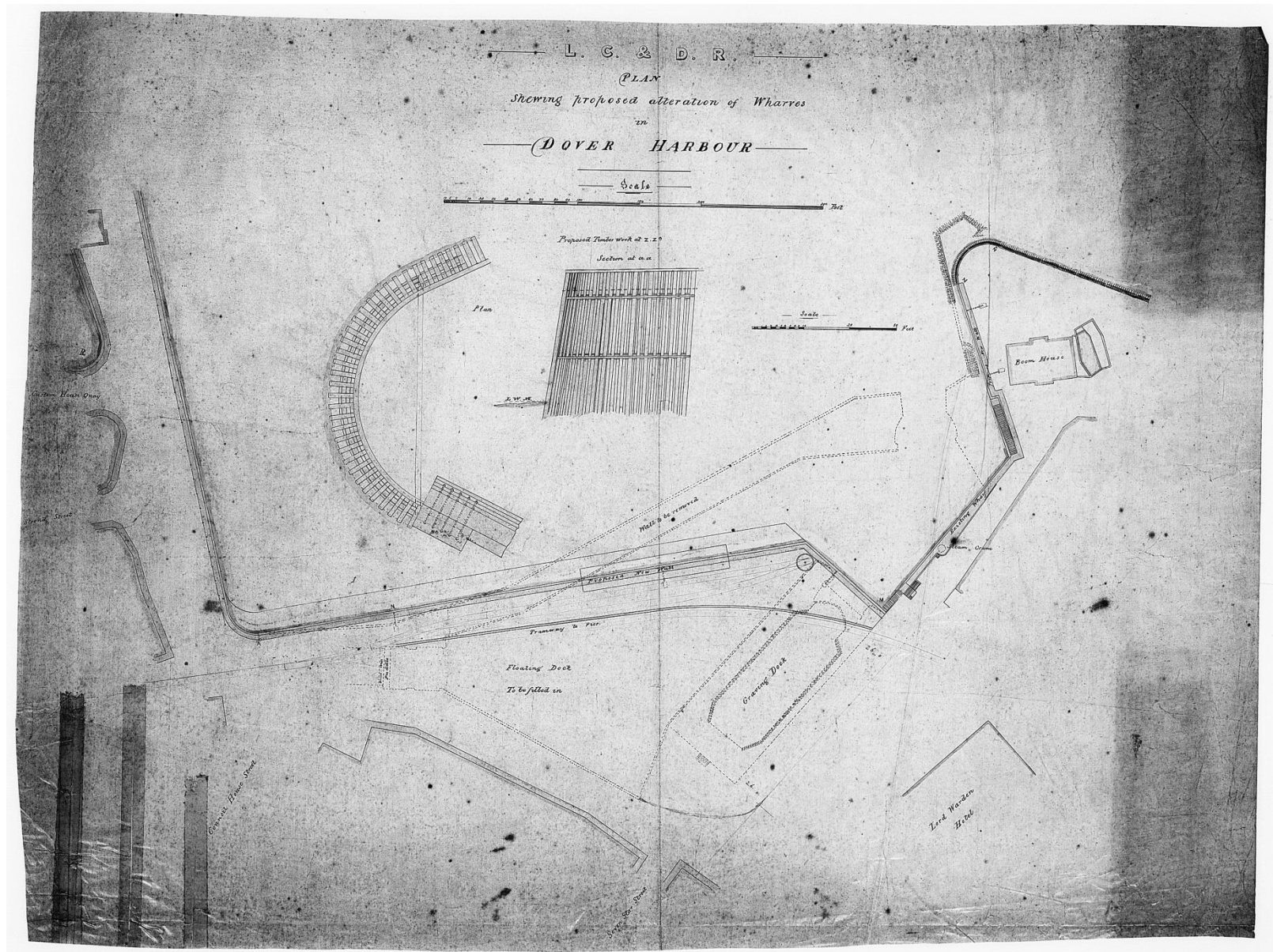


Figure 10: Plan showing proposed alterations of Wharves in Dover Harbour, 1860, DHB Historic Drawings Archive 4978.



Figure 11: Map titled Plan of Dover Harbour showing the recent alterations of the South Pier Head, Kent Library and History Centre DHB/P



Figure 12: OS Map drawn 1871, Kent Library and History Centre 4823.

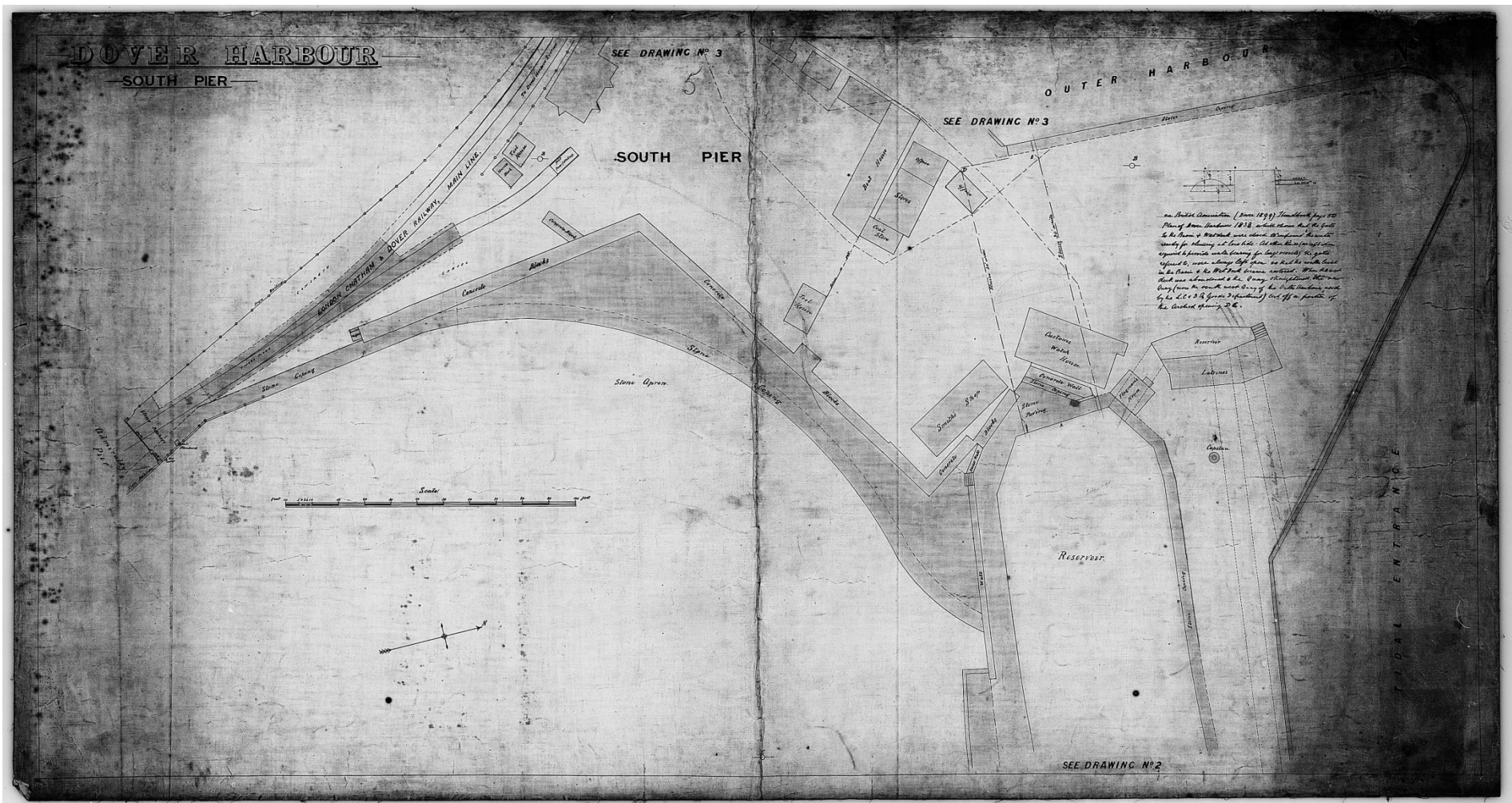


Figure 13: Dover Harbour, South Pier Alterations, 1880, DHB Historic Archive 4990.

