

THE BRIDGES OVER THE RIVER KEI

By William Martinson

William Martinson, chairman of the Border Historical Society, grew up in Parktown, Johannesburg and developed an early interest in building construction and architecture (geodesic domes in particular). He studied architecture at Wits University, graduating in 1987, then did a Masters Degree in Architectural Conservation. He worked for the National Monuments Council until 1996, then for FKH Architects and currently for Osmond Lange Architects. William has worked on a wide variety of heritage projects, including the preparation of Heritage Impact Assessment's for several notable buildings. He has compiled research into social and architectural history, detailed photographic documentation of sites and places and prepared Heritage Management Guidelines. He has also prepared construction documentation and technical descriptions for restoration work. and regularly contributes information and photographs to the artefacts.co.za website - a database of the South African built environment.

INTRODUCTION

The article is the outcome of the author's long-standing interest in the number and variety of bridges that were built within a short section of the Great Kei River at Victoria Drift - in close proximity to the village of Komgha - over a 100-year period.

The particular bridges under scrutiny - with their dates of construction - are as follows:

- Temporary Military Bridge, 1877 (no longer extant)
- Lattice Girder Wagon Bridge, 1879
- Timber Railway Bridge, 1905 (only foundations remaining)
- Relocated Lattice Girder Railway Bridge, 1948
- N2 SANRAL Concrete Bridge, 1977

A number of site visits were made to this portion of the Great Kei River to document and record the extant bridges. The observations, comments and descriptions of each of the five bridges - and some associated structures - are as seen through the eyes of a Conservation Architect.

An excursion to the site was arranged for the members of Border Historical Society on 28 February 2015. The tour was entitled 'Valley of the Bridges' and dealt with each of the five bridges in detail. Illustrated talks on the topic have also been given by the author at different times to the Border Historical Society, The Lower Albany Historical Society and the Johannesburg Heritage Foundation.

THE GREAT KEI RIVER

The Great Kei River (the Kei River) has a vast catchment originating in the Stormberg Mountains and the interior drainage basis comprises two main tributaries - the Black Kei and the White Kei .

This particular section of the Kei River is flanked by the Sihota mountain (Moordenaar's Kop) to the west and Smith's Kop mountain to the east - both on the right bank of the Kei River. Some significant floods have been recorded in this section of the Kei River, which follows a convoluted and deeply incised route through the landscape down to the coast at Kei Mouth.

The Kei River was a formidable barrier to movement and two natural drifts were used to cross the river in this area - prior to the construction of the bridges - and were known as old Kei Drift and Victoria Drift. The bridges under consideration were all built in proximity to the Victoria Drift.

HISTORICAL BACKGROUND

The original wagon route into the Transkei and up to Butterworth crossed the Kei River at what was known the 'old Kei Drift'. Ensign Beutler's expedition of 1752, for Governor Tulbagh of the Dutch colony at the Cape, is the first recorded trip into this area. At that time the land beyond Mossel Bay was officially unknown and the expedition was described as a journey "into the hitherto unknown". Beutler's expedition comprised a total of 11 wagons and 71 people.

A surveyor and cartographer, Carel David Wentzel fortunately accompanied the Beutler expedition and prepared an enormous drawing plotting their route in great detail, of which three original 'copies' are known to survive. The expedition presumably followed existing game paths and the outgoing route ran roughly parallel to the coast, crossing the Kei River at what is assumed to be the old Kei Drift. Their return route again crossed at the old Kei Drift but thereafter moved further inland. Of interest is that the River Kei is annotated as the River Y - presumably Wentzel's rendition of the interpreter's pronunciation of the river name.

Almost 100 years later, a map titled 'Eastern Frontier of the Colony of the Cape of Good Hope' published in 1847 by John Arrowsmith from surveys and sketches compiled by Lt. Col. Michell (Surveyor General of the Cape Colony) shows the main wagon route from Komgha to Butterworth passing Fort Warden and Smith's Tower and then crossing the Great Kei at what is clearly the old Kei Drift.

W F Drummond Jervis of the Royal Engineers prepared surveys in 1847 and 1848, which were published by Arrowsmith in 1853 and titled 'Military Sketch of Part of British Kaffraria'. The map records the name 'Hungry Hill' on the left bank and to the east of the old Kei Drift - recording the presence of an exceptionally steep hill that must have been a formidable barrier to ox wagons. Interestingly it also records the phonetic spelling of Quizzihota Mountain (for Sihota) and marks the site where the five British officers were killed in November 1848. Fort Warden was recorded as 'abandoned'.

