

Lyme's Battle with the Sea: Part 1: The Cobb Breakwater

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This is the first of two papers on Lyme's sea defences. Part 2 will cover the inner line of sea defences: shingle beaches, sea walls and jetties.



The curving High Wall of Lyme's principal breakwater up Monmouth Beach

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Introduction

Lyme Regis would not exist in its present form without sea defences. This paper is about the Cobb, the ancient harbour, in its role as the town's principal breakwater and sea defence. This is not a general social or trade history of the Cobb, but a history of its construction.

The exact age of the original Cobb is unknown, but it appears to have been in existence by about 1254, if not before. We do not know what the Cobb looked like before 1539, when it was the same size as today, but without later pier extensions. Since at least then it has always been on the line of the arc of today's 645ft (200m) long High Wall and 300ft (91m) long Landing Quay. The natural basin in the ledges dictates its size and shape. The oldest part of the Cobb still standing may date from about 1550 and most of the principal breakwater visible today was built between 1785 and 1826.

Originally the Cobb was a vernacular¹ construction of local materials, oak piles and Cowstones², flexible and porous. As a form of construction timber and boulder walls may have once been commonly used in harbours where suitable materials existed. Essentially this is an extension of the *crannog*, the timber and stone dwelling islands dating from the Neolithic to early 18th Century found in many Scottish and Irish lochs, the timber and stone harbours which have been excavated around the Baltic and Dutch dyke construction of willow mats and large stones. But the nearest *crannog* to Lyme is Wales' only example, at Llangorse Lake, 90 miles away. Some medieval harbour descriptions sound more or less Cobb-like (e.g. Scarborough, St Andrews) and whilst Lyme men built harbours elsewhere on Royal request, Lyme Cobb is a unique full-scale survivor not overlaid by something very much larger.

From the 1680s the Cobb was gradually converted, via intermediate stages of dry bedding up-ended Cowstones, later squared and set horizontally in mortar, to, from the 1780s, a rigid, heavy and carefully shaped structure, designed by military engineers and built with precision by masons from massive skins of costly imported dry-bedded Portland Stone tied with oak dovetails and iron cramps or later, dowels and filled with mortared Cowstones.

¹ For further discussion of its vernacular nature see Jo Cox 1996 *The Cobb: A Sideways Look at Vernacular Materials and Techniques Vernacular Architecture* vol 27.

² Hard, naturally cemented Upper Greensand boulders taken from the shores east and mostly west of Lyme - see rock type glossary in Appendix 1.

A note on Measurements, Values and Conversions

Today the total length of the breakwater, i.e. High Wall and Southern Arm combined, is about 1180ft or 393 yards (360 metres), to which can be added 75 yards (70 metres) of low parapet wall at the northern end and the rockery to Beacon Point to the east.

Imperial measures are used hereafter in this paper, the measurements of its construction. One yard = 3 feet (ft.) = 0.91 metres (m). One foot = 0.305m/305mm. Measurements from old maps may be approximate and historical measurements of the length of the breakwater may not all start from a common landward point, nor is it ever clear whether the length was measured was the inner or outer of the curve.

Monetary conversions to modern values after 1750 were made using the Bank of England's on-line Inflation Calculator, which represents consumer buying power, not construction industry costs. These costs are almost impossible to assess because labour and materials costs were so low in the past. Before 1750 the Bank gives no modern analogue, suffice it to say that £1,000 in the 1640s was a very large sum – the Cobb was always a costly structure to maintain, beyond the means of the Borough. However, sums or discounts from duties offered by monarchs or Parliament before 1750 were not always fully convertible to cash. For pre-decimal money, £1 or 100 decimal pence (p) = 20 shillings (s) = 240 pence (d), for example £1 10s 6d or £1 10/6 = £1 52.5p.

Sources

This account is a compilation from various authorities, tested against the sources referenced in this paper, material in the Museum collection such as artworks, photographs, maps and plans – **and** – the evidence from the masonry of the Cobb itself, such as plaques and inscriptions, masonry types, the keyed or butted joints between them and the foundations, which are often much older than the stonework above. The most comprehensive work is a two-volume report by Keystone Historic Building Consultants for West Dorset District Council dated 1994³ (the Keystone Report). It has been adopted as fact, apart from its phasing of the tip of the Southern Arm, where the authors have been misled by an undated plan into ignoring the evidence in the stones. Other detailed works are by John Hutchins⁴, George Roberts⁵ (1834, and his MS notes in the Museum), A F Chapman 1982⁶ and John Fowles 1993⁷. Nigel Clarke has produced a general booklet for public sale⁸. LRM numbers are accession numbers at Lyme Regis Museum, DC numbers are archives at the Dorset History Centre.

A port with no natural shelter on a dangerous lee shore

Lyme Bay is completely open from SE through to SW and offers no shelter to weather from those sectors. A choppy sea can get up very rapidly when the wind rises from an exposed quarter. In sailing ship days the Cobb was a port of refuge for vessels embayed in Lyme Bay, but unable to hold anchor due to stress of weather, providing they could reach it before going on shore.

³ Keystone Historic Consultants 1994 *The Cobb: Report to WDDC* LRM Cobb Files

⁴ *Hutchins History of Dorset* 3rd Edition by William Shipp and James Whitworth Hodson 1864 LRM 1983/162/1

⁵ George Roberts *History of the Borough of Lyme Regis and Charmouth* Bagster 1834

⁶ A F Chapman 1982 *Some history of the Cobb Structures and Sea Walls at Lyme Regis* Appendix to an unpublished report to the Borough of Lyme Regis LRM 1984/215.

⁷ John Fowles 1993 *A brief paper on the Cobb* Typescript in LRM Cobb files

⁸ Nigel Clarke undated *The Book of the Cobb: Lyme Regis* self-published

Summer visitors generally see a calm sea at Lyme: this apparent calm hides the reality of winter, and particularly the hefty storms which can occur at the equinoxes. Lyme has a history of great storms, which, in the days before accurate weather forecasting appeared to sweep up the English Channel from nowhere. Daniel Defoe reported on the effect on Lyme of the Great Storm of 1703⁹. Another Great Storm was that of 1824, when the Cobb was seriously breached and many houses and sea walls damaged. By contrast the worst of the Great Storm of 1987 passed Lyme by.

Lyme has no natural shelter from any storm which approaches from the Bay of Biscay through the gap between Start Point and Cape Finisterre. There is 8,000km of ocean beyond the High Wall of the Cobb between bearings 208° and 230°, reaching to the mouth of the Amazon – plenty enough fetch for the occasional well-aimed storm to deliver very powerful waves to batter the Cobb, or the town when the Cobb is breached, as they run into the shallow water of the bay. Yet South Devon and Britany provide relative shelter from other directions in the SW Approaches, keeping Atlantic swells away most of the time, giving calm seas for much of the year. Gales from the SE are much feared, for the Cobb provides less protection from that direction, but the fetch is much less.

Heading & bearing	Landfall	Distance of Fetch
N-ENE 0-60	–	–
ENE 060	Charmouth	2km
E 090	Thorncombe Beacon	7.5km
ESE 125	Portland Bill	41km
SSE 145	Cherbourg Peninsula	150km
S 180	St Malo	210km
SSW 208	Finistere	260km
SSW 220	Belem, mouth of R Amazon	8000km
SSW 230	Start Point	85km
SW 240	Seven Rock Point	1.5km
SW-N 240-360	–	–

The power of the sea is enhanced by the tidal range: 4.5m at maximum spring tides, 1.0m at slackest neaps. Parts of the Cobb, such as Victoria Pier, are submerged at spring high water, allowing the waves to break on and over the structure, particularly during storm surges. A particular tidal phenomenon occurs in certain conditions, leading to rapid filling of the harbour (see Appendix 1).

Would Lyme exist without the Cobb?

Put simply no, without the Cobb's shelter, Lyme would have been destroyed by the sea long ago. It would have already taken much of the Broad Street area, through slipping and subsequent removal of the material offshore. It would have broken through into the Lim Valley behind Broad Street into the area where the Town Mill stands. Bell Cliff may have become merely an isolated sea stack, and the Church could have disappeared. On the contrary, the Cobb Causeway has blocked the eastward movement of shingle since it finally linked the Cobb, once island, with the shore in the 1834, forming the ever widening Monmouth Beach. Since then the lack of shingle passing the Cobb to protect Lyme has resulted in increased erosion and consequently the need for ever better sea walls, shingle replenishment and new

⁹ Daniel Defoe 1704 *The Storm* ed. Richard Hamblyn Penguin Classics London 2005

jetties to hold the shingle in place. However, when first conceived, the Cobb may not have been an island: it could have been left isolated by earlier beach recession.



The Cobb in 1820, from the *Book of Lyme Regis* by Rodney Legg. The watercolourist is looking forward from the unfinished repair of the 1817 breach, so the scene is much as it is today, except for the narrow Landing Quay, shortly to be widened, with the Southern Arm curving away to the right.

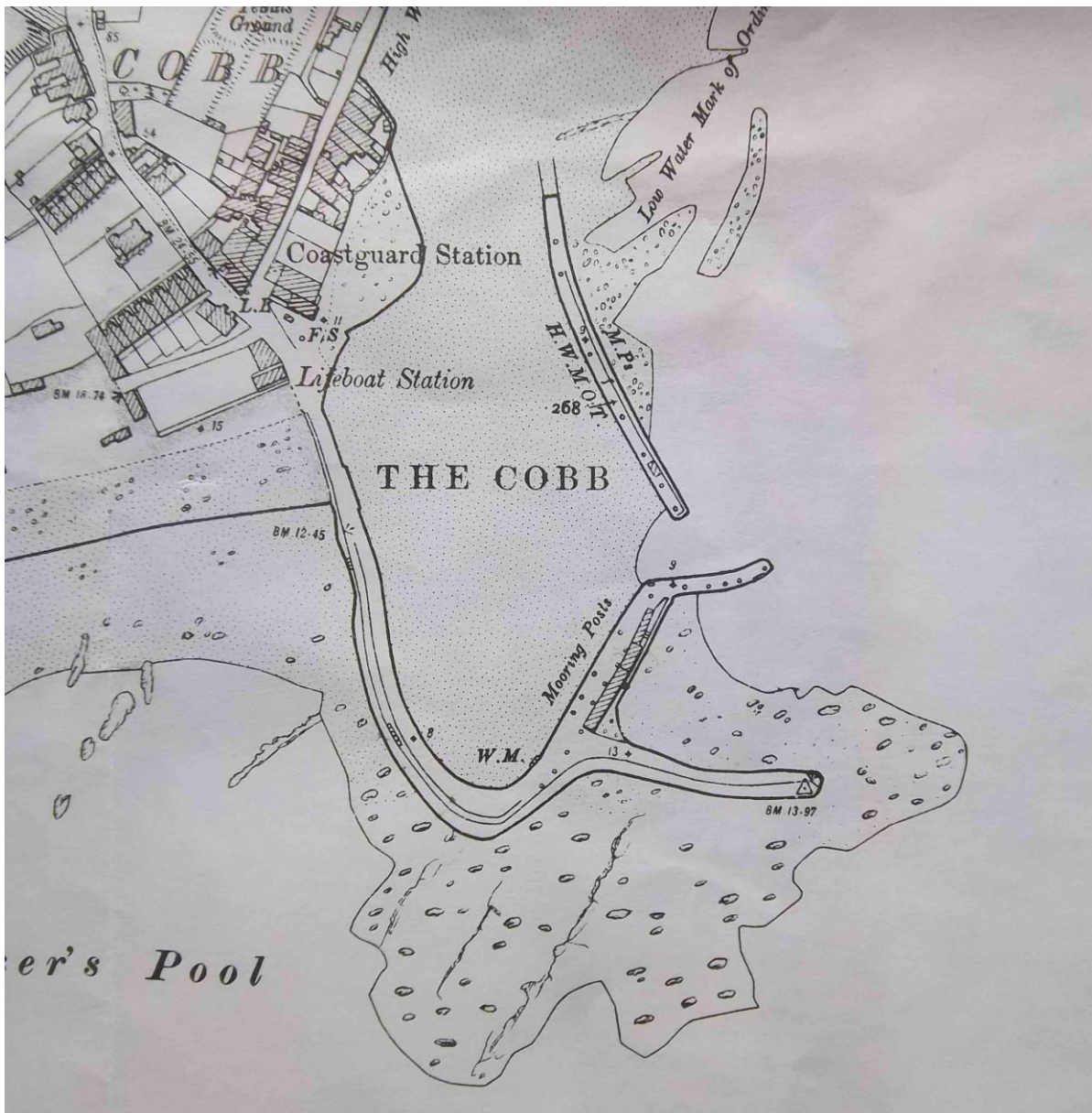
The parts of the Cobb

Some description of the Cobb, including the names of its various parts, is needed before its history can be told – see the OS 1:2500 map extract below.

The principal part is the c.645ft long **High Wall**, which is joined to the land by a lower c.225ft parapet wall on the line of the original continuation of the lower Cobb Wall. This once ran to the foot of the hill at back of present-day Cobb Square. The shingle of Monmouth Beach can still spill over during storms. The adjacent **Causeway** carries the **Roadway** past the modern **Lifeboat Station** and **Harbourmaster's Office**. This cobbled roadway runs parallel to, and below the High Wall, with a quayside for small boat moorings alongside. At times the Causeway has been a porous structure with a bridge or sluices, but at others the Cobb was not connected to the mainland except by the beach at low water. A **tramway** formerly ran along the roadway to the Landing Quay, cutting across the sharp bend in the Cobb on a wooden viaduct, the piles of which can still be seen.

A large concrete **apron** slopes into the water at the southern edge of Cobb Square, joining the **slipway** from the lifeboat station, which replaced the slipway for RAF Air-Sea Rescue Station. **Timber yards** and a **shipbuilding yard** used to lie either side of Cobb Square, with the last **Custom House**, **Coastguard Watch House**, **coastguards' houses** and the old **Bonded Warehouse** set behind in **Cobb Hamlet**. Once a **quayside** may have existed in this area, and an old quay wall used to support the RAF slipway.

The **High Wall** runs south and curves around to the east to form a half moon, often described as the **demi-lune**, the curved section known as **Roundabout** and continues as the c.330ft **Southern Arm** (it actually points easterly). At the end of the Southern Arm is a line of large boulders known as the **Rockery** or **Beacon Point**. All this, taken together, is the **Cobb Breakwater**.



The Cobb in 1903, substantially as today, but for the modern rock armour breakwater extensions on the end of the Southern Arm at Beacon Point (marked *BM 13.97*) and at the northern end of the North Wall. The northern tip is shown as unfinished and the now vanished Swimming Club hut stands near the roundhead. *W.M.* is near the Roundabout. The geological strike of the outcrop of the harder bands in the ledges is clear. The low tide line around the tip of the Southern Arm marks the rubble spread from the destruction of 200ft of the c.1697 arm in the 1736 storm. The low tide line on Monmouth Beach shows that by 1903 the build-up of shingle was already considerable. The Gin Shop on the High Wall is shown as the twin steps near the 8ft spot height. The 9ft spot height is on the Victoria Pier. The map shows the old Lifeboat Station, now a little to the south on the shingle, and there are no slipways off Cobb Square, just a wide shingle hard. The High Wall is linked to the land by the Low Parapet wall at a set of steps. *L.B.* stands outside the Custom House. Note: *BM* and *<-* means Bench Mark is a place where the height above sea level has been very accurately measured (the height is referred to the height above a mark on Newlyn Harbour in Cornwall, the OS standard reference), *M.P.* means mooring post, *L.B.* means Letter Box, *F.S.* means Flagstaff, *W.M.* means Weighing Machine, .268 is the acreage of the North Wall, figures thus: · 8 or + 8 are spot heights in feet, and Δ is a trigonometrical station where a theodolite was placed when the mapping was done, tying the exact position into the Ordnance Survey system.

Steps to the wall-top walkway can be found at the landward end of the High Wall, half-way along known as **The Gin Shop**, in the Roundabout known as **Granny's Teeth** and half-way along the Southern Arm. Below the High Wall on the harbour side is a raised stone apron, the "**raised or covered walkway**", which was the only dry route to the quay at the time of its construction between 1818 and 1826. It is too sloped and too narrow for carts. The "**low walkway**" is the cobbled roadway to the quay, which continues as a cobbled, then flagged pathway along the Southern Arm. Before it was built carts could only get to the Quay at low tide via a slipway, the foundations of which can be seen at low tide.

The 300ft long **Landing Quay** runs east from the Roundabout and supports **Cobb Buildings**, former ware and watch houses, now an aquarium and a marine college, with open fishermen's shelters. The Landing Quay once ended here at **Crab Head**, which now connects to the later 180ft long **Victoria Pier** at a change in angle by the **Gents** (or Jakes). There are steps at each end of the Landing Quay and on Victoria Pier, which terminates in a roundhead. At extreme low water springs the basin dries, and only Victoria Pier is left standing in water, hence its former use for paddle steamer landings.

There is a sand and shingle beach, known as **The Pool**, between the back of the Landing Quay and the Southern Arm. It was used as a ballast and stone store. Larger vessels can moor against the Landing Quay and both sides of Victoria Pier, the latter being only fair-weather moorings. **Pontoons** are put out in the summer in the sandy bay for visiting yachts.

The eastern side of the harbour is protected by the 480ft long **North Wall**, which ends raggedly on Main Beach and has an armour stone **Rockery**. There are steps near the southern end of the North Wall, which ends in a stone roundhead, protected by sheet steel piling since 1939.

