The stone industry at Bath

Phillip Wooster

This article is extracted from a longer. study by the author in which he describes the structure and geology of Great Oolite, or Bath stone, and then traces the history of its use from Roman times [1-11] *Early in the eighteenth century Ralph Allen was responsible for a new scale of operation in the industry when he directed his organising abilities to exploiting new methods of transport. Having been concerned in the scheme for providing a waterway route to Bristol with the Avon Navigation, opened in 1727, Allen acquired quarries on Hampton Down and Combe Down above Bath . . .*

To make a success of his investment he needed to solve the problem of the movement of blocks of stone weighing several tons from Combe Down to the river Avon a distance of one and a half miles but a descent of 500 ft.[12] The local roads were totally inadequate and so after investigations of the Northumberland plateways for carrying coal wagons, the designs of a resourceful Bristol engineer John Padmore, and surveys by his superintendent Richard Jones, he conceived the plan of a new tramway. The wagons were to run on timber scantling rails and be equipped with friction brakes. Two horses would pull them over the down, and then they would run down the hill side to a new wharf and stone yard on the Avon, empty wagons being returned with horses.

This tramway was built in 1731. The 'rails' 5 ins x 6 ins, probably oak, were supported on stone blocks and laid with a 3 ft 9 ins gauge. The wagons were a great advance upon the Newcastle chaldrons being built of stout oak timbers, they were three foot six inches wide and about 13 ft long, flat to carry blocks of stone, with short upright ends and long low detachable sides. They had four cast-iron spoked wheels with deep flanges and over 6 ins rims. The front wheels could be locked by bolts passing through the spokes, manipulated by iron rods leading to handles at the back. Either rear wheel could be braked by a 'jigg pole' pressed down by a chain which could be tightened from the back and held by a ratchet and pawl'.[11]

Daniel Defoe[15] wrote ‘Two Horses draw one of these machines, generally loaded with two or three Tons of stone, over the most easy part of the descent, but afterwards its own velocity ‘carries it down the rest and with so much precipitation, that the man who guides it is sometimes obliged to lock every wheel of the carriage to stop it, which he can do with great ease, by means of bolts applied to the front wheels and levers to the back wheels’.

John Padmore also designed cranes for lifting the stone on Combe Down, and for loading the barges at Dolemead Wharf and ships at Bristol Docks.[14] A contemporary detailed description of these cranes is given by J T Desaguliers[13] Richard Jones autobiograph[11] states that annually ‘we sent away yearly 1800 tonns [of stone] from the Dolemead wharf. The Carriage Road, cranes did not lose Mr Allen less than 10,000 pounds.’ This was a huge sum for the 1730 s but it reduced the cost of the stone from 10/- per ton to 7/6 delivered to the wharf. Even if the 1800 tons per annum could have been delivered without the tramroad its introduction saved Mr Allen £4,500 per year and so paid for itself in just two years! Jones[11] tells us that at the time of the building of the Parades '4 Carriages going the hill constant and over the water, 4 ditto loading on the hill, 2 ditto loading block to Dolemeads, 1 ditto spare if any misfortune should happen, which carriage cost £4O'. Bath stone was shipped through Bristol docks for Bristol, Liverpool and London (where the Portland Stone Firms had to reduce the cost of their stone by one third to compete). The whole amount of the stone for Georgian Bath came from Combe Down, Hampton Down and Southstoke Down.

Richard Jones[11] also tells us of the building of the Palladian bridge over the ponds in Mr Allen's estate. 'In 1755 he ordered me to build the bridge over the pond, the foundation stone was laid by Mr Allen 29 May 1755, the carriage road made down the hill, one carriage went down loaded and drew up the empty one, an exceeding good , contrivance, and was that year by my plan'. Arthur Elton[12] states ‘This may have been the first double self-acting incline built in Britain’.

Ralph Allen died in 1764 and to the indignation of Richard Jones the tramway and cranes were all sold off. It is assumed the tramway was lifted between 1764 and 1766. ***The New Bath guide*** [l6] 3rd edition 1764 states 'The stone of which the principle Houses here are built is for the most part dug out of the Quarries belonging to the late Ralph Allen Esq. and brought from thence down a steep hill by a curious machine of his invention. These machines, and the manner of conveying stone from the Quarries to the River are well worth Observation'. The 4th edition of the ***Guide*** in 1766 states only 'The stone of which the principle Houses here are built is dug out of the Quarries near the City of which there are a great number.

Vast quantities of stone must have been quarried just before and after 1800 but it is difficult to find references until in 1829 the quarry rights were sold after the death of Mr John Thomas.[18] Then new quarry owners were referred to and new quarries and mines were opened.

Stone had also been mined from 1770 in the Corsham district,[19] and the second escalation of the stone industry came in the 1830s when Brunel commenced work on the Box tunnel on the Great Western Railway's route from London to Bristol. The trial holes in the eastern end cut through beds of the Great Oolite. Following the opening of the railway in 1841, extensive prospecting was carried out in the Box and Corsham areas with good results, and many mines were started.

In 1887 The Bath Stone Firms Limited was established in an attempt to exploit the stone and market it in a more rational manner. The new company acquired the business of seven established firms: Stone Brothers Ltd, Randell, Saunders and Co Ltd, The Corsham Bath Stone Company Ltd, R J Marsh and Co Ltd , Pictor and Sons, Isaac Sumsion and S R Noble. The company capital of £250,000 in £10 shares was provided by ten quarry masters. Five of these came from the Bath quarries. In their first year 1½ million cubic feet of stone was mined.

The Bath Quarries and Mines
(All grid references quoted are prefaced by S T)

The above are situated on five Downs, all approximately 500 feet above the City. To the East, Hampton and Claverton Downs, to the Southwest Odd and Southstoke Downs and to the South, Combe Down.

