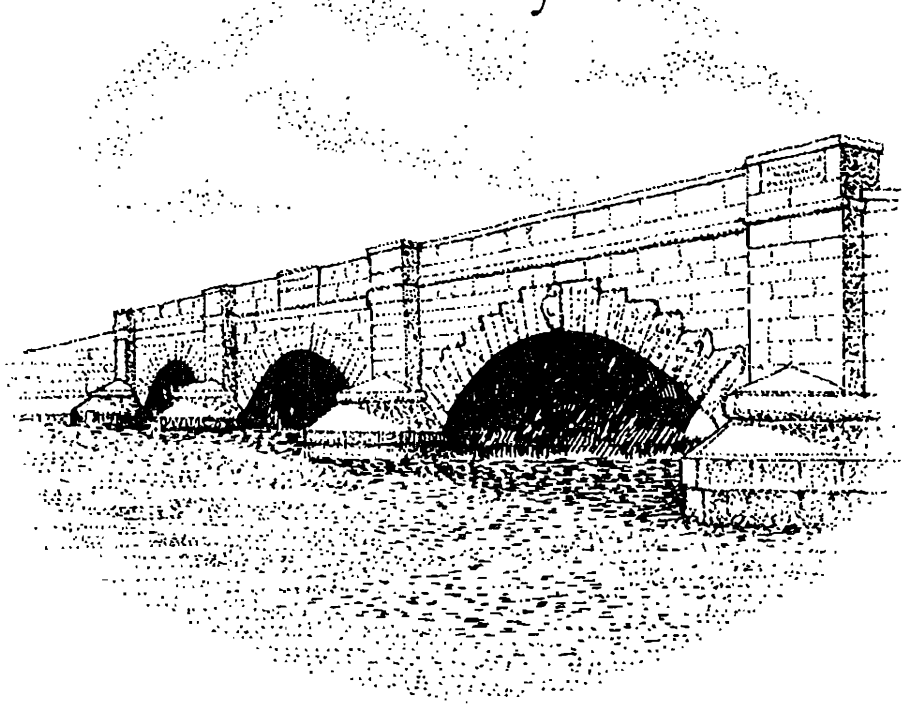
Ross Bridge Tasmania

Maureen Byrne



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Central arch on north facade of Ross Bridge. Note the various colours of the local sandstone, the inscriptions and the concrete applied beneath the arches during an earlier attempt to combat water seepage.

Acknowledgements

By its very nature the Ross Bridge project brought together many people of different backgrounds and disciplines; from this my own work and this publication benefited greatly.

For their co-operation and assistance I must thank the Ross Bridge Restoration Committee, Ross Council, the Public Works Department of Tasmania, and also the workmen who reinforced the bridge.

Of all the many people who helped me I must single out three for special mention. Gwen Eva spent many hours on the bridge drawing, measuring and writing, but even more hours excavating the footpath area. Mr. Norman Barnes, of the Public Works Department, ensured that this was truly a co-operative venture and always kept me abreast of any modifications of plans. Mr. Don von Bibra, of Ross, represented both the Ross Bridge Restoration Committee and Ross Council. To him go many thanks for without his interest and enthusiasm this record could not have been made. For permission to reproduce two photographs from P. Gazzola, Ponti Romani I, 1963, I must acknowledge both the author and his publishers Leo S. Olschki of Florence.

Maureen Byrne
University of Sydney
August 1976.

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Foreword

The Ross Bridge spans the Macquarie River in the Midlands of Tasmania. It is the focal point of one of Australia's most important historical villages.

Excellent recordings have been published of the events which led up to the planning, building and completion of this excellent sandstone structure in 1836.

We have now moved one stage further in having an archaeological study completed by Miss Maureen Byrne during the period of the excavations, the removal of the original roadway and the various strata to the skeleton of the arches.

Miss Byrne's treatise provides us with an introductory summary then proceeds by narrative and photographic records to explaining the methods and materials used to provide a roadway off this triple arch bridge, 140 years ago.

Of greatest significance is the collaboration between so many people and organisations. Miss Byrne, a graduate of the Department of Archaeology at University of Sydney has provided us with most interesting information.

This publication done in partnership with the Australian Society for Historical Archaeology and the National Trust of Australia (Tasmania) is another milestone in the accumulation of knowledge.

The continuing partnership between the Tasmanian Department of Public Works and the National Trust urges well for the future of the historical environment.

I am delighted to be associated with the work of Miss Byrne and to be a participant in preserving a great heritage in Tasmania.

D. D. Von Bibra,
Chairman,
Ross Bridge Restoration Committee

Ross Bridge : The History

The history of Ross and its bridge have been written before (1) and I have no new historical evidence to present. The facts I outline here, however, must be presented again as they are an integral part of any discussion of Ross Bridge.

Three inscriptions on Ross Bridge give a partial clue to its history. One is the date it was finished, MDCCCXXXVI (1836); the second commemorates the contemporary governor - Colonel George Arthur Lieutenant Governor; the third names the superintendent of works - Captn Wm Turner 50th or Queens Own Regt Superintendent. The story presented by the inscription is, however, by no means complete for it leaves out Daniel Herbert and James Colbeck the convict masons, the carvings of Herbert, Charles Atkinson the young English architect, Roderick O'Connor and Lee Archer, the corruption and pilfering begun by Mr. Foord of Bothwell and encouraged by all and sundry and much more. Some of these stories are peripheral to that of the bridge and are better told elsewhere. I am only concerned with those having a bearing on the construction of Ross Bridge.

The original bridge at Ross had been crudely constructed in 1822 of uncemented stone piers with a road surface of logs and clay (2). Although it soon began to show marked signs of wear it was not until 1829 that the governor instructed that it be repaired by the Royal Staff Corps. Previously, in 1828, Nicholas Turton, the Inspector of Roads, visited the bridge after the two central piers had collapsed.

Although the governor decreed that the

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1. Greener, L. The Bridge at Ross. Tasmanian Historical Research Assn. Papers and Proceedings. 14, 1966-7, pp 97-115. and a revision of this in : Greener, L. and N. Laird Ross Bridge and the Sculpture of Daniel Herbert. 1971
2. von Stieglitz, K. R. A Short History of Ross 1949, p. 9.

bridge be repaired in 1829, it was not until 1836 that the present Ross Bridge was opened to pedestrian and wheeled traffic. The intervening seven years were marred by corruption, inefficiency, and mismanagement. The Royal Staff Corps arrived in Ross at the beginning of winter to repair a bridge subject to flooding in the winter months. Their commandant, Lieutenant Vachell, was interested in neither the bridge nor his convict labour. When he was recalled the following August it was as if he had never come. The rebuildings had progressed only as far as the stockpiling of cut logs and the building of an unspecified number of unconnected piers.

In August 1829 Vachell was recalled and the six prisoners who had come with him were placed under the supervision of Alexander Jackson, the Commissariat Clerk at Ross. Still no progress was made and although Roderick O'Connor, Inspector of Roads, was appalled at the lack of work done when he visited Ross in 1830, he could do nothing to relieve the situation as he could spare no mechanics from other construction and road work.

With the final collapse of the old bridge in March 1831, the situation became more urgent. A contractor who had been repairing the barracks at Bothwell, a Mr. Foord, was called in to superintend the bridge work. He and his team, some forty strong, arrived in May 1831 and repaired the fallen span in two days, but only in order to get to the men's huts and store sheds. This pace did not continue.

At the time of Foord's arrival the bridge was to be rebuilt of timber. Soon afterwards, however, O'Connor decided that a brick bridge would be more durable; Foord, taking advantage of the situation, erected brick kilns. Stone was also being cut from local quarries to build the bridge piers. Curiously the piles of bricks and stone did not seem to increase; conversely a number of brick and stone buildings sprang up in the settlement. The official bridge superintendent, George E. Cock, the successor to Jackson as Commissariat Clerk, turned a blind eye to the obvious black market traffic in Government supplies. Foord's illicit activities were soon, however, to cause his downfall and in September 1832 he was dismissed.