A contemporary illustration from the Illustrated London News showing a military crossing of the old Kei Drift which describes a scene of intense activity with many spans of oxen already crossing the river. One can just imagine the sounds of the long whips cracking, the oxen bellowing and the shouting that must have taken place.

The 'Military Sketch of the Transkeian Territory' published in 1875, surveyed and drawn by Captain George Pomeroy Colley and Inspector J. Murray Grant, shows the wagon road still crossing at the old Kei Drift and going via Springs to Butterworth.

A 'Plan of Territories formerly known as Kaffraria Proper' compiled by the Surveyor General, A. de Smidt from various sources and published in 1884, shows the site of the Great Kei Bridge as well as the old Kei Drift.

TEMPORARY MILITARY BRIDGE, 1877

A temporary, small scale timber bridge was designed and constructed by the civil engineer Joseph Newey as a military bridge over the Great Kei River for the 1877-78 War of Ngcayecibi. Newey was then in the process of constructing the more substantial Great Kei Wagon Bridge alongside. Authority for the construction of the Temporary Bridge had been provided in a Memorandum of the Hon Commissioner of Crown Lands dated 7 October 1877.

Historic photographs of the temporary bridge have not yet been sourced but the original working drawing is still extant. The original drawing comprises a plan and an elevation and has been used to inform the detailed description that follows. An interesting feature of the Newey drawing is that three of the circular columns of the wagon bridge are shown a short distance away on the downstream side of the timber bridge.

The temporary military bridge was an interesting and well considered assembly of substantial timber elements, bolted together on site. It consisted of two sets of paired, triangulated fish-belly lattice girder trusses - each with a span of 100' (30,48 m). The two paired lattice girder trusses met at a point at about 25' (7.62 m) above the centre of the 'ordinary run' of the river bed.

Each pair of lattice girder trusses was supported on two pairs of timber columns - each pair separated from the next by a distance of 50' (15,24m) and placed to support each girder truss 25' (7.62 m) from their ends.

The timber columns were probably sheathed with a sharp pointed metal tip and would have been hammered deep into the river bed as piled columns. It is assumed that the piled columns would have been installed first. The fish-belly lattice girder trusses would then have been assembled on the dry river bed, between the paired columns. Each pair of trusses would then have been lifted up, between the columns, and supported on pairs of horizontal beams bolted to the columns. The girders would then have been incrementally launched towards the meeting point at the centre of the river. Once in position the formal bolted connections to the columns would have been made.

The gap between each pair of trusses was triangulated between the bottom chords to ensure adequate rigidity of the bridge structure. The gap between the two top chords was spanned by heavy timber baulks at regular centres, which were in turn overlain with planking parallel to the length of each span, to form a bridge deck of about 9' 6" wide (2.9 m). The bridge deck on each side had a nominal slope up, towards the central meeting point. Balustrades were not provided and crossing the bridge on horseback would not have been for the faint-hearted!

The approach to the bridge on the right hand bank was via a simple extension of the bridge deck - supported on a single pair of columns and a small earth embankment. The approach on the left hand bank (on the Transkei side) was formed with a more substantial extension of the bridge deck - this time supported on five paired timber columns and a small earth embankment.

Three of the columns on the downstream side of the bridge were additionally supported against flood waters by diagonal buttresses founded on the river bed. The two outer pairs of columns - closest to the bridge approaches - were additionally braced on the inner side to the bottom chord of the lattice girders, to provide some extra stability. Surgeon Norbury of the Naval detachment, who crossed into the Transkei in 1877, left the following description of the temporary military bridge:

"As we approached the Kei we lost the mountain breezes, and the heat became much more oppressive. A short distance from the right bank we passed a small encampment of the Frontier Armed and Mounted Police (F.A.M.P.), which was placed there to prevent any [Xhosa] taking possession of the drift, or destroying the bridge. This bridge across the Kei was a long wooden structure, sufficiently wide for horsemen to pass singly, but the foundations of a much finer and more durable one were being laid."

