

# **STONE ARCH BRIDGES OF THE NORTHEAST CAPE**

Research compiled by Dennis Walters, February 2009

## **1. VICTORIA BRIDGE OVER THE KAT RIVER, FORT BEAUFORT**

This multiple-arch bridge was the first of three major bridges authorised by the Cape Colonial Government to improve lines of communication along the Eastern Frontier. These three bridges (timber bridges across Great Fish river at Fort Brown, and over Koonap river) formed a vital link in the military road (called Queen's Road) from Grahamstown to Fort Beaufort and on to Post Retief. Credit for the design of the bridge goes to Maj Charles Jasper Selwyn RE, who commanded the Royal Engineer's Department in Grahamstown. It was also one of the first projects undertaken by Andrew Geddes Bain (of Bains Kloof fame) who had recently enlisted in the Royal Engineers in 1836. The foundation stone was laid by Lady Napier, the wife of the Governor on 25 November 1840. The bridge took three years to build and comprised a central elliptical arch span of 68 ft flanked by two small circular arch spans with a 16 ft wide roadway. The dressed sandstone of the bridge was quarried from the southern abutment, and was one of the first structures to use imported Roman cement. It was opened to traffic at the end of 1843. The parapets were washed away in a flood of 1848, while extensive damage was done when the masonry above the arch voussoirs were swept away by the flood of 6 December 1874. This flood also destroyed the Fort Brown and Koonap timber bridges. The bridge was repaired by widening the two side arches to 40 ft and replacing the roadway in October 1876 under contract by Mr Charles Pope, at a cost of £ 4900. The alterations and repairs were designed by Mr Joseph Newey of the PWD.

Information obtained from the Civil Engineer in South Africa, 1975.

## **1. ST MARKS BRIDGE OVER THE WHITE KEI RIVER, COFIMVABA**

The first large masonry stone arch bridge built by the Department of Public Works was over the White Kei river near St Marks mission, on the road to Cofimvaba. Mr James Fforde, the new Chief Inspector of Public Works from January 1877, visited the proposed site in May 1878, and had a survey of the most suitable position prepared by Sydney Stent, in addition to a design consisting of six spans of 40 feet each, clear opening, the crown of the arch being ten feet above the largest known flood. The foundations of the bridge had been completed and the piers and west abutment completed up to the springing of the arches, when the 1877/78 Frontier War broke out and the works were abandoned. The works resumed in July 1878 and by April 1879, the abutments, piers, and one arch were complete. By March 1880, carts and light vehicles were allowed passage, and the bridge was finally completed by the end of the year at a total cost of £ 10 403 9s 4d.

Information obtained from the "Blue Book", the annual report by the Chief Inspector of Public Works to the Parliament of the Cape Colony, Cory Library.

Additional information obtained from monthly progress reports from site to the Chief Inspector of Public Works, Cape Town Archives.

## **2. SAUER BRIDGE OVER THE KRAAI RIVER, ALIWAL NORTH**

In the estimates for 1878, Mr James Fforde, the Chief Inspector of Public Works allocated £ 8 790 of the total estimate of £ 17 580, to commence construction of the 'Kraai Bridge', as it was first called. It was an important bridge because the toll and pontoon revenue amounted to £ 720 per annum. The Divisional Council of Aliwal North was allowed to borrow £ 5 000 through an Act of Parliament, but was not enough. At the end of September 1879, Joseph Newey took over the position of Resident Engineer at the Kraai river and Orange river bridges at Aliwal North from Mr E George Woodforde, who returned to London at the expiry of his contract. From various correspondence it appears that the Chief Director was not satisfied with his performance and his contract was not renewed. Newey was on site for eleven months, and took six months leave to return to England during August of 1880 to sort out his mother's business, Mr John N O Eliot replaced him temporarily as the Resident Engineer during his absence, at which stage the first arch had been "keyed in", in addition to all the bridge piers being completed. From July 1880 construction was carried out on contract by Mr H Pearson. By January 1881, all the bridge piers were up to full height, three arches were complete, and two centering complete. Newey returned on 16 May 1881 and took over once more, to finally complete the bridge which was officially opened on 28 September 1881. Thereafter, Newey assumed the position of District Inspector of the Public Works Department for Districts 6 & 7, in October 1881, based in Komgha, and also had an office at his newly acquired farm, Peninsula. The multi span stone arch masonry Kraai river bridge was eventually called the Sauer bridge after the local member of the Cape House of Assembly, Mr JW Sauer, the Secretary for Native Affairs, and later Colonial Secretary.

The ironwork lattice girder bridge over the Orange river under construction at the same time at Aliwal North, was eventually given the name of the Frere Bridge, and was in use up until 1935 when it was demolished, having doubled as a railway bridge for many years.