While all this was going on, work was being further impeded by a dispute over the choice of a site for the new bridge. It was not until June 1832 that this was settled; John Lee Archer, the Government's Civil Engineer, was forced to agree that although Roderick O'Connor's site was further from the quarries it was more suitable for the type of structure they were planning. The new bridge was finally built approximately one hundred yards downstream from the old.

In March 1833 it seemed that progress was finally being made. O'Connor recommended a convict, James Colbeck, as superintendent of construction. Archer, however, had already hired a free settler, Shadrech Purton, as overseer. Cock remained acting superintendent. In April 1833 Archer visited the site with a revision of his original design. There were now to be three arches instead of five.

In November of that same year, 1833, a superintendent was finally appointed who had some qualifications for the job. This was Charles Atkinson, a young English architect recently arrived in the colony. He was appointed by Governor Arthur himself.

Events of 1834-5 proved, however, that without a master mason the architect was nothing. In December 1834 Colbeck, who had been in Ross since 1831, was sent, along with others, to Hobart Town for discipline. By March 1835, however, the absence of Colbeck had virtually stopped work on the bridge. In May 1835 Archer requested that Colbeck and another convict, Daniel Herbert, who was overseer of the building of the New Customs House in Hobart, be sent to Ross. In the same month Archer and Josiah Spode, Principal Superintendent of Convicts, requested emancipation for Colbeck and Herbert on completion of the bridge. This was later granted.

From this time onwards work continued systematically and consistently. The architect, Charles Atkinson, was dismissed in 1835 though he stayed in Ross to continue work on St. John's Church of England. He was replaced by William Turner in June, at the same time that Herbert and Colbeck arrived. Atkinson's dismissal seemed to have no effect at all on the progress

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made. As the new superintendent, Turner, readily admitted that he had no knowledge of construction, supervision was from this time entirely in the hands of Colbeck and Herbert.

One year later, on 14 July 1836, the bridge was completed and was declared open by Governor Arthur on 21 October 1836. At the same time the remains of the old bridge disappeared for ever; it was blown up. It had taken Herbert and Colbeck only thirteen months to do the bulk of the construction work on a project that had been started seven years previously. Even more amazingly it had taken only fifty-eight weeks - from 29 May 1835 to 14 July 1836 - to carve the 186 arch stones. (1).

It may seem strange that credit for the erection of Ross Bridge has been given to James Colbeck and Daniel Herbert, two convict masons not architects. The two architects at some time associated with the bridge, John Lee Archer and Charles Atkinson, had little to do with the details of its construction. There are no records of Archer visiting the site while work was in progress and Atkinson's appointment was short-lived. This dependence, however, on the ability of masons was not unusual.

Although the nineteenth century was one of increasing industrialisation and specialisation there was little change in the building trade. The vast majority of building operations and organisation remained little changed from the Late Middle Ages. (2)

Without having any specific information about Ross Bridge, therefore, it seems reasonable to assume that Colbeck and Herbert could indeed have had a more elevated role than would have been theirs today. In the Late Middle Ages most masons were recruited from the quarries; most medieval architects began as masons. The medieval concept of a mason is less specific than

1. Greener, L. and N. Laird op.cit. p.121
2. Chaloner, W. H. and A. E. Musson Industry and Technology p.54

ours: it encompassed both the master who designed and gave the orders and the skilled artisan who carried them out. (1) Herbert and Colbeck were craftsmen-mason-architects in this general pre-industrial tradition.

1. Harvey, J. The Master Builders p.13

Ross Bridge : The Excavation

The sandstone bridge at Ross is an aesthetically beautiful and satisfying structure. The three equal arches support a handsome, symmetrical bridge flanked at each of its four corners by a curving flight of stone steps sweeping down to the river banks. The proportions, with a carriageway 26 feet (approximately 8 metres) wide between the kerbs and 126 feet (approximately 38 metres) long, are both functional and pleasing. The local quarried sandstone, used throughout, varies naturally in tone from white to yellow, the variation emphasised by weathering by wind and water.

The feature which sets this bridge apart from its contemporaries is the series of carvings on the arches. There are 186 carvings in all, 31 over the top of each arch. Many are not directly representational but give impressions of rural activity with stylised wool bales and wheat sheaves. On the keystones, and often elsewhere also, are depictions of animal or human figures. The people include Daniel Herbert's wife, Mary; a self-portrait of Herbert himself; Jorgen Jorgensen, a Danish adventurer and his wife Norah Cobbett; Lt. Governor George Arthur caricatured in his top hat; the sixteenth century protestant, John Calvin; John Headlam, the hated schoolmaster, identified by his mortar board; William Kermode, a grazier prominent in local affairs; and a Tasmanian aborigine. There are also a Celtic horned god and many animal and monstrous icons including, as keystone on the north-west arch, a beast wearing a crown and gripping a lamb in its claws. (1)

Very few stone bridges in Britain have any decoration at all, let alone decoration on the scale of Ross Bridge. Henley Bridge over the Upper Thames, built in 1786 by William Hayward, has two keystone heads of Isis and Tamesis (2); another

1. For a description of these see Greener, L. and N. Laird Ross Bridge and the Sculpture of Daniel Herbert. pp.147-189
2. de Maré, E. Bridges of Britain p.125

of Hayward's bridges, Tern Bridge at Atcham in Shropshire, built eight years earlier in 1778, has balustrades and carved keystones. (1) Petherton Bridge in Somerset, dating possibly from the fifteenth century, has a pair of worn stone figures built into the end of the parapet, reputedly effigies of the founder and his wife. (2) Wilton Park Palladian Bridge in Wiltshire also has carved keystones. The two most famous decorated stone bridges in England are both the work of John Gwynn. The English Bridge in Shrewsbury. Shropshire, is decorated with carved dolphins on the cutwaters (3), while the Magdalen Bridge at Oxford, built in 1779, has keystones desorated with carved heads. (4)

Other than in these few exceptional cases, sculptural decoration seems not to have been in vogue for stone bridges, perhaps because "the scale of decoration must be so large to be effective". (5) Once Abraham Darby had shown the possibilities of iron, decorative motifs were no longer ignored. The Waterloo Bridge, for example, at Bettws-y-Coed in Caernarvonshire, designed by Thomas Telford, has, in the spandrels, enormous heraldic flowers, - roses, thistles, shamrocks and leeks. (6)

In Australia, also, sculptural decoration on stone bridges is very rare. Aside from Ross Bridge, the only early colonial bridge with some decorative motif other than inscriptions was David Lennox's Duck Creek Bridge at Parramatta in New South Wales. This bridge, dated to about 1837, had on the keystone on the downstream side, a carved Masonic symbol of a pair of compasses open on the segment of a circle, thought to be a Master Mason's mark. (7) Other bridges dated to this period are undecorated. Richmond Bridge in

1. Ibid. p. 125
2. Ibid. p. 127
3. Ibid. and photograph p. 9.
4. Ibid. p. 126 and photograph p. 8 and back cover.
5. Ibid. p. 7
6. Cossons, N. The B. P. Book of Industrial Archaeology p.334. Photograph in de Mare op.cit. p.78
7. Selkirk, H. JRAHS 6, 1920, p.228

Tasmania, the oldest datable bridge in Australia (1823), is of stone and unadorned, though like Ross Bridge it has steps down to the riverbank below. The brick bridge at Campbell Town in Tasmania, dated to 1838, has three arches like Ross Bridge but no decoration. David Lennox, working at this time in New South Wales, favoured the single stone arch. The Lennox Bridge at Lapstone (1833), the Lansdowne Bridge (1836), and the other Lennox Bridge at Parramatta (c.1839) are all of this type. (1) None bears any decoration aside from inscriptions and the Lansdowne Bridge is devoid even of that.

It was the interest generated by Leslie Greener and Norman Laird's book Ross Bridge and the Sculpture of Daniel Herbert that gave the initial impetus to restoration work on Ross Bridge. Local prompting resulted in the National Trust of Australia (Tasmania) forming a Ross Bridge Restoration Committee to take ultimate responsibility for restoration work on the bridge. This committee, which has local, National Trust and Public Works Department representation, spearheaded a fund raising campaign with a target of $25,000. It eventually raised $30,000. Ross Council, through National Trust representation, was awarded a further $7,000 by the National Estate for work on this project.