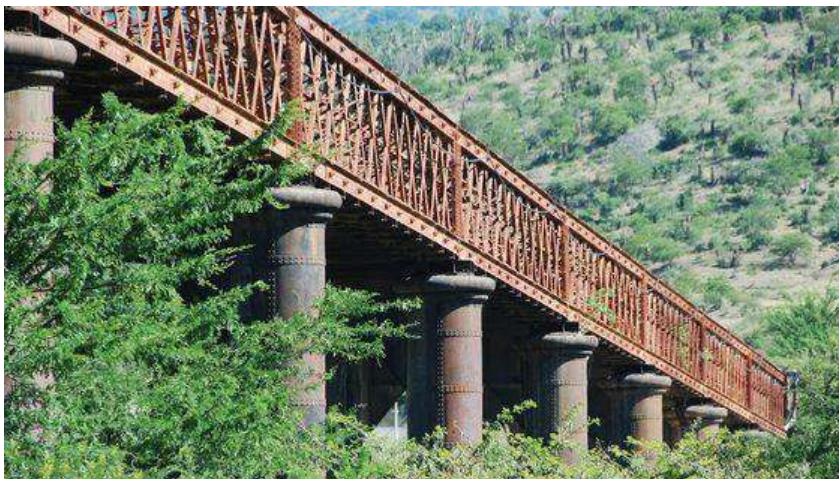
Commandant G Hamilton-Browne commanded a detachment of Pulleine's Rangers and left a contemporary description of his crossing of the temporary military bridge. The Rangers had largely been recruited from the navvies working on the construction of the East London-to-Queenstown railway line and were rough individuals, given to drunkenness and looting. While marching to the Transkei they purchased alcohol from the hotel-keeper at the Kei River and became uncontrollable, taking shots from the wooden bridge at their officers who were swimming in the Kei River to cool off.

The temporary military bridge remained in place for a brief period until it was washed away by a flood on 2 April 1879.

The author is employed by Osmond Lange Architects in East London and they utilise sophisticated 3-D modelling software. During the Covid-19 lockdown of 2020, a colleague - Philip May - utilised a copy of Joseph Newey's working drawing, photographed from the original in the Cape Archives by Dennis Walters, to reconstruct the temporary bridge as a 3D CAD virtual model. The 3D model was in turn used to generate an updated set of working drawings, various perspectives and to record various short film clips 'flying' over and through the bridge.

GREAT KEI WAGON BRIDGE, 1879

The Cape Parliament in their session of 1876 approved the construction of a bridge over the Great Kei River, which was at that time formed the eastern boundary of the Cape colony. The PWD District Inspector recommended a site for the bridge crossing at



Lattice Girder Wagon Bridge, 1879. Oblique view of bridge from riverbed on upstream side. (Photo: William Martinson, 2019)

Victoria Drift. George Berkley, a consulting Engineer in London, was then commissioned to design the bridge. Once the design was completed and the working drawings and specifications concluded, tenders were invited from specialist bridge fabricators. Five tenders were duly submitted and the tender was awarded to Messrs. Westwood Baillie & Co. on 11 November 1876. Once the fabrication of

the lattice girders was complete they would be dry assembled in the contractor's yard, with the individual pieces marked and stamped. A photograph of the girder in its assembled state would be taken for submission to the PWD, before being dismantled for shipping to South Africa.

Numerous rectangular cast iron manufacturer's plaques mounted on the inside top face of the top rails of each bridge section confirm that the bridge was indeed manufactured by WESTWOOD BAILLIE & Co, ENGINEERS & CONTRACTORS, LONDON, ENGLAND. These plaques have fortunately not been stolen for scrap!

The Great Kei Wagon Bridge was designed as a steel lattice girder bridge supported on a series of freestanding paired steel columns set at regular intervals.

The concept of a lattice girder for use on bridges evolved from a basic Warren Truss, which was a triangulated truss comprised of equilateral triangles. The Warren Truss was overlapped in various configurations to arrive at different types of lattice girder, including the following typical configurations:

- Two Warren Trusses overlapped to create a Double Lattice Girder;
- Four Warren Trusses overlapped to create a Quadruple Lattice Girder;
- Six Warren Trusses overlapped to create a Sextuple Lattice Girder, and so on.

The Great Kei Wagon bridge is a good example of a Double Lattice Girder bridge.

The name of the bridge and the completion date are recorded in v-cut lettering on the dressed stone wall at the south approach, namely:

GREAT KEI
BRIDGE
1879.

Helen Prichard crossed the Kei into the Transkei in 1877 and left the following description:

The great bridge over the river was then in course of construction, under the able direction of Mr Newie [sic], C.E., and at any other time I should have been much interested in the apparatus connected with the work, which lay about the bed of the river and surrounded us on every side. As it was, I had enough to avoid these obstacles and pick my way, sometimes over bridges consisting of a single plank, sometimes springing from rock to rock and, finally, clambering up a very steep and sandy bank, which felt so hot that one could hardly walk on it.

The wagon bridge comprises twelve lattice girder bridge spans (each approx. 28.5 m long and approx. 4 m wide) supported on eleven pairs of circular rivetted steel plate columns, filled with concrete. The pairs of columns are connected to each other with a horizontal beam and each column is each capped with a decorative hollow steel classically inspired capital concealing the structural connection within.

