Road bridges of the ZAR

– an annotated photo-essay

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Ten years ago there were no bridges worthy of the name in the State and what do we see now? There is no country other than this Republic that can show such a remarkable advance and improvement in ten years.

...this the Landdrost of Lydenburg said with pride, eleven years after the discovery of the Goldfields of the Witwatersrand, speaking at the opening of the Steenkamp Bridge.

The Zuid-Afrikaansche Republiek (ZAR) undertook an extensive road and bridge building programme which commenced during the latter half of the 1880s and ended with the effective demise of that independence in 1900.

Before gold was discovered in the Transvaal there were no bridges worthy of mention. Indeed, the whole system of communication by road was extremely primitive. District councils had to see to the maintenance of roads to the best of their ability. Flooded rivers constantly impeded travellers and transport riders and caused serious delays.

The remarkable road and bridge building programme which the ZAR undertook from 1887 onwards, was planned and carried out by the Departement Publieke Werken (DPW, Public Works Department,). Under the leadership of Sytze Wierda the road transport system was, by 1898, completely modernised. Wierda had spent much of his adult career as supervisor on the construction of railway lines in the Netherlands, where bridges were being constructed like he would do later in the ZAR, with stone piers and steel superstructures. Here he initially followed the example of his erstwhile employer, the Dutch Government Railways, in his use of steel plate girder bridges.
However Wierda himself had to discover the vagaries of Highveld summers. Of the first of his designs, the Arcadia Bridge over the Apies River, as part of a programme that saw the construction of an identical structure for the Jacob Maré Street Bridge (figure 05.02, now Jeff Masimola Street) over the same river, being constructed of locally quarried stone sub-structure with central pier, having a steel super-structure each spanning 6m and 3m wide, was erected where the Meintjesdrif crossed the Apies River, where the Lion Bridge now stands. It was located on the farm of AF du Toit, Arcadia, hence the name. Soon after its completion floods of February 1890 damaged the eastern buttress, followed by damage to the western buttress in October of the same year. This elicited sharp criticism in the local press. Wierda, in his annual report, retorted that he had not enough experience of local circumstances omtrent het kracht van het water in zoo een betrekkelijk gering riviertje (regarding the force of water in such a slight stream). He further reported that deze kleine brug zal voortdurend aanleiding tot moeilijkheden opleveren (this small bridge will be subject to continual problems). It was demolished in 1894 and replaced by the current Lion Bridge (figure 05.05). Construction of the bridge over the Wilge River near Bronkhorstspruit started in June of 1891 so work was in progress at the height of the summer rains, resulting in the sub-structure being almost completely inundated from time to time, hence slowing completion. Since the flood-waters remained within 150 mm of the heads of the sub-structure Wierda deemed this adequate and allowed the completion to the original design. Wierda was necessitated to redesign one of the early bridges, that across the Olifants River, the Du Toit Bridge in the Kromdraai District of Mpumalanga, eventually completed in 1891.