The Cobb in detail

The long and curving half-moon of the High Wall encloses an improbably sheltered harbour on what is otherwise an open and exposed coast, with a dangerous lee shore. If it wasn't so familiar, it would seem an unlikely place to build a harbour. Before it was built, low-tide ledges may have provided some fair-weather shelter for cogs, the small trading vessels of the 11-13th centuries, illustrated on the Borough Seal (right). The use of such shelter is not unusual, e.g. the traces of a fair-weather harbour called The Dock can be seen at low tide, dug into the Lias scars (ledges) near the southern cheek of Yorkshire's Robin Hoods Bay. Here Whitby brigs once exchanged coal for alum, the same ships that brought coal to Lyme. Some suggest that the Cobb ledges were once sheltered from the SW by the long-since vanished Devonshire Head. There is no scientific evidence for or against such a headland, but the name persists and the tortuous writings of St Aldhelm, Bishop of Sherborne (c.639-709) suggest it may have existed¹⁰.



The first High Wall probably followed the shape of these ledges, running around the rim of the natural basin in the Shales-with-Beef Formation which now

¹⁰ Dr Katherine Barker pers com

forms the harbour. This formation is the 100ft of mudstones, with a few thin bands of limestone and fibrous calcite ("beef"), which overlies the Blue Lias Formation. The strata dip southwards towards the Cobb Syncline, the axis of which runs NNE-SSW a short way to the east of the Cobb, so that the northern end of the High Wall crosses the thin Devonshire Head Limestone, then runs south over progressively younger mudstones, including the thin Spittles Limestone, turning to join the Landing Quay on mudstones. Only the Southern Arm can be truly said to be founded on a harder bed for much of its length as it turns to follow the strike of a thin limestone band just below the top of the Shales-with-Beef¹¹.

The Shales-with-Beef formed a good substrate for medieval for pile driving, being soft enough to readily accept the iron-shod wooden piles of the day without them having to penetrate hard limestones, as would have been the case had the Cobb been sited on the Blue Lias ledges off Cobb Gate and Gun Cliff. The boulder fill of the early High Wall would have, to an extent, settled into this substrate and become locked in place, only having to be topped up if settlement occurred.

Techniques had changed by the 1690s, when construction of Southern Arm was first attempted. A foundation trench had to be dug to provide a firm foundation for the kerb of an interlocking boulder wall, without a continuous wall of timber piles outside for protection. This had to be founded in a hard bed, if there was one. Some piles were still used to secure the foundation. Large, vertically-set kerbing stones were seen in 1993 beyond the tip of the present, now shorter Southern Arm¹². William Jessop proposed using this kerbing as a foundation for extending the arm again in 1805. They now lie under the rockery. Failure resulted from the sea undermining the foundation, or a particular hard bed in front of the foundation. Gradually the whole Cobb breakwater was changed to a stone-only masonry wall. Eventually this proved secure because of better care with the foundations and latter-day toe protection with sheet steel piling and concrete aprons. Today, whilst some settlement is visible, the top of the breakwater is remarkably true and level when compared with the horizon from Marine Parade.

There is no surviving English breakwater of comparable date - others of its scale are half a millennium younger. It was an ancient wonder even by the time Defoe described it¹³. Consequently the Cobb is a Grade 1 Listed Building, but not, surprisingly, a Scheduled Ancient Monument. There is no other harbour quite like it, but its name is not unique - The Cob (Y Cwb) at Porthmadog is a slate barrage across an estuary built in 1811 for land reclamation, the slates laid dry, vertically. The Listed Building description for the Cobb (1974) is not totally accurate, particularly on dates:

*Cobb
Piers & Walls including North Wall - stone sea-wall of mediaeval origin; Cobb shown in 16thC sketch. Before end of 18thC, wall was dry-built; a small section of this kind of walling remains in the east face of the Victoria Pier. Complete rebuilding took place between 1783 and 1829 especially after the great gales of 1824, which destroyed a great part of the walls. Victoria Pier added between 1842 and 1852. North Wall constructed in 1849¹⁴.*

¹¹ Gleaned from Gallois R W 2006 *Saving Lyme Regis from the Sea* Geoscience in SW England vol 10 pp 183-189 and same author *Report on the geology of the area between Devonshire Head and the River Lim* WDDC Technical Services Report No. 06/01

¹² Plate 4 of Vol 1 of the Keystone Report.

¹³ Daniel Defoe *A tour thro' the whole island of Great Britain 1724-1727*

¹⁴ British Listed Buildings web site accessed 14th November 2014

Today the Cobb may look precarious at extreme high tide under storm surge conditions, when waves break over the High Wall and wash right over Victoria Pier and the North Wall. However, although sea level is rising gradually and storm intensities are increasing, Victoria Pier and the North Wall were always low at spring high tides.

When was the Cobb first built?

The first breakwater of timber and boulders was constructed before 1328, having been mentioned as *beaten down and quite destroyed by the sea* in a petition for funds to Edward III in that year. Wanklyn¹⁵ considered that, from trade and defence records, the first Cobb might have been built 74 years before that, i.e. 1254, when there is first mention of a port in records from Henry III. According to John Fowles the Cobb was first mentioned in 1294, but he considered a construction date before 1250 as likely, following possible loss of access to the old Roman port in the Axe Estuary through shingle baring the entrance¹⁶.

The Cobb has a history of storm damage leading to funding petitions

The petitioners to Edward III stated the Cobb's importance quite simply: there was no harbour other than the Cobb, in which they meant that there was no effective harbour between the Exe and Weymouth. Their request was to be granted "keyage", permission to take duty on goods to pay towards its repair. Permission was granted at the rate of 1d in the £1 on the value of goods for five years, later extended¹⁷.

From Edward III until the 19th Century the Cobb has been regarded as a national work of strategic significance, worthy of Exchequer support. This was arranged by one or more methods: by allowing the Borough to maintain it out of the fee-farm otherwise due to the Crown; dedicating harbour dues to the repair of the Cobb; annual grant or annuity, sometimes out of Customs revenue at Lyme; exemptions from duties, such as contributions to the Cinque Ports; direct action through the Board of Ordnance or by direct grants and loans for particular projects, once out of the sequestered funds of Royalists. Of course, some of these sums would not have materialised in full if harbour or customs duty revenues had been insufficient, or if getting the money from London involved bribes, fees or travelling expenses (e.g. once noted as a sturgeon for the Speaker and bribes to the doorkeepers at the House of Commons). It must also be assumed that some petitions were exaggerated – that the Cobb was said to be "destroyed" may be the spin.

In addition an annual fund-raising festival, the Cobb Ale, had been held each Whitsun from some time about the 14th Century. It had been held by Wanklyn that the ale was banned around 1610 by the Puritans for its drunkenness and debauchery, but Magee considered that, with rates income available, it had become too onerous to organise¹⁸. Whatever, it was held in the long-vanished Cobb Hall and its funds were not always used for maintaining the Cobb.

Since Edward III's time successive storms damaged or destroyed the Cobb, resulting in regular petitioning for assistance to the Crown and inquiry into the utility of the structure by monarchs and governments, In 1313 keyage was granted after the Cobb was destroyed¹⁹, but further destruction came in 1329²⁰, and again in 1372-7. From 1532 an annual repair grant of £20 had to be provided from the Exchequer. In addition Henry VIII granted the fee farm for fifty years in 1543, providing the

¹⁵ Wanklyn C *Lyme Retrospect* 1927

¹⁶ Fowles John *A short history of Lyme Regis* Wimborne 1991

¹⁷ Roberts G 1834 p 41 quoting Patent Rolls 2 Edward III part 2

¹⁸ Wanklyn C *ibid* and C Magee *Puritans and Performers in Early Modern Dorset* Early Theatre vol 6 2013

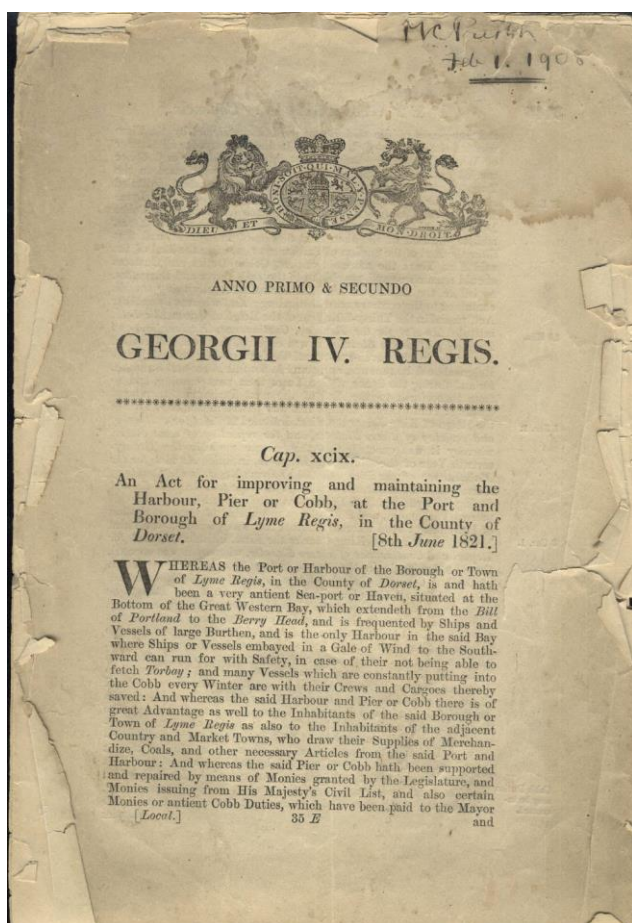
¹⁹ Roberts *ibid* p 233

²⁰ Roberts *ibid* p 233

burgesses maintained the Cobb²¹. Although Mary I reduced the funding, because of Lyme's protestant leanings, the Civil List contribution was voted annually by Parliament for some 300 years until the Municipal Reform Act of 1835, the sum varying from £20-£200, with one-offs as required in addition in response to petitions after storm damage (see Appendix 2 for an annual summary of these grants).

In 1579 Elizabeth I codified the results of an inquiry into the condition, utility and revenue of Cobb in a Charter²², which Parliament followed up with **The Cobb Act of 1593** (Eliz I 27), *An Act for the Maintenance of the Peere and Cobb of Lyme*. This provided for the continuance of funding as a direct grant from the Civil List, reconfirmed in the following further instruments: an Act of Elizabeth (35); a Charter of James I (1) 1610 which granted an annuity of £20 for 21 years to maintain the Cobb out of the customs revenue of Poole²³ and an Act (James I, 21); an Act (Charles I, 3)

and a Charter of Charles I 1634 which confirmed the fee farm retention for ever and gave permission to dig stones and rocks²⁴.



In 1655 a Charter of Oliver Cromwell granted an annuity of £100 for 10 years to maintain the Cobb, out of Lyme Regis customs²⁵, as well as a £2,000 grant for the modernisation of the Cobb after the 1644 Siege. An Act (Charles II (14) provided Lyme with exemption from the duty to contribute to another national work, the cinque port of Dover Harbour, and by Charter of 1670 Charles II granted an annuity of £100 for 7 years to maintain the Cobb, out of Lyme Regis customs²⁶, reconfirmed as a further Charter in 1686 for 21 years²⁷. In 1705 Anne by Charter confirmed Charles II annuity of £100 for a further 19 years²⁸.

The Cobb Act of 1821 (Geo IV) *An Act for improving and maintaining the Harbour, Pier or Cobb, at the Port and Borough of Lyme Regis* brought the powers up to date. It set the rates of harbour dues so as to ensure

there was sufficient income for repair. Dues over £500 were to be invested in Bank of England 3% Consolidated Bank Annuities and the Harbour Book had to be certified annually by the Justices of the Peace, presumably to ensure that dues were not spent *ultra vires*. It also exempted Lyme from ancient duties in regard of Ramsgate Harbour, another of the Cinque Ports. The Cobb Act rates board is still displayed at

²¹ Lyme Regis Borough Archive at Dorset Heritage Centre DC /LR/I/12

²² Ditto DC/LR/I/17

²³ Ditto DC/LR/I/21

²⁴ Ditto DC/LR/I/22

²⁵ Ditto DC/LR/I/23

²⁶ Ditto DC/LR/I/24

²⁷ Ditto DC/LR/I/26

²⁸ Ditto DC/LR/I/28

the Landing Quay. The Civil List vote was discontinued in 1832, presumably as the Cobb breakwater, having had so much attention, was now in good heart and the income from harbour dues was now sufficient, only needing maintenance. The Municipal Reform Act, 1835 reformed Lyme's rotten borough and extended its area from just 41 acres to the whole parish of Lyme Regis, at a stroke increasing its income. Having seen decline during 100 years of maladministration by the Fane family, the reformed Borough now started to develop the Cobb's facilities.

During the 18th and 19th centuries the Board of Ordnance* (The Board), despite querying the military value of the Cobb, was required to provide financial and engineering support by Parliamentary vote. Being part of the military, the Board's technical support was provided through the Army's Royal Engineers, although generally the Borough employed contractors to do the Board's work. The Board's interest was the limited to the breakwater, i.e. the High Wall and Southern Arm: the rest remained the full responsibility of the Borough, which at various times had a Cobb Warden, Cobb Mason and Cobb Committee.

In all, the Board spent £51,409 17s 2d on the Cobb breakwater between 1742 and 1826²⁹, which in modern terms is several million pounds, but no sensible overall comparison can be made because of the wide range of years, the very low historic cost of labour, which hardly figures in some of the estimates, the low cost of materials and the then disregard for worker's safety. On the other hand modern use of machinery and concrete bring savings today. The Borough will have been required to match-fund breakwater works at around 25%, as well as having to maintain and develop the rest of the Cobb.

*** The why and the wherefore of the Board of Ordnance**

The Board, a branch of the military concerned with supply, lands and fortifications, including dockyards, was set up in 1671 from the Tudor Office of Ordnance, becoming the War Office in 1855. The Cobb produced customs revenue for the Exchequer, but it was no military harbour or depot. The Borough had managed it since 1250, although it had always been considered to be of strategic significance, none more so than during the run-up to the Spanish Armada and during the Civil War Siege of 1644. By 1750 any military value had declined, as warships became larger, although an 1812 Cobb-built warship, the gun brig *HMS Snap*, had yet to be launched, and RAF Lyme Regis air-sea rescue launch station was but a distant dream. The Board's involvement which started in 1842, reflected the Government's response to petitioning for funds from the Borough, as Exchequer funds had been sunk into Cobb repairs over the centuries. The Board protested about being dragged into working on a civilian structure, but its involvement accelerated the move, which was already taking place, from vernacular to precise, designed construction by professional engineers and outside contractors using imported, accurately dimensioned stone. Whilst the Board and the Treasury considered the Cobb to be a money sink, it was the only way to get a lasting breakwater, although the Borough retained ownership and management. The Borough retained total responsibility for the rest of the Cobb, but it could never afford the cost of repairs following significant storm damage. The Borough would not have been able to provide the lasting 18-19th century breakwater we see today from its own resources. Although there is no sign of animosity between the Borough and the Board, sometimes there was frustration that the Borough should have carried out repairs sooner to avoid major work later. Borough Surveyor Peterson had a close working relationship with the delegated Royal Engineers officer, Captain George Fanshawe – although before Fanshawe was called in 5 months after the 1817 storm the Borough had unsuccessfully invited famous Scottish civil engineer John Rennie to design and supervise the repair works³⁰.