Hampton Down In the late 1720s Ralph Allen married for a second time. The family of his second wife, Elizabeth Holder, owned the Hampton Manor House (Bathampton) and as they had financial difficulties Ralph Allen leased, and later bought from them the manor and the Down above the estate. In 1730, Peach[7] tells us, 'Allen also made roads to the Down and about the estate. He began to develop the stone works on Hampton Down. Nearly all the beds of oolite were hewn in the open, dressed with much care, and laid by for seasoning. A series of short trams were laid on to a centre, where was constructed a large drum worked by some kind of machines but we cannot tell what. A tram line or way was constructed, extending from the drum along the Down, then decending the slope to the edge of a rather steep gorge. The stone was here unladen and conveyed to Allen's stoneyard and basin, but what was the precise mode of conveyance is not clear'. It is probable that this system was the prototype of the Prior Park tramway but its life seems to have been short, and little more was heard of the quarry until the following century.

The directors of the new Kennet and Avon Canal, which was built between 1794 -1810, were having great difficulties in obtaining reliable stone for their canal. This was because they had used Avon valley stone from Conkwell, Winsley, Westwood and Bradford-on-Avon. Some of these stones if selected carefully, seasoned and laid in the correct bed could have been usefully used. However, wrongly selected, unseasoned and incorrectly laid, the stone proved disastrous and, at vast expense, much work had to be replaced with more reliable stone.

In 1808 it was decided to re-open the Hampton Down quarry and the following invitation appeared in the ***Bath Chronicle:***[10] 'Incline Plane. Any Person or Persons willing to contract for forming, making and completing an inclined Plane from Bathampton Quarries to the Kennet and Avon Canal a distance distance of about 800 yards are desired to send their proposals (sealed up) to Mr Bennett, engineer, St James Parade, Bath. Plans, sections and specifications may be seen at Mr Bennetts Office'.

It has not been determined on what date the incline was completed and opened, but if the stone was used in the canal construction it would have had to be in use before 1810 when, on 10th November, the ***Bath Chronicle*** reported: 'We have the pleasure of stating that this morning for the first time, a barge loaded with 40 tons of stone passed the locks from the river Avon to the Kennet and Avon Canal' P Egan[21] wrote in 1819: 'Proceeding some distance down the river on the left side of which an iron railway, from an immense steep height is to be seen. It is curious to observe the iron carriages sent up and down without horses; and by the aid of machinery the vehicles change their positions midway, the full one running down to the barge in the canal and the empty one making its way to the top again to receive its load'.

This second working of the quarry, and part mine, was short-lived, the stone was soon worked out and the mine roofs became very dangerous. In 1847 James Tunstall[22] wrote of a boat trip by canal to Bradford-on-Avon' a little further on the stone wharf, now disused, connected with Hampton rocks by the ruined railroad' In another walk over the down he wrote 'we find ourselves descending the rugged path to a quarry, deserted by all living things . . . A few years since, I remember a cottage near the level of which few traces now remain. The rail road is destroyed and covered with turf'.

The course of the incline can still be traced (778665 to 783659). Arthur Elton[12] has deduced that the plate rails were laid for 43 ins gauge wheeled trucks. The rails were laid on rows of stone blocks each 3 ft apart, with a 5 ins flat and 1½ ins hole to take the oak plugs in which the fixing spikes were driven. The blocks were staggered to prevent the rail joints falling opposite each other. About half-way down the line the rails passed over the old turn-pike road by means of a dry arch. This still stands in the wood above the present road. The stone wharf can also be seen at the side of the canal.

In 1962 it was decided, that the old mine entrances should be sealed. This was done by the Territorial Army who btasted the remaining entrances.

Claverton Down There is no record that Ralph Allen quarried in this area although there were several small quarries on the western edge of Hampton Down. One fairly extensive open quarry is known as Claverton Down Quarries or Quarry Farm (768638). This was worked until the 1950s by Edward Hancock having been in the Hancock family for over 50 years. The Bool family were also the masters of a small quarry adjacent to Claverton Down Road (769639) in the 1880s and 18905.

Odd Down The stone in this Down quarried in the present century, although of fair quality, often contained small clay holes and lay in thin beds. The latter attribute often caused the stone to be cut 'face bedded' which greatly reduced its market value. The quarries were generally small and employed about five men who would be both quarrymen and banker masons. They would quarry the stone, lift it on to the trucks with their crane, convert it into suitable sizes and then work the stone to its finished dimensions, the converting and working all being done in covered shelters similar to that now in use at Lawn Quarry and Combe Down.

The quarry to the west of Bloomfield Road (738628) was worked by the Shellard family, father and son, from about

1900 until the 1930s[23]. The family also ran steam wagons which hauled stone from the quarries. Further up the hill on the right is an old chapel, now used as a furniture store, and behind it a small unnamed quarry. (737624). To the right hand at the top of Rush Hill is a small quarry face (730626), where now stands a garage, and near the Clark's Shoe factory is a small circular quarry (733625). Of the former little is known as it was worked out by 1900; the latter was still working in 1904 when one crane was in use.