It has an interesting history, only recently determined. Originally designed to span 21m, the design was later increased to 30m so as to solve the problem of the corkscrew swirls when the river was in flood, which undermined the banks adjacent the buttresses. This change probably was cause for the delays in the delivery since the steel super-structure to the revised design needed to be imported. The sub-structure, as with all of this period, was of coursed, rough-hewn ashlar. It is the opinion of Erasmus and Friebus (2008, cited below) that this bridge was demolished in 1939 at the start of World War II, and components re-erected as the Bridge over the Wilge River, ‘Bronkhorstspruit Bridge’ as part of a programme for bridges to the military base located at Spitskop, nearby. The work was probably covered in secrecy and hence a lost history. It is recorded by them as the only recycled ZAR bridge structure extant and only remaining example of a bow-string steel bridge from the period, although the authors have since discovered another extant example – the Zandspruit Bridge (figure 05.07), near Volksrust, Mpumalanga – still intact and in service but badly in need of maintenance. Could this be the Brug over de spruit te Volksrust (Bridge over the stream at Volksrust) listed as having been constructed in 1899 in the ZAR DPW register of specifications?
In 1890 the ZAR parliament introduced Act 4 of that year to institute a system of popular representation to assuage the grievances of the Uitlanders (aliens) and give them voting powers after two years of citizenship. They then were represented in the Tweede Volksraad or Second Volksraad (Assembly) to which were delegated powers considered politically neutral, such as mines and companies, telegraphs, telephones, and postal services as well as roads. Bridges that were erected in the various districts came to be built in the following way: memorials or petitions requesting that a bridge be built across some river were signed by the voters of the district concerned and submitted to the Second Volksraad. If the Second Volksraad was satisfied that a need for the bridge really existed, it passed a resolution requesting the Government to have the bridge built provided that the financial resources of the State permitted it. Specifications were then prepared and an amount of money placed on the estimates. The Department of Public Works then called for tenders. The tenders were then referred to the Auditor-General who recommended to the Executive Council that a suitable tender be accepted. Only when the Executive Council had approved the particular tender, was the contractor allowed to commence building the bridge.

With few exceptions, the bridges were built by private contractors who were nearly all foreigners, as shown by their names: GB Giletti, T Knoop, Max Lagois, Celso Giri and MCA Meischke. Not all were equally reliable or honest. The tender for the bridge over the Hart River in the Schweitzer Reineke District was awarded to Max Lagois, who made delivery in 1896 but the sub-structure immediately showed signs of failure. This was brought to the attention of Wierda and even though the Supervisor had signed off the structure the last payment was withheld. Wierda sought legal advice and the Supervisor disappeared! Fraud was suspected and the contractor instructed to demolish and rebuild the structure, whereupon he too absconded! The contract guarantors were then called upon to rebuild under supervision of the DPW, which was done.

1 NASA, TAB, File PWW 166(1).
The structure is of the usual type for the period, being of coursed rough-hewn ashlar carrying two 18m spans of steel beams. It is in a good state of repair although the deck appears to be replaced by concrete and used by the traffic between Schweitzer Reineke and Bloemhof.

At first only steel bridges were erected in the Zuid-Afrikaansche Republiek. Many were manufactured by the Actiengesellschaft für Eisenindustrie und Brückenbau of Duisberg, imported from the firm of Harkort of the same city, Germany. Others were of British, chiefly Scottish, manufacture, such as the Buffalo Bridge, executed jointly with the Natal Colony, in 1897, although vetted by RAI Snethlage, appointed as Consul-General and Technical Advisor for the ZAR in the Netherlands (figure 05.04). The Wierda Bridge over the Sesmylspruit (figure 05.08) near Pretoria is one of these steel structures and the first in the bridge construction programme, the Bridge over Marthinuswesselstroom at Wakkerstroom another (figure 05.16). The earliest of the bow-string bridges for the Vaal River at Standerton (figure 05.03) the superstructure is of a later date), named after President Kruger, was manufactured in 1890 by Harkort, Germany, where Snethlage and GJ Th Beelaerts van Blokland, Minister Resident in Europe for the ZAR, visited the factory and inspected the pre-erected structure for quality assurance before its demounting and shipping to the Republiek. The super-structure has since earlier been modified by the Provincial Roads Department to that of girder trusses.

In his annual report for 1895, Wierda surprisingly argued strongly for the implementation of a different, and until then, foreign technology: the building of bridges of stone, especially where exposures of rock offered firm foundations for the pillars, since they would eliminate the need to import ‘pre-fabricated steel bridges’ from overseas. Wierda had a personal interest in stone as building material. He had authored a book entitled Gids van de Belgische industrie met betrekking tot de bouwkunde, en wel in het bijzonder hare steen-, marmer-, lei-, kalk- en glasproductie (Guide of the Belgian Industry with reference to construction, with in particular her stone, marble, slate, lime and glass production), published in 1875. This publication contains, amongst others, a catalogue of Belgian stone quarries and the quality and characteristics of each quarry’s stone. There are also guidelines for quarrying, transportation and laying and fixing of stone. He therefore had an interest in, and predilection for the use of stone and was able to assist with the identification of and quarrying of suitable stone. His later choice for the use of an archaic technology, stone arched bridges, is an anachronism and has no direct

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2 RAI Snethlage (1845–1919) had been chief engineer to the NZASM for the construction of the Eastern Line but resigned from his post after a year. It seems that after his return to the Netherlands he acted as agent for the ZAR DPW.