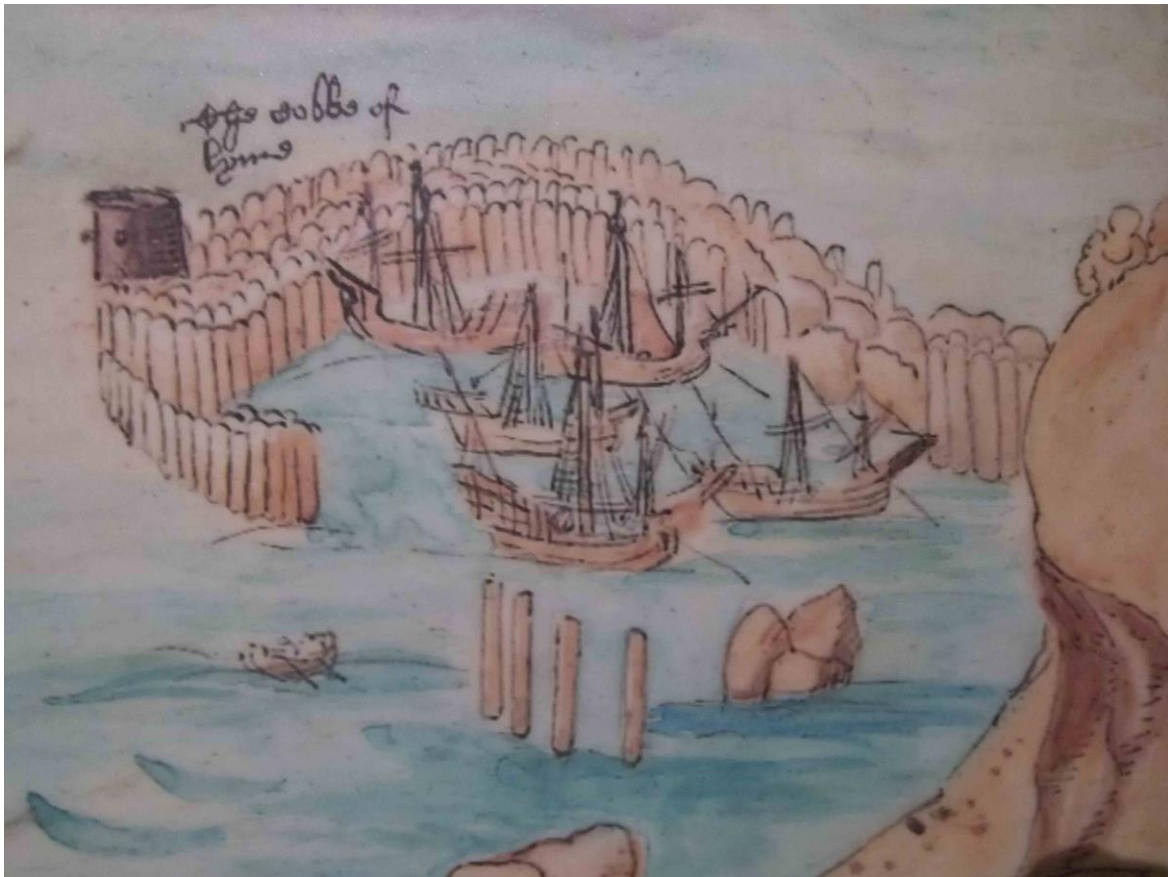
²⁹ £89,267 1742-1822 from House of Commons Report in 1825, plus £11,742 in 1826 at 67.7% of total cost of 1825/6 repairs

³⁰ Letter in National Library of Scotland dated 5th June 1817 MS Coll 19795 ff190-1, copy in LRM Cobb files

Today the Cobb functions as a recreational and fishing harbour, as a vital breakwater sea defence and as a historic building. Its loss would cause immense damage to the local economy. Government support continues for major repairs through Exchequer grant aid from DEFRA, the Environment Agency and English Heritage. Since 1974 it has been owned by West Dorset District Council, which is the Port Authority and employs a Harbour Master, currently Grahame Foreshaw MBE.

Construction of the Cobb

- **Stage 1 Timber and Boulders**



The Cobb in 1539 as presented to Henry VIII, Cottonian MS at the British Library

At first the Cobb was an open, flexible structure through which the waves, diminished, could pass. It consisted of oak piles holding a crib-work of timbers filled with large rounded Cowstone boulders. These were gathered from the beaches on both sides of Lyme and dropped in from flotation casks at high tide. Wave-pressurised air pockets would not destroy such a structure, but it provided no useful hard surface for the landing or movement of goods. The structure would need to be periodically topped up as the boulders wore away and it would need to be taken down and rebuilt if serious settlement or undermining occurred. Other than the piles, no particular foundation would be needed, as the structure would settle firmly, unless undercut. Lyme men were well known as expert in this form of pier construction and were called to repair harbours elsewhere at times of national stress, even ear-marked for Tangiers. A drawing of 1539 (above) depicts the Cobb built in this way and a model by David West, based on this drawing can be seen in the Museum. None of this early work survives, except possibly the remains of piles under the current structure. It has to be assumed that this is what the Cobb was like during the preceding three centuries, as there is no written description. Southern Arm apart, it was the same size.

During the repair of storm damage in 1825 Roberts³¹ saw rows of piles just inside the outer line of the damaged Cobb High Wall, which he took to be the piles of the Elizabethan crib work, although the Ordnance Engineer, Lt Col Edward Fanshaw, did not report such. Roberts said that the wood had been thoroughly eaten by wood-boring organisms, called *Artes* in the Cobb Act of 1593, where they were blamed for causing havoc to the structure. He thought that they were gribble (a marine isopod not unlike the familiar woodlouse) rather than shipworm³² (a wood boring bivalve). This, and the increasing scarcity³³ of good oak within easy reach may have forced the move to the next stage.



The oldest work still visible in the Cobb, possibly from mid16th century

- **Stage 2 Cowstones set vertically, from about 1540**

From about the mid16th century a transition started in the method used to build and repair the Cobb, marking a radical change away from timber and loose boulders. Large Cowstones were set vertically on a constructed foundation, each carefully interlocked, but laid without mortar. This is still a vernacular build - and to an extent, still allowed the waves to pass through before it was later pointed with mortar, as in the remnant above. If settled or breached, it could be quickly rebuilt. The back of the Landing Quay, now facing The Pool, may be from this date and is the earliest work of this type still standing. Some Cowstones, particularly at its base, are massive. Similar work was visible in the foundations of at the outside tip of the Southern Arm in 1950 (see photo near the end of this paper), before being covered by a later concrete apron. Indeed the back of the Landing Quay was exposed to the full force of the sea until the Southern Arm was built in the 1690s. At the Landing Quay there is no

³¹ Roberts MS Notebook *Sea Walls* bound into an album Lyme Regis Museum LRM 1979/19

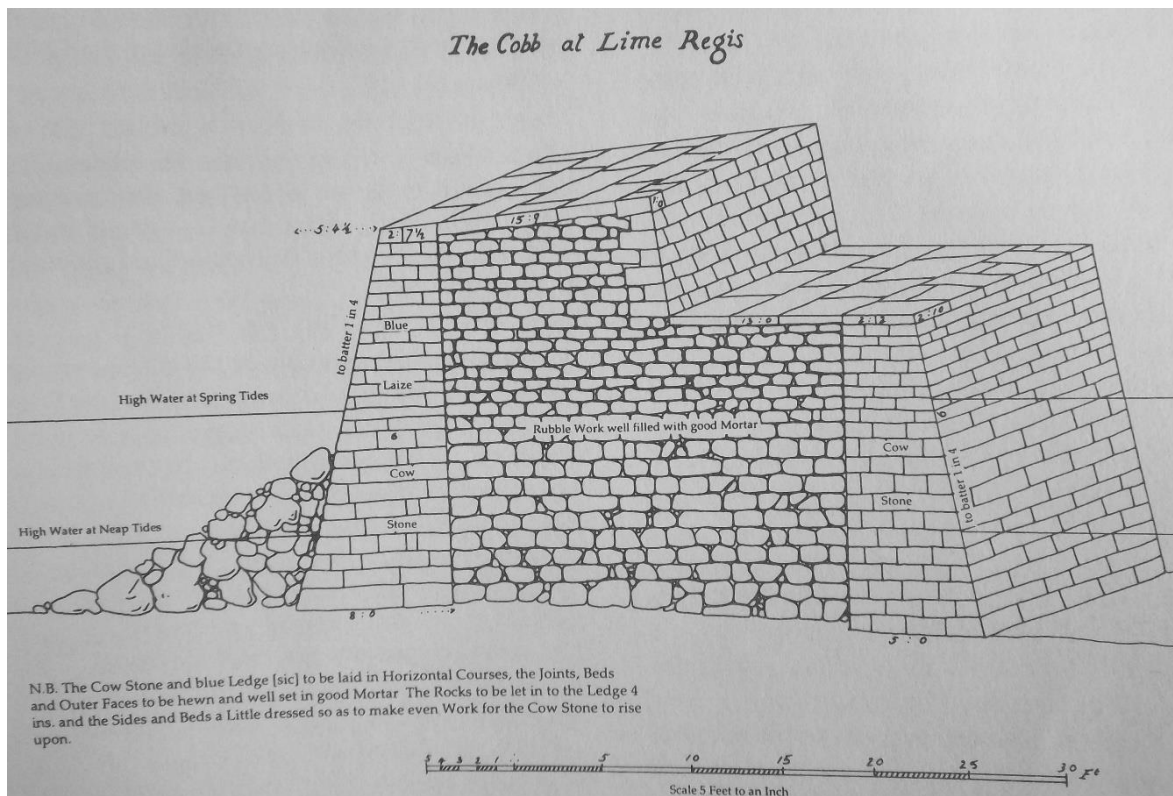
³² For example, in the late 20th Century the 2,500ft wooden railway viaduct across the mouth of the Mawddach Estuary at Barmouth was seriously compromised by infestation with shipworm in its Baltic pine timberwork.

³³ Peter Lacey pers com

original coping with Portland blockwork. The High Wall and Southern Arm were later built like this and a small section survives on the inner face of the later at Granny's Steps. Today the remnants of this work have become heavily weathered, in a honeycomb pattern, as the natural calcite cement has dissolved from the sandstone over nearly 500 years of exposure to rain and sea spray.

- **Stage 3 - Biscuit Work - Cowstones squared and set horizontally in mortar, marking the move from vernacular construction by Lyme craftsmen to work designed by engineers and built by contractors, from the mid18th Century.**

The change to Biscuit Work appears to have been instigated by the Board of Ordnance in an attempt to get a more precise, designed structure. The change occurred first in those parts of the Cobb where the Board's professional engineers were involved; elsewhere the Borough had full control and vernacular methods persisted. Now the Cowstones were labouriously squared and laid in mortar, and capped with copings that appear from the drawing below to be Portland Roach slabs or Cowstones worked flat. On the Southern Arm a remnant of biscuit work shows squared stones with tooling around their edges, although was never an easy stone to work. The hearting would be Cowstones and Blue Lias rubble, solidly bedded in mortar. A good foundation would be essential, as this structure was meant to be impervious and rigid, standing up to the wave pressure by its weight. Settlement and undermining would be very damaging, although the structure could be jacked and wedged back up and packed with stone and mortar, if caught before collapse. Wood piles were avoided entirely, but the need for stable foundations on ledges brought a fresh molluscan challenge, that of piddocks (*Pholas*) which bore into the mudstone ledges.



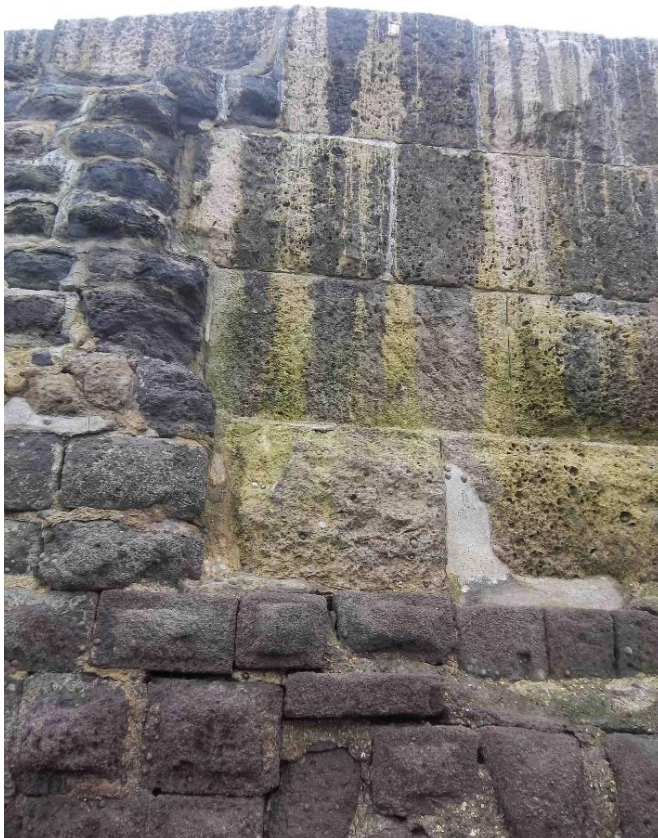
This, the earliest known cross sectional drawing of the Cobb conforms to the Biscuit Work remnant near the end of the Southern Arm and SE of Grannies Teeth. Undated drawing given to Lt Skinner by his father in 1872. In British Library, but not associated with any plan or costings.

Biscuit Work can be seen near the end of the Southern Arm on the inside wall below the walkway. This is a remnant of the Board's 1763 rebuild of the Southern Arm, incorporated under 1785 Portland ashlar work. At Granny's Teeth Stage 2 and 3 can be seen within a 17 yard stretch of the inside wall, running from east to west:

East	1762-3	Biscuit Work as in the above, with Portland capping
Centre	?1646-7	Cowstone arranged vertically through Granny's Steps.
West	1818-20	Portland Roach ashlar blockwork in regular courses.



Three styles of construction, Left Surviving 1650s vertical Cowstone work butted to, and under, post 1817 Portland ashlar blockwork inside the High Wall at the Roundabout. **Right** Surviving Biscuit Work of 1762-3 below the walkway of the Southern Arm - horizontally laid squared Cowstone under Portland copings keyed and butted to the 1785 Portland ashlar tip of the Southern Arm, keyed and butted to 1795 Portland ashlar to the right.



Detail from the right hand joint in the right hand image above, showing the evolution of the Board's design.

1793-5 Portland Ashlar keyed against and lying on 1762-3 Biscuit Work low on the inside face near the end of the Southern Arm.

Note that the Cowstones are squared, and that the edges are tooled, even though they are not uneven, although that may be from settlement before the ashlar was laid.

- **Stage 4 – Portland Ashlar, hearted with Cowstone, from 1785**

Following failure of the tip of the Southern Arm in 1783 the Board adopted a much higher standard, using skins of massive ashlar blocks of Portland Roach in regular courses. The blocks are un-mortared³⁴, tight-fitting, oak-dovetailed and iron-cramped. The coping of Portland Roach slabs was also cramped (this could have been done on the paving of the earlier Cowstone work, but it does not appear in the diagram and everything is now capped with Portland). The Cobb now gains its characteristic modern appearance and cross sectional shape. The hearting is still Cowstone and Lias³⁵, laid in mortar. In 1785-95 work a stepped arrangement was used on the outer face of the Southern Arm (as in the famous poster image for *The French Lieutenant's Woman*), but from 1817 the new outer face of the High Wall was built smooth, in two batters (slopes). The entire High Wall and Southern Arm were rebuilt in this style between 1785 and 1826, except for small surviving sections and the northern tip, which may be later, but before 1841.

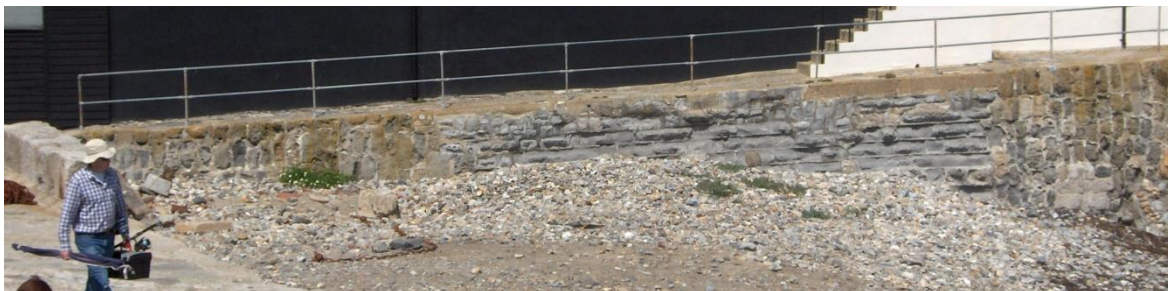


Oak Cobb Dovetail in the Museum Collection



Iron Cramps on the Southern Arm

The Board's work required good foundations chased well into the mudstone and not resting on shingle, although the Southern Arm still rests on a kerbing formed of its ancient founding Cowstones. The structure resists the waves through its massive weight: it must not be undermined. Its characteristic shape reflects or deflects wave forces, rather these being dissipated, as they would in a flexible structure. Wave pressure can compress air in the structure, opening up joints and blowing the top pavings. Undermining and settlement has been dealt with by wedging and pointing. Around 1900 air pressure relief holes were augered vertically through the seaward and inside ashlar skins from the top, and horizontally on the inside face. Later the air spaces were pressure grouted. The paving which was blown could not be reset flush, so still stands proud on the top and lower walkways as a trip hazard around the Gin Shop.



Lias breach infill of 1826

³⁴ Recent reports of site investigation by boroscope suggest that the block work was mortared, but this was probably later grout (WDDC drawing Construction phasing of the Cobb 1998).

³⁵ In part the hearting may be Portland ashlar or large Cowstone blocks, but the results of trial bores in the 1980s are surprisingly vague on this important point. No geologist can have seen the cores or cuttings.

- **Stage 5 – Borough work - Lias ashlar block walling – 1826**

Horizontally bedded Lias ashlar was used by the Borough to fill a breach at the back of the Landing Quay, probably out of expedience to rebuild quickly the Cobb Buildings above, which were badly storm damaged in 1824. The wall is now heavily weathered.



North Wall Inner Face 1849



Original Hearting of Victoria Pier of 1842-8



Extension to Landing Quayside 1829

- **Stage 6 – Borough work - composite style of Cowstone, with Portland Roach strengthening blocks and copes 1829-1849**

The Borough adopted Portland ashlar blockwork for the extension at Crab Head (known as Victoria Pier) in 1842-8, for the seaward face of the North Wall and its roundhead in 1849 and for both faces of its northern extension in 1861-2. For less exposed work it adopted a composite style, probably to save money, consisting of vertically-set squared Cowstone blocks (and sometimes Lias) under Portland copes. Portland bonding blocks are incorporated into the Cowstone work for strength. Other parts, such as the Landing Quay widening of 1829 and the Lower Roadway in 183, are of horizontally bedded blocks of Cowstone and Lias with Portland copings in part. These structures are mainly hearted with sand, gravel and cobbles and some Lias, all materials which would rapidly wash out if the outer skins were breached.