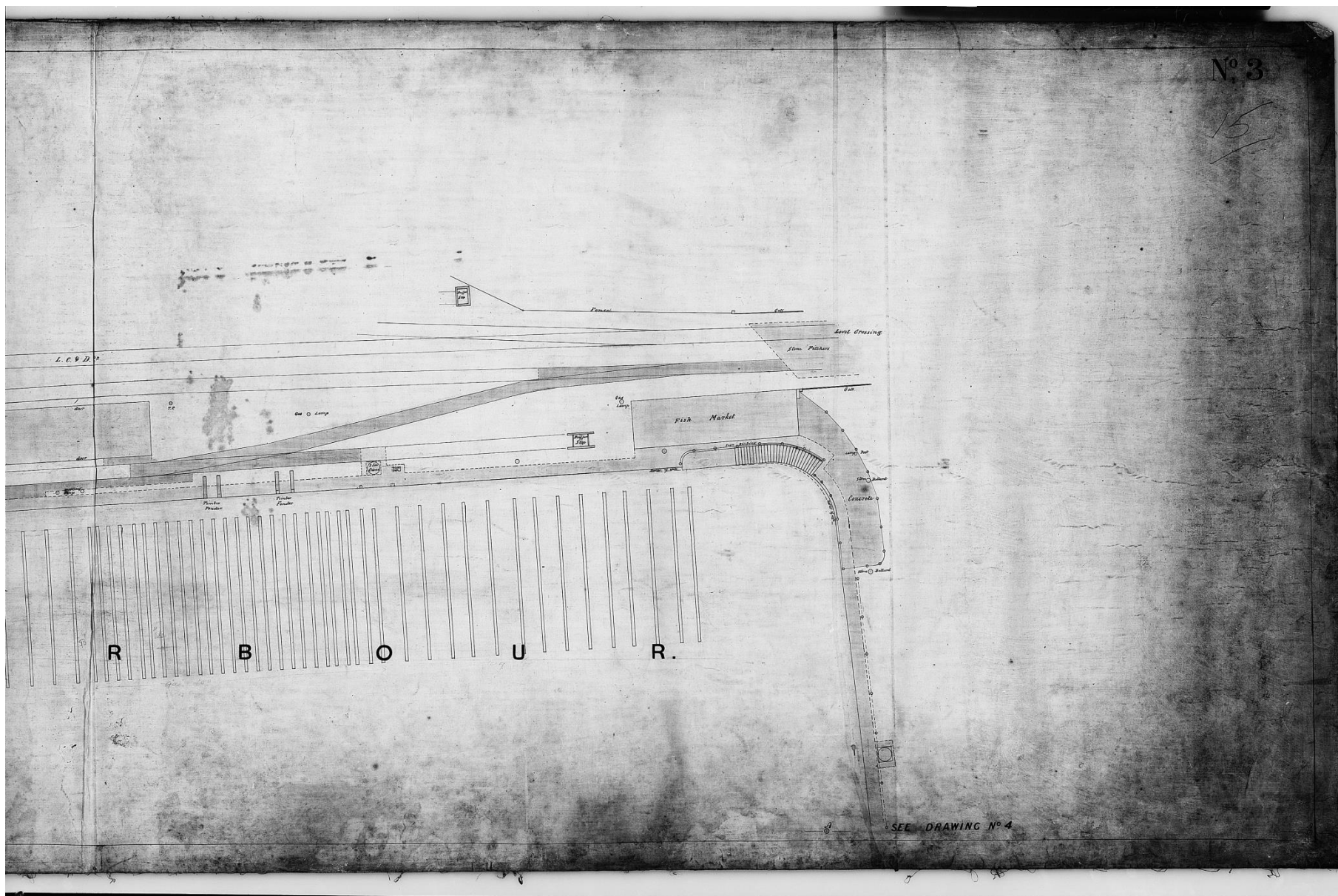


Figure 14: Dover Harbour, South Pier Alterations, 1860, DHB Historic Archive Ref 4979.

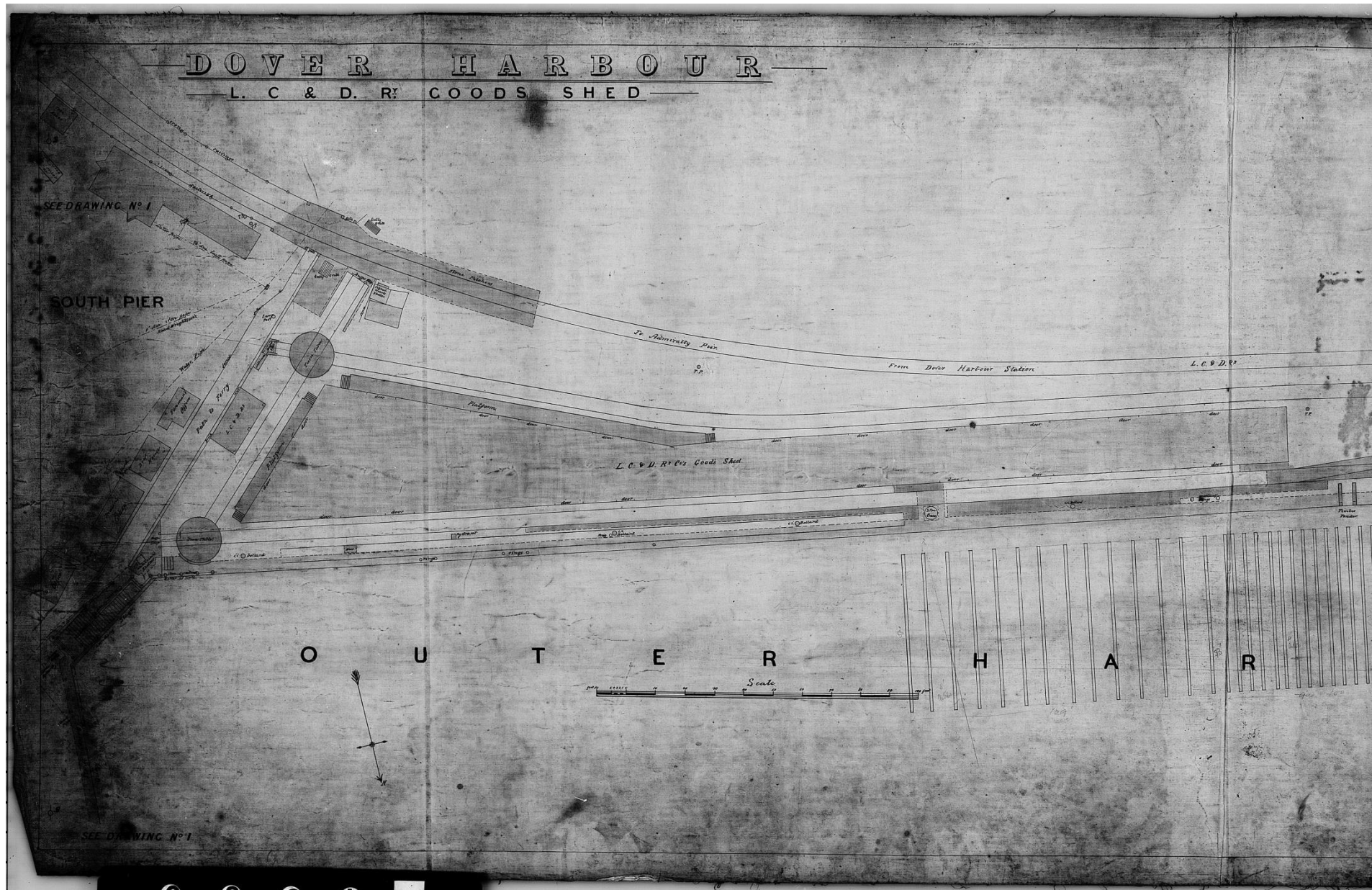


Figure 15: Dover Harbour, L.C & D.R Goods shed, 1860, DHB Historic Archive Ref 4980.