Returning to east and passing to Upper Bloomfield Road, to the right is the site of the Beehive Quarry (736623). Still working in 1904 but long since tipped over, it is now under a council house estate. To the left is Hallets (Red Lion) Quarry (738623). This was shown as a very small quarry in 1904 but was worked by S G Hallet between 1920 and 1940. The quarry can still be seen as it is now a transport depot. South of Red Lion Quarry and now under the houses of Oolite Road was Loves Quarry (738622), worked by the Love family from 1885 to the mid 1930's. Again to the south, Jack Hill had a small quarry producing only walling stone up until the start of the last war. To the south of the Wells Road by the Burnt House Public House there were two small walling stone quarries worked before 1900.
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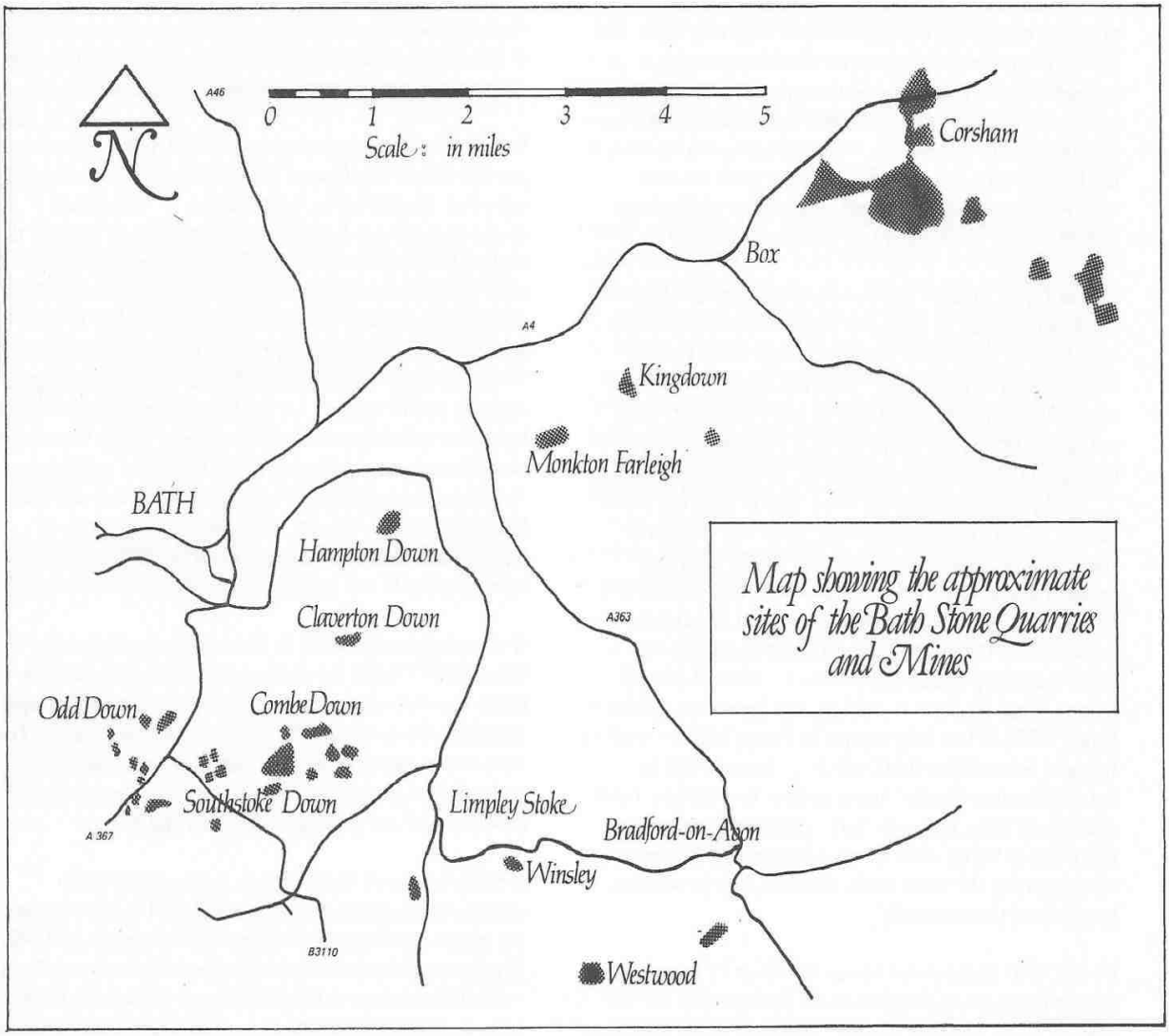
The largest quarry on Odd Down was situated between the Wells Road and the Wansdyke (738619). This Wansdyke or Horsecombe Quarry was quite extensive but its main product was walling stone. It was worked by a Mr Jones in the early 1900s but was bought by Gazes, the National Landscaping and Tennis Court Company who in the thirties employed as many as fifteen men on the site and traded as Horsecombe Quarries and Stone Works Ltd. Gazes received the contract to lay the roads for the three Admiralty camps around Bath in the late 1930s and all the filling and loose stone was cleared from this quarry to form the foundations to the extensive road system. The quarry closed upon the completion of this contract and the site has now been tipped over and covered in playing fields and housing estates. To the east of South Stoke lane (748616) there is a small quarry also last owned by Gaze's which specialised in garden wall stone, vases and ornaments.

To the north of Midford Road opposite St Martins Hospital is Union Quarry (743622). In use by 1904 it had two cranes. The quarry was worked between the wars by the Hill Brothers and had been considerably extended by the 1930s. After the war and until the mid -1960s the quarry was worked by Mr Bill Reed. In 1958 when the writer visited the quarry Mr Reed was working the west face and used one crane. The freestone was found at approximately eleven feet below the surface and was sixteen feet deep, ranging in beds from one foot six inches to three feet thick.
It was cut on its natural bed, some of the beds giving a very clear and even-textured stone with few faults, but small clay holes could be observed in other beds. The



annual output of the quarry at that time was approximately five thousand cubic feet. The quarry has recently been excavated out and a factory built over the whole site. The owner has, however, kept the metalwork of the last crane.

South Stoke Down The quarries and mines in this area were confined to the top of Entry Hill,, where there were extensive workings at either side of the hill (747622 and 748622) but both were worked out by 1904. The western quarry site has been filled and is now a playing field while, the eastern site is covered by the Roman Catholic Church, new housing estate and telephone exchange. Lower down Entry Hill on the west side of the road is another large quarry site (747625) now used as a local authority storage depot. This quarry had also closed by 1904. Little is known of the owners or output of these three quarries, although a Mr Hamblin did a little quarrying in the 1940s.

Opposite the last is a small quarry face with entrances, to the face behind the houses. This is an extension of Springfield Quarry (748625), which lies to the east and may be approached through the new housing estates. This is by far the largest open quarry on the whole Downs. Several writers have suggested that stone from this quarry could have been used in Medieval or even Norman Bath. However a careful study of Thomas Thorpe's 'An Actual Survey of the City of Bath . . . and Five Miles Round' made in 1742 shows no quarries in the Entry Hill area (it does however, show workings by the old Wells Road now Bloomfield Road). It is therefore probable that this very extensive quarry was worked between 1750 and 1900. The last workings were carried out by Armstrongs and it is believed that they were the first company to introduce petrol-driven sawing on the Down. A very approximate measurement of this quarry, disallowing any mining beyond the faces, gives a volume 2,500,000 feet cube of stone removed. Stone was also mined beyond the quarry faces but no record of the extent of this mining exists.