Lower Roadway built in 1834

- **Stage 7 – Concrete and steel**

In the 20th Century problems with earlier work were countered by buttressing with concrete, sheet steel piling, fitting steel dowels, pressure grouting of heartings and pointing of joints with hydraulic mortars. Mass concrete was used to raise part of the Causeway wall and a concrete screed was placed over the cobbled roadway in the Gin Shop area to cheapen repairs. More recently tarmac has been used to fill potholes, although only as a temporary stitch.

The Cobb Mason

The transition from “work determined locally” and “*ad hoc* repairs” to “survey and specification”, started by the Board’s engineers in 1742, was not complete until the retirement of Jim Stone, the last of the Borough’s long line of Cobb Masons, shortly after the takeover of the Borough and the Cobb by West Dorset District Council in 1974. Before that the Cobb Mason and the Borough Surveyor walked the Cobb weekly to look for trouble, arranged for immediate repairs or reported to the Borough’s Cobb Committee. Later WDDC stationed its Engineering Office in the Cobb Buildings, but that function is now run from Dorchester, although WDDC’s Harbour Master remains on site. Now full regard is given to the Cobb’s Grade I listing status, so that even apparently straightforward tasks, such as re-pitching cobbles, can only be undertaken after approval by English Heritage, after which individual cobbles have to be traced and numbered, to enable replacement exactly as they were before by a conservation builder in the correct lime mortar.

Chronology of Extension, Damage and Repair

The record shows that the damage and repair cycle was continuous since the Cobb was first conceived around 1250 - no structure as exposed as this would survive long without attention, as storms quickly exploit any weakness. The original vernacular structure was flexible and porous. The main danger then was the brute force of storm waves exceeding the strength of the materials, perhaps weakened by boring organisms or settlement. Once the Cobb became a stone buttress, the main danger was collapse after undermining and settlement. The ledges erode by washing out of the mudstone under each thin limestone bed leading to marginal collapse, as can be seen in the Blue Lias at Lucy’s Ledge. Not getting the foundation deep enough to prevent undermining led to successive failures of the Southern Arm after its first appearance in the 1690s. On the existing heritage structure such issues can only be solved today by non-heritage intervention, such as sheet steel piling, pressure grouting, steel piling, mass concrete aprons and the deposit of armour stone boulders, as well as repairing the surface paving using traditional methods, all of which are currently holding the structure

On 11th November 1377 the Cobb was totally ruined. Richard II set up a commission of inquiry which reported³⁶ that the damage occurred *by a sudden storm and horrible flux and reflux of the deep sea rolling up to the town. 77 tenements were wasted and carried away, 15 large and great ships and 40 boats carried away and destroyed and [a further] 71 tenements became ruined owing to lack of trade and merchants.* Goods could not be landed, so the fall in harbour dues did not allow the fee farm to be paid. Repairs to the Cobb repairs were estimated to cost over £300.

In 1410 the “port” was destroyed again. Henry IV had to grant the town special favours to ensure its repair³⁷. The same happened again in 1481, by *tempest and wasting by tides and overflowing of the sea.* In response to a petition from the town burgesses Edward IV granted freedom from paying the fee farm for 65 years³⁸. In

³⁶ Roberts G *ibid* 1834 p 52-5

³⁷ Roberts G *ibid* 1834 p 57

³⁸ Roberts G *ibid* 1834 p 58

1526 Cobb repairs were approved by Henry VIII at charge to the town, granting liberties in recompense³⁹.

The earliest surviving image of the Cobb was probably drawn in 1539⁴⁰ (illustrated earlier), when invasion was threatened. It was shown in stylized form as two rows of wooden piles infilled with Cowstones forming a curving half-moon structure, in the same position as the present High Wall and Landing Quay, although no useable quayside is shown and walking on the structure would have been difficult. Cargo would have been landed directly into carts at low tide or transferred in small boats to the quayside at Cobb Gate, where the Custom House was located after 1576 (earlier it had been at the Cobb). There was small fort at the seaward termination at Crab Head, from which a lower short breakwater curved back inwards. The map shows rocks and timber piles, which may have been part of an early North Wall. No breakwater extended out to sea beyond the fort, which would have been situated near the end of the later Cobb Buildings. It is not clear whether this Cobb was an island, or the wall joined the land.

In 1545 the oak walls of this structure had to be repaired, 61 trunks being brought from eight miles away⁴¹.

A narrow Landing Quay may have been built in 1547⁴² (or soon thereafter). The timber and boulder construction used hitherto could not provide a rolling surface, so a new form of construction was used to enable carts to access the Quay. This consisted of vertically arranged Cowstone boulders, interlocked, but laid without mortar, on a prepared base. This must have been a success, because its seaward face of massive, weathered Cowstones still visibly supports the buildings on the quay, although it had no protection from the full force of the sea until the 1690s. At some time, presumably from the outset, the Quay was provided with a slipway to the basin for carts at its SW end, suggesting that the High Wall was still not negotiable by vehicles.

In 1585 the Cobb was thrown down by violent storms and two years' repairs lost. A year later Sir Thomas Walsingham reported to Queen Elizabeth I the need for *an exceeding number of great piles to protect the town from the violence and fretting of the sea, which otherwise would in a short time eat out both the town and the land thereunto adjoining*, that the necessary repairs would cost £2000 and that regular repairs costing £100 per year could not be afforded by the town⁴³ (the annual grant of £20 was clearly not enough). Camden's 1586 description that the Cobb was *sufficiently defended from the force of winds with rocks and high trees* would confirm the description. The Cobb Act of 1593 regularised the situation, but by now suitable oak was in short supply⁴⁴.

Charles II charter of 1610 gave the Borough the power to dig stones and rocks in the town, parish and sea shore for the reparation and new making of the port or haven known as the Peere quay or Cobb. Portland Stone may have been first used by 1619⁴⁵, but the evidence seems scant and there was reluctance to use Portland when recommended in 1762 by the Board of Ordnance (see later).

³⁹ Roberts G *ibid* 1834 p 58

⁴⁰ Plan in Cottonian MSS in BL

⁴¹ John Fowles *A Short History of Lyme Regis* Wimborne 1991

⁴² Keystone Report

⁴³ Roberts G 1834 p 61

⁴⁴ Peter Lacey *pers com*

⁴⁵ A F Chapman *ibid*, but source not quoted, and A R Clark *Portland Stone Armour in Coast Protection* Quart Journ Eng Geol 1988 vol 21 pp113-136 (a useful description of the properties of Portland Stone and its use in the harbour works at the Cobb, Portland and West Bay).

In 1635 a lieutenant reported⁴⁶:

at low water I rode into the rare and unparall'd harbour called the Cobb, wherein after a Sea drift, the Shipps are safely impounded, and locked up from wind and weather with a broad and strong triple Guarded stone wall a furlong or more into the sea, between which and the Town, it overflows and swells every full sea.

He went on to say that the Cobb is less protected from easterlies, which must mean that there was no effective North Wall at that time. *Triple guarded* could mean three rows of oaks enclosing stone?

In 1644 the Cobb would have proved its military value during the Civil War Siege of Lyme, had it not come under artillery fire from Holmbush.

Some barges were sunk. Nevertheless Parliamentary supplies delivered by sea kept the Royalists at bay and £800 was provided by Parliament for Cobb maintenance or defence out of the sequestered funds of Royalists. Afterwards, the Commonwealth Parliament allowed the Navy £2000 to be spent on the Cobb and other sea walls out of revenue, which amounts to a very large sum, possibly several million pounds in modern values. Local revenue could not provide such sums⁴⁷. What was done is not certain, but it probably involved the conversion of the structure from timber and boulders to interlocked, vertically set boulders.

Something was done, but Francis North, Lord Keeper Guilford described the Cobb in the period 1660-1685 and did not mention timber or Portland Stone.

He described repairs, whereby subsidence detected in the High Wall, which he calls a *swamp*, required *the whole wall taken down or it will collapse much worse later*, whereas a timber and boulder wall could be topped up. He described the method of transport of stones direct to the site where they are to be laid using flotation casks, which indicates the use of Cowstones, and he describes their placing as a wonderful feat: *the pebbles of the sea piled up and held by their bearings*⁴⁸. He also described the system where goods were taken to Cobb Gate direct from the ship, not unloaded alongside at the Cobb itself:

the vessels at Lyme are laden and unladen by horses, which turn and return across the sand between the Cobb and the town. They have no drivers, but are charged with bales at the town warehouse and away they trot to the ship's side, and stand (sometimes above the belly in water) waiting to be discharged; and they then gallop back to the warehouse again. So they perform the tide's work; and know by the flood when their labour is at an end.

James Brome, Rector of Cheriton, Kent, writing in 1707 about a visit some time before 1694, did mention timber, but in an ambiguous way⁴⁹:

the Cobb, which being sufficiently defended from the Violence of the Wind and Weather with Rocks and high Trees which hang over it, doth many Vessels to put in hither for shelter.

⁴⁶L G Wickham Legg ed 1936 *A relation of the survey of the Western Counties made by a Lieutenant of the Military Company in Norwich in 1635* Royal Historical Society Camden Miscellany vol XVI

⁴⁷ The Cobb at Lyme Regis, Return to an Order of the House of Commons of 31st March 1825 LRM 1999/10 and 1943/43

⁴⁸ Reported in Roger North's biography *The Life of Lord Keeper Guilford 1685*

⁴⁹ James Brome *Travels etc.* 2nd Edition London 1707

The first Southern Arm was possibly built in 1697⁵⁰. As this provided protection for the Landing Quay, the Cobb Buildings were built at about the same time⁵¹. The first Southern Arm was unsustainably long, extending to a point slightly further out and just to the north of the termination of the current rockery, where some piles were seen during rockery replacement⁵². In 1697 the Borough spent £122 2/5d on the Cobb⁵³. A remaining fragment by Grannies Teeth shows that it was probably built of vertically-placed interlocking Cowstones.

Celia Fiennes visited the Cobb around this time. Like Francis North she made no reference to timber in her description⁵⁴, although the use of timber had been the very marvel of earlier writers:

Lime a seaport place open to the main ocean, and so high and bleake Sea, that to secure the Harbour for shippes they have been at a great Charge to build a Mold from the town with stone like a halfe Moon, w^{ch} they call the Cobb; its raised with a high wall and this runns into y^e Sea a good Compass that y^e Shippes rides safely within it, when the tide is out we may see the foundations of some part of it - that is the tyme they looke over it to see any breach and repaire it immediatly, else y^e tide come with so much violence would soone beate it down - there is some part of it low and only is to joyne y^e rest to the land, and at high water is all Cover'd of such a depth of water that shippes may pass over it to enter the Cobb or halfe moone, which is difficult for fforeigners to attempt, being ignorant, though its better than goeing round the other way for those that know and do observe the tide - the spring tides and any Storme does some tymes beate up and wash over the walls of the forte or castle into the Court and so runns into the town, though at other tymes when it's the ordinary tide and calme sea it is at least 300 yards from the banke on which the high wall is built.

Fiennes may have implied that the Cobb could be entered around the northern end of the High Wall, but in 1700/1 a causeway was built to link the Cobb to the land⁵⁵. This causeway suffered a chequered history of indecision, when it was realised that easy access from the shore had to be balanced against the need to maintain the longshore drift of shingle and allow currents to scour the basin of silt. This was no immediate worry, as the causeway was destroyed by storms in 1702⁵⁶. Dr Stukeley's engraving of 1723 shows a line of stumps where the causeway had been.

In 1703 Portland men are recorded working on the Cobb⁵⁷, which may suggest the use of Portland Stone, but in 1817 George Fanshawe⁵⁸ (see later) reported that Portland had been used for some thirty years, i.e. only since D'Aubant's work of 1785. **Later, on 26-27th November an intense depression** tracked NNE across southern England, following several lesser storms in the preceding days. The storm was fully reported by Daniel Defoe in 1704⁵⁹. It is thought to be the worst storm that Britain has experienced in recorded history. Defoe's report is supported with good

⁵⁰ High Point Rendel *Evolution of the Southern Arm of the Cobb* Draft Diagram for WDDC November 2002 in LRM

⁵¹ Keystone Report and Clarke *ibid*

⁵² Keystone Report and High Point Rendel *ibid*

⁵³ Lyme Regis Borough Accounts during the mayoralty of John Burridge 1697 DC/LR/G1

⁵⁴ Celia Fiennes *Through England on a Side Saddle in the Time of William and Mary* Reprinted by the Leadenhall Press 1888

⁵⁵ Keystone Report quoting Fowles

⁵⁶ John Fowles unpublished typescript on Cobb history in the Cobb files at LRM

⁵⁷ Lyme Regis Borough Archives DC/LR/G9/510 as quoted in Keystone Report

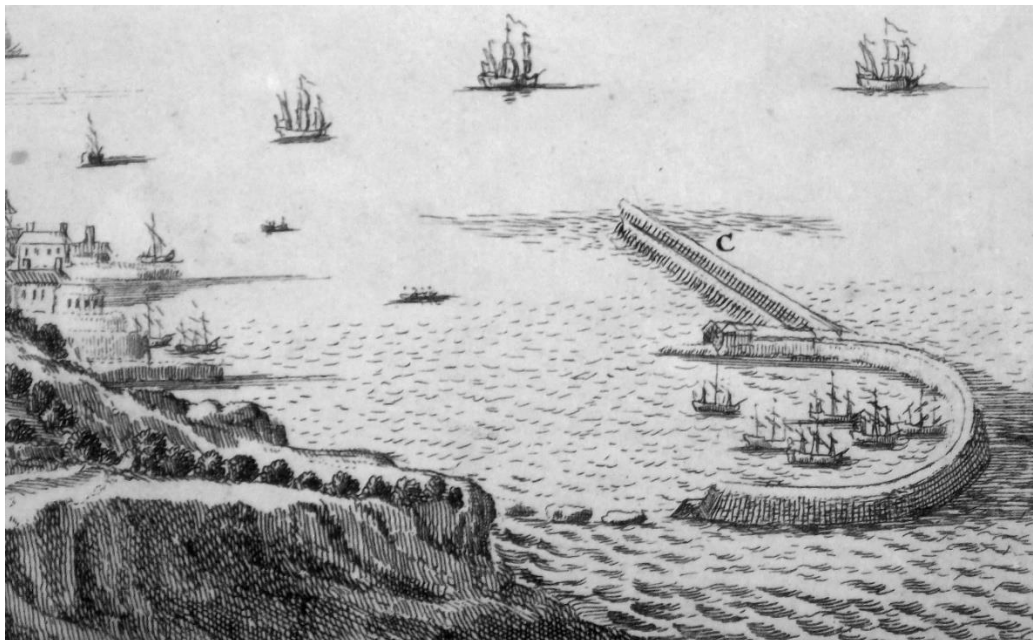
⁵⁸ There were two Fanshaw(e)s working on the Cobb – George and Edward, both Royal Engineer officers. On Lyme references only George had a final "e", but Edward had an "e" in the Army List for 1821.

⁵⁹ Defoe *ibid*

metreological reporting and eye-witness accounts, which he collected by pro-forma. It resulted in the loss of 8,000 lives and 1/5th of the Royal Navy. Stephen Bowdidge provided Defoe with the Lyme narrative:

Five Boats drove out of the Cobb...had that Hurricane happened here at high water, the Cobb must without doubt have been destroyed, and all the Vessels in it been lost, most of the Houses had some Damage...But a great many Trees blown up by the Roots in our Neighbourhood.

In 1722 the Cobb was “injured”⁶⁰. The nature of the injury is not known, but two years later legal opinion was sought on the possibility of action against inhabitants of Lyme *who have been used to take great stones from sea at low water* by permission of Lord Petre, Lord of the Manor of Downhumfraville, to repair the Cobb. These rocks guard the land against the sea, but in 1720 or 1721 rocks were taken from higher up the beach, only covered at high tide. The sea recently broke in and washed away much ground, whereas Lyme claims grant from Crown to take stones where they will⁶¹. The manor was in the Hundred of Axmouth, so this means west of the Cobb. Maybe the supply of Cowstones easily taken at low water was getting short and Lyme men were having to roll them down from the foot of the cliff.



Detail from Dr Stukeley’s print of 1723 shows the Cobb, but the construction method is not clear, either vertically set Cowstones or timber or both, although most commentators think that Stukeley shows vertically set Cowstones. It also shows the full length Southern Arm. There is apparently no North Wall, but it could be under water at high tide. The broken masonry of the causeway destroyed in 1703 is shown. The engraving also shows the town ending very abruptly seawards – it was already on the brink. Ships are shown moored by Cobb Gate as well as in the Cobb itself – one appears to be alongside at Cobb Gate Quay. The engraving also shows the Cobb Buildings standing at the eastern end of the Landing Quay. In his text Stukeley adds little, except that Lyme’s method *is to throw up a huge wall of dry stones which by time gathers a beach*, but he may be talking of the jetties rather than the Cobb, as he goes on to say *besides, here is a great artificial pier called the Cobb*⁶² LRM 1938/7 on display.

⁶⁰ A F Chapman *ibid*

⁶¹ Devon Record Office, Estate Papers E1148

⁶² Dr William Stukeley 1724 *Itererarum Curiosum*

In 1736 200ft of the Southern Arm was lost in a storm, with parts ruined elsewhere, possibly the heads of the old North Wall and Landing Quay at Crab Head. The repair cost was estimated at £4,800⁶³. No special sum was voted by Parliament above the usual £200 annual grant (£39,000 in 2014 prices, if calculated for 1750), although a first contribution from the Board of Ordnance was made in 1742, of £571 18/3d in 1742 (£113,000) (see Appendix 2).