The lattice girders were fabricated of rivetted hot rolled steel sections. The road bed is supported on an assembly of folded flat plates forming a permanent shutter for a concrete slab, surmounted with a close packed layer of pieces of hardwood approx. 100 mm thick - placed end grain up - which is in turn capped by a more modern layer of asphalt. The road bed is marked at the junction between every adjacent spans with an overlapping steel movement joint.

The careful structural detailing of the bridge is noteworthy. This can be seen in the simple handrail brackets used to attach the pipe handrail to the lattice girders; the radiating star shaped end caps of the connecting pins visible at intervals on the exterior faces of the lattice girders; the carefully arranged and spaced domed rivet heads and associated gusset plates and the finely realised columns fabricated from steel plate rolled into cylindrical forms and connected with rivetted steel belts around on the external faces.

Construction of the Wagon bridge was interrupted by the 9th Frontier War and by the significant flooding on 2 April 1879 when four completed girders that were on the ground were damaged and buried in mud.

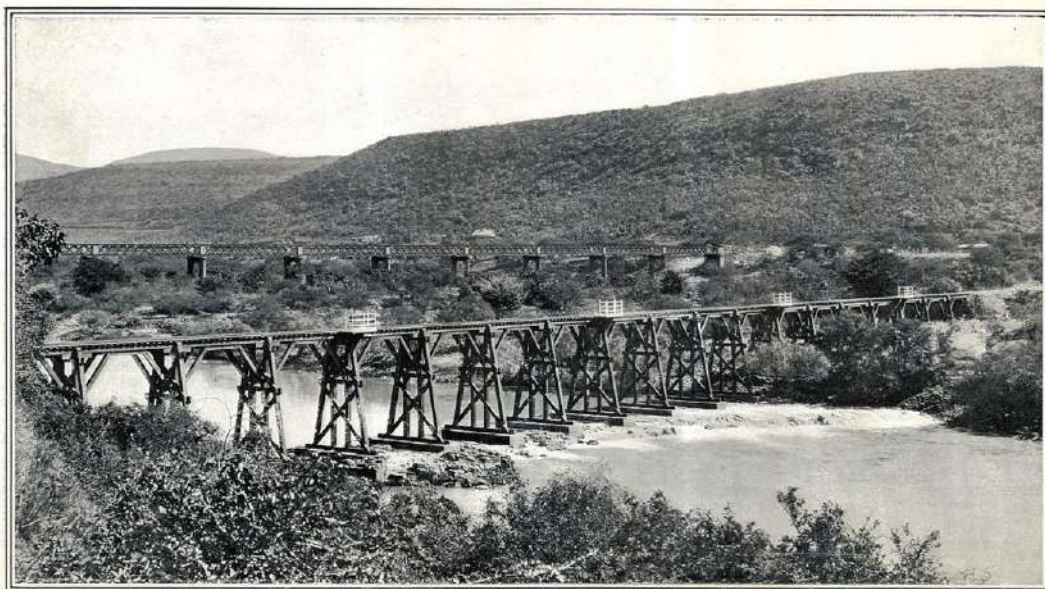
When the bridge was re-purposed in 1917 to accommodate the relocated railway line, the bridge was strengthened by fixing transverse lengths of inverted railway lines to the underside of the road deck structure

TEMPORARY TIMBER RAILWAY BRIDGE, 1905

A substantial timber bridge formed an integral part of the Cape Government Railways (CGR) Komgha - Ndabakazi Section of the Amabele to Butterworth line. Contemporary black and white photographs record that the bridge was originally only intended as a "Temporary Bridge".

The Railway bridge was constructed following the typical CGR detail of substantial timber trestles set at regular, closely spaced intervals. This particular type of bridge construction was used with minor variations at other contemporary timber bridge crossings in the Eastern Cape. The trestles were supported on individual, linear concrete pad footings in the river bed and were probably constructed of imported Burmese Teak. It appears that there were about 23 individual bridge spans but this remains to be confirmed. The bridge abutments on both riverbanks were formed of cast in-situ concrete.

Each individual bridge trestle comprised a careful arrangement of substantial square section timbers (probably 12" x 12"), each with two vertical posts and two inclined posts - all in the same transverse plane. The four posts were sandwiched by two horizontal timber rails at the apex of the trestle. These rails in turn supported short timber impost blocks placed on top of the vertical posts and in turn supported the main structural timbers spanning between the adjacent trestles. Each of the trestles was also cross braced with opposing pairs of diagonal braces to create a rigid triangulated structure.



Ref 109

TEMPORARY BRIDGE OVER THE GREAT KEI RIVER.