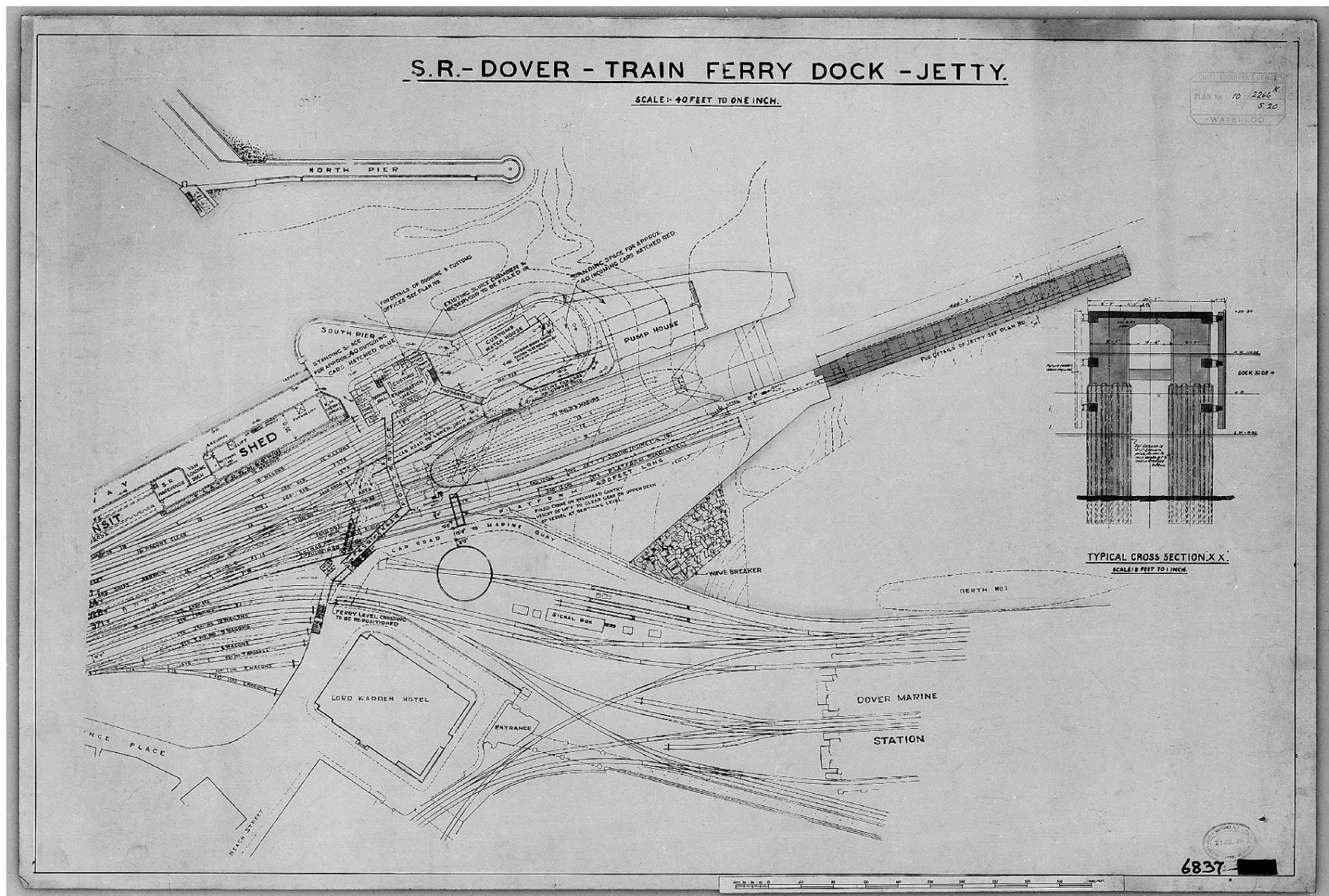


Figure 16: S.R Dover, Train Ferry Dock Jetty, 21/01/1934, DHB Historic Archive Ref 6837.

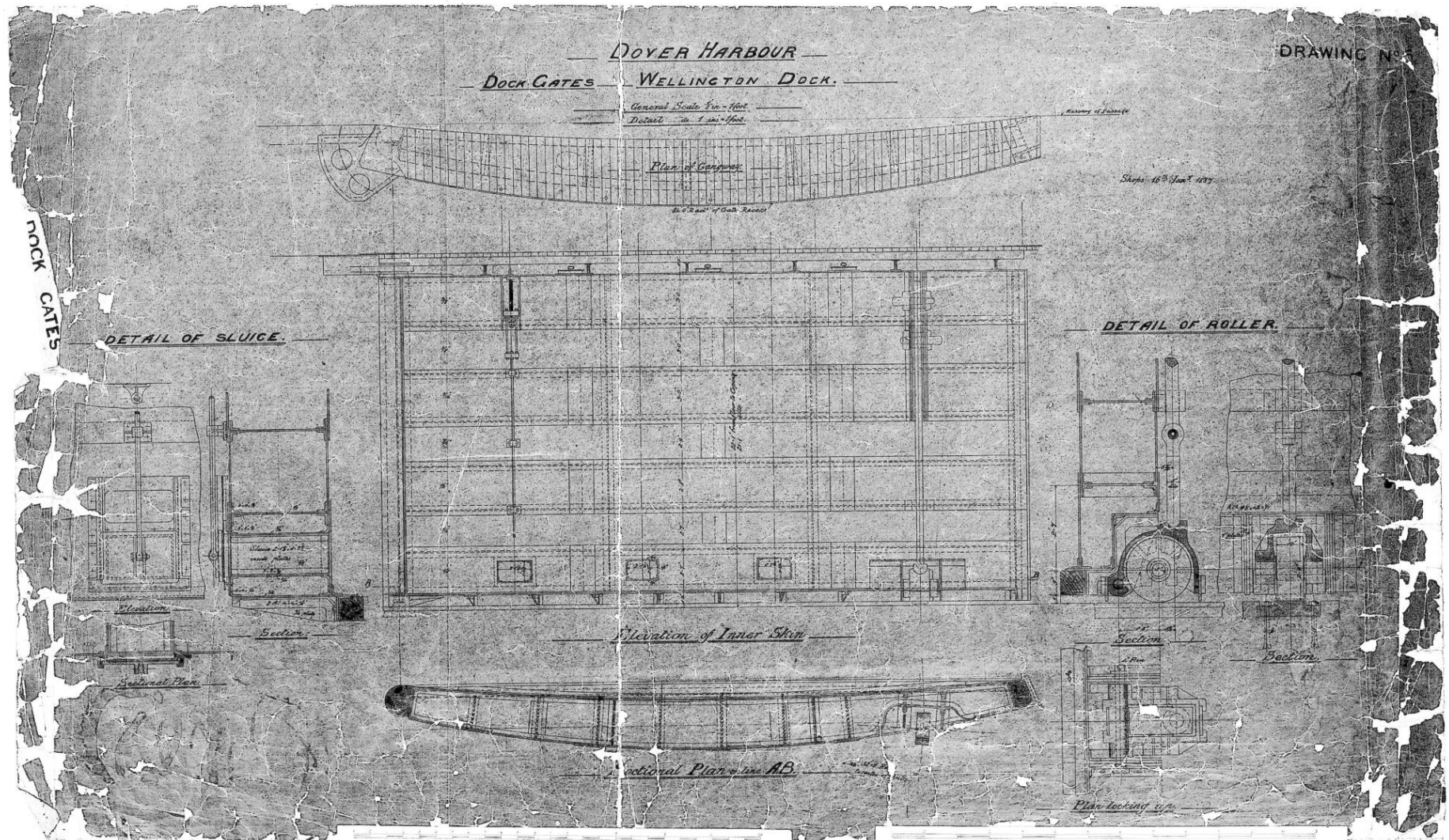


Figure 17: Wellington Dock Gates, Dated 03/04/1897, DHB Historical Drawings Archive Ref: 3991.