In 1744 the Cobb was injured⁶⁴. Repairs in 1745 to the High Wall and Causeway were referred to in an unsigned copy letter dated 26th August 1745, reproduced below, which speaks for itself⁶⁵. It was presumably from John Burr ridge, Mayor to an engineer engaged by the Borough:

We haveing contracted with Robert Smith for the Rebuilding of the Cobb Gate Wall...But your son being apprehensive it might be done out of the Ordnance money would not permit Smith to set about it untill he had been had been down to Plymouth to represent it to you for your approbation. Since his return he hath acquainted us that the hon^{ble} the Board of Ordnance granted the money for Repairation of the Cobb only And that therefore it cannot be done with that money But if done at all must be done at our own Expense Which we do agree to(o) and as we employed Smith in this jobb we do expect to pay him.

We take this opportunity to Return you thanks for yours and yours son's great Care and trouble in Conducting the repairs of the Breach at the half moon which when finished will be a Compleat piece of work of its kind Infinitely better than any other part of the Cobb had which we think to be intirely owing to your sons great care and diligence In whose commendation we cannot say enough.

In relation to the £100 Which you think most advisable to be layn out in repairing of the western causeway we have considered that matter and think that the Repairing of that part of the Cobb next is of the Greatest Consequence Because it will be an effectual means of preserving the ships and in case it be can be completed as you first proposed will be of great advantage by making a Communication between the Cobb and Land at all times So that people may get into Cobb by that means to assist ships coming in in distress when no(e) person can get into Cobb in a boat We are ever your most obliged and most hble Serv^{ts}

For works on the breakwater the Board paid £1,200 in 1746, £400 in 1748 and £500 in 1749 (£0.4M in 2014). **But it was not until 1756 that the causeway, given importance in the letter, was finally re-built**⁶⁶, as the Borough had to raise the money outside the Board

Around 1750-1751 Bishop Richard Pococke reported that⁶⁷:

"the famous cob or mole...repaired lately at great expense by the Government, which will now allow the Corporation £300 a year to keep it in repair.

⁶³ Keystone Report vol 1 p 14

⁶⁴ A F Chapman *ibid*

⁶⁵ DC/LR/N/23/4 - transcribed copy in LRM Cobb files

⁶⁶ Cyril Wanklyn *Lyme Regis: A Retrospect* 1927 p 123

⁶⁷ James Cartwright *The Travels through England of Dr. Richard Pococke during 1750, 1751 and Later Years* Camden Society 1888 vol 42

The west side of it begins at the foot of the hill and is only four feet broad, widening gradually till it becomes seven yards wide at a distance of 160 yards from the hill; it then forms an irregular figure, coming nearest to a semi-circle, having a key⁶⁸ within about 12 yards wide; the wall without being about 7 yards wide towards the south side where it is most exposed to the sea, this part being a semicircle; about 340 yards in length from the south-east part a pier⁶⁹ is carried to the north-east for about 200 yards, the wall being eight feet broad, with a key below it five yards in breadth; across the opening of the mole to the north-east, a pier is built about seven yards wide and 100 long⁷⁰. All this is made of large stones set up on end without mortar, which is found to be the best way of building to resist the force of the sea”.

Pococke’s description is a little confusing at first sight, but he notes the wall starts at the foot of the hill, i.e., Stukeley’s breach at the causeway had been repaired, and that stone is used throughout. There is no reference to anything but upright stones, meaning Cowstone, which fits the next report in 1762.

In 1762 more of the Southern Arm was lost⁷¹. A report and plan⁷² by **Col Patoun** RE for the Board shows 50ft breaches near Granny’s Teeth and halfway along the Southern Arm, which he describes as *quite demolished* as the tip had already gone. **Patoun suggested⁷³ that Portland Stone should be used instead of the local Cowstone,** and that it should be laid *in terras* made of blocks 2ft 6” deep and 5-6ft long, dovetailed and bound with iron. *In terras* must mean stepped horizontal coursing, rather than stones set vertically, as the Cowstones had been. His plan also shows that a North Wall was in place at this time. **For some reason Portland Stone was not used,** possibly to save money, and the work was done with Cowstones set horizontally in mortar and the low walkway cobbled, rather than paved with Portland slabs. It was finished in 1763 and the Board paid £1,988 14s that year (adding the £200 annual grant makes £0.4M in 2014 prices) towards the rebuilding⁷⁴. The Borough was spending money on the project in October 1762, covering mason’s wages, hammers, a new town boat and coal to burn the lime for the mortar⁷⁵.

In around 1766 the tip of the Southern Arm was extended by about 31 yards from the 1763 roundhead to a new roundhead apparently using Cowstone on the old Cowstone foundation⁷⁶. This extension left the ruined work beyond the new roundhead as a shoal of rubble: it must have been considered not worth constantly expending money on trying to repair the whole original length, although repair would have better protected the town, but that was not an objective of the Board. It was in 1766 that the Board paid £1,700. (£264,000 in 2014 prices)(see Appendix 2).

In May 1783 this latest extension and its roundhead were severely damaged to foundation level at the tip and on the outside face⁷⁷, although parts of the Biscuit Work on the inner face and the outer foundation still survive.

⁶⁸ the Landing Quay

⁶⁹ the Southern Arm

⁷⁰ The North Wall

⁷¹ Board of Ordnance plan at DC/LR/F7

⁷² DC/LR/F7 quoted in Keystone Report

⁷³ DC/LR/G9/10

⁷⁴ Return to an Order of the House of Commons for sums paid by votes or Civil List for the Cobb at Lyme Regis 31st March 1825 (see appendix 2)

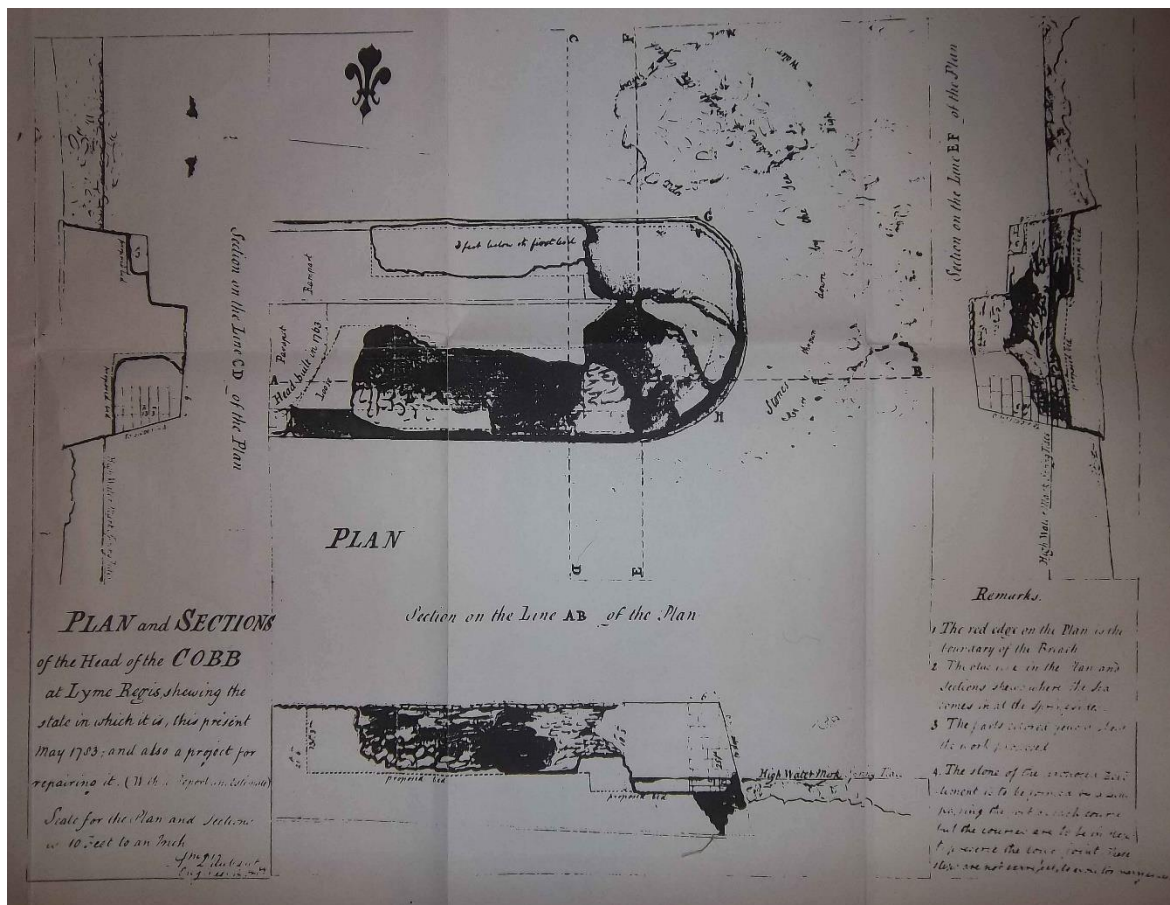
⁷⁵ Keystone Report

⁷⁶ Plan in National Archives MPO/48 included in Keystone Report

⁷⁷ On plan MPO/48 above

Major D'Aubant RE, for the Board, surveyed the damage and estimated repair at £3003 2/11d (£0.4M in 2014 prices), the amount paid in 1784⁷⁸. D'Aubant's 10ft/inch plan dated 1783 is at the National Archives, previously mentioned MPO/48 - a copy from the Keystone Report is shown below. The repair survives and is in Portland Roach ashlar as proposed on D'Aubant's plan - **this is probably the first major use of Portland Stone at the Cobb**. It follows Patoun's advice, having a stepped outer face and being capped with massive Portland Roach slabs cramped together with iron. The roundhead now slopes seawards, a later modification. The interior is probably Cowstone bedded in mortar. It incorporates a small section of Biscuit Work below the walkway on the inside face, consisting of horizontally bedded squared Cowstone blocks, and it rests on the old Cowstone foundation of vertically set boulders. Murdo McKenzie's chart of 1787 (LRM 1993/133) shows the tip as left by D'Aubant, and it remained this way until augmented with armour stone in the 20th Century.

There is a rough carving on a Portland block by the seat 9 yards from the landward end of the repair: **IE 1785**. The "I" is barred and the date, 1785, fits the date of construction. A very indistinct **Ń** may occur above the mark. There is unbarred IE mark on the top paving of 1826-built High Wall of the Cobb 47 yards north of the Gin Shop, but who or what IE was is unknown, possibly a mason's initials or mark.



D'Aubant's combined plan of the 1783 damage and his repair proposals. The repair corresponds with the present roundhead of the Southern Arm, apart from its current terminal slope. It includes the retained Biscuit Work below the walkway. The earlier roundhead marked *built in 1763* is shown to the left of the plan, by the letter A. As far as can be understood, the black areas are the parts of the pier eaten away and the smoothly drawn blockwork areas show his proposed new work in Portland ashlar.

⁷⁸ House of Commons *ibid*

The Southern Arm suffered another catastrophic destruction on 24/5th January 1792, after which only D'Aubant's tip survived. On the basis of an undated and unattributed plan in the British Library (ADD MS 33231 A3), which it reproduces, the Keystone Report concluded that the D'Aubant's work was lost in this storm, yet this runs contrary to evidence in the stonework, viz., the IE 1785 stone (which *could* have been re-used, of course), the direction of keying up to the subsequent repair and the position and wording of its plaque, the preservation of a section of Biscuit Work from the 1766 extension and William Jessop's report of 1805 (see later). In addition a plan produced for the Board in 1824 marked the Southern Arm as *outer pier rebuilt by the Ordnance in 1787 and 1795*. This plan is reproduced below, at the entry for 1824.

Captain D'Arcy RE, for the Board, was the engineer for the repair. A worn stone plaque is inserted west of, forming part of the keyed joint with D'Aubant's work, some 31 yards from the end the D'Aubant's roundhead, reads:

**The Work extending 223 feet West of this stone
was Erected by James Hamilton Builder and Contractor
with the Hon'ble Board of Ordnance to
repair the Breaches made in the Cobb in
Jany 1792 Under the direction of
Capt D'Arcy Engineer 1795**

Note that "west" means towards the High Wall, as hereabouts the tip of the Southern Arm is due east of this plaque. D'Arcy used Portland ashlar blockwork skin, filled in the same way as D'Aubant, and with the same terraced arrangement on the outside face. To the west, near the blockstone steps, D'Arcy's ashlar blockwork is keyed against Cowstone work on the inside face, dating from 1746. On the inner face at low water the foundations of his ashlar in part rest on the original foundation of vertical Cowstone boulders and horizontal Cowstone. Whilst it seems foolish to have founded ashlar blockwork, which must not settle, on an unknown foundation which had failed elsewhere in the same length – but **now 316ft of the Southern Arm is completely rebuilt in Portland ashlar and is still standing 220 years later.** The Government paid £10,000 2s 5d (£1.24M in 2014 prices) in 1794 in financial year 1794/95 towards this repair⁷⁹.

However, there must have been more damage to repair, as on 30th June 1795 Captain D'Arcy gave Mr Peterson, the Borough Surveyor an estimate for a repair 1016 cu ft. of close jointed and well-bedded Portland Stone (£25 18s) on top of 606 cu ft. of Cowstone (£17 3s) to fill a 49ft breach, coped by 627 cu ft. of Portland Stone blocks (£62 14s). The same James Hamilton of Weymouth carried out the work *SE of the New Work and agreeable to D'Arcy's report*, but it is not clear where this means unless it was D'Aubant's work that was in trouble. His receipted bill dated 4th January 1796 was paid by the Borough⁸⁰. That this, and other work, was grant aided by the Government is indicated by payment that year of £686 7/8d (£69,286 in 2014 prices) in 1796, which included the annual grant of £200 (£20,200 in 2014 prices)⁸¹. The Board must have been happy to leave Peterson to deal with Hamilton as a trusted contractor, but it turned out that this was an error: his foundation works were soon found wanting by Jessop.

⁷⁹ House of Commons *ibid*

⁸⁰ DHC file G9/134 copy in LRM Cobb files

⁸¹ House of Commons *ibid*

In 1804 the Borough sought Hamilton's advice, but whatever the advice was it was overtaken by William Jessop who reported very critically of Hamilton's work in the following year. Jessop, the well-known Canal and Dock civil engineer, reported⁸² that the conversion from a Cowstone to a Portland structure was well under way, although a length of 560ft of old masonry (the High Wall) still remained, although with Portland breach-fills of 90ft and 124ft, the latter not finished. Unfortunately his plan is lost. He reported that the *external end of the Pier* (the Southern Arm) *has been wholly rebuilt in a very substantial manner, except for want of proper attention to its foundation*. He found D'Aubant's tip had settled from undermining and was liable to collapse if it received no attention, the north east angle of which must be taken down and rebuilt. About 120ft of D'Arcy's work showed its foundation mudstones washing out, up to 8ft under the wall in parts, for about 120ft length, resulting in settlement of the ashlar. He says that the settlement must be raised with jacks and wedges and the cavity filled with good masonry, closed with kiln dried oak and the foot of the sea wall secured by an apron of [stone] pitching. The gaps in the paving which have opened up must be stitched together with oak dovetails boiled in tar, rather than the iron cramps used hitherto, and the joints filled with Lias lime and sand.

Jessop also suggested that if the full length of the *Old Pier* (i.e., the Southern Arm) was restored, then ships of up to 500 tons could shelter; that the Landing Quay be lengthened; that the North Wall be removed or rebuilt further east; that the causeway be raised to help shingle protect the Cobb; that beach loss in the town be countered by better jetties, which he suggested should have sloping ends to dissipate wave energy and that Portland Roach was best for such *water works* and should be worked to size on Portland by the people who know it best, which would reduce freight costs.

He submitted estimates: a. £2,117 for repairing the Southern Arm and a breach in the Hall Wall, b. £12,326 for extending the Southern Arm by 194ft and c. £16,526 for rebuilding the North Wall entirely in Portland Stone and extending the quay. The first he considered as essential, the second, in effect, good value for money and the third for future consideration. His total estimate would be £2.4M in 2014 prices.

In the event, (a) was done, the record is in the survival of the Southern Arm. In the resetting of the capping at the tip of the Arm the slope he recommended for the jetties was adopted, and "Jessop's Slope" can still be seen in the Cobb profile from Marine Parade; (b) was not done until 1973 and not in full until 2005, but as rockeries and (c) was done in the 1840s, but not entirely in Portland Stone. Only (a) and (b) might have qualified for Board support, but it looks from the grants paid (see Appendix 2) that this was not forthcoming.

He did not estimate for raising the causeway, but this was done with a bridge soon after. The causeway had a chequered history because of arguments about its effect on town beach levels, which Jessop rather glossed over. It was often kept "porous" through deliberate lack of repair to allow shingle and scour currents through.