Combe Down Leland[9] mentions passing 'quarre' whilst crossing the down in 1542, but again, Thomas Thorpe's map in 1742 shows only Mr Allen's Free Stone Quarry in this area. Richard Jones[11] who was born in 1703 'was kept close to writing till he was 15 years of age and then put apprentice to Old Jno. Pitcher, a Freemason. We had a quarry on Combe Down and one Mr. Greenway had one . . . And after he had worked some time in Bath Mr. Allen bought all the quarry's on Combe Down and the estate there unto belonging, about the year 1727'. B Boyce[24] writes that due to Mr Allen's improvements in the working of the stone 'The price of freestone in Bath dropped by ten per cent, and though Milo Smith fought hard as a rival . . . Allen eventually bought out Smith . . .' Richard Jones[11] tells us ‘When Mr Allen bought Combe Down and Colthurst Estate (1726-27) he then bought Dr Ponter's Estate reaching to burnt house [West Odd Down] . . . About 1740 he bought Hampton Estate’. It can be seen that William Tyte[6] was correct when he wrote ‘Such appears to have been the condition of things when Ralph Allen embarked in and revolutionized the stone trade, of which, like an octopus, he obtained the monopoly'.

By late 1731 Ralph Allen owned the whole of the present Combe Down and had obtained the mining rights for 100 years in 1729. The new tramway described earlier connected the mines to the Dolemead Wharf and is shown clearly in Thorpe's Map (759622 to 754643). R Jones states 'and in the hill for taking the stone out of the Quarry was four horse cranes, and one to lay the stone down to square it, which crane stood in the centre of two roads’. At this time there were no houses on the bare expanse of hill top and it was very exposed to the weather.

John Wood[8] wrote: 'Mr Allen entering into the Free Stone - Business with a view of reducing the price of the material . . . he embarked in domestic Masons Trade of Bath and proposed to lower the rates for all manner of Workmanship not only by a saving to Workmen of all the time they lost in going between their Habitations in and about the City . . . by finding them constant Employ, and Paying them their Wages regularly every Week. To facilitate this scheme it was resolved that Houses should be erected on the top of the Down, for all such as should be concerned in Digging, Raising and Transporting the Unwrought Stone down to a common yard by the water wise, and the Masons employed in working it should have proper sheds in that yard to work under as well as Houses near it to live in’. Richard Jones built these sheds for the sawers and banker masons at Dolemead which can be seen in ***The South East Prospect of the City of Bath 1734*** and are shown on the ***Plan of Bath 1750-57***. Their house's still exist, although empty and boarded up, and are now known as Prior Park Road Cottages (755642). The houses built on the Down are the eleven rather superior houses built in Church Road formerly known as The Old Rank and now De Montalt Place. Richard Jones lived in the centre house named Dial House. Obviously eleven dwellings could not have housed the very extensive labour force and . most men and boys must have still walked to work.

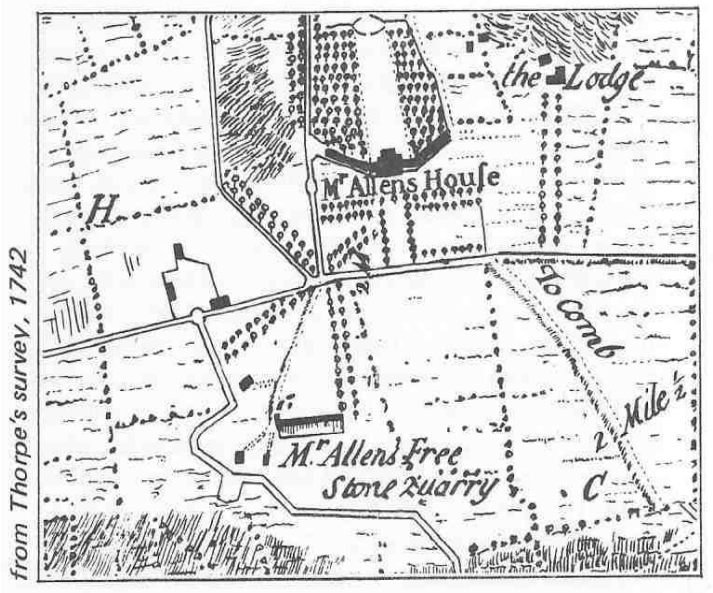
Both Ralph Allen's quarries were, in fact, mines. The largest one was called 'Firs Quarry' after the extensive groves of fir trees that he planted on Combe Down. The miners gained access down a rubble wall lined staircase beneath the Hadley Arms stables and this still exists although capped over. Stone was probably drawn up the vertical access shaft, with an approximate diameter of 15 ft , sited 250 ft south west of the Hadley Arms, by one of John Padmore's cranes. There is a large rough stone arch over the main, underground entrance to this shaft. A further four air/light shafts have been located to this mine, all of which are now sealed. These shafts would have been constructed as the mine was extended. Access could be gained to the mine by horse and cart from Davidge's Bottom, the rear of De Montalt Place, rear of Hopecot and Quarry Bottom. A depth of 50 ft of stone has been removed in one section of the mine.

It has not proved possible to find a name for the second of Ralph Allen's mines but as this was entered by a cartway below Byfield-buildings and to the side of Byfield Cottages it is proposed to name it 'Byfield' mine in this account. The mine finally had five light/air shafts (all now filled) and probably had access to Coxe's Quarry to the west and the quarry east of the playing fields to the North.

A careful study of Thorpe's map, giving regard to the accesses to the mines, is most rewarding. It is obvious that the alignment of Combe Road has been altered since 1740. The road must have followed the present Beechwood Road, entered the bottom of Rock Hall Lane, crossed the present route and continued to the edge of Davidges Bottom before

turning north to North Road. The position of De Montalt Place, establishes that the straight through-line of the tram-way stopped above Quarry Bottom, the first western leg finished above the entrance to 'Byfie|d' mine and the second western leg stopped above Davidge's Bottom. Allowing for a crane at each place we have allocated all four of John Padmore's cranes listed by Richard Jones.