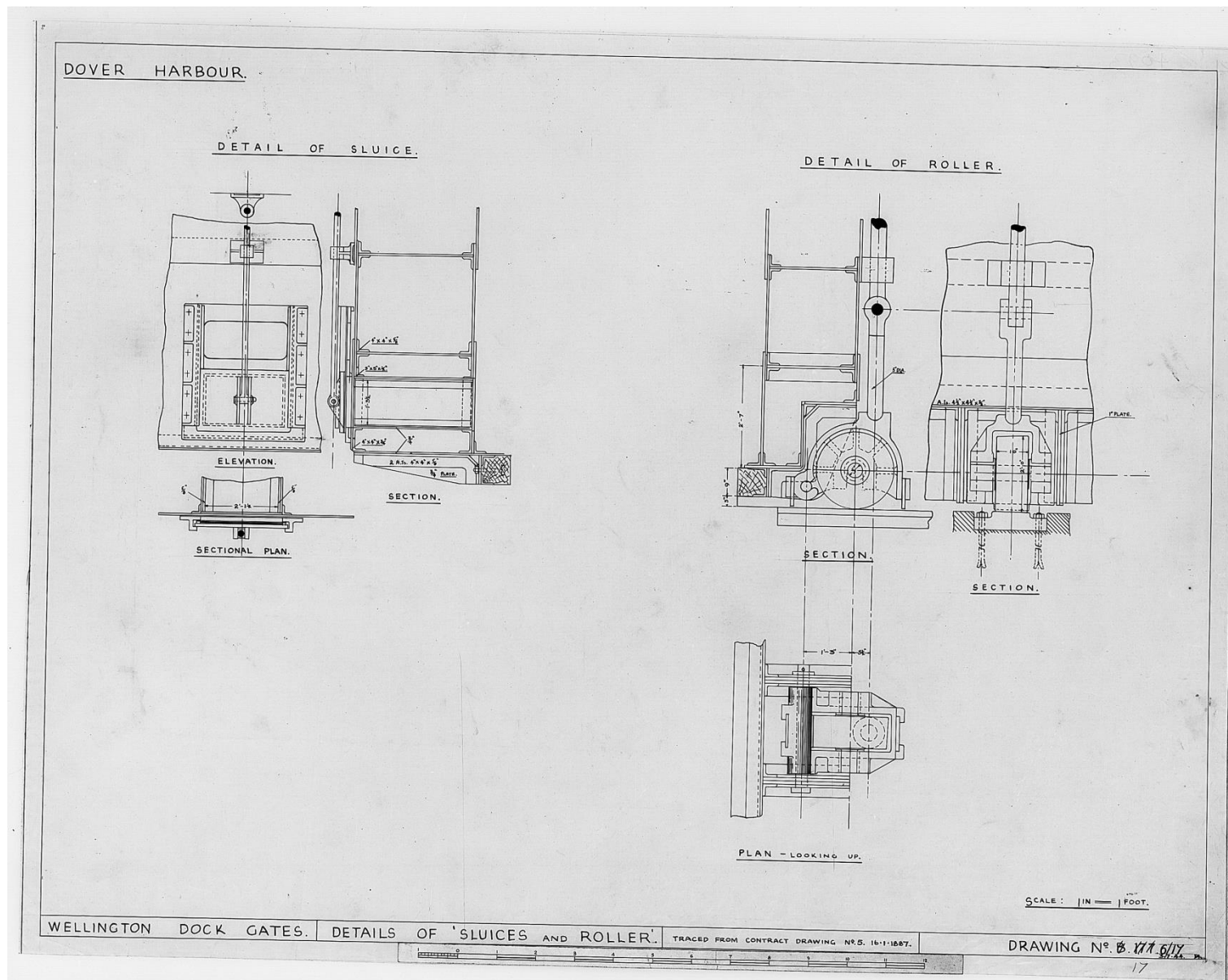


Figure 18: Wellington Dock Gates, Details of Sluices and Roller, 16/01/1887, DHB Historical Drawings Archive 4093.



Figure 20: Detail from *The Platt of Dover Castle Town W. Eldred, c.1641*, DHB Historical Drawing Archive.

Contract Drawing N^o 14



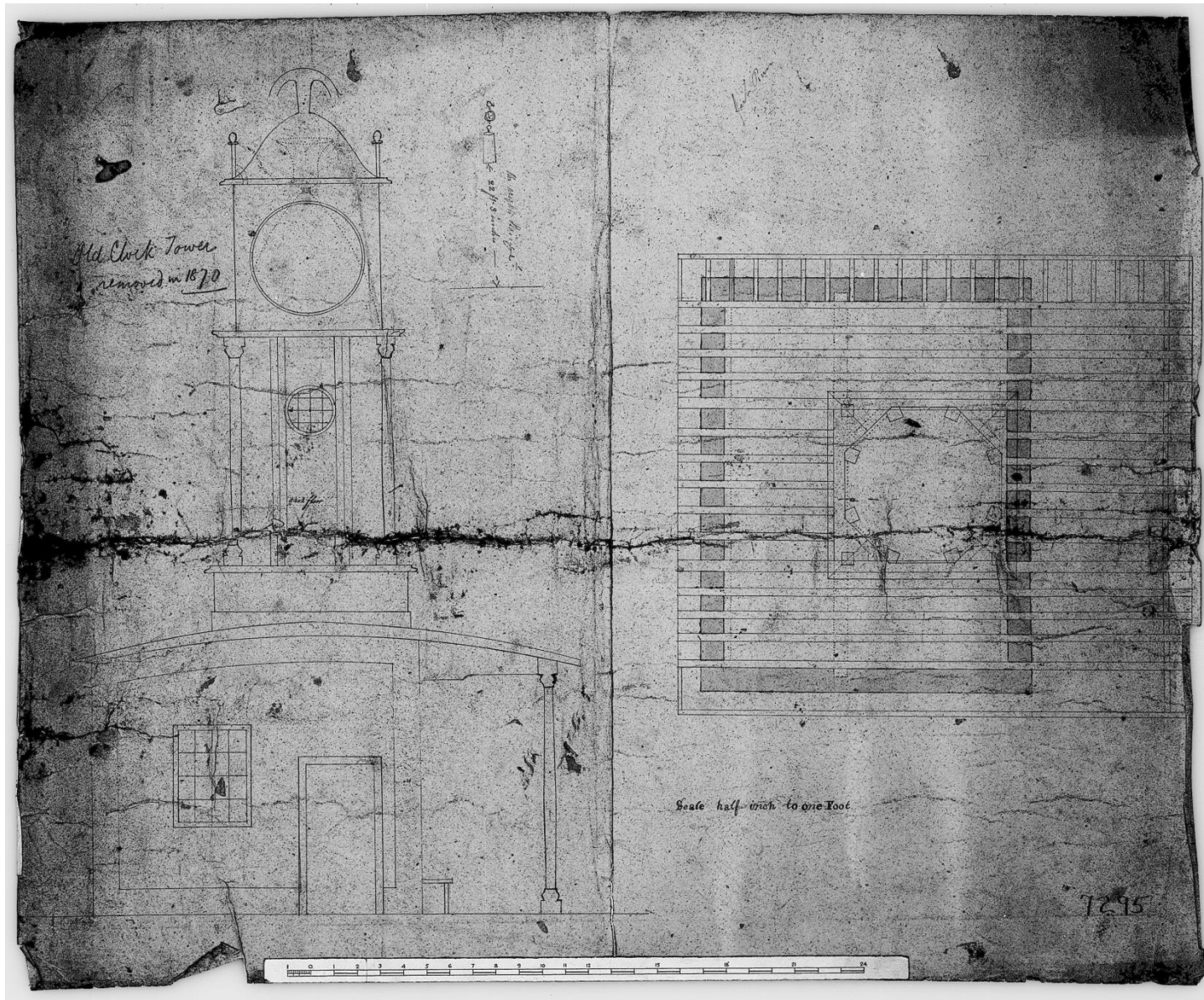


Figure 22: Drawing plans for the old clock tower, c. 1819, DHB Historical Drawings Archive 7295.