1907 Railway bridge View from downstream of the timber bridge
(Collection: Transnet Heritage Library)

A pair of horizontal rails set at about the upper two-thirds of the height of the trestle, formed a springing point to the diagonal timber brackets on each side of the trestle. These diagonal brackets rose up to support the main beams at a position equivalent to a third of each individual span. The two diagonal timber brackets on each side of each span were joined to a short horizontal section of beam using heavy, linear wrought iron plates to form a secure, bolted connection. The main beams forming the bridge deck were placed directly above each support bracket and beam. A series of heavy timber sleepers was fixed at close centres to the upper surface of the two main beams and the railway line was in turn secured to them - each line placed directly over each of the two main beams.

The resultant narrow width of the railway bridge would not permit a person to walk on the bridge while a train was crossing. A number of small cantilevered 'balconies' were therefore constructed on the down-stream side of the bridge - one at every fifth trestle - to provide a safe refuge to a pedestrian in the event of a train passing. Each balcony had a simple white painted timber balustrade and perimeter kick-plate.

The first official crossing of the Railway bridge with a passenger train took place on 16 April 1905, together with the Chief Engineer and staff. While possibly an apocryphal story, it is said that due to the lightweight nature of the timber construction, the bridge would move marginally during the crossing. Passengers with weak constitutions were apparently afforded the opportunity of leaving the train and walking over the adjacent wagon bridge!

The timber Rail Bridge was destroyed in a flood on 3 October 1917. The concrete foundation pads of the bridge trestles are all that remain - and are visible in the river bed during periods of limited rainfall. The remains of one of the concrete abutments can also still be seen on the left hand side bank.

ZIG-ZAG SIDING

On the west bank of the Kei, at the southern approach to the Railway Bridge, the arrangement of the railway line had the descriptive name of Zig-Zag siding. The name derived from the complicated reverse manoeuvre the train had to follow prior to moving onto the bridge. This manoeuvre was required in order to deal with the change in level between the railway line approaching the Kei and the railway line on the timber railway bridge itself.

No drawings of the Zig-Zag siding have yet been located, but the possible layout has been considered in detail and a sketch drawing has been prepared to record this reconstruction. The radius used for the nearby Spiral (probably a minimum radius for this gauge of railway line) was used as the basis for the curve. When the curve of the Spiral was overlaid it fitted perfectly over the 'memory' of the Zig-Zag siding to be seen on the site and clearly visible on Google Earth aerial photographs.

SPIRAL HALT

The design and construction of the Komgha - Ndabakazi section of the Amabele - Butterworth Railway line experienced other difficulties in achieving acceptable gradients down into the west bank of the Kei River valley. The selected route meant that the railway line had to drop in elevation about 170 metres down to the river crossing.

The route of the railway line was determined by the topography and the maximum permissible gradient that the locomotives could manage. In this case the topography did not allow sufficient length of the line – unless a steeper gradient was used. This was partly resolved by looping the railway line underneath itself. Called 'The Spiral', the large oval loop of the railway line so formed was about 230 metres wide by 550 meters long. The linear travel distance from crossing overhead to passing below is a total distance of about 1 300 metres. The difference in vertical elevation between the two railway lines at the crossing point is about nine metres.

The crossing of the upper line over the lower line was constructed with a segmentally arched stone tunnel, curved in plan to follow the radius of the railway line. The stone tunnel regularised the faces of the deep cutting and provided adequate support for the loading of the train on the overhead line. The tunnel was built in fine hammer-dressed local stone formed in regular courses with tuck pointing. This form of arched stone construction was also used on many of the smaller culverts where the railway line crossed were minor streams and watercourses.

The dressed stones forming the salient corners of the two arched openings were expressed as quoined blocks with dressed margins. The quoined corner stones project about 15mm beyond the face of the side walls, which detail helped to differentiate the quoined stones from the balance of the similarly coloured and textured stone wall surface.

The radiating voussoirs of the segmental arch all had a flat top face and a vertical side face to allow easier integration into the coursed stone walling. A central keystone completed the segmental arch. The mortar joints to the voussoirs were made flush with the stone surface and struck with a half round pointing tool.

The measured width of the tunnel is 5 metres and the height from the rails up to springing point of the segmental arch is 3.5 metres. The height from the railway lines up to the underside of the segmental arch is approximately 5 meters. These dimensions suggest that the proportions and setting out of the segmentally arched tunnel section - within a 5 x 5 meter square - were carefully considered.