In the spring of 1734 William, Prince of Orange came to Bath.[24] 'His Majesty went to Combe Down once and then again to see Mr Allen's Stone Quarries, and was much pleased in viewing them'. Wood also wrote 'accidents frequently happening in the Old Subterraneous Quarries,



from Thorpe's survey, 1742

Mr Allen began to dig for stone in a new Quarry, open from the top:' We can only conjecture where this new quarry was, it could have been the small quarry at the rear of De Montalt Place or, it might even have been Springfield Quarry.

Upon Ralph Allen's death in 1764 this large and well organized quarrying concern was sold up by his niece. This lady, being the wife of a prelate thought it unbecoming to be involved in trade. The tram road was lifted. The Dolemead Wharf is shown to be out of use on ***An Accurate Plan of the City of Bath for May 1776***[25] and Jones[11] details the disposal of the cranes and states 'In short she put off all the old servants'. He does say though that 'one crane was sold for £14 to the proprietor and is now in the Quars'.

Little detail of the quarries can be traced from 1777 until 1829 when Mr Allen's mining rights, granted for 100 years finally ran their term. However the mines must have still been worked because the building of Bath was at its most productive and the stone must have been quarried on Combe Down. Tyte[6] wrote 'The abolition of the monopoly Allen had created opened the stone business to competition of which several of the late hands hastened to take advantage. They took on the existing quarries and opened others. There was little, or no interruption to the trade.' it would appear that these workings, must have been leases under the heirs, or purchasers, of the Ralph Allen estate.

In 1819, P Egan[21] wrote: 'Byfield-Buildings is also as pleasantly situated and a few paces forwards, the visitor, if inclinations permit him, may descent into the stone-quarries at Combe Down, opened and worked by [The late] Mr Allen. This sudden contrast in extremely pleasing: the vast depth of freestone which has been excavated from the earth; the lofty arches, or pillars, remain in a craggy state, [light wells] left by the excavators to let in light to the Subterraneous passages and caverns, which extend for a considerable way under the earth most interestingly claim the attention of the explorer. The appearance altogether has an effect difficult to convey to the reader anything like an adequate representation: several men are employed in breaking-up the freestone into different sizes, and which it seems, yields with much placency to the tools used upon it; and carriage and horses are also seen among the openings, loading for buildings of Bath . . . On regaining the daylight. . . Several shafts are seen in the fields, raised about three feet from the ground, to let light into different parts of the quarry, to give facility to the excavators in proceeding with their work. The prospect continues enchanting at every step, and in a small quarry in repassing the grounds of Prior Park some of the pieces of stone measure twelve and a half feet long by three feet ten inches wide'. This is probably the most expressive description written of the mines.

Transport of the stone to Bath must have been difficult by horse waggon although we are told that the state of the roads had improved greatly. Stone was probably usually hauled along the Down to the west and conveyed down the Old Wells Way and later down the new Wells Road when built by the Bath Turnpike Trust.

The Rev D Lee Pitcairn[18] wrote that 'In 1829 when the quarry rights were sold after the death of Mr John Thomas, several new quarry owners appeared on the scene". This is borne out by Keen's ***Bath Directory*** which does not list any quarry masters before 1833 (the first available Directory after 1829). The names of Nowell, Drewe, Sumsion, Baynton, Davidge and Stennard are stated to have been masters but only three of these are listed in the 1833 Directory.

Work continued in the Firs and 'Byfield' Mines until they were exhausted, according to Mr Tyte, in 1860 by which time, the Rev Pitcairn states, the two adjoining mines covered an area of 25 acres. This date is supported by references to the quarries found in James Tunstall's[22] ***Rambles about Bath***. The 3rd edition in 1847 states: 'But let us pursue our ramble to Combe Down, and look into some of the Bath Freestone quarries, now in full operation immense blocks of stone taken out of the rock without the aid of blasting, and at once worked into convenient ashlar for the mason . . . The Old Quarries, which run under a considerable portion of the down, will well repay a visit; light is admitted by circular shafts. The Workmen are extremely civil in showing their collection of fossils; and the stranger usually bestows on them a slight gratuity for their attention.' The 1876 edition gives a reduced version and finishes: 'The Old Quarries, which run under a considerable portion of the down, will well repay a visit', whilst the 1889 edition states: 'The stone was formerly worked by underground levels but is now usually reached from the surface . . . Great quantities are at present being extracted from different Oolitic quarries of the district'.

Our present-day surveys of the two mines, which at the time of writing are not complete, have established an area of

approximately 21 acres and lie under the land generally bounded on the north by North Road east by the foot path from Ralph Allen's drive to Church Road, south by Church Road and West by Combe Road. We have been unable to find a passage linking the two mines. An area under the intersection of North Road and Combe Road has been worked after 1860 but before 1900 with access being driven through from the now filled-in open quarry to the east of the playing field north of North Road. A further working of the eastern section of 'Byfield' mine was made between 1910 and 1920 when James Riddle and Son sunk a vertical shaft beneath the present builders yard of Rock Lane. The collapsed filling to this shaft has exposed the underside of the buildings above.

Around this area it can clearly be seen where 'modern' mining has taken place to rob the sides of the old piers with the use of tramways and face cranes. 1920 ‘Combe Down type’ oil lamps and contemporary bottles left by the miners have been found in this area of the mine. The writer was also told twenty years ago, 'that one quarry owner, about the First World War, tried removing some of the old stone piers, but although the stone was of a good quality, over the years much of it had become crushed by the increased weight of the overburden it had had to support and so it was of little market value’.

The mines are totally deserted with virtually all the entrances and all the air shafts filled in. Even by torch light the sight is just as impressive as that described by P Egan but is now daunting due to the extensive areas of fallen rag stone roof often precariously wedged, and no longer supported by the rotten and often fallen elm wood knellers. Many of the piers show extensive shear fractures but to date there are few total collapses of the corridors.

Other quarries were developed upon the Down. To the west of Combe Road is the extensive working known as Coxe's Quarry (755622). This was an old quarry and the deeds relate that one owner, previously a wheelwright, was put in the Fleet prison for debt. Following a Royal pardon he returned to his quarrying! The quarry is in three sections, to the west an open quarry behind Rosa Villa, in the centre a worked out open quarry with a few short caverns in the northern face and in the south east a mine working back under the King William public house in Rock Hall Lane. A section of this mine was used as an air-raid shelter in the last war. Little stone quarrying was carried out after 1900 but the late owners removed and crushed the limestone for use in mushroom growing. The quarry is now being tipped in and levelled.