The main danger to the bridge was water seepage through the stonework. For some years local residents had noticed this seepage during wet weather. It had apparently caused much of the deterioration of the masonry, especially on the north-east pier (pl. 4.1). The local bodies concerned were to be responsible for the replacement of much of this stonework while the PWD undertook to waterproof the bridge surface in an effort to prevent future damage in this way. The Ross Bridge Restoration Committee has remained responsible for the work throughout.

The PWD specifications called for the removal of all of the filling material to approximately 100 mm. below the base of the kerbstones. This material

1. For a description of all these N.S.W. bridges see D.M.R. pamphlet, Early Bridge Building in N.S.W., Main Roads, 1950, 1951.

was to be replaced by a series of layers that would, it was hoped, waterproof the bridge.

Bitumen was to be applied over the area to be waterproofed to a depth of 25mm. An elastomeric sheet, with a thickness of 1.90mm. ± 0.12mm., was then to be unrolled directly over this, Portland cement dust sprinkled directly on top, and a further layer of bitumen was then to be applied to seal this. The rest of the filling material was then to be replaced and the road sealed with bitumen. The kerbstones were to be replaced in their original positions but set into a bed of concrete. (1)

My role in the waterproofing of Ross Bridge was that of recorder; I was to document anything of interest that might appear while the PWD work was being carried out.

On 2 February 1976 the road surface across Ross Bridge was a layer of bitumen approximately 100 mm. in depth. This was removed with a track-laying excavator (pl. 6.1) and revealed a deposit doubtless similar to the original road surface, a deposit of crushed stone mixed with brown earth. It was approximately 150 mm. in depth.

Exposed at the same time were two rows of kerbstones dividing the carriageway from a footpath on either side of the bridge. (pl. 6.2) The kerbstones are of sandstone and have a rounded upper edge. Their lengths are irregular; their heights are fairly standard at around 460 mm. Three of the four end kerbstones were dummy bollards; the fourth was missing. It probably disappeared when that end of the bridge was washed out during a flood.

These kerbstones were numbered, photo-

1. Department of Public Works, Tasmania. Historic Ross Bridge. Road Reconstruction and Waterproofing of Bridge.
Sheet No. M - 23.

graphed in situ, and their vertical and horizontal distances from the third joint down the bridge wall was measured. They were then removed to be put back after the waterproofing was completed. About half of these stones needed to be replaced by newly quarried sandstone blocks. The filling along the southern wall of the bridge had subsided at some stage and many of the very long stones had broken into pieces; most of those along the north side were relatively undamaged. The stone for the replacements came from the original Ross quarries.

All the filling material was removed from above the stonework on the bridge after it was realised that the basic filler appeared to be a black clay. It was taken out in sections using a back-hoe; the northern half of the bridge was exposed first, the areas between the arches being cleared one at a time. The southern half was then cleared likewise.

In most areas of the bridge black clay had been used as a skin over the masonry before the road surface was built up. (plan 4, pl.8.1). Quarry waste material was also very widely used as a filling material; ironstone gravel was also used. The relationship between these three varied according to area.

In the area between the central and western arches there was, as in other areas, a mixed deposit of brown earth and crushed stone gravel. Below this was a quite shallow deposit of quarry waste material but the major filler here, unlike other areas, was dense black clay, (pl.8.1). The quantities of this material found here were unlike those anywhere else on the bridge. The clay was also damp, becoming quite wet beneath the footpath area. Its removal was therefore very necessary, since there is little point in waterproofing over a waterlogged deposit.

The area between the central and western arches is floored with very rough and large blocks of stone, not mortared together and lying, it appears, on a mortared base. (pl.7.2; 8.2). The black clay was packed in around these and had to be removed by hand. In this detail also the area between the central and

western arches differs from the rest.

Between the central and eastern arches was, again, below the bitumen and mixed brown earth and gravel, a deposit of quarry waste material. It took the form of mixed sandy clay, yellow sand, and sandstone pieces. This material formed the main filler. Black clay covered the arches to a depth of approximately 50 mm. (plan 4); it also extended outwards from both the north and south walls approximately 300 mm. There were a few lumps of it elsewhere but the basic filling deposit was a quarry waste material.

This filling material was removed completely to reveal not a base of large stone blocks but a thick mortar layer (pl.9.1,2). From subsistence of this deposit in one spot it appears that the mortared surface covered roughly shaped stone blocks.

The two ends of the bridge were also different in their combination of filling materials. In the area from the eastern arch to the end of the bridge (pl.10.1,2; 11.1) there is black clay over the arch, again to a depth of c. 50 mm., with quarry waste material as the main filler. The sandstone pieces here were larger than between the arches. The floor is again mortar over brown earth and stone. In the filling material throughout this area were large lumps of black clay.

The area from the western arch to the end of the bridge follows much the same pattern but earlier road reconstruction had altered it somewhat. The destruction of part of the road surface due to flooding some years previously had resulted in the addition of ironstone gravel to the earlier filling materials. Black clay, as elsewhere on the bridge, lines the walls and covers the arch. Sandy quarry waste material, the basic filler, is found below the ironstone gravel and on top of the series of mortar floors. (pl.10.1; 11.1). The ironstone gravel is found immediately below the bitumen and to a depth of approximately 400 mm. below the kerbstones. Any kerbstones disturbed during its addition, and these were only in the south-west area, were replaced on a bed of fine

blue metal. (Originally the kerbstones were placed on a bed of mortar).

Against the north wall, and in the original black clay was a vertical piece of squared wood. It possibly came from the original shoring. Other finds, for example the pieces of leather, also came from the black clay in the north side of this section. (see Appendix II).

It is clear, then, that a fairly simple pattern emerges with regard to the filling material used on Ross Bridge. Black clay appears to have been used as a skin over the unexposed stonework, perhaps as an attempt at waterproofing. The reason for the strange discrepancy in filling material, where in three areas quarry waste material is mainly used while in the fourth black clay is favoured, is not clear. Either the builders wished to use all quarry material but ran out and resorted to black clay, or they intended using only black clay but eventually decided to change, perhaps because of the weight of the clay. I favour the first explanation but there is no real evidence either way.

In an arched bridge the main force is a thrust since the arch works by compression. The weight above the crown is perpetually transferred down through each voussoir (arch stone) to the springings and abutments. (1) It is the arch itself which takes all the weight. The spandrels (the spaces on each side between road and arch) are not necessarily filled, as they are on Ross Bridge. In some English bridges these spandrels become merely large, empty, enclosed spaces.

The steps to be followed in constructing a multiple-arched bridge are quite straightforward. After the site is selected, one affording good bedrock for supports if possible, the river, stream or creek must be dammed while the piers are built. A variant of this is common to all types of bridge building where piers are built in water. In the nineteenth century this temporary coffer dam was normally built of logs and clay.

Next the piers are built up to the springings - the point at which the arch begins - and the arch is built up stone by stone from each side simultaneously until the keystone can be dropped in to hold the arch in place. (pl.14.1) The keystone is then normally weighted to prevent the pressure exerted on it from forcing the stone upwards.

The bridge walls are then built up (pl.14.2); the carriageway is made. Kerbstones, pavements and the like are added. To put the stones in place required an elaborate system of scaffolding, hoisting pulleys and windlasses. (pl.14.1 shows a modern version of this same operation during reconstruction of a Roman bridge.) The bridge is then finished.

The reconstruction work done on Ross Bridge enabled many points of construction detail to be noted. In an arched structure the central arches lean on those next to them; with Ross Bridge, therefore, the weight of the central arch is taken by those arches on either side. The end arches, however, have only one support; their weight is taken by the bridge wall. Photographs (pl.10.1,2; 11.1) illustrate how this is achieved. The arch is built into the bridge wall by a series of buttresses of different heights and different lengths.

The stones used on the bridge walls are decorated in three different ways; all are chiselled. The stones below the ledge on the outer face of the walls have a stipple-type decoration chiselled onto them. The stones above the projecting ledge and on the inner face of the wall have a shallow grooved decoration, very similar to Regency stripes. The stones of the bannisters vary again; they are dressed with a short, chiselled, oblique pattern.