In 1813 W Pickering produced the first known large-scale map of the Cobb and town foreshore. He was an Axminster surveyor. Pickering shows that the Cobb Wall started well back in what is now Cobb Square outside the NE corner of the present Cobb Arms. It was very low and narrow landward of the old High Wall. His map shows the bridge under the Wall, which allowed tidal scour and shingle through. In 1995 John Fowles saw a foundation wall consisting of substantial stone blocks in the position of this bridge during sewer works outside the beach goods shops in Cobb Square. He considered that it *could* have been part of the lower works of an abutment

⁸² William Jessop 1st December 1805 letter (without plan referred to) in the Borough Archive DC/LR/57 and transcribed in Vol 1 of the Keystone Report, probably the Borough's copy of a letter to Lt Gen Morse at the Board of Ordnance.

for this bridge⁸³. The shingle beach and low water mark are shown equal either side of the Cobb Wall, a far cry from the present situation. The map also shows the old, sinuous North Wall and the then narrow Landing Quay terminating at Crab Head, only just past the Cobb Buildings, and with a slipway to the Cobb Basin floor, rather than a raised cart track alongside the High Wall. The original Gin Shop is shown on the High Wall, but there is no record of what it was like, or what it was, although it might have been a store for a permanent crane or pile driver. The Southern Arm is as built by the Board, with ruins beyond the 1785 roundhead. The North Wall is the old construction, before it was destroyed in 1817 and 1824.



Pickering's Map of the Cobb, 1813 LRM 1991/18

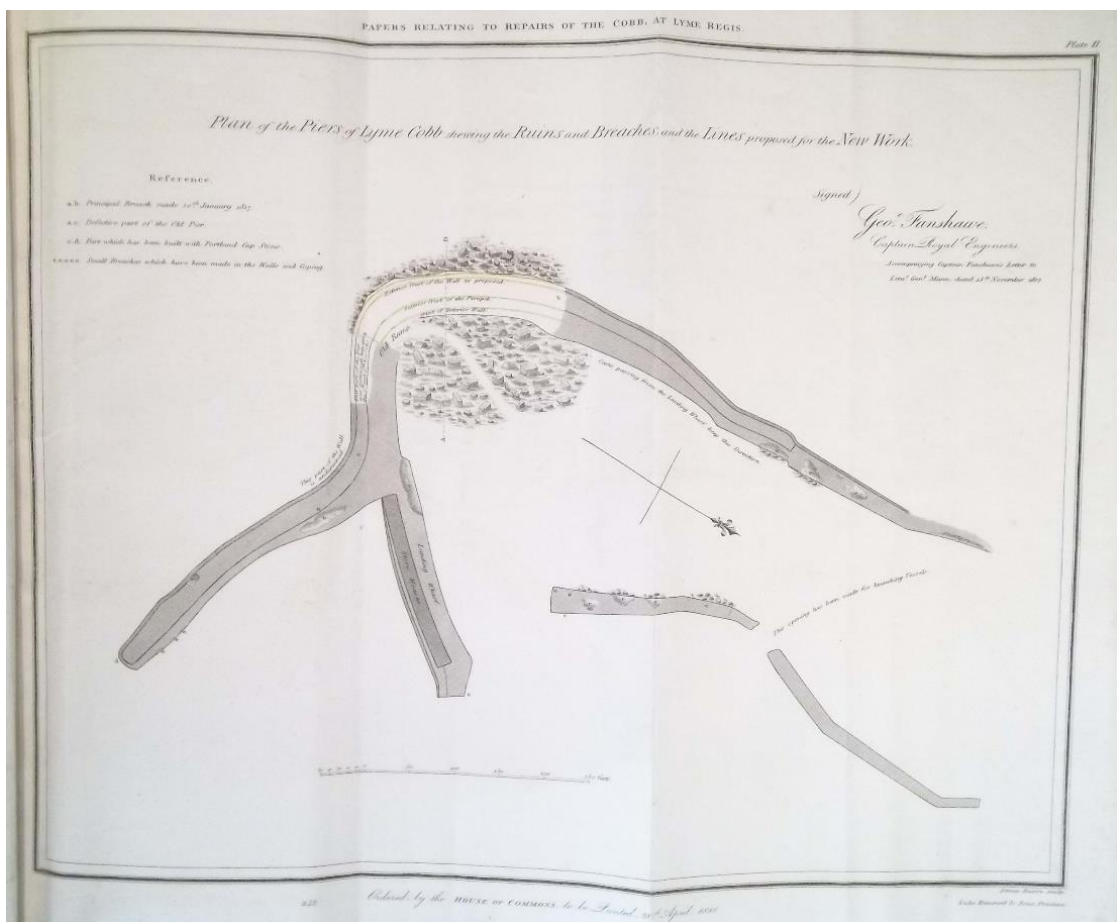
In January 1817 a severe storm made a 192ft breach in the High Wall. This lay in the curved Roundabout section of the High Wall, extending south and east to just before Granny's Teeth⁸⁴. In addition part of the outer face of the Southern Arm was undermined and part of the surface of the North Wall was damaged, and the

⁸³ John Fowles note on the find in LRM Cobb Files and photos in LRM Cobb photo box.
⁸⁴ Roberts *ibid* p233 and Geo. Fanshaw's Plan and Section dated 1817 LRM 1978/29

basin was filled with debris obstructing the slipway from the Landing Quay. A breach made in the North Wall to allow launching from the shipyard had not been made good.

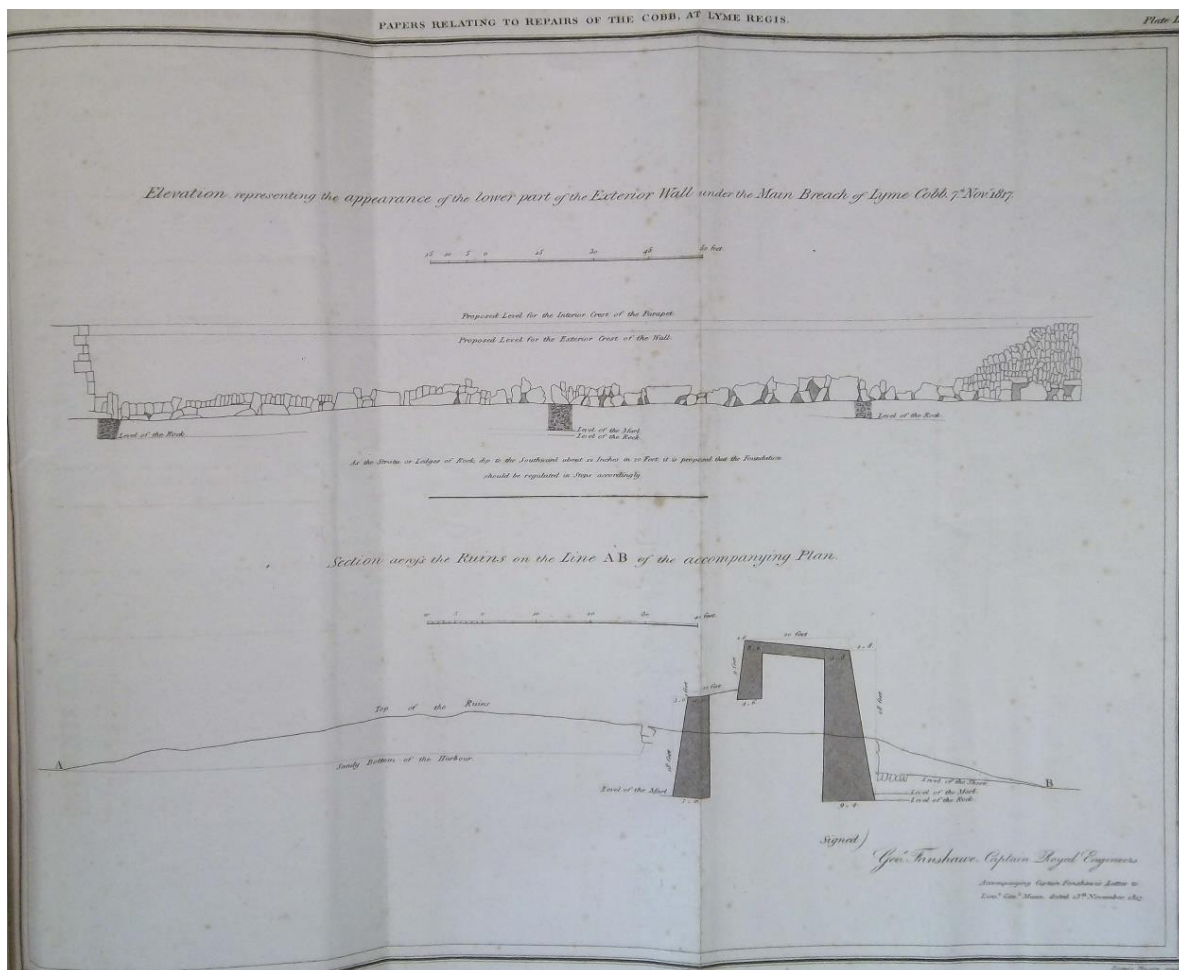
Captain George Fanshawe RE, for the Board, surveyed the damage, reporting to a special Cobb Select Committee of the House of Commons set up to consider whether assistance should be given, following the Borough's petition to the Prince Regent for assistance and adverse questions by politicians and HM Treasury. HM Customs reported on duty revenue and shipping trade, to assess the value of the port to the nation. Exchequer grant paid annually since the Cobb Act of 1634 (see Appendix 2) was set out, mostly the annual subsidy of £25, later £200, but also including larger sums to cover particularly repairs⁸⁵. It was decided that the Cobb was still an important haven of refuge on a dangerous lee shore and a port important for supplying the Channel Islands garrison with beef. Fanshawe reported to the Committee that:

Within the last 30 years [i.e. since D'Aubant in 1787] large [Portland] blocks have been used for repair or used as bond stones amongst the Cowstones, and often the coping is secured with cramps or bolts of iron or dovetails of oak, although there has been partial settlement. The main pier is 15ft thick and 20ft high at its outer edge, originally built of Cowstone 18"-2ft, 8-10" thick laid on edge without mortar, the wall filled with Cowstone and decayed Lias.



Fanshawe's 1817 plan, with the breaches and the rubble spread from the main breach

⁸⁵ *On the Repair of the Cobb at Lyme Regis: Report of Select Committee, House of Commons 10th June 1818 LRM1990/10*



George Fanshawe's section through the main breach showing the jagged remains of the Cowstone grounders and the broken walls either side, the Board's ashlar to the left and the presumably 16th Century vertically-set Cowstone to the right.

He produced detailed plans and sections of the ruins with the lines of his proposed new work superimposed, together with a detailed costing. He clearly shows that the base of the old wall was made of massive vertically-arranged Cowstones founded on marl (i.e. limy mudstone), but he later discovered that it was founded on shingle in places.

For his new wall he used Portland Roach ashlar blocks for both inner and outer faces throughout. The wall was set on a bed of massive Portland blocks secured in front by short piles - not the old Cowstone foundation had been done on the Southern Arm. He did not use D'Arcy's iron cramps to join the blocks, preferring oak dovetails and vertical iron bolts or dowels. He designed the outer face of the wall in two batters, together sloping inwards by 4ft. These surfaces remain very smooth and perfect to this day. His work is 25ft high from the ledge foundation, whose strata dipped S at 1:20. The top is 20ft wide, sloping seawards. The inner face was formed in two steps, the top 9ft high above an apron of stone forming a walkway 10ft wide and 18ft above the foundations. This set the general shape and coursing for the High Wall through succeeding repairs. He insisted that the filling should be of dressed Cowstone carefully laid horizontally on beds of mortar, without the use of rubbish such as rubble or quarry waste, but strengthened by occasional bonding courses of Portland Roach blocks.

To the east his work is butt jointed to D'Arcy's terraced outer face, which runs from here to the far end of the Southern Arm, although a short section of the old work had

to be rebuilt in the D'Aubant-D'Arcy style using the materials on site. This is obvious, as this rebuilt work is somewhat irregular and is levelled up with thin Cowstones (see photo).



The butt joint between the 1818-20 work (left) and the 1795 work (right) in the High Wall is just in front of the larger group, with a modern concrete apron below. Notice the precise profile of Fanshawe's work on the left. On the inner face the keyed joint is some ahead of the two people, who are right above Granny's Teeth. The blockwork ahead of them on this side has been disturbed, with more irregular coursing than to the right. On the inside wall the coursing is more regular and the joint between 1818-20 and 1795 is butted. This outer section was destroyed in a later 1817 storm than the main breach, but in 1818-20 Fanshawe clearly rebuilt it to the old design with the blocks on site, hence the irregular coursing compared with that to the right.

Further damage occurred in 1817 and 1819. By 7th October 1820 only 162ft of the breach had been rebuilt, about half the length needed to fill the widened gap. James Hamilton, the Board's previous contractor, was no longer in business, so the contract had been let to Mr Taylor of Exeter. Unfortunately he was declared bankrupt, failing to provide more than one or two courses of ashlar above high water mark at the most critical point in the High Wall, leaving it open for the sea to wash over. The Board was still writing to him seeking early completion of the work after his committal to the King's Bench Prison for debt, but in the end the Borough was left to complete the work and failed in turn to do so⁸⁶. Taylor's bankruptcy was not helped by HM Treasury's parsimony, squeezing the contract and delaying payments. The gaping hole in the High Wall, which this left, is clearly shown in contemporary artwork, such as shown in Carter Galpin's print shown below.

These incomplete repairs cost the Government £19,729 3/1d over the three years 1818-1820⁸⁷ (£1.6M in 2014 prices), with the Borough contributing £3,505 8/3d (£0.27M in 2014 prices) in 1819⁸⁸ and probably *pro rata* sums in the other two years.

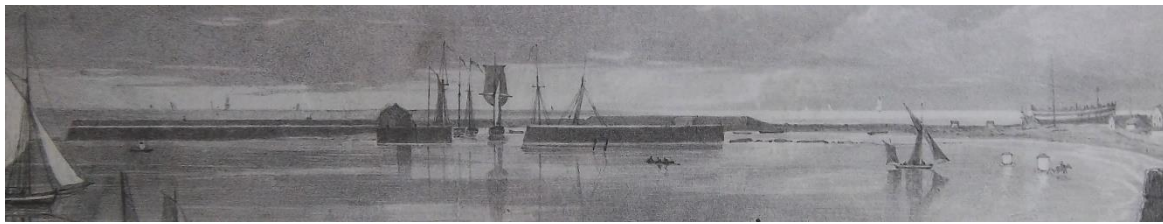
In 1824, whilst the breach was still open, a truly great storm hit the Cobb. It occurred on the night of 22/23rd November 1824 and was suffered all along the coast,

⁸⁶ House of Commons Report *ibid*, Keystone Report vol 2 and Peter Lacey *Ebb & Flow* Wimborne pp178-9

⁸⁷ House of Commons Report *ibid*

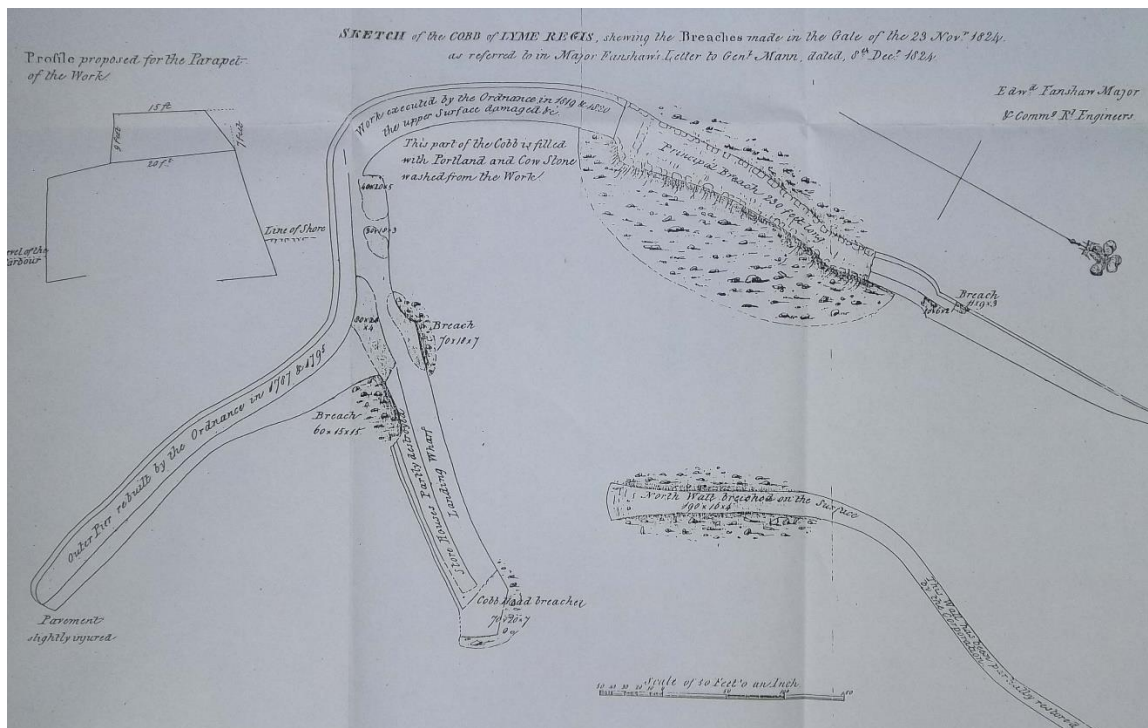
⁸⁸ By calculation from Cyril Wanklyn's 1927 statement in his *Lyme Retrospect* that £13,224 was expended in 1819.

Sidmouth being badly affected. It appears to be one of the worst storms that Lyme has suffered and caused serious damage not only to the Cobb and ships sheltering there, but to sea walls and houses from Cobb Hamlet to Gun Cliff, which could have been avoided had the High Wall presented a complete breakwater.