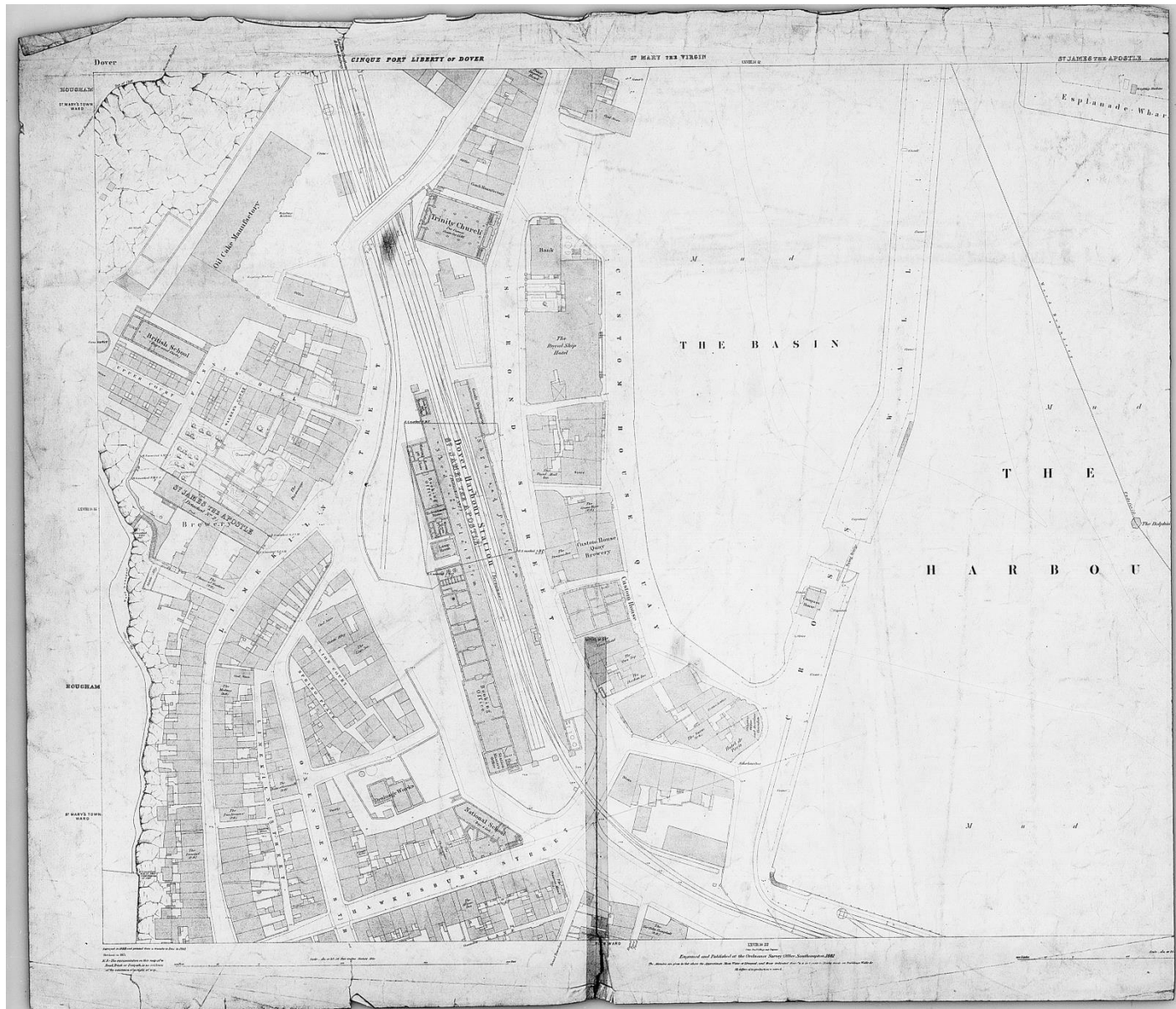


Figure 23: Ordinance Survey Map of the Crosswall Area, 1861, DHB Historical Drawing Archive 4828.

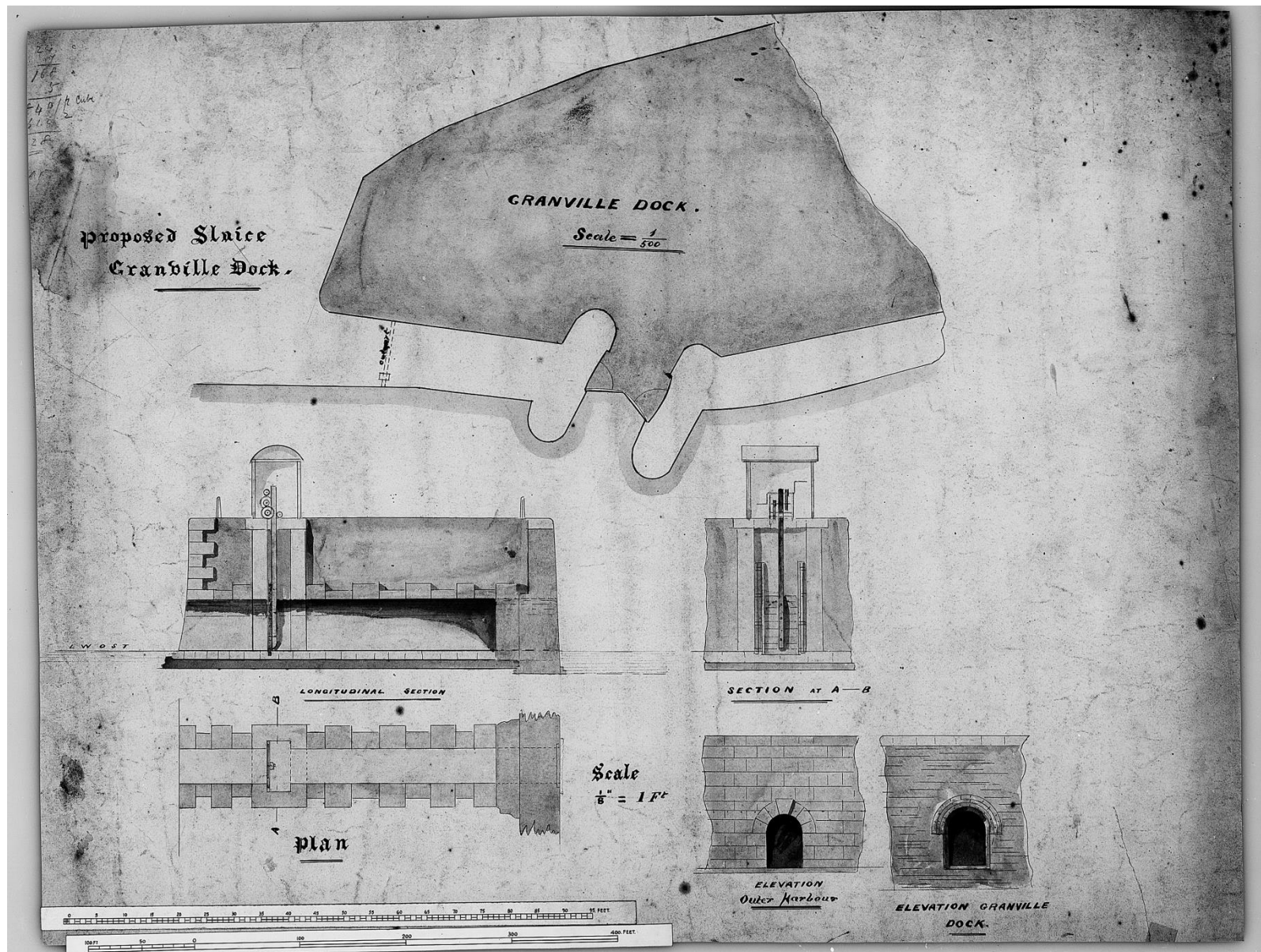


Figure 25: Proposed sluice in Granville Dock, 12/06/1884, DHB Historical Drawings Archive 4607.