Under the entrance building of the Ministry of Defence site was sited Coxe's Vertical Shaft Mine (754625). This mine worked after 1900 but was closed by the mid 1930s. As its name suggests there was a vertical shaft with a timber crane which, unusually for Combe Down was driven by a gas engine. The mine was comparatively small, but had a stone crusher underground for making mortar.

In the area of Stonehouse Lane there were three open quarries. To the west the deep quarry (756626) at the north exit of 'Byfield' mine. This quarry was working in 1904 when it had two face cranes. It finally closed on the start of the First World War in 1914. This has now been tipped in and is almost totally built over. At the northern end of Stonehouse Road was a quarry (759627) which was disused by 1904, was filled after the last war and is now a housing estate. Between Pope's Walk and Ralph Allen's Drive there was a quarry owned by the Bath and Portland Stone Firms Ltd (760628). This had one crane in 1904 but was then considerably extended up to about 1925 when it closed. It is now the site of Priory Close.

To the South of Prior Park House and also over the area of Rainbow Woods there were extensive open quarries in the 1800s but all activity had ceased by 1900. Mr Hancock's grandfather started quarrying here, cutting blocks of stone he dug out during the day and delivering them by horse and cart to Bath in the evening. In the area of land between North Road and Shaft Road lies the only working quarry left on the whole of the Downs. This is Lawn Quarry or Lodge Style Quarry (766625) which has been in the Hancock family for three generations since Edward Hancock first registered as a quarry master in 1878-79. The Hancock family have, during this period, also quarried Coxe's Quarry and Claverton Down Quarry. In 1904 the main face was being worked by three cranes but at one time four or five were in use. The freestone is found here at a depth of ten feet and is usually seventeen feet thick in beds varying from two feet to four feet six inches deep. The stone though is divided by faults. One crane, the only complete one left, is still in use and the blocks of stone are still cut into ashlar by petrol saws, in a similar manner to that followed for the last 75 years. The saws are covered by a 'shelter' constructed of timber and iron sheeting all held in position by blocks of stone. This is the traditional manner of constructing such a shed; as the stone quarry face moved away the crane followed it and in time so did the shelter. A structure fixed with nails was both time consuming and wasteful on materials when moved.

To the east of Shaft Road was the mine known originally as Lodge Hill Quarry, but later as Combe Down Quarries or Shaft Mine (767625). As yet, the date when this mine was started is not known but it was worked by the Sumsion family who were first listed as quarry masters in the 1833 Keen's ***Bath Directory. The Report of Commission Respecting Stone to be used in Building the New Houses of Parliament*** in 1839 gives the following details of this mine:- Freeholder: W.V. Jenkins, Owner: Isaac Sumsion, Stone: ridding top bed 7ft, top bed 3½ ft, second bed 4ft, third bed 4½ ft, bottom bed 2ft top, second and third beds being weathering beds, Blocks 12 to 96 cu ft, Price 6d per cu ft, Transport by land to Dundas at 2d thence by Kennet and Avon Canal to London, Used on Kennet and Avon, and Somerset Coal Canals.

In 1887 The Sumsions joined the Bath Stone Firms Ltd and this company owned the mine until closure in 1934-35. it then covered an area of approximately 6½ acres with all main faces served by horse drawn tramways. Quarrying was by the modern method described later and was, in the last years, carried out by three gangs of three men each with a face crane. The stone wagons were drawn up the single slope shaft with the aid of a horse whim. Above ground were railway lines serving the two surface cranes, used for loading the blocks for direct transport by steam wagon to Monkton Combe or Limpley Stoke Railway Station via Summer Lane, Or if sent to Bath, down the carriageway on payment of a

2d toll. A store, office and a small bankers shed were the only surface buildings. Lighting in the quarries before 1900 was by 3in tallow candles, between 1900 and 1930 4ins circular oil lamps 2ins high with a small side handle and a circular wick burning a mixture of parafin and thin oil, from 1930 to closure carbide lamps were used.

A small mine called St Winifreds mine (768625) was also worked to the east of the shaft in the 1920s and 1930s, finally closing just before the last war. This mine was approached by a private road from Claverton Down Road with a sloping shaft leading to a mine covering an area of just over one acre. Regrettably all plant was withdrawn from both mines on closure and presumably scrapped or transferred to Corsham. To the south of Shaft Road lie the Mount Pleasant quarries (767623). These were also merged into the Bath Stone Firms Ltd in 1887 but were closed in 1914. Since then the main quarry has been owned and worked by Bath Height Quarrys, Bill Bright and G V Williams and later a succession of concrete block and reconstructed stonework companies.

North of Summer Lane, Rev Pitcairn[18] writes, there was a quarry and mine called The Jackday Quarry (764622) which is said to extend into the Down below The Brow. Only a rough lined tunnel and some open quarrying remain today. He relates that: ‘When the Midford Canal and the Midland Railway extension were being made, the owner of this quarry and the owner of Vinegar Down quarry . . .joined hands, and truck lines were laid between them and carried down into the Midford valley by which stone was provided for the work. No other confirmation of this has been found but it is possible as vast quantities of stone were used to line the railway tunnel under the Down.

To the west of Summer Lane and below Beechwood Road little remains of Vinegar Down Quarry (760621). The last quarry master, a Mr Davidge, was killed when he dislodged a prop in the 1920s and the quarry has not been worked since. The present owner of the land has just completed tipping to level the site.

The Method of Quarrying Stone

Assuming that there is an existing quarry face the crane has to be mounted in the correct position. The traditional Combe Down crane was formed of a 14 x 14 ins pitch pine centre post set vertically on a rotating base plate on a stone slab and was approximately 20 ft high. At the cap of the post fixed to a rotating plate were ten to twelve metal guy ropes consisting of 10 ft lengths of ‘/gins bar twisted and interlocked at their ends to form a 'chain' that could be extended, or shortened, as the crane siting required.’ These guys were held in position on the quarry floor and above the new face by large piles of block stone. The 15 ft jib was formed of two 13 x 4‘/2 ins pine timbers joined to the post at a height of about 2 ft and set on two short cross timbers. The two jib timbers were joined at the top with a bolt through the jib wheel and a ridged metal brace back to the head of the post. The cast-iron gearing was carried on the post at the base of the jib and had provision for winding by hand on both sides with loose windlasses. The cranes were generally painted off-white. The stone was handled with a set of shears and the quarry master had these in increasing sizes to enable. him to lift all blocks of stone up to about five or six tons.