Some of the stones dressed with the parallel stripe pattern had obviously broken or become flawed in some way during preparation. These have been used in the lower, hidden courses and some

1. de Maré, E. op.cit. p.15

are marked in plan 1. (pl.11.2) Tools used for working and laying the stones were quite primitive and had changed little since medieval times and beyond. These consisted mainly of chisels, wedges, hammers, picks, hoes, spades and trowels. (1) Stone was cut out by pickaxe and wedge and then worked into blocks.

The carriageway surface itself was originally constructed on the Macadam principle with the two upper courses of broken stones of graded sizes (i.e. the quarry waste material with the mixed crushed stone and brown earth above it). That such a roadway should dip towards each end of the bridge, to aid among other things water runoff, is not surprising. But it is a testimony to the builders of Ross Bridge that they took note of that fact when building the walls, especially so as it economised on the number of stones needed to be dressed. It can be seen from plans 1 and 2 that at each end of the bridge, where the road should slope downwards, there is an extra series of dressed blocks at each end of what is an undressed course. The pedestrian refuges are one course lower at each end also.

The pedestrian refuges (pl. 12), or road recesses as they are sometimes called, have no real function on such a bridge as Ross Bridge. They are an innovation into bridge building of medieval times "which often continue the angular cut-waters up to parapet level where pedestrians could retreat from passing carts and quadrupeds..." (2). Since Ross Bridge has two adequate footpaths "passing carts and quadrupeds" should hardly be a problem.

1. Chaloner, W. H. and A. E. Musson op.cit. p.11
2. de Maré, E. op.cit. p.15

The waterproofing and surface reconstruction carried out on Ross Bridge in 1976 is quite unusual in building, or structural, conservation work. Normally if a stone structure is to be waterproofed it is sprayed with a plastic substance on the exterior. It is not possible of course to use this technique on Ross Bridge, since the technique would trap water inside the stone and road surface.

There are few close precedents for the work undertaken at Ross. The fabric of many old bridges has, of course, been repaired and strengthened, but Ross Bridge posed unique problems solved in a unique way. Restoration on bridges of comparable importance has been instructive but the problems and possible solutions are different.

The celebrated Iron Bridge at Coalbrookdale in Shropshire, credited for design to Thomas Farmolls Pritchard and erection to John Wilkinson and Abraham Darby, the first iron structure ever built, has been the subject of some restoration work. The north abutment was excavated and reinforced concrete strengthening inserted. Photographs taken during the restoration (1) clearly show the cracking of the foundations.

Closer to home the Lennox Bridge at Lapstone, New South Wales, designed and built by David Lennox during 1832-3, (2) was the subject of some restoration work by the New South Wales Department of Public Works around the same time in 1976 as the work at Ross. The road across this bridge had been closed to traffic for some years because of the deterioration of the stonework. The sandstone was not eroding but the blocks were slipping out of place and although anchor rods were used to try to pull them back into place this was not successful. The illustration (pl.12.1) demonstrates quite clearly both the bridge construction and the type of restoration carried

1. Cossons, N. op.cit. p.333, pl. 69
2. for a description of the bridge see D.M.R., N.S.W. report from Main Roads 1950,1951 (Early Bridge Building in N.S.W.) p.38

out. The one-and-a-half foot wide stone footpath which curves over the arch but which had been buried by the raising of the level of the carriageway, was exposed when the road surface was removed. The top of the arch can clearly be seen in the photograph as can that part of the wall which is not normally exposed.

To enable the road across Lapstone Bridge to be opened to traffic again, and to ensure the preservation and stability of this unique bridge, it was decided to build a concrete bridge inside and over the stone one, leaving the stone untouched. In the right of the photograph is one concrete wall; there is another on the opposite side of the arch. The filling material was then to be replaced, a concrete top put down, and the road relaid.

Although the work done on the Iron Bridge and at Lapstone was not the same as at Ross, the three demonstrate that the importance of these eighteenth and early nineteenth century bridges is being recognised. The two Australian examples show how Public Works Departments are acting imaginatively to preserve the types of structures that will never be built again. The work done at Ross Bridge was important in many different ways. First it demonstrated that a stone bridge can be waterproofed though in some ways only time will tell whether the operation will be a permanent success. More importantly, the publicity surrounding Ross Bridge impressed upon the people of Ross and of Tasmania that they have preserved a significant and unique part of Australia's cultural heritage. The success of this co-operative venture at Ross should, it may be hoped, encourage those elsewhere attempting to retain for posterity buildings of historical importance.

Appendix I

The Footpath Area

The four approaches to Ross Bridge are lines with stone bollards. (pl.1.1). The end ones are squared with a plinth and a cap-stone. The others are smaller and rounded, sometimes grooved. All are linked by chains though it seems clear that they were formerly linked by three parallel metal rods. (pl.2.1).

The two eastern approaches, i. e. the town approaches, each have in addition a second parallel row of bollards marking out a footpath. These small bollards are placed one opposite each large stone, and one in between. (pl.1.1). There are therefore, twice as many small bollards as there are large ones on these approaches.

The large bollards are approximately 5 m.400 apart. The distance between the small ones is approximately 2 m.700.

Due to frequent flooding of the Macquarie River this footpath area had been raised considerably above its 1836 level to a point where many of this second row of bollards have almost been covered. The tops of most are now on ground level and have frequently been damaged by lawnmower blades during trimming of the grass footpath.

A small area on the footpath was excavated for two reasons. One was to see whether the original footpath surface could be found. The other was to define the shape of this second row of bollards.

This venture met with mixed success. The original footpath surface appears to have been a mixture of brown loam and clay mixed with sandstone chips and river pebbles. In this layer, as well as in the brown loam overlying it, were found pottery, metal and glass. Beneath it was a deposit of black clay over wet, soft sandstone.

The small stone bollards were found to be approximately twelve inches in height. They were not upright but angled, probably to deflect carriage wheels away from the footpath and hence from the pedestrians and from the large stone pillars. (pl.1.2).

It seems clear then that originally the town approaches to Ross Bridge were two gravel (mixed stones, brown loam and clay) footpaths lined on either side with a row of sandstone bollards. It would be highly desirable that Ross Council might lower the present level of the footpath and restore these approaches to their former condition.

Appendix II.

The Finds

There were very few finds from this emergency excavation. They are listed here by area. All are now in the possession of Ross Council.

The Bridge

South-east end of the bridge. Thin piece of dark green bottle glass.

Between Central and Eastern arches (south). Brown salt-glazed stoneware shoulder of, probably, a jar.

Near south-east pier in black clay, footpath area.
Large, hand-made, squared iron nail.
End of a small hand-made iron nail.
Piece of blue-and-white glazed earthenware.

Between central and western arches (north) in black clay. Broken iron pin.
Piece of squared wood.

North-west end of bridge in brown soil filling. Piece of leather (flat).
Brown leather boot strap?

The Footpath

Layer (2)	1 modern iron nail, 80mm long, round in section. 1 squared iron piece. 3 pieces dark green glass. 1 piece light green glass. 1 piece brown glass. 1 piece amber glass. 3 pieces clear glass. 1 piece blue-and-white glazed earthenware. 3 pieces white glazed earthenware.
Layer (3)	3 pieces dark green glass. 1 piece pale green glass. 10 fragments dark green glass.

1 fragment amber glass.
2 pieces white glazed earthenware.
4 fragments white glazed stoneware.
1 modern iron screw bolt with two washers.

Layer (4)
14 pieces dark green glass.
8 pieces light green glass.
4 pieces light blue glass.
2 pieces amber glass.
2 pieces clear glass.
5 pieces white glazed earthenware.
1 piece grey-and-white floral decorated earthenware.
4 pieces blue-and-white glazed earthenware.
1 piece aquamarine glazed stoneware.
1 piece thin twisted iron wire.
1 iron and lead stopper.
1 piece slate pencil.

Layer (5)
2 pieces dark green glass.
1 piece pale green glass.
3 pieces white glazed earthenware.
1 piece hand painted earthenware: white with blue stripes.