3 1843–1897. It is possible that a personal connection with Southern Africa existed as Beelaerts van Blokland’s father had been born at the Cape. He followed a legal training and lead a political life, being at one time the chair of the Dutch Parliament (Tweede Kamer).

4 Amsterdam: CL Brinkman.
Dutch precedent, but rather reflects then current regional approach to bridge building. In the Cape Colony Joseph Newey had already utilized this system for the construction of the Loch Bridge in the Barkley East District in 1893, logical for its context because this is a region where building in sandstone was and still is common.

Wierda’s stone arch bridges occur mainly in the eastern part of the former ZAR (now Mpumalanga) – an area with abundant workable stone. The ZAR authorities accepted Wierda’s recommendation to construct bridges in stone. He immediately put his mind and his office to the task and by 1898 five such bridges were already in use:

The Grobler Bridge over the Komati River between Machadodorp and Carolina (figure 05.17–05.20),

the Meyer Bridge over the Little Olifants River at Middelburg (figure 05.14–05.15),

the Joubert Bridge over the Blyde River between Pilgrim’s Rest and Lydenburg (figure 05.22–05.23),

the Begin-der-Lijn Bridge over the Vaal at Ermelo (figures 05.09, 05.24–05.26),

the bridge over the Pevaan (Pivaan) River in the Vryheid District (figure 04.22).

Two of the ZAR road bridges now lie submerged in dams, namely an early one of 1891, erected along the old transport road between Pretoria and Rustenburg across the Crocodile River on the farm Schoemansrus. It was originally planned as a single span of 12m. However Wierda was unaware of the seasonal damming of the river, which required that this be changed to two spans of 12m, later adapted to three spans of 12m. The superstructure of triangulated steel trusses was carried on two abutments and two regularly spaced piers. It was named the ‘Schoemansbrug’ at the opening ceremony. Severe flooding on 10 February 1893 washed away and severely damaged the superstructure, carrying pieces some 1.5kms downstream, requiring that some of this be replaced with sections imported from Germany. JJ Kirkness was awarded the contract, the bridge supports were raised 1.5m and the works completed in 1894. When the Hartbeespoort Dam was constructed in 1917 the bridge was inundated.

The steel superstructure was demolished and the bridge stone sub-structure submerged beneath the rising waters. Similarly the fate of bridge over the Crocodile River, near Koppie Alleen, Lydenburg District, Mpumalanga, a late steel bridge built in the time when all others were of stone. It was of a single span of 30m, possibly of the same style and design as that for the contemporary Buffalo River Bridge, being a deep girder truss supplied from manufacturers in Scotland, design vetted by Snethlage in Amsterdam. Delivery seems to have delayed the contract. The British forces were pleased to discover the bridge on their campaign in the Second Anglo-Boer War.

When the Braam Raubenheimer Dam (now Kwenas Dam) was constructed the bridge fell within the area to be flooded and was demolished by the Transvaal Provincial Administration.

No fewer than 21 large road bridges were designed and built between 1889 and 1898, and this provided a sound basis for communications between the country districts and the capital, Pretoria. Archival sources (the complete DPW register of specifications) indicate a total of 40 timber, steel and stone pedestrian and traffic bridges were constructed between 1887 and 1900. Pedestrian bridges such as one for Barberton were designed as cable stay bridges. Flooded rivers no longer delayed the travellers, transport riders and the mail coaches, and communications with the capital were now assured throughout the year.