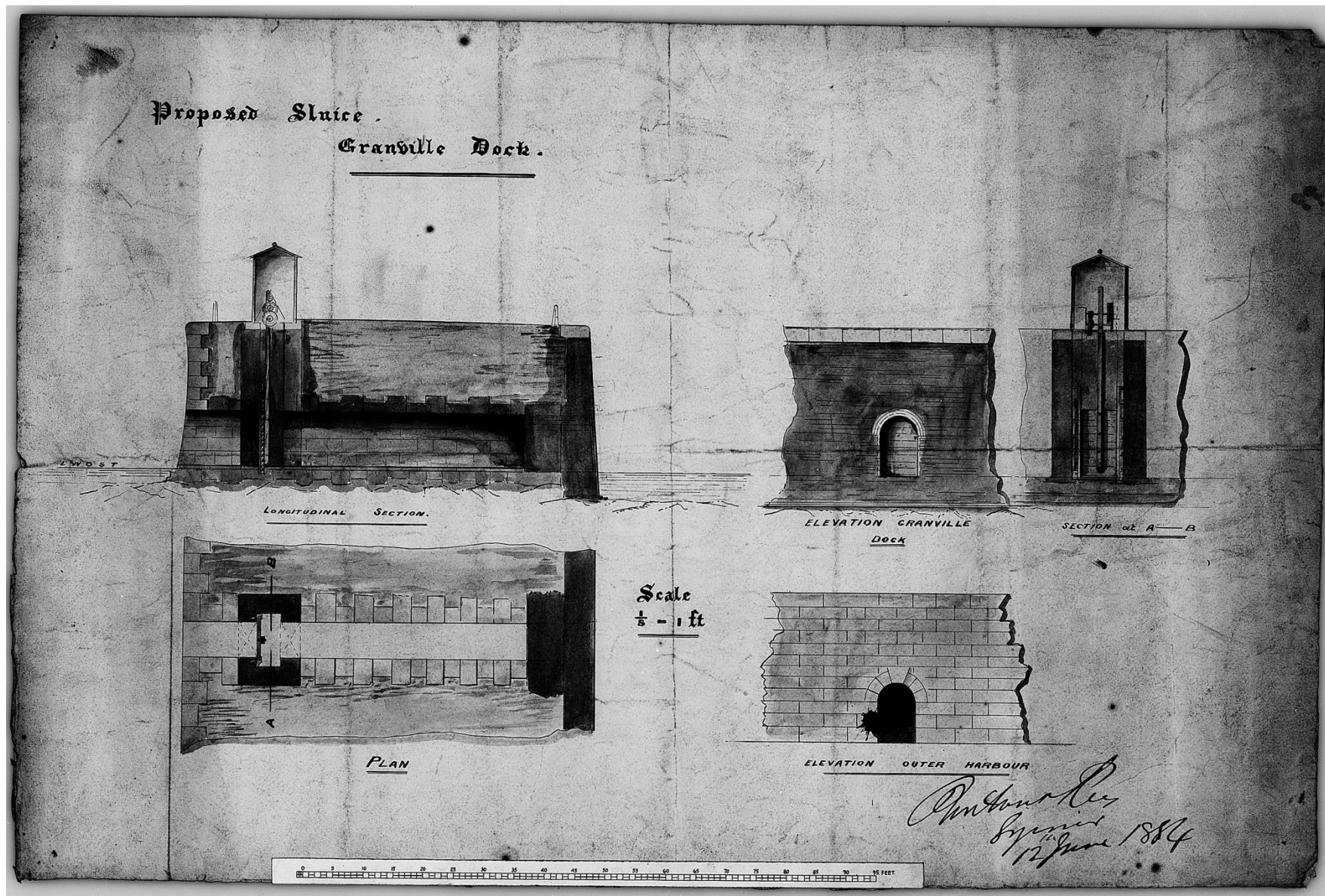


Figure 26: Proposed sluice in Granville Dock, 12/06/1884, DHB Historical Drawings Archive 4608.

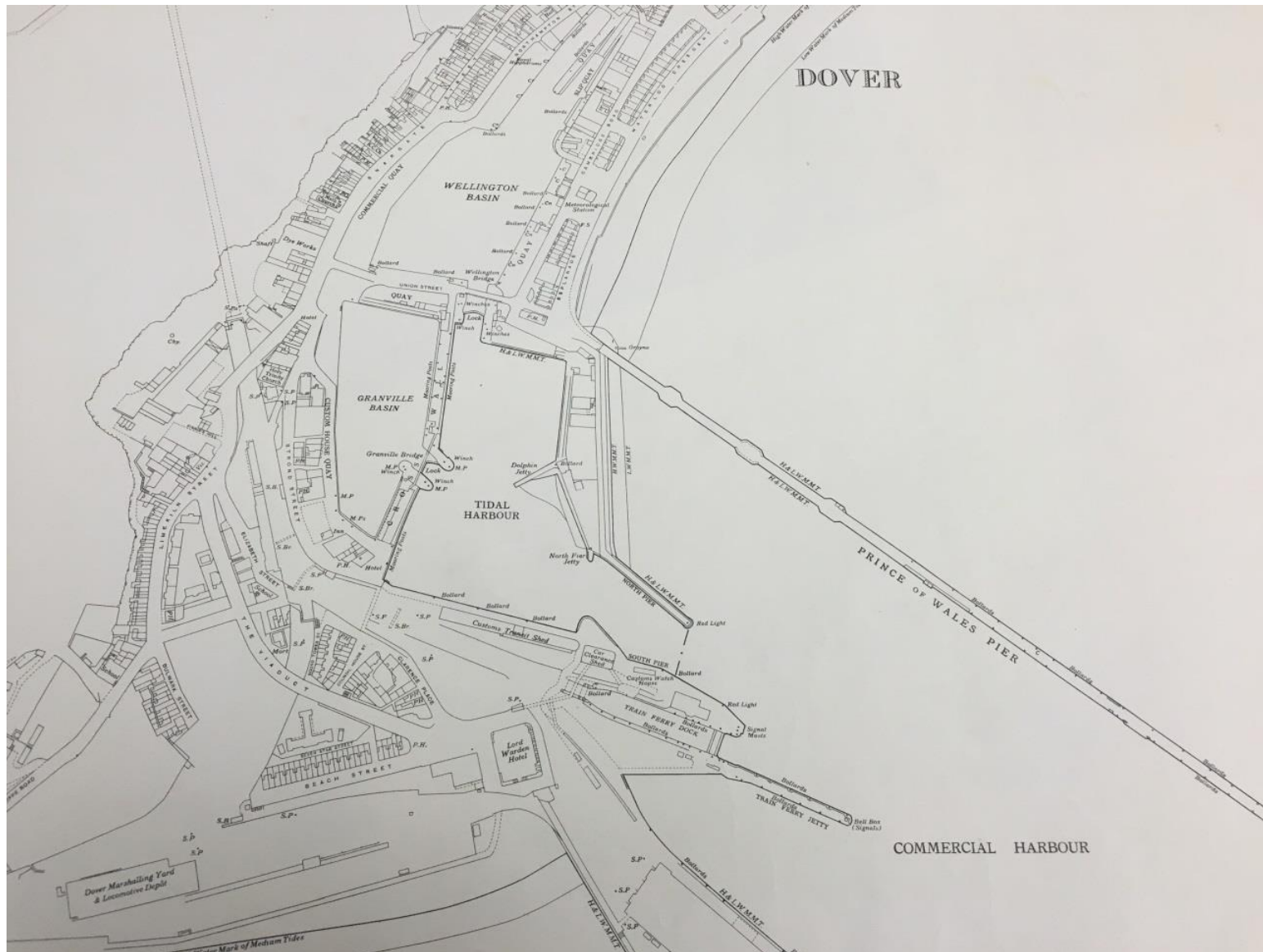


Figure 27: Dover Division Ordnance Survey Map Surveyed 1858, revised 1937-1938, 1945 (detail from), DHB Historical Drawings Archive.