Little else can be said about any of these finds other than that those found in the black clay layer must date to the period of the construction of the bridge.

Appendix III

The Brickworks, the Stone Quarries and the Lime Kilns

The importance of the stone and the lime in the bridge is obvious today. The bricks have a historical significance, only for it was originally decided that the second Ross Bridge would be of brick.

There is one brickworks and possibly a second close to Ross. The first is at Somercotes, a very old property situated just south of Ross. Bills of sale, for bricks, between Somercotes and Macquarie House are still in existence in private ownership. (1) These predate the bridge and so seem to indicate that the brickworks on Somercotes were set up by Mr. Foord, the bridge contractor for a short time in 1831-2. Evidence on the ground at Somercotes seems to verify the existence of a brickworks. In an area littered with broken baked brick and small mounds is an iron pug mill for mixing clay for the manufacture of bricks and tiles. It is quite likely therefore, that bricks were fired in either kilns or stacks on this site.

On Ashby, not far from Somercotes, in a flat area on the river bank there are many pieces of brick rubble. Although this was a rubbish tip in the not too distant past, the bricks do not appear to belong to this period. They are exposed in section, in areas of firmer earth amongst small gullies where the earth has been washed away during floods. These bricks, which appear to form lines, have been on the ground long enough to be covered by a deposit of earth averaging approximately 500 mm. in thickness.

That Ross is built on sandstone is amply illustrated by her buildings; the majority of nineteenth-century ones are of stone. This stone, like that for the bridge, came from quarries very close to Ross. One of these quarries has supplied the stone for the replacement kerbstones on the bridge

1. Information from M. R. Riggall of Somercotes, Ross.

and also for the replacements on the bridge wall. The stone is fine and ranges in colour from white to yellow. Many grindstones made of the hard white variety of Ross sandstone were distributed throughout Tasmania and exported to the mainland.

Also on Ashby but on the opposite side of the property to the probable brickworks is an area where lime kilns are traditionally thought to have been. The ground here is strewn with limestone. Most pieces have multiple fossils. In an area that lies on the boundary between Ashby and a neighbouring property, Williamswood, are many pieces of burnt and warped brick. There are also the overgrown foundations of what appears to be a circular structure - perhaps a lime kiln. The ends of the bricks facing the inside of this structure are covered with a molten substance that gives them a glazed appearance consistent with the interior of a kiln. If this is indeed a lime kiln then it further illustrates the independence of the people of Ross. They ensured that all the raw materials they needed for building could be processed close at hand.

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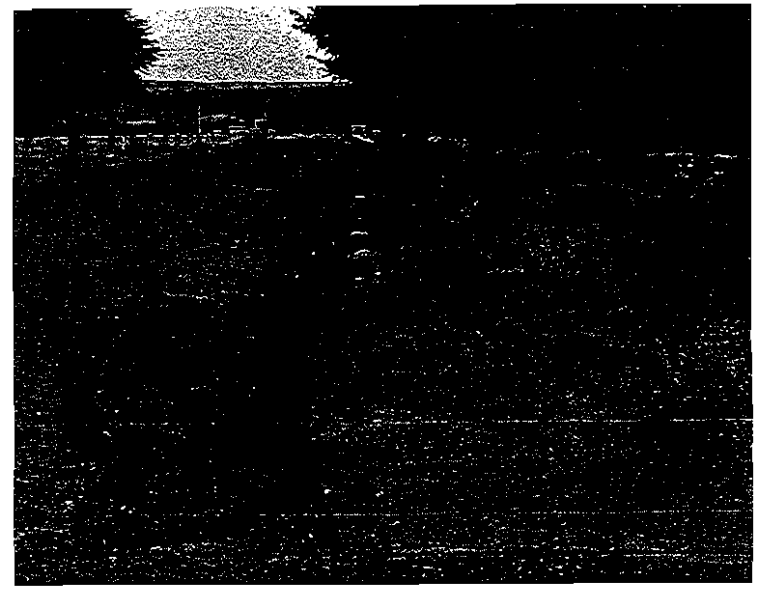
13. Stancombe, G. Hawley Highway in Van Diemen's Land. 1969.

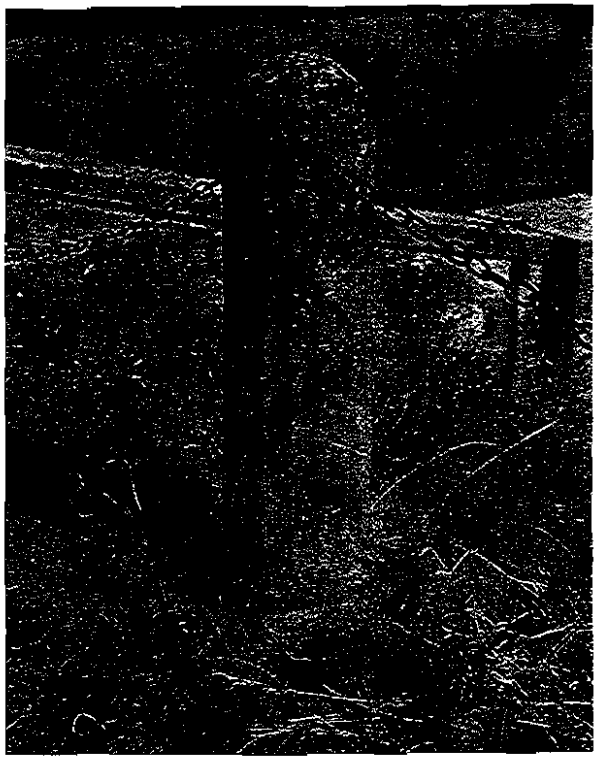
14. von Stieglitz, K. R. A Short History of Ross. 1949.

1. Town approach to the bridge showing row of bollards and just exposed dummy bollards.

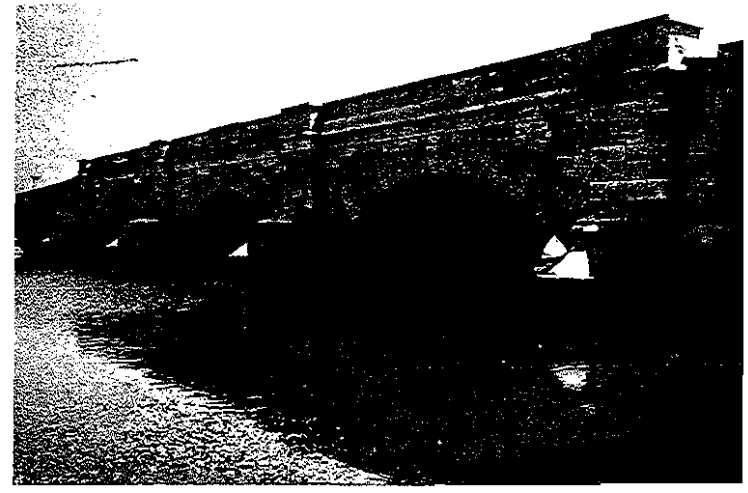
2. Carved dummy bollards before excavation.



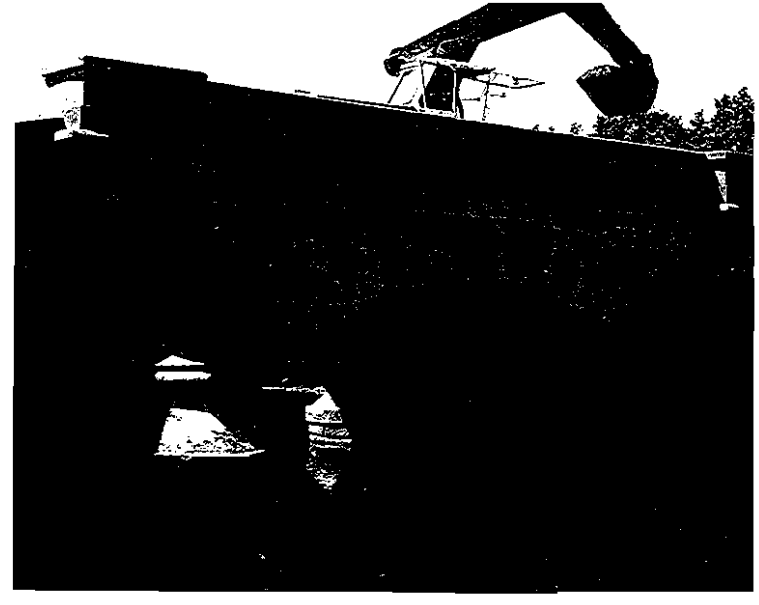
Fluted bollard on North-east approach. Note the three plugged holes indicating initial linkage by three parallel metal rods rather than chains.