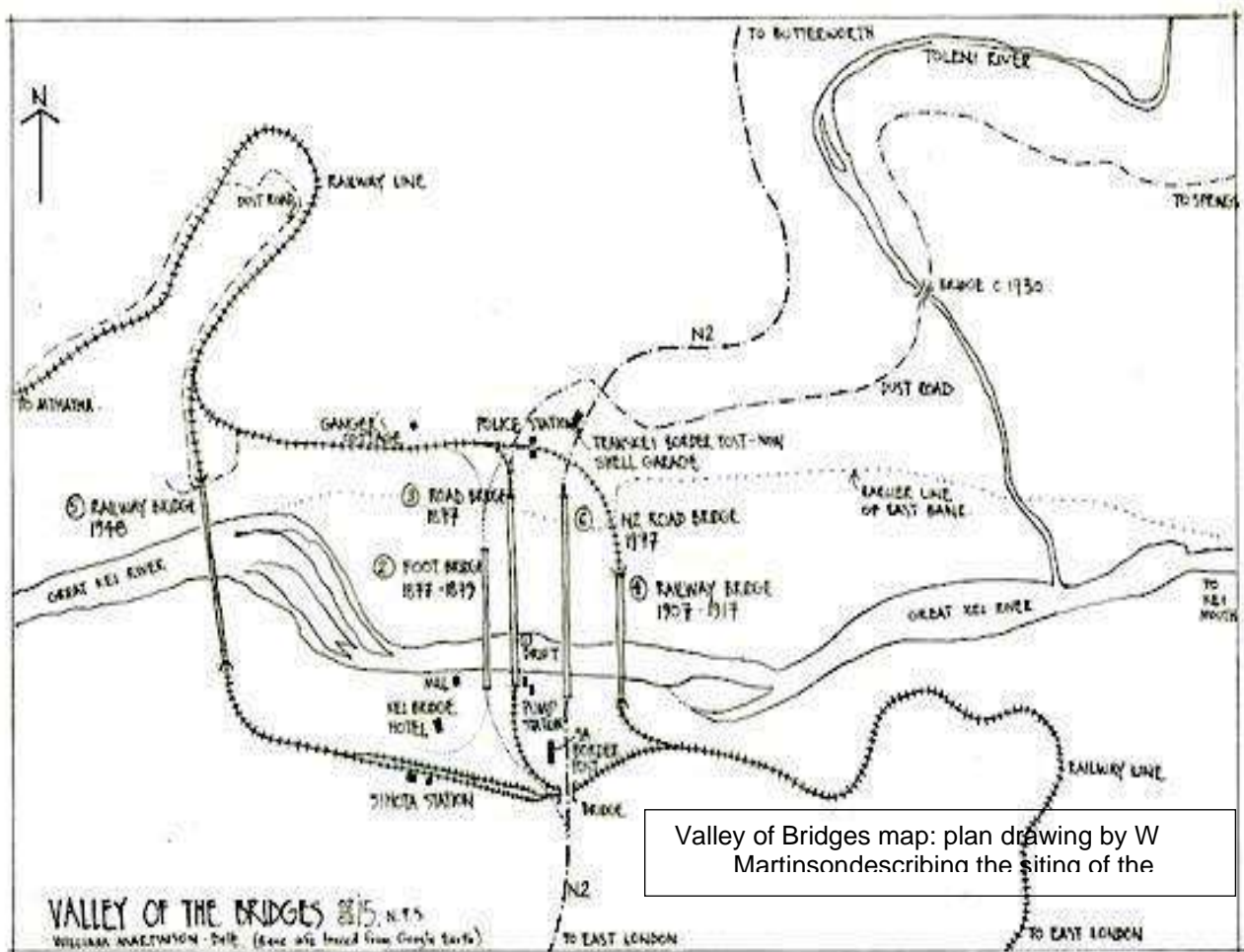
The tunnel is a short distance to the southeast of the Spiral Halt. The ruins of a CGR Gangers Cottage are situated a distance of about 750 meters to the northwest of the tunnel.

DESTRUCTION OF BRIDGE AND DIVERSION OF RAILWAY LINE

Following the destruction of the timber Rail Bridge in a flood on 3 October 1917, the Zig-Zag siding was adjusted and the railway line was diverted over the adjacent Great Kei Road Bridge to run along the centre of the roadway. Railway traffic was compelled to cross the bridge under severe speed restrictions and the use of heavier and more powerful modern engines was not possible.

The dual arrangement of road and rail remained in place until 1949 when the Great Kei Railway Bridge was constructed further upstream. An American couple made a tour through South Africa in 1948 and fortunately recorded their 'chase' of a train over the Great Kei Bridge through their windscreen with their cine camera. This film has since been digitised and uploaded on the internet and is an interesting visual record of the dual use of the Great Kei wagon bridge.

The positions of the various affected bridges and the changes to the railway line over time has been recorded on the sketch plan titled 'Valley of the Bridges'.