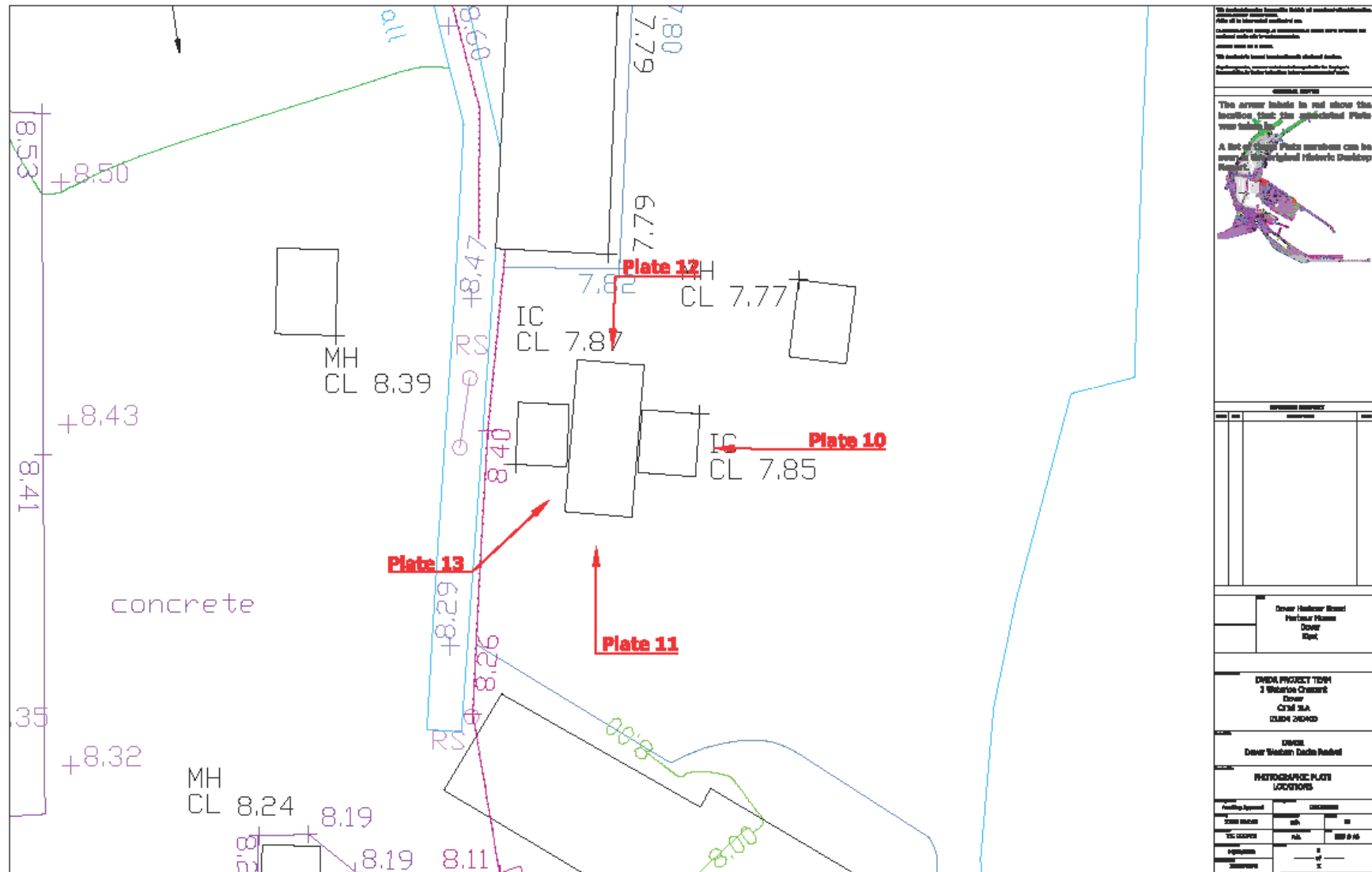


Figure 28: Photographic location drawings for photos of the Sluice next to the Swingbridge, Sluice A, 2016, DHB.



Appendix 002 – Report on Dover Harbour by Thomas Telford, Civil Engineer

**This document is to be read in conjunction with The Telford
Sluices and Associated Sluice Mechanisms Desktop Study**



Kent History and Library Centre, Report on Dover Harbour by Thomas Telford, Civil Engineer (transcribed), DHB/AR47

Having on the 25th of January 1834 received the directions of his Grace the Duke of Wellington, to Report upon the state of Dover Harbour, I proceeded to that place, and on the 30th January and the following day I examined the Harbour, and the Works connected with it, and conferred fully with the Resident Engineer, the Harbour Master, and Sir Henry Oxenden.

The History and description of this Harbour being well known, I shall confine my observations to its present state, and referring generally to the plan of Dover Harbour I shall proceed to communicate my opinion as to the most effectual means or rendering the Harbour accessible at all times; for until this essential object is attained, attention to interior improvements might seem to be premature.

The Tide here flows from the South West, at the rate of three or four miles per hour; - Spring Tides rise Sixteen or Eighteen feet, Neap Tides Twelve or Fourteen feet, perpendicular: - The prevailing Winds are from the South West, and a very unusual succession of violent gales from that quarter during the last Autumn and Winter, produced an accumulation of Beach Gravel or Shingle, on the Bar and in the entrance of the Harbour, notwithstanding the utmost efforts of the Harbour Master, and the application of all the means which have been devised for clearing away such obstruction.

It is to be understood that the Beach Gravel or Shingle is constantly in motion from the South West, so that although the Channel was oftener than once nearly opened by Sluicing, it was not regularly re-established until the 22nd of January, and on the 30th I found it sufficiently good, although a considerable quantity of Shingle still remained at the Western Pier-Head, and on the North East side of the entrance.

On the 31st of January (being the Sixth day after full Moon) the depth of Water in the Bason being Eighteen feet, The Culvert No. 3 on the Pier head was opened by the Harbour Master at two Minutes after Ten O'Clock A.M., and was closed at seven Minutes after Ten; and in these five Minutes the Shingle (five feet in height) opposite to this culvert was displaced.

The Culvert No. 2 was then opened (10.08A.M. to 10.15A.M.) and in Seven minutes the Shingle opposed to it was entirely displaced.

The Culvert No. 3 was then re-opened (10.10A.M. to 10.20A.M.) and in Ten Minutes partly in conjunction with Culvert No. 3 cleared away all the remaining Shingle, the effect extending outward 150 feet.

The Sluice Gates in the Cross wall between the Harbour and the Bason were raised at the same time, that is, at two minutes after Ten O'Clock, and this current of Water produced its full effect at the Turn-Water (North side of the Harbour entrance) in the space of Fourteen



minutes, and continued in full force during Thirty minutes, when day light appeared under the Sluice Gates in the Cross wall, and in another half hour the Water lost its power. The length of the lower Turn-water in use this day was 60 feet, the distance between the Pier heads being 110 feet.

From these Experiments I am led to conclude, that if the effect of a Backwater extending over Twenty Acres behind the Cross wall were exerted under more favourable circumstances, the Harbour entrance might always be maintained; and if so, it is proper in the first instance to attempt an improvement in the effect of Sluicing, especially as this would not preclude other and farther improvements.

The existing defects in the Sluice are these; (1) The Culverts in the Pier Head are too few in number, and of too great length; (2) nor are they fully supplied with Water, the Archway through which the backwater current reaches them, not being adequately large; (3) And besides these defects, the distance from the Sluices in the Cross wall to the Harbour entrance is such that the current loses much of its force before it is brought to bear upon the external bar of Shingle.

For remedy of these defects I recommend (1) That the Culverts be shortened, and the Iron lengths of Tube thus obtained be applied in increasing the number of Culverts: -
 (2) That a Tunnel 30 feet in diameter be constructed in the body of the Pier from the Culverts quite to the Wet Dock.-
 (3) and that a similar Tunnel be made from the said Wet dock to the Bason, thereby also communicating at pleasure with the Inner Pent.

All this would give the command of more than Twenty acres of back water, applicable, and with undiminished forces, through the Culverts in the Pier-head, thus bearing directly upon the bar; while the seven acres additional of Harbour back water will be directed on the same object by means of the Turn-waters on the North side of the Harbour entrance.

After the additional Culverts are completed, an Apron or Granite pavement, Thirty feet in breadth, should be placed around the Pier head, so as to prevent the violence of the Culvert discharge from scooping pits in the Chalk, which are receptacles of Shingle, whereas the proposed Pavement would facilitate the removal of Shingle, whenever collected on it.

But as Granite is expensive, and Portland stone unfit for Harbour Masonry, I recommend in preference to either, for general purposes (but not for the above described pavement) the Bramley Fall Stone from Yorkshire; this is of durable quality for such purposes, and was found preferable to any other at the St. Katherine's Dock.

As the Harbour entrance is of primary importance, I recommend that all operations in the interior do forthwith cease, until this is secured, and that the materials intended for other purposes be employed in the more urgent and decisive operations herein recommended.



The expense has been estimated, with with (sic) as much accuracy as the nature of the work admits, at £20,000.

During the present year 1834 the Tunnel, connecting the Wet Dock and the Bason may be accomplished, and by the additional supply of Back water, acting with undiminished force upon the Bar, the ensuing Winter season, by means of the present Tunnel, the effect would I expect be very considerable.

During the year 1835, the additional Culverts in the Pier head, the Apron or advanced pavement, and the Tunnel between them and the Wet dock may be accomplished; and the expenditure of £20,000 might thus be equally divided between the two years 1834 and 1835.

If by the means here proposed, of applying the back water with better effect, the Shingle can be prevented from forming a Bar and choaking (sic) the Mouth of the Harbour, the Westerly Gates and Flowing Tides would I expect carry it into the Bay North of the Harbour, and afford additional security to the new Houses, and it has already made progress in that direction.

London 13th Feby 1834

Thomas Telford



Appendix 003 – Extract from Telford and Rickman, Life of Thomas Telford containing a descriptive narrative.