Just before the 1824 storm – Carter Galpin’s print actually dated 1825. LRM 1938/5

A hurricane force wind (force 12, above 75 mph) came roaring out of the SW, pushing the sea before it, resulting in what is known as a ‘rogue tide’. A rogue tide is one which doesn’t stop rising when it is meant to, rising for another five hours after predicted high water. The wall of water created was so high that it overtopped the new, but unfinished High Wall of the Cobb, damaging the then highest course, and creating a new breach 232ft to the landward. The North Wall was damaged for 190ft to a depth of 4ft over a width of 16ft. In addition, Crab Head was damaged and a breach was made in the seaward face of the Landing Quay near its junction with the Southern Arm. The Cobb Buildings were all but destroyed and an old couple living in the seaward building only saved themselves by escaping into the upper floor of the Watch House in the middle of the row and scuttling (breaching) the floor to allow the sea that was coming in to escape.



Edward Fanshaw’s plan of all the breaches made in the 1824 storm; note the Southern Arm annotated *built by the Ordnance in 1787 and 1795*, the North Wall in its old position, the launching breach having been repaired, Crab Head not yet extended and the old Gin Shop on the High Wall.

Edward Fanshaw Lt Col RE [not Capt George Fanshaw of 1817) reported to the House of Commons Cobb Select Committee. He surveyed the damage and proposed to replace the rest of the High Wall, using the same design he had used in

1818-1820, Portland ashlar blockwork skins hearted with large flat Cowstones laid in mortar under a heavy paving cap of Portland roach. This time the Board had learned the lesson of using contractors for Cobb works; no more the Borough ignoring the Board's invective to use Portland Roach, of Hamilton's dodgy foundations nor Taylor's shaky business. No more leaving the Borough to finish work. HM Treasury was admonished for parsimony and delays in giving spending approvals. This time the Board posted Captain Savage RE to get the job done in-house using hired labour. Accordingly the work was started and completed, under estimate, in 19 months, including repairing and finishing the work Taylor and the Borough had left undone. The whole length of the High Wall and Southern Arm was now a product of the Board, well founded and built to last. Savage must have gone down with local society: he left Lyme's best wishes⁸⁹. **Now the entire breakwater was a precision product of the Board.** With modern repairs and strengthening it has endured.



The work under way, a sketch by George Cumberland in 1825 from the England's Hotel (The Captain's House) in Marine Parade. The new Gin Shop is finished, and the wall is rising with two shearlegs to help, but there is still an open hole not quite facing the River Amazon! The shipyard has recovered from storm damage and the Cobb Buildings are repaired (LRM 1993/38-4).



This section includes the new Gin Shop, a geometric tour-de-force of the skill of the designers and masons. However, other than providing double steps from the walkway to the wall top - and a niche for a plaque and a seat - its purpose is unclear. The previous Gin Shop might have housed a crane, winch, pile driver or other gin (engine), but this one just seems to be a nice flourish, although some have claimed it was an ammunition store, although the structure was in no way military. It was fitted with doors: the hinge pins can still be seen, but this is said to have been done to stop use by courting couples!

On the top of the High Wall a stone is roughly marked "IE", 25 yards from the bottom of the northern steps. The meaning is uncertain but reminiscent of the stone marked "IE 1785" near the tip of the Southern Arm. Forty five yards from the steps is a top paving stone roughly carved with the date 1826. A roughly carved Ж mark can be found 131 yards south of the steps. This appears to be a mason's mark or graffiti, rather than a compass rose, particularly as it has no E-W cross bar and the upright

⁸⁹ Sherborne Mercury January 13th 1827

bar is 56° W of True North. Magnetic variation has never exceeded 26° W in the UK since 1660. Curiously that was in 1818.

To meet the estimate the House of Commons voted £13,000, and the Borough budgeted for £6,000. The total cost was £1.5M in 2014 prices. The Board unveiled a brass plate in the Gin Shop on Saturday 6th January 1827⁹⁰, but the original ordered by the Master, the Duke of Wellington, is not in the Museum. The replacement reads:

*By Order of the Master General and Board (of) Ordnance - The repair of this Cobb was commenced and finished under the direction of Lt Col Fanshaw RE by order of the Master General dated 2nd April 1825 and under the immediate supervision of Capt Savage of the same corps. Length of pier rebuilt 232ft Length of parapet rebuilt 447ft Amount of estimate £19193 19 10d Amount expenditure £17337 0 9¼d Date of commencement of work 19th April 1825 Date of completion of work 18th November 1826.
The original tablet can be seen in the Museum*

In 1831 Capt William Reid RE of the Board reported that lack of regular maintenance was affecting the ashlar joints, even on Savage's work, and that further settlement of the Southern Arm had not been addressed⁹¹. He should not have been surprised, as Lyme's rotten Borough was still being run down by absentee Fane hands, who had little interest in local affairs. The Reform Acts of 1831 and 1835 enabled a wider electorate to get a MP and a Council actively interested in developing the town – and at last the Borough started to develop the Cobb, implementing some of Jessop's 1805 suggestions.



George Fanshaw's work stops abruptly at its northern end - where it is butt jointed to the 17 yard section shown in the photo above. This includes the steps down to the Parapet Wall and a blocked-up opening under a prominent lintel, walled up with Blue Lias. This work does not have quite the same coursing as the main work, and has a tooled finish around each block on the inside wall, although on the outside wall the style and coursing continues without a break across the butt joint, apart from a slight change in angle. It is possible that the Borough added this work a few years later to provide additional shelter to the basin, steps and a checkpoint or guardhouse. That it was done by 1841 is shown by its appearance on the Tithe Map of that year, shown as a separate block. This section may be hollow in part – but what, if anything, is walled up inside?

⁹⁰ Sherborne Mercury 13th January 1827

⁹¹ In a letter to Maj Gen Bryce 12th April 1831, copied to Clerk of Works of the Borough DHC file DC/LR/D4 copy in LRM Cobb file

In 1829 the Landing Quay was widened⁹². The new quayside wall was built in horizontally-laid Cowstone and is capped with Portland Roach blocks for strength, although these could have been added later. The wall is backed by concrete and the filling is sand and gravel, according to Dobbie & Partners in 1982⁹³. The Quay is cobbled in a vernacular style, more like that of a farmyard, according to the Keystone Report, and has a rectangular area that used to house a weighbridge. A wooden crane was provided at some time, mounted on solid wheels, so it that could be dragged around, as well as a capstan at Crab Head for warping ships alongside. The remains of a slipway to the basin floor occur just beyond the western end.

In 1834 the Roadway was built to admit carts to the Landing Quay at all states of the tide at cost to the Borough, and without public subscription, as a quay which could not be accessed from the land at all states of the tide could not be designated a "legal quay" under Customs Regulations. It may have been a condition of Lyme being made a bonding port in 1830⁹⁴, when Drayton's Bonded Stores were opened in Cobb Hamlet⁹⁵. To keep check one of the Cobb buildings was a Customs ward (watch) house⁹⁶. The roadway is some 2ft below the Fanshaw(e)s' low walkway and is cobbled with Cowstones, Dolerite/Gabbro and some red Granite (concreted over in part) and is supported by a long, roughly-built quayside of horizontally-laid Cowstone with some Lias blocks. It is filled with cobbles and gravel. The roadway connected to the new Cobb Road, also built that year. Before there was no high tide vehicular route to Cobb Hamlet.

In 1837 the Borough voted to extend Crab Head by 80ft, to start the following March, and contemplated moving the North Wall outwards. The funds were misreported as to be raised by public subscription, but this was retracted a few days later for petitioning Parliament instead⁹⁷.

In 1841-2 Crab Head was extended 100ft and renamed Victoria Pier. It was extended a further 40ft in 1848⁹⁸. These Borough extensions were in Portland ashlar blockwork with a roundhead at the seaward end. A side of the old roundhead of Crab Head can be seen at low tide beneath the jakes, or gent's loo. Victoria Pier was filled with sand and gravel and capped with Portland Roach paving. The work subsided in the 20th century and had to be supported with concrete and steel, and the filling replaced with concrete. Victoria Pier stands in water at all states of the tide and so enabled its use later as a paddle steamer quay. It sits low in the water and can be awash at high tide. It was provided with a town gas-lit leading light in 1858.

In 1843 Maj C J Selwyn reported to the Board that *43ft of the Biscuit Work has decayed with some displacement and might fail*. He suggested that an apron or buttress should be built, but in September 1843 the section was wedged, jacked and pointed by the Borough. This must mean the remnant sections in the Southern Arm. **This marks the last involvement of the Board of Ordnance**. It is not known if any Exchequer money was involved.

In 1846-9 the North Wall was rebuilt further east following Jessop's suggestion of 1805, widening what had been a very narrow harbour. Part of the new work was

⁹² A F Chapman *ibid*

⁹³ As shown on WDDC drawing *The Cobb: Construction Phasing* November 1998

⁹⁴ Hutchins *History of Dorset* 3rded 1864 p.67

⁹⁵ Dorset County Chronicle October 2nd 1834

⁹⁶ National Archives plan Cust 63/57 copy in LRM Cobb files

⁹⁷ Dorset County Chronicle 28th December 1837 and 4th January 1838

⁹⁸ Keystone Report and DL/LR/F8/4

washed away in 1846, including 3-ton slabs joined together with iron cramps⁹⁹ (the Fanshaw(e)s' had used oak dovetails and iron dowels to avoid this problem on his work). The outer face shows one continuous length of massive ashlar masonry in Portland Roach, with eight courses visible above a modern concrete apron provided in 1986-7. The inner face consists of vertically aligned Cowstones with a Roach coping and sporadic Portland Roach bonding stones (Jessop specified Roach for both faces). It is likely that the inner face is built from the good Cowstones stones left after the demolition of the original more sinuous North Wall and squared-up by the masons. The new wall was built some 200ft east of the old, whose foundations must have been removed. The southern end of the North Wall terminates in a stone roundhead, jacked and wedged and encased in concrete and sheet steel in 1939 and given a second sheet steel pile wall in 1986-7. The top of the wall is paved with Portland Stone and the structure was found to be hearted with sand, gravel and cobbles when it was strengthened with steel tie bars, dowels and internal concrete in 1986-7¹⁰⁰. At that time a concrete apron was provided on the seaward face of the North Wall.

In 1852 the Borough wrote to the Admiralty seeking to extend the exterior wall of the Pier (presumably the Southern Arm extension recommended by Jessop in 1805). The reply was that an engineer would be sent, but no report has come to light¹⁰¹. The Board of Ordnance was not abolished until 1855, but perhaps it had given up sea works to the Admiralty by this time. However, an Admiralty plan dated 1862 shows a plan for an armour stone rockery on the end of the Southern Arm¹⁰².

In 1853 a tramway was opened to link the Cobb to the new Cement Works being built on Monmouth Beach¹⁰³, shown in undated plans by Northumberland-born Richard Dixon, Cobb Shipowner and Merchant, seen by the authors of the Keystone Report. The tramway necessitated greater solidity to the Causeway and a wooden viaduct was provided to ease the curve getting to the Landing Quay. The line ended at Crab Head. Photographs suggest that it was narrow gauge at first and standard gauge later.



The 1854 Chart by Cox and Davies shows the tramway appearing to cross a narrow bridge to gain access to the Cobb, as well as the new, but short North Wall, a rubble

⁹⁹ Sherborne Mercury 11th October 1846

¹⁰⁰ WDDC drawing *ibid*

¹⁰¹ Dorset County Chronicle June 3rd 1852

¹⁰² Copy of Admiralty plan in LRM collection obtained from the WDDC Engineer on closure of WDDC's Cobb office

¹⁰³ Sherborne Mercury 22nd November 1853

shoal marking the remains of the end of the Southern Arm and the strike of the ledges on which the Cobb is built (LRM 1986/267/1).

In 1857 Richard Dixon rebuilt and raised the causeway including a two-course Portland ashlar parapet wall on the west side, re-laying the tramway in concrete. Now Monmouth Beach really started to build seawards and Main Beach became deprived of shingle.

On 8th October 1857 a severe gale drove six vessels from their moorings in the Cobb. Four were wrecked on Main Beach. A newspaper reported that that:

the scene of wreck and ruin on the beach and the piers is indescribable. The railway, upwards of half a mile long, by which the stone is conveyed in trucks to the vessel side, for shipment, is almost all torn up and destroyed, and many of the metals are thrown into the sea. The piers and sea walls are much injured, and two large blocks of stone, dovetailed together, forming part of the parapet to the Victoria pier, and weighing probably a ton weight, were dislodged from their position by the force of the water, and thrown to the opposite side of the pier.

As a consequence the North Wall was extended landward in 1861/2, but the work stopped, leaving the tip unfinished, as it still is. The joint between 1849 and 1861/2 stonework is clear to see. On the outer face the new blockwork abuts in a keyed joint. On the inner face the new work is entirely Portland ashlar blockwork.

In 1866 the Borough paid for 81 Portland Roach blocks from Weston Quarry on Portland shipped by Jonathon Lander in the *Ann*, owned by England of Lyme Regis, at 9/4d a ton, the total cost being £40 3 3d (£4,252 in 2014 prices). These may have been used other than on the Cobb. In the same year the Board of Trade granted the Borough a loan of £4,000 (£0.425M in 2014 prices). It is not clear what works were being done.

In 1867 ships were driven out of the Cobb by a storm and wrecked on main beach, with cargoes of coal split and picked up by townspeople. The gas Leading Light on Victoria Pier was washed away.

In 1873 repairs to the south-east or outer wall and the Biscuit Work were specified for tender for the Borough, to be completed by 31st October 1873¹⁰⁴. This is the remnant of horizontally laid Cowstone under walkway near the end of the Southern Arm.

In 1874 a group of northern industrialist proposed a major Cobb expansion to 75 acres, enclosed by a 1000ft extension of the Eastern Wall from Church Cliff and a 200ft extension to the Southern Arm. The harbour was to be linked to Axminster by a railway. The scheme only got as far as the Private Bills Office¹⁰⁵.

In 1875 part of the Causeway was removed to allow shingle through, and stones arranged as a bridge of sorts, as it had been in 1813¹⁰⁶.

In 1906 removal of the Causeway was mooted, but three small sluices or ports were left until finally blocked up in the 1930s-40s, probably because they were always choked with shingle.

¹⁰⁴ LRM Cobb File

¹⁰⁵ Wanklyn p 257/9 and plan

¹⁰⁶ Peter Lacey ibid

In 1922 the rubble remains of Southern Arm, not rebuilt, but still functioning as a breakwater rockery, were moved by a storm towards Cobb mouth. It was suggested that an old warship hull be dumped to provide an extension to the Southern Arm, but this would have cost £2,400 (£122,000 at 2014 prices, so the idea was dropped¹⁰⁷.

In 1939 the RAF built a concrete slipway from the landward end of the causeway for its air-sea rescue launches. It was extensively repaired in 1966¹⁰⁸.

During WWII the Cobb was defended by pillboxes on Victoria Pier (just south of the Gin Shop, on the Causeway and at the end of the Southern Arm), a gun emplacement on Monmouth Beach, dragon's teeth tank traps on the Causeway and barbed-wire entanglements. The sockets for the traps can still be seen.



The North Wall roundhead in a poor state in 1939. It was repaired and faced with sheet steel piling later that year by Blackford & Sons of Calne (WDDC Summary of construction phasing drawing 1998 in LRM).

In 1950/1 a 380ft length of the breakwater, the Southern Arm and the Roundabout area of the High Wall were pressure grouted with 260 tons of cement grout until it oozed out through joints at the foot of the wall, when the fissures were stopped up with canvas¹⁰⁹. A concrete apron and sheet steel piling were provided on the seaward face of the Southern Arm to forestall collapse of its 1690 foundation and/or undermining through erosion of the Shales-with-Beef beneath. The next photo shows the foundation at the tip of the Southern Arm, consisting of very large Cowstone boulders, just as Jessop proposed for its extension in 1805. These cannot now be seen, as they are covered by the apron built by Blackford & Sons, recalled after the war.