1. Southern aspect of the bridge. (Photograph by N. A. Barnes).

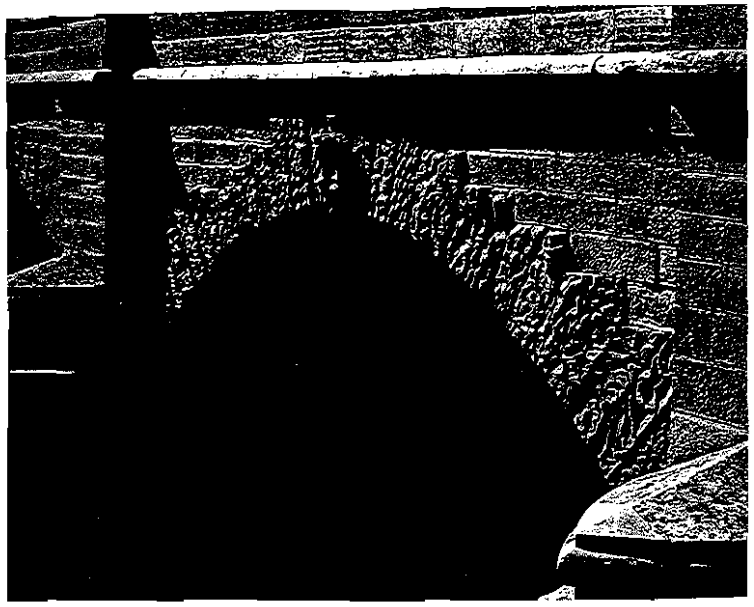


2. North-eastern arch. Note inscription to Captain William Turner.

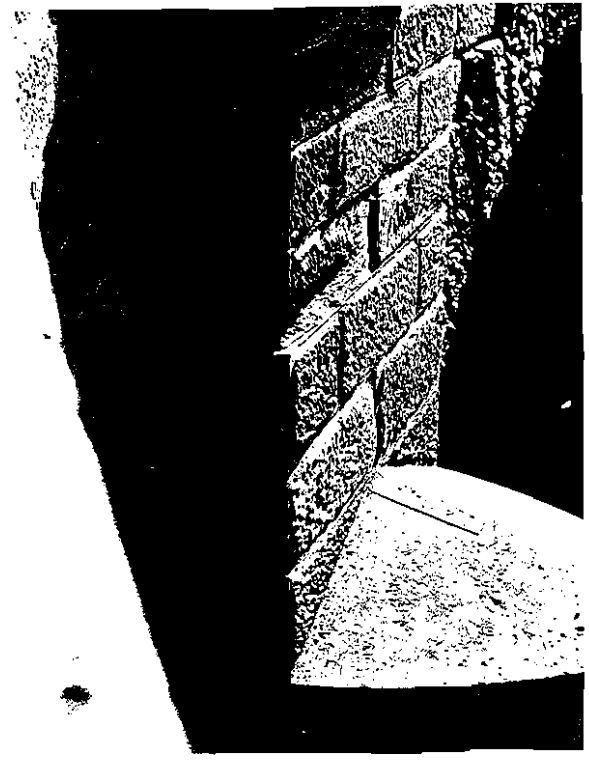


1. Carvings on the north-west arch.

2. Stone steps and bannister curving to the river bank on the south-west corner.



North-east pier. Note the weathering caused by water seepage. These stones have now been successfully replaced.



1. Removal of bitumen by track laying excavator.

2. Kerbstones emerging after removal of bitumen.

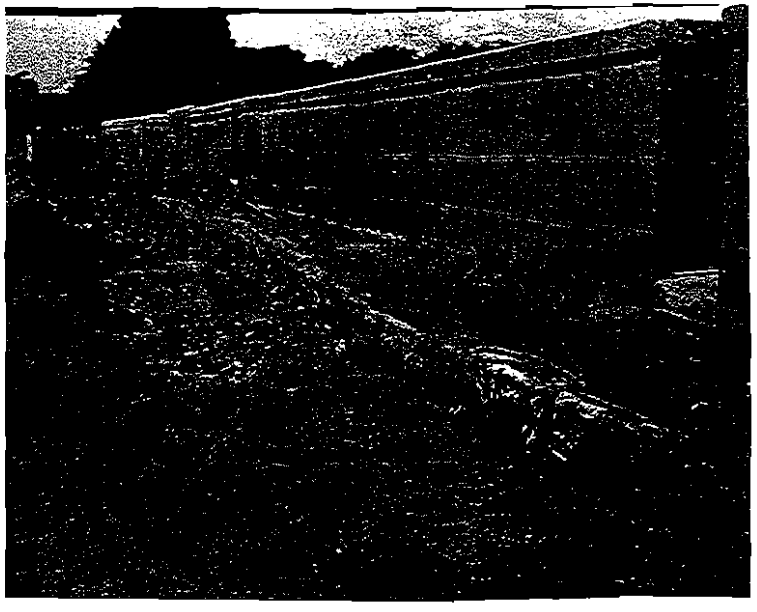


PLATE 7.

1. Removing the filling material on the north side of the carriageway.

2. Floor of large stone blocks between the central and western arches (south side).

PLATE 7.

PLATE 8.

1. Stone blocks forming the west side of the central arch (N). Note the depth of the black clay filling.

2. Eastern side of western arch (N) and adjoining floor.

PLATE 8.

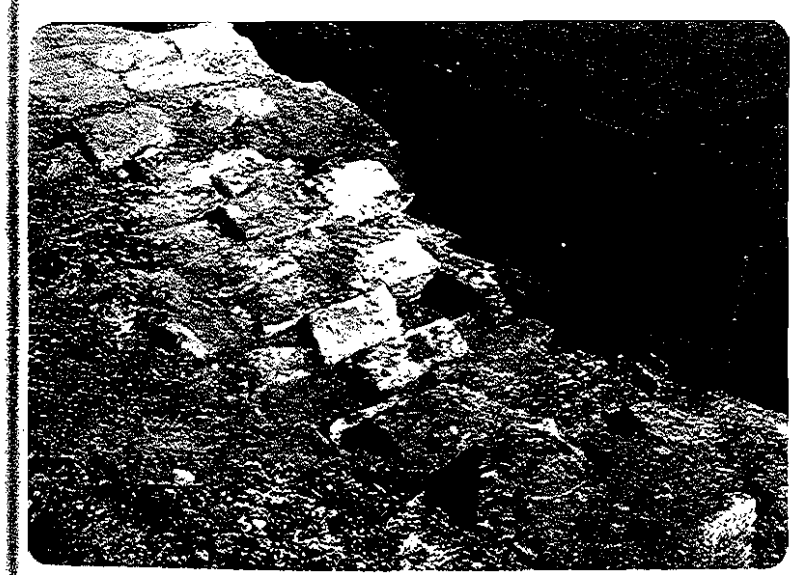
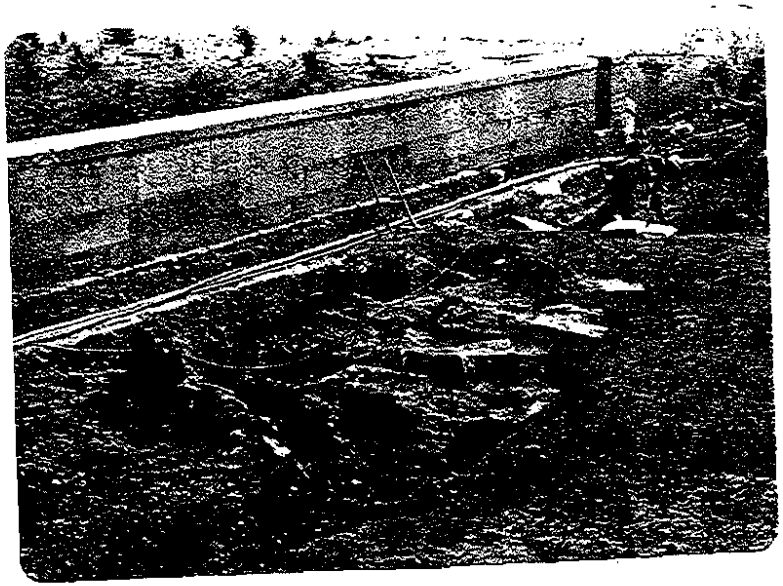


PLATE 9.