GREAT KEI RAILWAY BRIDGE, 1949

As road traffic increased on the Wagon Bridge it was clearly problematic to continue this dual arrangement. The South African Railways & Harbours decided in the mid 1940's to relocate a redundant railway bridge from a remote river crossing and re-erect it over the Kei.

Originally installed by the Cape Government Railways over the Vaal River at Fourteen Streams, near Warrenton, the bridge was dismantled in 1946 and re-erected on this site. The bridge had originally been fabricated by the Horsehay Co and the maker's plates survive intact on the relocated bridge. The original concrete piers are still clearly visible in the river bed at Fourteen Streams.

The bridge had an overall length of 1 286' (392 metres). Nine lattice girder bridge sections, each spanning approximately 40.5 metres are supported on eight substantial cast in-situ concrete columns in the river bed. The first and last bridge sections are supported on the respective banks on a substantial cast in-situ concrete abutment.

The competently executed concrete work for the columns and abutments was carried out by the firm of Buccimazzi & Morante (which firm was to become Buccimazzi, Pompei & Bassi Civil Contractors). The owners are also presumed to be ex Italian Prisoners of War, but this has not been confirmed.

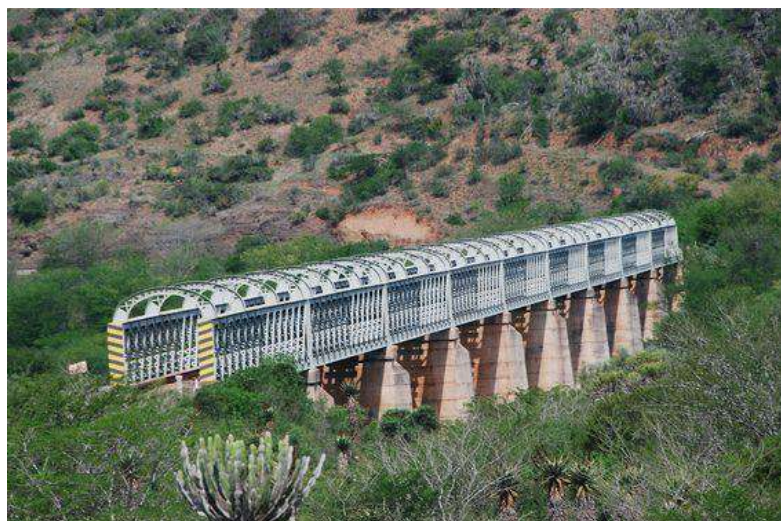
The dismantling and re-erection of the steel bridge sections was undertaken by the SA Railways & Harbours, using a Departmental bridge gang for the project.. The dismantled components of the bridge were set out on the left (Transkei) bank and the lattice girders bridge sections were assembled and end launched into their positions on the concrete sub-structure by means of the 'moving tower' method.

The individual lattice girders were assembled in pairs, lined up, given their correct camber and all joints rivetted. The two girders were then temporarily braced together for launching. The girders - weighing about 90 tons - were then pulled forward by means of winches until they reached the bridge abutment, beyond which was the gap to the first free standing pier.

A substantial 'moving tower' or 'walking trestle', moving on six rollers along two temporary rails in the river bed was then utilised to support the end of the two girders as they were progressively winched outwards. The rear ends of the two girders were supported on a roller cradle on another temporary set of rails. Some three hours later the front face of the girders would overhang the free-standing pier in the correct position. Temporary jacks would then be installed to lift and support the girders. The temporary packing on top of the 'moving tower' would be removed and the girders would be lowered into position. The temporary bracing would then be removed and the two girders moved apart until at the correct distance when the floor system and overhead cross girders would be installed.

Once the floor structure had been installed the railway line was extended out to the end of the span. the main girders for the next span would then be assembled and prepared. The 'moving tower' was also skidded out sideways, skidded forwards then sideways onto the newly prepared temporary tracks ready to advance the second set of girders.

The first span was launched in May 1948 and the ninth span in December of that year, an average of about a span per month. Railway Bridge over the Great Kei was finally completed in 1949. The completed bridge formed an integral part of the Komgha - Ndabakazi Section of the Amabele - Butterworth Railway. The Sihota Station was now moved onto the right bank of the river and the only real evidence of the prior alignment are some ganger's cottages on the left hand bank.



Right: Railway Bridge 1949
Elevated view of Railway Bridge
from Transkei Photo: William
Martinson, 2019

SANRAL N2 ROAD BRIDGE: B – 168

The N2 Road over River Bridge was constructed in 1977 for SANRAL (100 years after the Temporary Timber bridge was constructed). Construction of the bridge was undertaken by Colarossi & Sons - an Italian building contractor based in Cradock.