Despite the vagaries of war and progress, many still stand, some still used. They are monuments to skill and determination of bureaucrats and entrepreneurs alike.
Bridge over Zesmylspruit

(*Sesmylspruit / Wierda / Hennops River Bridge*) Swartkops, Pretoria, Gauteng (1891)

The bridge along the main Pretoria-Johannesburg Road was erected at the wagon drift at the then Zesmylspruit (now Hennops River), so named because of its distance from the Pretoria (figures 05.09 and 05.10). The initial design was for a 12m span. The contractor appointed to the task was the well-known Pretoria resident, John J Kirkness.* The first sub-structure was completed in October of 1890 but damaged by flooding in May of 1891. Immediately a second contract for the re-build was awarded. This design was for a 21m span but provided for the re-use of the materials of the already constructed buttresses. The coursed rough-hewn ashlar buttresses and pier originally carried a steel beam structure of German manufacture but this has since been replaced by one from Skinningrove, England (date uncertain). The construction was fraught with problems of flooding and damage to the buttress surrounds. When completed the bridge was ceremonially opened in October 1891 by General NJ Smit, then Vice President of the ZAR, who gave recognition to the service and achievements of Wierda by naming the bridge in his honour.

In 1955 the main road to Johannesburg was widened in places. This gave cause for concern to conservation groups that the historical bridge was threatened. Instead the road was widened by constructing a second parallel concrete bridge for the south-bound Johannesburg traffic, and gave dedicated use of the extant bridge for north-bound Pretoria traffic, an arrangement which persists to this day, hence keeping the historic fabric preserved. It was declared an historical monument (now Provincial Heritage Resource) in 1965, although the bronze badge and plaque have long since been sold to scrap metal merchants!

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*John J Kirkness (1857–1899) was born on the Orkney Islands, obtained a diploma in Building and Construction from the Herriot Watt College in Edinburgh and arrived in South Africa in 1879. He had settled in Pretoria in 1887, in time to take on the construction of the largest project in the city at the time, the Raadzaal. Other DPW projects include the ZAR State Artillery officers housing complex (1897). He also acted as the fourth mayor of Pretoria. Coetzee, 1987. p. 413–414. He is credited with establishing brick industry in Pretoria and greatly influencing architecture on the sub-continent, though this construction and production activities. Fisher, 1997.*
Bridge over the Apies River,
(Leeubrug / Lion Bridge) Arcadia, Pretoria, Gauteng (1894)

It is the oldest existing bridge over the Apies River and is the only remaining bridge in the centre of Pretoria dating from the days of the ZAR (figures 05.05, 05.11–05.13). It replaced the ‘Arcadia’ Bridge although keeping that name in some contemporary depictions. It has a coursed rough-hewn sandstone ashlar abutments and central pier, which carried steel beam superstructures spanning 14.6m. The deck was 10m wide flanked each side by 1.8m walkways. Each of the causeway walls was mounted by cast iron recumbent lions, still extant, which lent the bridge its name. They were cast in Glasgow, Scotland by the Sun Foundry. Their presence is thought by some to be a testimony to the site which was earlier known as Leeudrif (Lion’s Causeway) but others postulate that they represent the ZAR Coat-of-Arms which depicted a recumbent lion. The bridge was declared a National Monument (now Provincial Heritage Resource) in 1981. John J Kirkness acted as contractor.
Meijer Bridge – also Meyer Bridge – is one of the first fine stone bridges built by the Zuid-Afrikaansche Republiek (figures 05.14 and 05.15). It was constructed in 1896 by an Italian contractor, Celso Giri. It is formed by two equidistant stone vaults, each spanning 18m. The site was surveyed in 1894, before Wierda’s recommendations that subsequent bridges be of stone construction. Wierda declared *De brug lever teen schoon geheel op en is met haar gelijkkleurige zandsteen een der fraaiste boogbruggen in Zuid-Afrika.* (The bridge has a beautiful unity and is one of the most attractive in the South Africa due to the homogeneous colouring of the stone.) The steelwork balustrading on the superstructure bears the marks of ‘Mitcheson and Kolbrunner Durban’. The bridge is named in honour of Isaac Johannes Meijer, who represented Middleburg in the Second Volksraad, the Executive Council of which passed the Act for its construction in 1865. It was proclaimed a National Monument in 1968, now a Heritage Resource in Mpumalanga since 1999. It is in a good state of repair but no longer does service, being replaced by a parallel running concrete bridge.
Bridge over the Utaka River
(Marthinus-Wesselstroom / Wakkerstroom Bridge), Wakkerstroom, Mpumalanga (1893)