PLATE 9.

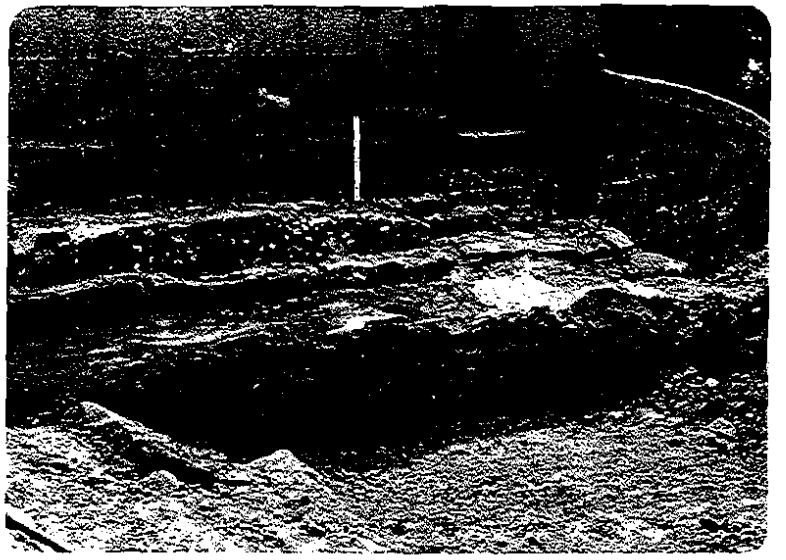
1. Eastern arch (N) and mortar flooring between it and the central arch.



2. Western arch (S). Note the refilling of one area with ironstone gravel and cement.

1. North-east end of bridge. Note the series of buttresses taking the weight of the arch.

2. North-east end of bridge looking along buttresses to the eastern arch. Each buttress starts from a different level of the arch.



1. Buttressing on south-west end of the bridge curving around the bannister.

2. Detail of a broken, dressed stone used in an unexposed course (the trowel blade is 153 mm. in length).

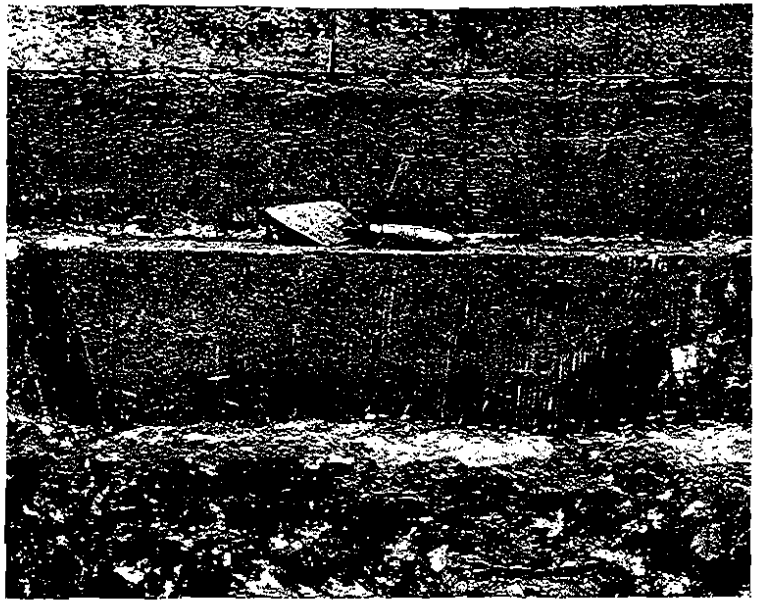
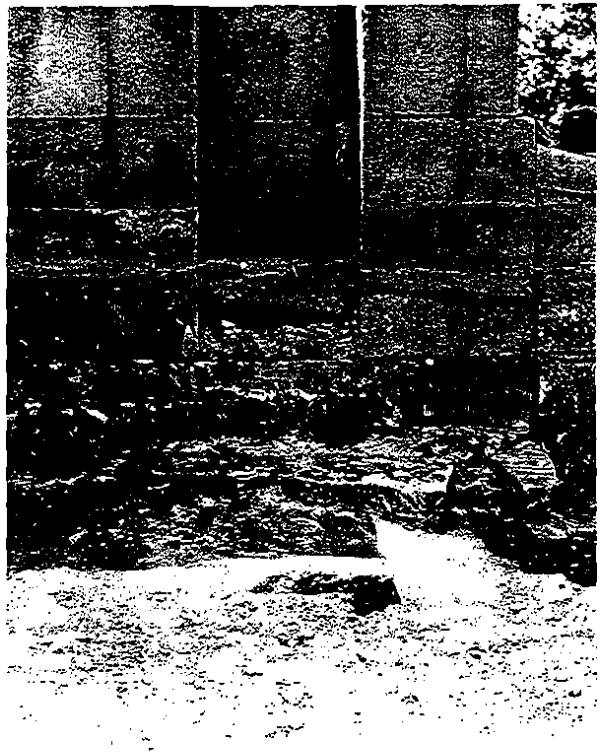


PLATE 12.

Eastern pedestrian refuge (north side) and buttresses. The stone is sitting on a layer of brown earth over a thicker layer of mortar.

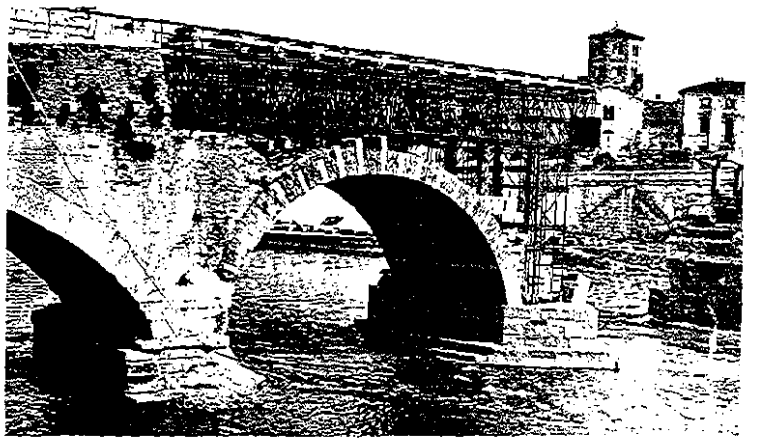
PLATE 12.



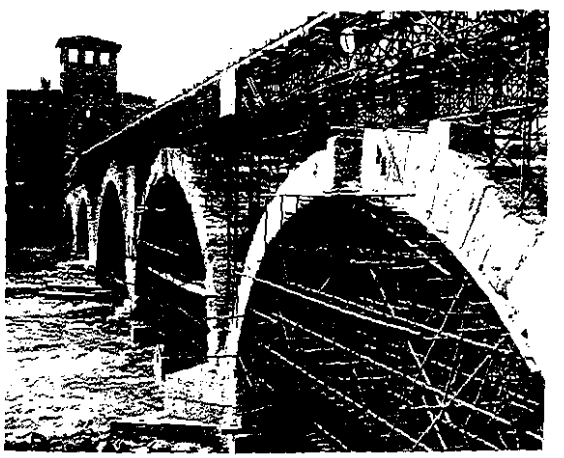
1. Voussoirs (arch-stones) on the north-east arch. Note how the lengths of the middle seven stones of this arch were underestimated and extra small blocks had to be made.