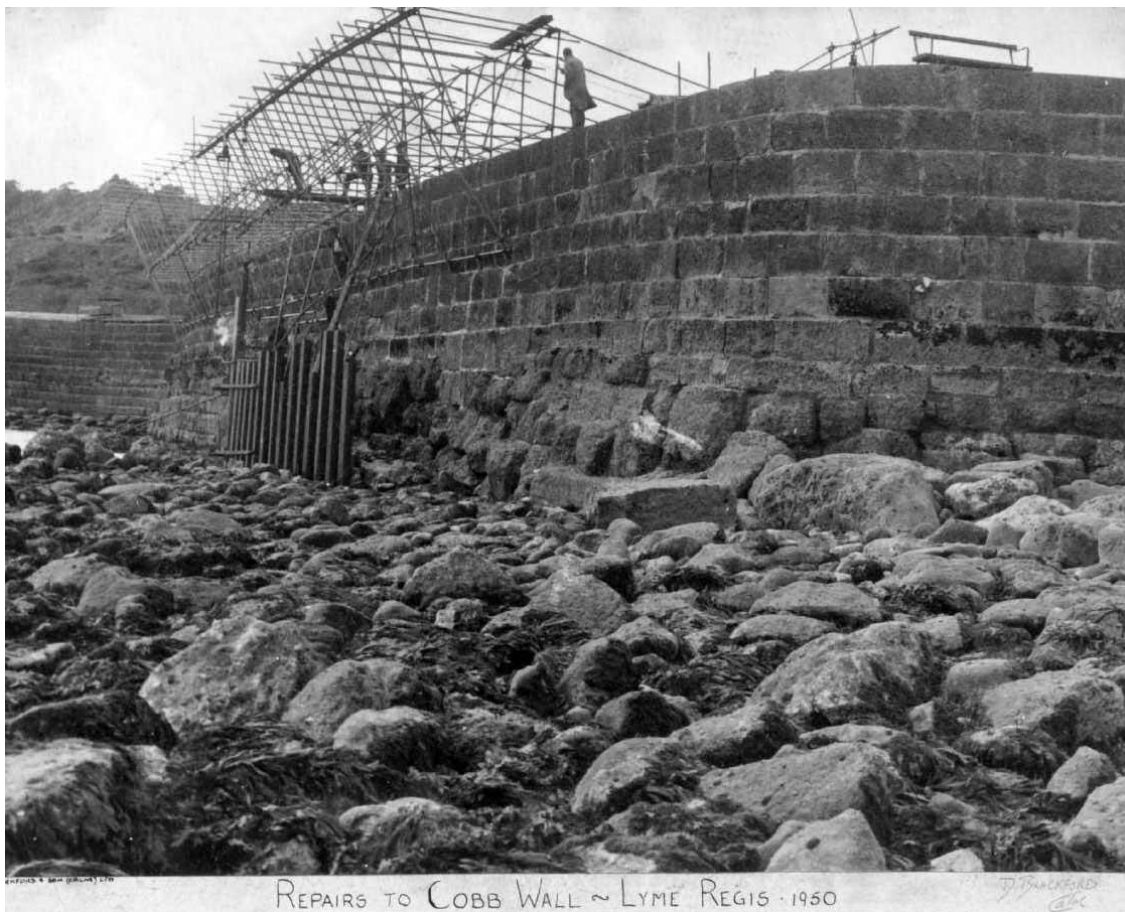
In the 1954 the low parapet wall, which connects the High Wall landward, was raised in part by 1ft 8" of mass concrete to restrain shingle spillage from Monmouth Beach¹¹⁰. Locals believe this caused beach depletion eastwards and considered commissioning a report from Hydraulics Research in 1989 to counter work by the same organisation to a different brief – see Part 2: A Town on the Brink.

¹⁰⁷ Peter Lacey ibid

¹⁰⁸ A F Chapman ibid

¹⁰⁹ Keystone Report, quoting Ken Gollop and Donald Boalch, Deputy Borough Surveyor Retd.

¹¹⁰ Donald Boalch quoted by A F Chapman ibid



The tip of the Southern Extension in 1950 – notice that the fine ashlar coursing is resting on a foundation of Cowstone probably dating from 1690 LRM 2001/21

In 1969 a rockery extension was added to the unfinished tip of the North Wall following a report to the Borough by Lewis & Duvivier. The idea was to direct sand and silt from the Cobb, but it made silting worse¹¹¹.

In 1973 the rockery at the end of the Southern Arm was replenished with stone. More Portland Stone blocks were added to extend the mound eastwards in 1982¹¹².

In 1986/7 Victoria Pier and its roundhead were strengthened with sheet steel and reinforced concrete to counteract cracking from settlement seen below. The hearting was found to be mainly sand and gravel, with some Lias and beach material in the roundhead. These had to be replaced with concrete. The North Wall was strengthened with tie bars and internal concrete, and an apron was added to its outer face. The outer face of the Southern Arm and the outer butt joint between 1818-20 and 1826 work on the High Wall were both supported by concrete aprons and sheet steel piling, with steel dowels inserted in the latter and some capping stones replaced.¹¹³

¹¹¹ Hutchinson JH *Report to WDDC on the condition of the sea walls at Church Cliffs*

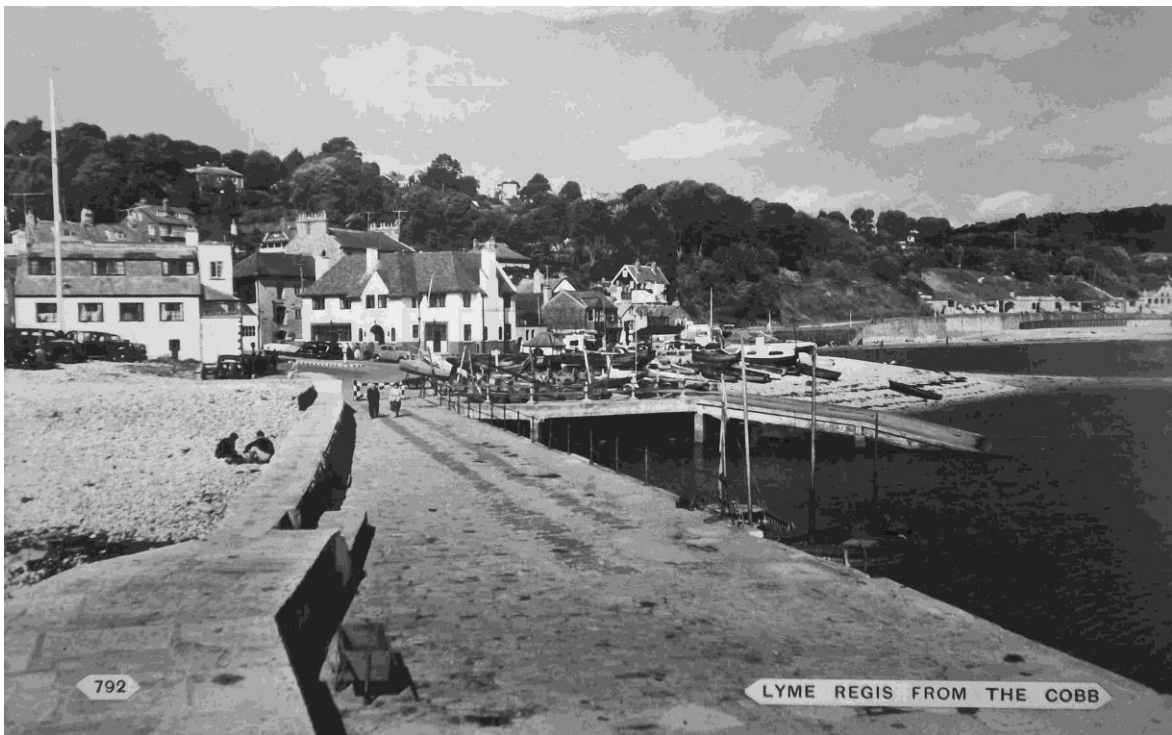
¹¹² A F Chapman *ibid*

¹¹³ Keystone Report and WDDC Phasing of the Cobb drawing dated 1998¹¹³



Victoria Pier in 1926 showing early signs of settlement. The pier abuts the termination at Crab Head by the white gents' loo. The loose Roach blocks still sit on the edge of the Pier, as do the sloping blocks on Crab Head. LRM Cobb Photo Box

The Cobb Causeway in the late 1950s/early 1960s, little different from the 1920s view at Plate 36 in the Keystone Report, but for the RAF slipway built over a low quay - and the growth of Monmouth Beach. The low, narrow parapet wall to restrain shingle is as built in 1857, apart from a concrete addition ending at the barrier and a short extra parapet this side of the barrier. The foundations of the parapet wall continue under the tarmac almost to the back of Cobb Square. The Lifeboat Station and Harbour Master's office are yet to be built. LRM Postcard Collection



Towards the end of the 20th Century Monmouth Beach had built further seaward and shingle spillage was proving troublesome, so loose Portland blocks left over from the unfinished end of the North Wall were placed in, rather untidily, in two rows to hold back yet more shingle. Today, storms still regularly cast shingle across onto the roadway and into the Cobb basin.



Shingle spillage over the Cobb causeway in February 2014

In 2004 a new wide slipway was built from the Harbour Inn around the frontage of Cobb Square to the Lifeboat Station, replacing the RAF slipway (information from plaque on site).

In 2005, as part of WDDC's Phase 2/3 Lyme Regis Environmental Improvements the Southern Arm and North Wall armour stone rockeries were lengthened and repositioned. The original Portland Stone rockery at the end of the Southern Arm was moved to extend the rockery protecting the northern end of the North Wall, which was repositioned in a NE direction. A new rockery of massive Larvikite blocks was built to extend the Southern Arm, carefully interlocked using an excavator mounted on a jacked-up platform. The new stone arrived direct from the Larvik Quarry near Oslo on board a very large barge in two loads.

In 2013/4 the winter was stormy, with spring high tides coinciding with low pressure and Force 10 winds. Significant damage occurred elsewhere, but Lyme's defences held well. The surface paving of the Cobb was scoured, and parts of the edge of the roadway were washed into the harbour. Elsewhere damage was minimal, although the Cobb roadway was blocked by shingle from Monmouth Beach. Uplyme-based Gee Stonework carried out repairs to the High Wall, where three new Portland Stone slabs were provided, along with 60 sq. metres of stone re-laid on the roadway and 150 sq. metres of repointing generally. Stones had to be numbered and replaced exactly, using plastic sheets as "tracing paper", in hydraulic lime, to meet the requirements of English Heritage. Much more needs to be done under a planned Phase 5 of the Environmental Improvements, including re-cobbling tarmacked areas and the Landing Quay and, more importantly, securing the Cobb for the longer term by addressing cracks and other signs of stress on the seaward side of the High Wall.



Replacing roadway cobbles in 2014 using a full-scale tracing for guidance

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Richard Bull
Lyme Regis Museum
Version 1.0 March 2015

Appendix 1 Chronology of Great Storms, Surges and the Thunderbore

1313 Cobb destroyed ¹¹⁴	1744 Cobb injured ¹¹⁸
1329 Cobb destroyed ¹¹⁵	1759 *The sea <i>flowed three times in one hour</i> on 31 st May ¹¹⁹
Late 1330s Storm & inundation destroyed greater part of land and tenements of Lyme ¹¹⁶	1762 Cobb injured ¹²⁰
1372 Cobb damaged	1775 Cobb injured ¹²¹
1373/6 Storms completely destroyed the Cobb and damaged much of the Town	1792 Outer end of Cobb destroyed ¹²²
1377 On 11th November the Cobb was totally ruined, tongue of land with warehouses and 70 houses at Cobb Gate destroyed	1797 *Possible tsunami on 18 Aug <i>The sea flowed three time attended by lightning</i> ¹²³
1410 The port destroyed	1799 *Possible tsunami on 26 Jan <i>The sea flowed three times with an earthquake</i> ¹²⁴ .
1481 Cobb destroyed by tempest 1500	1824 Great Storm
1545 The oak walls of the Cob had to be repaired	1841 Damage to Gun Cliff
1702 New Cobb Causeway damaged	1843 Damage to walls
1703 The Great Storm described by Daniel Defoe	1852/3 Damage to walls at Gun Cliff
1722 Cobb injured ¹¹⁷	1857 Ships driven out of the Cobb
1736 200ft of southern arm of Cobb lost to a storm	1867 Ships driven out of the Cobb
	1922 Storm moves Cobb rockery
	1974 Storm lowers Main Beach forcing installation of wooden groynes
	1987 The worst of the Great Storm of SE England passed offshore.

***Note: The "possible tsunami" incidents may have been "only" accentuated manifestations of the Cobb's "Thunderbore"**

Thunderbore is a local name for product of tidal harmonics, bad weather from the South and a rising tide (although it can also occur on the ebb). A swirling current will enter the harbour mouth and rotates strongly inside the North Wall. The tide will rise ½ metre higher than normal. It occurs 2½ hours before low water and lasts about forty minutes before dying down again, when the tide falls back to normal. It occurs four or five times a year¹²⁵. George Roberts reported a similar strange tide which occurred after low water in 1848¹²⁶. In 1886 swirling currents along off Main Beach at high tide, some of which came through the mouth of the harbour, were reported as: *breaking the mooring chains of the fishing trawlers, and carrying them away out into the middle of the harbour, causing at the same time the smaller and open boats to dance about in wild confusion... Some of our oldest sailors say they never witnessed a similar sight here before ... but a lesser form of the phenomenon is not entirely unknown, and the fishermen call it "Bovers"*¹²⁷.

Appendix 2 Expenditure voted by Parliament on the Cobb

Source: House of Commons Cobb Select Committee Reports 1818 and 1826

¹¹⁴ Roberts 1834 p223

¹¹⁵ Roberts 1834 p227

¹¹⁶ Roberts 1834 *ibid*, quoting *Nonae* Rolls 14 Edward III

¹¹⁷ Roberts 1834 p227

¹¹⁸ Roberts 1834 p227

¹¹⁹ Roberts 1834 p157

¹²⁰ Roberts 1834 p227

¹²¹ A F Chapman *ibid*

¹²² A F Chapman *ibid*

¹²³ Cox C (undated - 1950s?). *The History of the Church of St. Michael the Archangel, Lyme Regis.*

Gloucester

¹²⁴ Cox *ibid*

¹²⁵ *Port of Lyme Regis Maritime Operations Plan 2012* viewed on www.yourdorset.co.uk 26th January 2015

¹²⁶ Roberts G 1840-60s *Remarkable tide in the British Channel as it appeared at Lyme Regis* Cutting in LRM Landslip files from a journal (Proc DNHAS?) headed *Transactions from the Sections* but not labelled or dated.

¹²⁷ Lyme Regis Newspaper extract for July 24, 1886 in LRM Landslip Files

LRM 1999/10 and 1943/43

Year	Total per year all votes £	of which from the Board of Ordnance £
Before 1634	not given	
1634-1642 each year	20	
1643 (Civil War 1642-51)	nil	
1644 (Siege of Lyme)	800	
1646-7 (each year "for pier & sea walls")	1000	
1684-1708 each year	100 some years 50	
1709	1100	
1710-1725, 1727-32 each year	100 some years 300-250	
1726	800	
1733	400	
1734-42 each year	200	
1743	571	371
1744	200	
1745	100	
1746	1300	1200
1747	100	
1748	500	400
1749	200	500
1750	100	
1751-1762 each year	100-300	
1763	2188	1988
1764	200	
1765	333	133
1766	1700	1500
1767-1783 each year	200	
1784	3106	3006
1785-1793 each year	200	
1794	10002	9802
1795	200	
1796	686	
1797-1813 each year	200	
1814-1816 each year	100	
1817	408	308
1818	5534	5534
1819	9918	
1820	4576	4576
1821	100	9918
1822	242	42
1823-4 each year	100	
1824	nil	
1825	nil	
1826	11742	11742
After 1826	by special grant or loan only	nil

Appendix 3 Rock types used in the Cobb

Source Richard Bull, with some information on stone sources from a WDDC typescript in LRM Landslip Files)

Local Sedimentary Rocks

Shales-with-Beef – not used as a building stone, but the mudstones with thin hard bands which overlie the Blue Lias and form the rather soft and insecure foundation for the Cobb

Blue Lias – grey soft limestone used for walling, traditionally won from the ledges and cliffs, doing great damage to the cliffs. This brine-soaked stone was prone to rapid weathering. Better Blue Lias came from Uplyme, but now got from Somerset. Not used where open to wave action, but in hearting in the Cobb walls.

Chert – some Upper Greensand Chert was used in Phase I works to match existing chertstone walls at Gun Cliff.

Cowstone – large rounded boulders of naturally calcareous cemented micaceous grey Upper Greensand taken from the foreshore both sides of Lyme and named after their resemblance on the beach to cows lying in a field. Cowstones were floated to the Cobb between casks to be placed loose in piled oak cribwork to build the first Cobb breakwater. Later used dry, interlocked vertically and later still squared and placed horizontally in mortar, to build the Cobb breakwater before enclosure in Portland ashlar skins was adopted. After 2-300 years in a maritime atmosphere Cowstone weathers with a honeycomb finish, but stays sound longer in foundations below water. Can resemble Blue Lias in a wall, but it is much harder and usually contains *Serpula*, a coiled fossil worm tube. Wining Cowstones was another cause of rapid cliff retreat.

Imported Sedimentary Rocks

Portland Roach Bed or Capstone – creamy hard shelly limestone with voids where fossils have been dissolved out, sometimes filled with calcite crystals from the Isle of Portland. Regarded as waste Portland Stone only suitable for docks and harbours, it had to be removed before the high quality Portland Stone beneath could be extracted. The whole Roach Bed was used as massive ashlar blocks up to 2ft 6" thick by the Board of Ordnance in late 18th and early 19th rebuilds of the Cobb. Roach cannot be got thicker than this, but it can be extracted in pieces up to 5-6ft long and cut to precise sizes and shape, despite its rough appearance. Although it has voids where fossil shells have been dissolved, it weathers so well in a marine environment that in 200 years there is hardly any surface loss. In the same monolithic way the Borough used it for the North Wall, the Eastern Jetty and to cap jetties and for copings on sea walls from the 1780s.

Shingle and Cobbles - used for cobbling and hearting those parts of the Cobb not built by the Board of Ordnance.

Sand – sand from the beach at Charmouth was specified by the Board of Ordnance for mortar mixes made with best Lyme Lias lime.

Exotic Igneous Rocks

Granite - There is some red, possibly Peterhead Granite in the paving of the Cobb Causeway.

Dolerite/Gabbro – dark coloured crystalline basic igneous rock with good wear resistance used as blocks in the cobbled roadway to the Landing Quay, possibly from coastal quarries in North Wales. Gabbro is coarser than dolerite.

Larvikite - Dark blue-grey coarsely crystalline ultrabasic igneous rock from Larvik, Norway was used for the rock armouries at the end of the Southern Arm.

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