Information obtained from the "Blue Book", the annual report by the Chief Inspector of Public Works to the Parliament of the Cape Colony, Cory Library.

## **3. XALANGA BRIDGE OVER THE TSOMO RIVER , CALA**

This bridge was designed and construction drawings prepared from the District Inspector's office in King William's Town by Joseph Newey during 1883. He prepared two designs and specifications, one steel superstructure on stone piers, and one entirely of stone, and which was approved, to consist of five arches, elliptical in form, each 40 feet clear span, and soffit being 12 ft 8" and roadway 16ft 8" above highest indication of previous flood. Severe financial conditions in the Cape Colony led to the project being shelved for a number of years, together with various senior staff being retrenched. However, prosperous times in the Colony led to an increased budget in 1888/89 due to increased revenue, with the PWD budget increasing from £ 166 745 to £ 318 743. All bridge tolls stopped on 12 August 1889.

It was reported that the works could not commence in 1888 because of the shortage of stonemasons, later a few masons were sent up from Cape Town. More masons were sent out from England because during 1889, the works progressed to the point where the piers were almost up to springing level, the voussoirs were cut for one arch and centering for one arch was complete. In 1890 the bridge was completed.

Information obtained from the "Blue Book", the annual report by the Chief Inspector of Public Works to the Parliament of the Cape Colony, Cory Library.

#### **4. LOCH BRIDGE OVER THE KRAAI RIVER , BARKLY EAST**

Instructions were issued for the commencement of construction of the Loch bridge during 1889 as all the plans were completed, but a suitable site had still to be found. In 1890 the works were to proceed Departmentally as no tenders had been received in response to tender advertisements, and the position had been selected near Vorster's Mill. The need for a bridge was very forcefully demonstrated when Colonel Wavell's column was delayed for three weeks on the banks of the Kraai river near the present site of the bridge, at a cost to the Government of £ 15 000, and as early as 1882 the Government had been urged to select a site and build a bridge over the Kraai river. Once a site had been selected, Mr Joseph Newey, the District Inspector at King Williams Town was instructed to complete designs for both ironwork and stone masonry type bridges. The estimated cost of a stone masonry bridge of £ 14 000 was approved, especially as Mr Newey had found a good quarry site within half a mile of the site. Construction commenced in the middle of November 1891, under Mr William Birnie, the Clerk of Works, the last arch was keyed in on 5 December 1892, and the bridge was finally completed about the middle of March 1893, a labour shortage resulted in the approach roads only being completed in September 1893. There were 24 stone masons, three carpenters, and about 150 natives employed on the works, and some 300 more were kept on the work of the approaches on either side. The bridge consists of five elliptical arches of 40 feet each, the length of masonry is 264 feet and the full length of the bridge is 640 feet. The roadway is 16 feet clear, and is 43 feet above the bed of the riverbed. The highest known flood reached 21 feet below the roadway. Wing walls were added to the bridge after the floods of January 1898 damaged the abutments. The final total cost of the bridge amounted to £ 14 722, while compensation costs of £ 1 509 were paid out to adjoining landowners after arbitration. Mr Birnie's good management and accurate work was praised as the project was completed within the estimate, and when the last stone was laid, there were only two left out of the thousands that were cut.

The official opening of the bridge took place on Wednesday 6 December 1893, the delay was due to a dispute between the local Divisional Council of Barkly East and the Government about the former taking over responsibility for the bridge. The bridge was opened by Mrs Gie, the wife of the Civil Commissioner and Resident Magistrate of Barkly East, Mr J C Gie, amid great festivities attended by almost a thousand people, followed by a sports meeting, all while the band played on. A stone plaque on the parapet wall had the following inscription :

“Built by the Public Works Department, WILLIAM MAGEE GRIER, M.I.C.E., Chief Inspector, under the immediate supervision of JOSEPH NEWY, M.I.C.E., District Inspector, WILLIAM BIRNIE, Clerk of Works, 1893.” The bridge was named after the Governor of the Cape Colony, Sir Henry Brougham Loch.

Information obtained from the local Barkly East Reporter newspaper of Dec 1893.

#### **5. WILDEBEEST RIVER BRIDGE, UGIE**

This bridge was built at the same time as the Mooi river bridge, and was almost identical in design, having three 40 foot span segmental stone masonry arches with an overall length of 162 feet and a height of 22 feet from the river bed to the arch soffit. In 1896 stone was being quarried and prepared near the site, however in 1897 with the piers and abutments up to springing level, work was suspended pending the completion of the Mooi river bridge, when the centering became available. The bridge which was also built Departmentally, was completed in 1898 at a total cost of £ 6 354 14s 8d, or £ 39,2 per foot.