**This document is to be read in conjunction with The Telford
Sluices and Associated Sluice Mechanisms Desktop Study**



Extract (pp. 650-653) from Telford T. and Rickman J. (ed) (1838). *Life of Thomas Telford, Civil Engineer, Written by himself; containing a Descriptive Narrative of his Professional Labours; with a Folio Atlas of Copper Plates*. London: James and Luke G. Hansard and Sons.

Progress of the Improvement of Dover Harbour Entrance.
Communicated by James Walker, Esq., P.I.C.E.

No harbour, and scarcely any engineering subject of the same apparent facility at the first view of it, has caused more difference of opinion, or more difficulty in the mode of treating it, than Dover Harbour, while its great advantage, as being the nearest port to France, has rendered the improvement of the harbour a matter of great and almost national importance. One of the great evils is the accumulation of shingle in front of the entrance; this is brought up from the west by the prevailing southerly and westerly winds, and lodged directly at the entrance to such an extent and height, as sometimes to completely block up the entrance for several days together, particularly during winter, and in rough weather, when the harbour is of the greatest consequence.

The management of the harbour is under the Lord Warden of the Cinque Ports (at present the Duke of Wellington), the Lieutenant Governor of Dover Castle (at present R.H. Jenkinson, Esq.), and a body of the most influential gentlemen of the county; and these have called in aid the professional assistance of the most eminent engineers of the day; at various times, Smeaton, Gurney, Huddart, Ralph Walker, Rennie, who have all reported their opinion, and under whose advice various works were done for the improvement of the harbour. The outer harbour is divided from the basin and Pent by a cross-wall, in which there are gates for the passage of vessels. These gates, being shut at high-water,¹ retain in the basin and Pent nineteen acres of water, and at low water the large sluices which are built in the cross-wall being opened, the water is discharged with great force through the sluices, and runs with considerable velocity through the outer harbour, to the entrance where the stream is narrowed, and directed by turn-waters, movable as occasion may require, against the bar; but the main power of impulse was lost after the immediate discharge from the sluices. The above method was frequently found insufficient to clear the harbour entrance; and it was sometimes necessary to have one hundred men, with horses, trying to make a breach through the accumulated shingle without effect. The delay to trade and the danger may be easily supposed. Mr. Moon, the ingenious harbour-master and superintendent, about the beginning of the present century, appears to have suggested the plan of bringing the water from

¹ The average rise of a spring-tide on harbour-index is - - - - - 17 feet.
And that of a neap-tide - - - - - 13 feet.



the basin through culverts, placed behind the walls, so as to discharge it directly upon the bar, in front of the south pier; and Mr. Ralph Walker being consulted, approved the plan, and recommended iron in preference to brick or stone for the purpose. Accordingly, a pipe five feet diameter was laid from the basin to the wet-dock, and thence was carried through a culvert to a small reservoir, about two hundred and thirty feet from the pier-head; and from this reservoir, three pipes, two of seven feet diameter, and of five feet, with sluices, branched off. The effect of this was found to be good; the water being discharged, with a considerable head, directly upon the bar, cut through it in a way to which the former plan was unequal. Still the evil, but in a less degree, existed; the five-feet pipe being insufficient to supply the larger outlet pipes, the power of the discharge was lessened, and confined in its operation; and the complaints against the harbour were as loud as ever.

Mr. Moon died in 1832, and was succeeded by Mr. Fordham, as resident engineer, and Mr. Iron, as harbour-master; their attention was given to the subject, and in 1833, they proposed the plan of substituting a large brick tunnel for the five-feet pipe, and of enlarging the reservoir, with an additional number of sluices; a plan for increasing the sluicing power, the necessity for which was increased by the harbour being shut up for several days in the month of December 1833, and in the early part of January 1834. The then state of the harbour, and the object of the application to Mr. Telford, will be better understood by the letter of the Lord Warden (the Duke of Wellington) to him, written from Strathfieldsaye, on the 25th January 1834.

"Sir,

You will have heard reports of the inconveniences experienced at Dover, in consequence of the impediments to the entrance of the harbour, by the constantly repeated collection of shingle upon the bar.

These inconveniences, although greatly exaggerated, certainly exist to a certain degree at all times; they have been removed up to this time by the skilful application of a very moderate quantity of back-water, through culverts, and by means of sluices; but the gales from the southward and westward having prevailed to a greater degree than usual during this autumn and winter, and repeatedly for several days and nights successively, it has been found impossible to clear away the beach so fast, and as frequently, as it is collected; the entrance of the harbour, therefore, has been at times entirely closed, notwithstanding the vigilant attention of the harbour-master, and the constant application of all the means at his disposal to remove the beach; but I must add, that this inconvenience does not appear, by the official reports, to have occurred so frequently as has been publicly stated.

It is desirable, however, to satisfy the public upon this subject; and I am anxious that you should take the trouble of going to Dover, and that, after examining the existing works for the construction and maintenance of the harbour, and conversing



with the engineer employed there by the Lord Warden and Court of Assistants, and the harbour-master, you should report your opinion, whether any other and what description of works ought to be constructed for the purposes of a harbour at Dover; at what expense; and, if you should think the works now in existence are sufficient for the purpose, whether any and what additional means of operation could be given to them to render them more efficient.

I think it proper to send you reports on this same subject, received some years ago by my predecessors in office.

You will see that they are contradictory; and that the Lord Warden and Court of Assistants were finally advised to adopt the system which is now being carried into execution. But you will judge from the whole on the spot, after hearing the engineer, the harbour-master, the pilots and other person, and gentlemen most capable to give you information, what it is fit that you should recommend to be done.

I have the honour to be, &c. &c.
(signed) 'Wellington'

To Thomas Telford, Esq.
Civil Engineer,
Abingdon-street, Westminster."

In consequence of this, Mr. Telford visited Dover, and afterwards arranged with Mr. Fordham the plans; entered into contracts with Mr. Burge for some of the works, and superintended the same until the time of his death.

The plan consists of the substitution of a brick-tunnel, thirty feet wide and sixteen feet high, in place of the five-feet pipe; from the basin into a new and larger reservoir, from which eight pipes radiate with sluices, so as to discharge upon an apron in front of the pier-head. At the time of Mr. Telford's death the greater part of the brick-tunnels was made; part of the excavation for the reservoir-dam, and a small part of the wall, built; but none of the drawings prepared, or work done, towards the sluices or machinery.

The works are now (March 1838) completed under contracts (by Mr. M'Intosh, and by Messrs. Hunter and English for the machinery, under Messrs. Walker and Burges, the engineers, and Mr. Howkins, resident engineer), without any alterations to affect materially the design; three of the new sluices were opened on 25th October 1837, and the success has quite equalled the expectation, as may be seen by the following letter from the present harbour-master to Mr. Walker.

"Sir, Dover, 11 February 1838.
I beg leave to state that the entrance into Dover Harbour, during this winter, has been clearer from bar than any winter since I have been in office. We have had no obstruction to vessels coming in or going out, and the passage has been kept open.



Many valuable vessels have taken shelter here during the easterly gales, and several remain until the ice breaks up on the opposite coast. The prevailing easterly winds have had no bad effect on the harbour. We have now a safe channel into the harbour, sufficient to admit any ship whose size is calculated to use the port.

I do not hesitate to state, that had it not been for the new sluices, though they cannot be put fully into operation, we must have had at time the harbour completely blocked up in the early part of the winter, from the effect of the westerly and south-west gales bringing a great quantity of beach along the shore, and not having the means to remove it; and I have no doubt but I shall at all times (with exception of any extraordinary cases) be able to keep a good channel for ships to enter the harbour; but it being a bar-harbour, the alteration of the winds must at times alter the channel into the harbour.

I am, Sir, &c. &c. &c.

To James Walker, Esq.
Civil Engineer, &c. &c. &c.

John Iron,
Harbour Master."

Mr. Walker's last report to the Duke of Wellington is to the same purport, and includes suggestions as to the further improvement and enlargement of the harbour and its entrance.

In closing this short outline, it is proper to notice the personal attention and frequent attendance given by the Duke of Wellington during the progress of the works; also by Mr. Jenkinson and by Sir Henry Oxenden; the latter, not only since the commencement of the present improvement, but for half a century previously, as an active Commissioner in the care of Dover Harbour.