A dry stone wall would be built 6 ft away from the face and the area on the quarry side filled in with compacted filling to a height that enabled the crane to stand on the filling with the top of its jib level with the top of the freestone. Having done this and erected the crane an area of two 'perches' above the face would be stripped of the overburden above the freestone. This usually consisted of one foot of top soil and three feet of dirty brash, all of which was wheeled away and tipped, four feet of clean brash used as filling and three feet of rag stone used for dry walling. The top bed of the freestone was now exposed and quarrying could start.

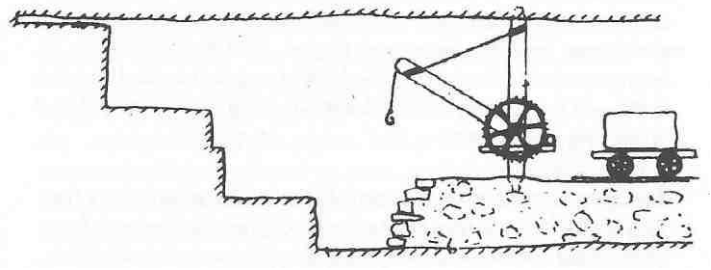
The quarry master would look for a fault running into the face at 90° and if this existed it would be used as one face of the first block. A vertical cut, the first cut, would then be made at 90° to the face and about three feet away from, and parallel to, the fault. This would be cut five feet into the face and to the depth of the first natural bed in the stone, with the use of a frig bob saw. This was the quarry man's main saw which could be 5ft, 6ft or 7ft long and usually about 12 ins to 14 ins deep (when new) with a single vertical pole handle at one end. This saw was thrown into the stone, a little water added from the water tin, and the ‘point’ of the saw made to bite into the stone face and saw horizontally. When the first cut had been completed, wedges were driven under the front edge of the block and jumper bars inserted and levered to break the block away from the face at the back. Then the block was pulled forward and lifted away by the crane by means of the shears, and placed on a trolley, on rails, for despatch to the shed. Here, it was either trimmed with a double headed 14 lb axe to remove any projections or 'much', rung with an iron bar to check for faults and if clear, sent on for sawing at the quarry into ashlar or despatch as block to a stone yard. Having removed the first block the quarryman now made his second cut into the face approximately six feet away from and parallel to the first. He could then enter the space vacated by the first block and make his third, or back cut, at 90° to the second to detach the second block from the face. This done, the second block could be 'jumped' off its bed, cut in half to give two blocks 3 ft x 5 ft and lifted out by the crane. This progression was followed along the top bed and then repeated down the four or five beds until the quarryman had removed his 14 to 16ft of freestone down to the red bed. This is a hard and shaky stone which has no building use.

The quarryman then cleared another two perches of over-burden and started all over again. A face was worked with two quarrymen and one crane usually on piece-work, being paid per cu ft of block removed.

The Method of Mining Stone

The method of mining the stone was similar to that described for open quarrying but was made more difficult by the confined space in the mine. From about 1825 face cranes were introduced to the mines which were similar in type to the open quarry crane but were adapted for use underground. It is probable that most of the cast ironwork for the cranes came from Stothert and Pitt Ltd of Bath[26], but they were kept in working order by the three blacksmiths on the Downs, at the Cross Keys, Midford Road and the two smithies either side of Tyning Road where it meets North

Road. The mine crane had similar gearing and jib but the post was much altered. Guys were not needed as the crane was wedged between the floor and roof of the mine, the post, in later years, being constructed so that it could be telescoped to make adjustments for the roof height. The later cranes were rated at 10 tons.



A large lewis bolt would be set in the roof on the new crane site in front of the new face. Alongside the lewis, a square mortice 9 x 9 x 6 ins deep would be cut in the roof and a wood block containing a centre metal sleeve wedged in. A base stone would be set in the mine floor vertically below which was pre-cut and had a similar mortice to the roof, but it was open on one side and had two additional grooves cut to enable a plate to be dropped in to secure the crane base. The crane hook was then connected to the lewis bolt in the roof, the fixing plate in its first base position removed and the crane lowered to the floor in such a position that the gearing could still be used. It was then drawn along, probably on a trolley, to its new position and lifted up vertically under the lewis. The head pin was placed in the top sleeve, the base block swung into the floor mortice and the fixing plate secured. The crane was adjusted telescopically and was then ready for use. No face cranes now exist on the Downs but disused and derelict examples can be found in Hayes Wood Mine Limpley Stoke, Kingsdown mine and certain of the Box and Corsham Mines.

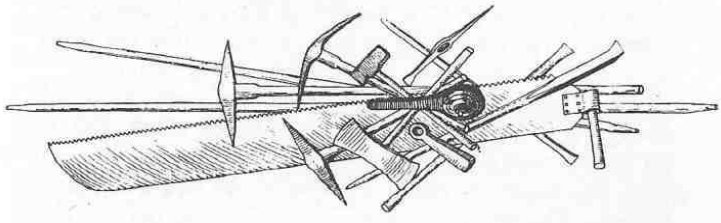
The miner could not remove the over-burden and so a method of removing the top of the freestone under the rag bed was developed. This was termed 'picking the jad' and was carried out by a 'picker'. This operation was effected by means of adze-shaped picks, on the heads of which longer handles were inserted as the work proceeded, drawing out a horizontal 'breach' below the ceiling from four to six feet deep and 6 ins to 9 ins high, being the space required for the picker to swing his pick. The width of the span of the stall depending upon the soundness of the rag bed above. The handles of the picks were ground ash cut by the pickers, left to season for a month and then worked to the shape and length required. The picking of one stall usually took in excess of two days work.