#### **6. SIVEWRIGHTS BRIDGE OVER THE MOOI RIVER, MACLEAR**

A wire warp over the river for crossing the mail was installed in 1890. This bridge was almost identical to the one on the Wildebeest river at Ugie, and comprised three 40 foot span stone masonry arches with overall length of 162 feet and height between river bed and the arch soffit of 28 feet. In 1896 stone was being quarried and prepared near site. In 1897 piers and abutments were complete and centering for the arches was being fixed. The Mooi river bridge was completed in 1898 at a total cost of £ 7 957 5s 10d or £ 49,1 per foot.

#### **7. LONG KLOOF RIVER BRIDGE, BARKLY EAST**

The site surveys, designs and drawings for this three 40 foot span segmental stone masonry arch bridge were completed in 1892, at the King Williams Town offices of the PWD, having been designed by Joseph Newey himself. The bridge had an overall length of 173 feet and a height of 22 feet from river bed to arch soffit. However in 1893, sufficient funds had not been placed on the estimates, and it had to be held over to the next year, when it was delayed again, a bridge at the designated point was not so urgently required as opposed to other sites where surveys had also been done. In 1896 the bridge was set out and work was to commence after the Divisional Council of Barkly East had completed all compensation claims from adjoining landowners. Stone quarrying started in February 1897, while actual Departmental construction started in June 1897, with water in the excavations for the foundations increasing the costs somewhat. The bridge was completed in October 1898 at a final cost of £ 8 485 7s 11d, or £ 49 per foot, and handed over to the Divisional Council on the 11 October 1898, when it was officially opened.

## **8. DE WET BRIDGE OVER KARNMELKSPRUIT RIVER, LADY GREY**

In 1896, further investigation of the site had to be made, the design modified, with wingwalls being added to the abutments, hence the alteration to the estimate, and arrangements made to commence work on this two 40 foot span segmental stone arch bridge, with overall length of 130 feet and a height of 32 feet between the river bed and the arch soffit. Work was further delayed owing to continual negotiation with the Divisional Council of Barkly East and the compensation claims by adjoining landowners. Bridge construction finally commenced in April 1897, using good quality stone, abutments were started, but progress was slow on the west side due to the quantity of water in the foundations, requiring the use of steam pumps. The work was carried out Departmentally and handed over to the Divisional Council in March 1899, at a final cost of £ 8 711 0s 7d or £ 60,7 per foot.

This was the last stone arch bridge to be built in the Cape Colony due to the outbreak of the Anglo Boer War in October 1899 to 31 May 1902, when some stone masons were used to build blockhouses and repair sabotaged bridges and culverts during hostilities. Stone arch bridge sites were surveyed, designed and construction drawings prepared for the crossing of the Bell river on the road from Moshesh's Ford to Rhodes and Naudeshoek, with others over the Kraai River near Moshesh's Ford, the Kraai river (Belmore) also near Barkly East, and over the Sterkspruit river at Sterkspruit.

The only stone arch bridges to be built after the Boer War was in Bloemfontein over the Bloemspruit in 1904, six flat arch bridges with wider carriageways. All the above stone arch bridges were built with narrow, single lane carriageways, leading to most of them being replaced with wider, reinforced concrete bridges much later.

Information obtained from the "Blue Book", the annual report by the Chief Inspector of Public Works to the Parliament of the Cape Colony, Cory Library.

Additional information obtained from monthly progress reports from site to the Chief Inspector of Public Works, Cape Town Archives.

The above information will be included in a forthcoming biography on the Engineer, Joseph Newey, to be published in 2010, and titled :  
"Bridging the Eastern Cape, the Life and Works of Joseph Newey".

When using the above material, kindly acknowledge the source as D. E. Walters.

**JOSEPH NEWWEY** M.I.C.E, was born on 15 December 1846 in Poplar, London, the fourth child of eleven children born to George and Sarah Newwey. His father was a boiler maker employed by the shipbuilders Ditchburn & Mare of Deptford, London. Later as CJ Mare & Co, George Newwey was employed as one of five foremen on the construction of the Britannia bridge, where he met up with Thomas Fleet and together with James Riley, formed the firm of Riley, Fleet & Newwey in 1848, as subcontractors to the Britannia bridge fabrication.

In 1861, aged fourteen years, Joseph Newwey was articled to his father's firm, the Crown Works of Fleet & Newwey of Henry Street, Swan Village, West Bromwich. There he learnt all aspects of working with iron, and with time he was involved in the design, working drawings, manufacturing supervision and erection on site of lattice girder iron bridges, in England and abroad. Projects such as railway bridges over the Itchen river, Southampton in 1866, along the railway line from Port Louis to Mahbourg in Mauritius for Thomas Brassey in 1864, along the railway line from San José to Puerto Limón in Costa Rica for Minor Cooper Keith in 1871, along the railway line from Santos to Sao Paulo in Brazil for Robert Sharpe & Son in 1867, and other bridges in New Zealand, Jamaica and India.