Mr Colarossi (Senior) was apparently an ex-Prisoner of War, interned in SA during WW2. He was a very competent contractor and a character of note. Dennis Walters recalls attending site meetings (at another civil engineering project) where Colarossi would produce a bottle of red wine at the start of the meeting and the matters arising would all be dealt with in an agreeable way!

The construction of the SANRAL bridge was presumably prompted by Transkei's independence which had been granted in 1976. During the period of independence the N2 Road bridge was the border crossing between the South African border post on the west bank and Transkei Border post on the east bank - the latter which has since been adaptively re-used as a petrol station and restaurant.

The construction of the bridge followed the standard SANRAL detail of cast in-situ concrete columns constructed in the river bed, with a total of 15 columns constructed to support 16 separate bridge spans. Each separate bridge span was formed with a set of five pre-stressed pre-cast concrete beams spanning from column to column. The beams would have been individually cast in a casting yard in close proximity to the bridge site and carefully transported and lifted into place.

Once the beams had been correctly placed and aligned, a series of concrete diaphragms were cast between the beams to stiffen and consolidate the road deck. Temporary shuttering was then placed to cover all the apertures between the beams and the diaphragms and a reinforced concrete road deck was then cast to form a road deck. The concrete surface was then finished with tarmac. The transvers junction between each individual span is marked with an expansion joint.

The bridge deck was edged on either side with a typical SANRAL concrete balustrade onto which an additional Armco barrier was bolted. A narrow rectangular cast bronze plaque recording the bridge number (B-168) is fixed to the base of the balustrade at each abutment - which plaques are fortunately still intact.



Left: cast iron Westwood Baillie maker's plate on Wagon Bridge
(Photo: William Martinson, 2019)

CONCLUSION

This significant concentration of major engineering projects bridging the Great Kei river - located in close proximity to one another - are a noteworthy collection and fairly unique grouping, and an important 'layer' in the history of the Kei River valley and the surrounding district. The bridges that

are no longer utilised should be protected in the future as an integral part of this conservation worthy group of structures.

ACKNOWLEDGEMENTS:

- Carl Vernon for accompanying the author on many trips to the Kei Valley to document and record the bridges;
- Denver Webb for sharing his draft text titled: Additional Information on Great Kei River Bridges and Surrounding Area, dated January 2015 which included the three early descriptions of the crossing of the Kei river;
- Denver Webb for sharing the link to the cine footage titled "Safari 1948" compiled by Arthur and Kate Tode, American tourists to Africa. The film includes a segment showing their car following a train over the Great Kei Wagon Bridge. The film is in the collection of the Pennsylvania Museum of Archaeology and Anthropology, Pennsylvania, USA and is available online.
- Philip May of Osmond Lange Architects in East London for constructing the detailed Revit model of the 1877 Temporary Timber bridge and for creating simulated fly-throughs around the bridge - now loaded on the Border historical Channel on YouTube;
- Dennis Walters for sharing his electronic copy of the original image of the Temporary Military Bridge drawing by Joseph Newey - included on page 62 of his book titled "Bridging the Eastern Cape". This drawing was the source of the detailed construction information necessary to construct the above noted Revit model.
- Leila Komnick of the Library of Parliament for sharing scanned copies of the Portfolio of photographs submitted to Parliament by the Cape Government Railways, circa 1907.
- Ben Maclellan, Chairperson of the Anderson Museum in Dordrecht, for pointing out the piled timber bridge column in their collection. This was fabricated by the Royal Engineers - circa 1883 - with a sharpened metal end - and was almost certainly similar to that which would have been used by Newey for the Temporary Military Bridge;
- Transnet Heritage Library in Johannesburg for the provision of scanned articles and images relating to the two Railway bridges.

REFERENCES:

Hamilton-Browne, G. *A Lost Legionary in Africa*. London: T. Werner Laurie, n.d. [possibly 1912], 46-47

Norbury, H.F., *The Naval Brigade in South Africa During the Years 1877-78-79*. London: Sampson Low, Marston, Searle and Rivington, 1880, 98.

Prichard, H.M. *Friends and Foes in the Transkei: an Englishwoman's Experiences during the Cape Frontier War of 1877-8*. London: Sampson Low, Marston, Searle and Rivington, 1880, 96-97.

Roe, D. B. *The Bridge Spans that were moved from the Transvaal to the Transkei*. South African Railways and Harbours Magazine, July 1949, pg. 471- 474.

Walters, Dennis *Bridging the Eastern Cape - The Life and Work of Joseph Newey*. Coral Tree Press, East London, 2014.