2. Lennox Bridge, Lapstone N.S.W. Note the recently exposed footpath, the top of the stone arch, and the beginnings of the concrete bridge being built inside this 1832 structure.

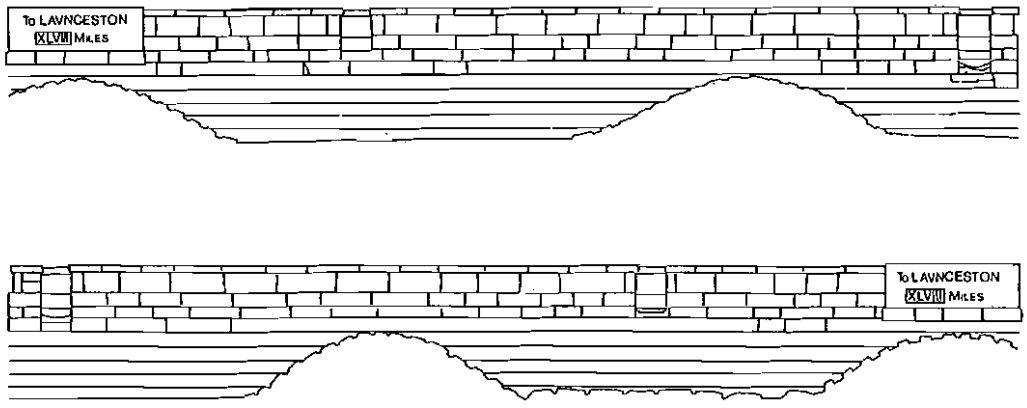
1. Reconstruction of Ponte Pietra. From P. Gazzola Ponti Romani I. 1963. plate 79.



2. Reconstruction of Ponte Pietra. From P. Gazzola Ponti Romani I. 1963. plate 87.

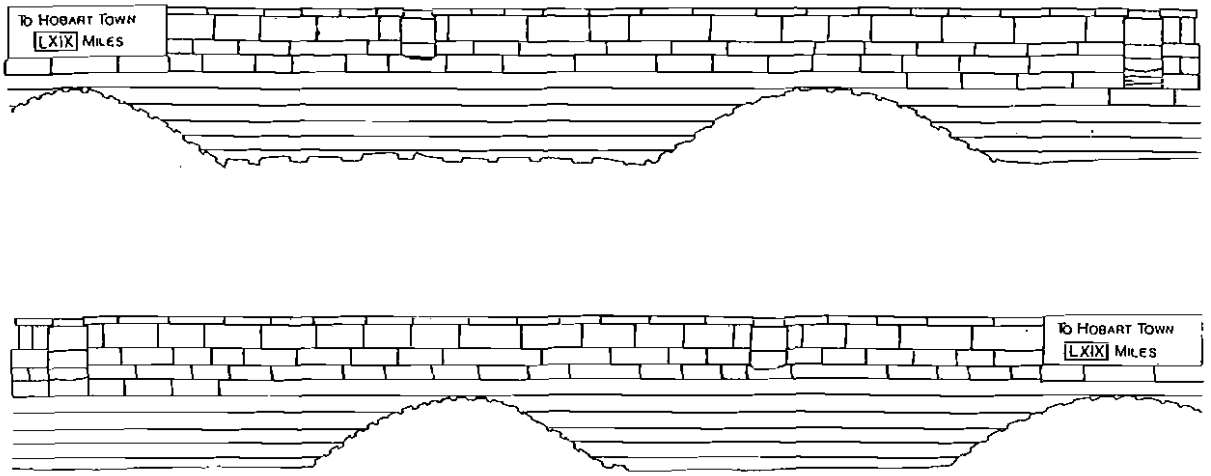


PLAN 1



Elevation of north side of bridge showing arches, bridge walls and lower, normally unexposed, courses

0 1 2 3 4 5 10metres

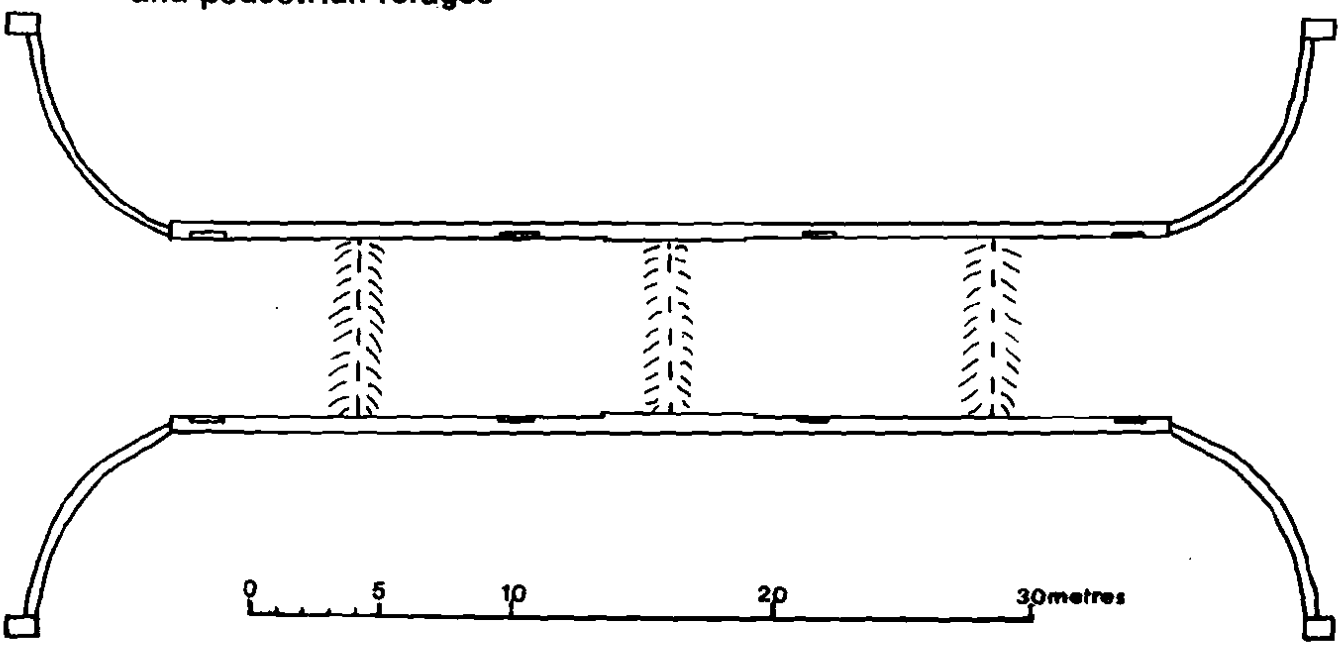


Elevation of south side of bridge showing arches, bridge walls and lower, normally unexposed, courses

0 1 2 3 4 5 10metres

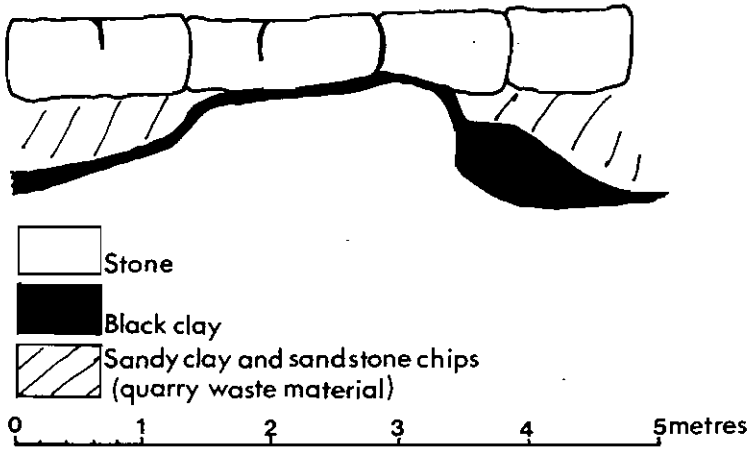
PLAN 3

Plan of Bridge showing walls, arch tops, balustrades and pedestrian refuges



PLAN 4

Relationship between the kerbstones and the top of the western arch (North)



PLAN 5