Having picked out the jad the miner had also checked his roof. An unsound roof would fall into the 9 ins space so blocking the stall but not usually causing danger to the gang. However this rarely happened as the quarry master checked the roof and the pattern of faults and was able to locate loose beds of rag stone by 'ringing" the roof with a metal bar.

The 'sawers' now moved in.[28] Two vertical cuts were made into the stone down to the first bed three feet apart. First a 'razor' saw was used, being of a similar length to the 'frig bob' but only 3 ins to 4 ins in depth. As soon as the cut was deep enough the frig bob was used as being heavier, it cut faster and enabled the sawer to throw the far point into the stone and maintain the horizontal cut. Once the two cuts were made the block was driven off its bed with wedges and 'busted' out at the back with the use of the jumper bar. This was often up to 4 ins square at its foot with flattened claw feet, for inserting into the bed joint, and tapering to a round bar 6 ft or 7 ft long. If the miner was lucky the block broke away cleanly and he had a good block. If, however, it split he was left with a partly filled hole. This, being in a confined space, was very difficult to remove. In this situation occasionally shot holes were drilled with a jumper bar and small quantities of black powder were used to blast out the remaining stone. Having once cleared the hole the miner could now enter it and cut a transverse cut down the back at right angles to the third face cut. The block was then morticed in the front edge and a lewis bolt inserted which was hooked up to the face crane, the block then being rocked off its bed.

The name 'lewis' was given to an ingenious contrivance for lifting stone by a French architect[27] who named it after his King, Louis XIV. He called it Louis which the English miners corrupted to lewis. It consists of two short iron wedges with broad feet. Between these, when placed in the mortice in the stone, is driven a third wedge of iron called the bolt. As this is forced in the feet are driven in opposite ways into the stone. An iron ring joins the two outer wedges together, and the stone, thus pierced can be raised by the crane and placed on the low-wheeled trolley.

Care had to be taken when drawing out the top beds. When the block was drawn forward it reached its point of 'balance and if allowed to tip forward it wedged under the roof. As it could weigh several tons, this caused problems and wasted time. The block was therefore slowly drawn forward by two men working the crane until it was nearly at the point of balance. The winders then turned at full speed so that block pulled clear of the roof. Once the block was on the trolley it would be stripped off by the 'choppers' with the 14 lb double-headed axes to remove any loose 'much'. The block would then be rung, if clear, checked for size by the ganger, marked with the gang mark and despatched by horsepower to the shaft. The gang was usually paid on a foot cube of block raised to the surface and so got no payment for waste or 'gobs'. This was packed back into old workings. thus saving the cost of bringing it to the surface.



Quarry tools used by the Bath Stone Firms Ltd

The sawers then continued down through the beds in a similar manner. This was done in a series of steps to enable the picker to commence picking the next stall whilst the sawers worked on the lower steps behind him. In the Combe Down mines the faces were worked by a gang of three

men. Once the top bed was removed, if the quarry master thought it necessary, elm kneelers were wedged between notches in the roof and the side of the piers for strengthening.

The Miners and Quarry Men

Very little has been written of the actual workmen. Wood's[8] references to Ralph Allen's improvements for their welfare have been mentioned. It was a very hard life with long walks to and from the mines, before and after the long working day. Wood mentions deaths in a number of places and Boyce[24] quotes a newspaper reference of 'three deaths caused by collapses in quarries on Combe Down and Odd Down' in 1755. Tyte[6] wrote 'Allen no doubt made provision for the welfare of the men in his service, and it is somewhat strange that no medical officer was stationed on the Down. Accidents in the underground quarries were, it is admitted, of frequent occurrence and in each instance a surgeon to attend the sufferer had to be fetched from Bath. It was not till 1786 that a remedy was found. In that year the Casualty Hospital was established on the Lower Borough Walls. . . To this institution the maimed quarrymen were for years promptly taken . . . The injured man was laid on a blanket-covered hurdle and a sheet thrown over him. The hurdle was then raised to the shoulders of four quarrymen who with quick and measured tread bore their comrade to the Hospital'.

Tyte[6] wrote 'During the palmy days of the quarrying industry, drunkeness was much too common among the workmen, with the usual concomitants, quarrelling and fighting. In one of these encounters a young man was killed. His antagonist was tried at the Assizes and sentenced to ten years transportation to Botany Bay. The Rev Pitcairn[18] adds that the buildings in Davidges Bottom included a popular beerhouse 'It is related that to avoid interference by the village constable on Sundays when it was his duty to see that they attended a place of worship, they would get their mugs filled at a back window, and taking their pipes disappear into the depths of the quarry where they knew many hiding places.'

'The Miners had a Benefit Club[6] whose headquarters were at the Carriage Inn [it is not known if this was an earlier name for the 'Hadley Arms' or yet another house]. It held Light Festival on Whit Monday and made a gala day for the general public . . . The Club was swallowed up by the big Societies . . . Still, while it lasted the good work it did in giving relief in cases of sickness, accident and death, deserves to be had in grateful remembrance'.

Conditions did improve though. Cottages were built near the mines from the 1790s onwards such as those in Davidges Bottom, Quarry Bottom, Byfield Buildings and Byfield Cottages and later Tyning Place so reducing the walking to work. ***The Bath Weekly Chronicle*** reported in August 1874 'District Mine Inspector banned use of Boys under age of 13 and resulted in loss of 200 jobs in all the Stone mines'. Little is known of wages, hours or even clothing. The last miners in the 1930s normally worked 8.00 am to 5.00 pm with an hour taken for lunch. In November and December this was extended to 8.00 am to 9.00 pm to increase the wages for Christmas. Every Friday afternoon the saws would be sharpened with triangular files, the saw being set in a saw-cut in a block of stone with the teeth upwards. Examples of these saw-sharpening stones and the surrounding incrustations of metal filings can still be seen in the mines. Clothing usually consisted of an open checked shirt with a neck tie., brown corduroy trousers with a leather strap round the calf to keep plenty of 'bag' around the knee to facilitate bending. The men working under-ground often made a hat from a rim-less bowler for protection from the roof and also to run off the percolating rainwater.

The Hancocks still have three generations working at Lawn Quarry on Combe Down. Let us hope the tradition will continue.

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