After erecting two bridges over the Dora and Comba Scura rivers on the approach railway line to the Mount Cenis (Frejus) tunnel in Italy in 1872, Newwey left the UK and was then employed on contract by the Public Works Department of the Cape Colonial Government in South Africa to erect a two span road iron bridge over the Buffalo river at King Williams Town, arriving in December 1873. His next bridge was the high three span wrought iron lattice girder bridge over the Great Fish river at Committees Drift, Grahamstown district. In December 1874 the partially erected bridge had all its falsework washed away by a huge flood, that also destroyed several bridges in the vicinity. Newwey was entrusted to have then all repaired or replaced. His next bridge was the erection of the thirteen span road bridge over the Great Kei river, where construction was interrupted by the outbreak of the Ninth Frontier War in 1877-78, when the Xhosa tribes invaded the Colony from Transkei. Newwey and all his workers were forced to flee to the fortified village of Komga. At the cessation of hostilities he returned to complete the bridge construction, in addition to personally surveying, setting out and constructing the Kei river cuttings on both approaches to the river. In 1880 he was transferred to Aliwal North where he supervised the construction of the six span stone masonry arch bridge over the Kraai river outside Aliwal North, and the thirteen span iron girder bridge over the Orange river, the Frere bridge at Aliwal North.

Newwey was promoted as District Inspector for the Eastern Region in 1881, and was transferred to King Williams Town in 1885, from where he often personally designed and had several more stone arch bridges erected at Cala, Barkly East (2), Lady Grey, Ugie and Maclear. In addition, in excess of fifty iron and steel road bridges over dozens of rivers were initiated, being designed by such Consulting Engineers as George Berkley and Henry Wakefield of London, and manufactured by firms such as Westwood Baillie & Co, Joseph Westwood & Co, Braithwaite & Kirk, Crumlin Bridge Works, etc, and erected by PWD personnel. It is interesting to note that the firm of Fleet

& Newey was bought out by Braithwaite & Kirk in 1884. After experimenting with smaller suspension bridges, Newey personally designed, including all workshop drawings of a suspension bridge, the Newey bridge, over the Keiskamma river at Convict Station Drift, the fabrication being undertaken by Heenan & Fronde of Manchester, and erected by PWD staff in 1897.

In his capacity as District Inspector of the PWD he was entrusted with the layout of many trunk road routes in the eastern parts of the Cape Colony and the Transkeian territories, such as road cuttings through the Kei, Keiskamma, Bashee, Tsitsa, Tina and Umzimvubu river valleys, the Mlengana Pass between Umtata and Port St Johns, the new Katberg pass with Thomas Bain, including several timber bridges. There were also winding roads over the Great Winterberg between Bedford and Elliott, Nonisi's and Mackay's Nek passes between Queenstown and Lady Frere, the Barkly Pass between Elliott and Barkly East, the Bushman's Hoek and Penhoek Passes outside Queenstown, and the road from Barkly East to Rhodes. These projects were regularly inspected by Newey in his four wheel, two horse drawn "Spider". As the District Inspector he also had to initiate and have many sandstone public buildings constructed in most of the towns of the region.

After the death of Mr William Grier, Newey was appointed Chief Inspector of Public Works of the Cape Colony on 1 June 1893, after which he was transferred to Cape Town. During the Boer War of 1899 - 1902, Newey made a great contribution to the war effort, as all borehole water drilling fell under the PWD and his personal direction, and was Mentioned in Despatches by Lord Kitchener. He also directed all works to contain the 'Rinderpest' (cattle disease) outbreak in 1896, by erecting a fence right around the Cape Colony. He retired in 1905 to his farm 'Peninsula', in the King Williams Town district, and died there on 19 January 1907. Joseph Newey married Elizabeth Ball in 1869 and the couple had seven children, he was elected Associate and Member of the Institution of Civil Engineers, on 6 May 1879 and 9 November 1891 respectively, and his obituary was published in the minutes of proceedings of the ICE of 1906/07.

#### Bibliography :

1. "My Story" the unpublished, handwritten memoirs of Capt AF 'Tod' Newey.
2. Annual Reports of the Chief Inspector of Public Works to the Cape Colonial Parliament, 1872 - 1906
3. "Bridging the Eastern Cape, the Life and Works of Joseph Newey", by DE Walters (In progress, publication due 2010)