This bridge was designed by the Zuid-Afrikaansche Republiek’s Department of Public Works. In the archives it is referred to as the Utakarivier. It spans a modest 12m (figure 05.16). It was erected by A Klute, completed in 1893 and was one of the last steel bridges commissioned by the ZAR. On 24 May 1904, Father David Bryant baptized the first black Zionist in South Africa in the Marthinus-Wesselstroom next to this bridge. It was proclaimed a National Monument in 1984, now Provincial Heritage Resource in the Mpumalanga Province since 1999.
The road from Machadodorp to Carolina crosses the Komati River by means of Grobler's Bridge (figures 05.17–05.20) about 29km from Machadodorp. The bridge is called after Johannes Lodewikus Grobler who represented the Carolina District as a member of the Second Volksraad from 1895 to 1899. It was built in accordance with a resolution passed by the Executive Committee of the ZAR on 22 January, 1896. The contractor was Johannes van Waart. The bridge was constructed after Wierda, in his annual report for 1895, had argued strongly for building stone bridges and by 1898 five such bridges were already in use, the Grobler Bridge being one of these. The bridge consists of four 9m stone arches and has a total length of 41m. It was opened to traffic by JL Grobler in May, 1897.

While the bridge was being built, it was found that a bend in the river above it retarded the flow of water and constituted a danger to the bridge during floods, so the course of the river was diverted over a distance of 210m in order that the water should flow faster under the bridge. This work was done by a certain HA van der Merwe.

The bridge fell into disuse when replaced by the nearby Stoltz Bridge in 1967. It was proclaimed a National Monument in 1955, and now a Provincial Heritage Resource in the Mpumalanga Province since 1999. It is easily spotted from the main road and well worth stopping for.
The Bridge is located on the farm Potloodspruit (figure 05.21). Its original construction comprised an steel arched structure with steel deck spanning 30m with a passage width of 7m. The sub-structure was built of hard 'blue-stone'. The bridge over the Spekboom River was taken into use on 27 June 1897 and was used until 1965 when it was replaced by the new road bridge. Two stone pillars originally supported the steel deck. The bridge was named after Helgard P Steenkamp, member of the Executive Committee of the Volksraad and Commander of the Lydenburg Commando.

During the Second Anglo-Boer War, (1899–1902) part of the steel deck was deliberately damaged by the Boer Commandos under General Ben Viljoen to hinder the British who had occupied Lydenburg in 1900, particularly in them reaching Pilgrims Rest where he had his headquarters. In 1903 it was replaced with stone by the PWD of the Transvaal Colony and renamed the Spekboom Bridge. It was declared a national monument in 1973 under its original historically correct name, Steenkamp’s Bridge. Sections of the original bridge found their way into the town of Lydenburg where for a while the railings served as barriers on the De Clerque Street Bridge, as barriers at the road closure of Viljoen Street, and some as part of a cattle crush on the farm where it stands.
Bridge over the Blyde River
(Joubert Bridge) Pilgrim’s Rest District, Mpumalanga (1897)

The bridge (figures 05.22 and 05.23) which spans the Blyde River just outside of Pilgrim’s Rest to the west, was named after JS Joubert, Mine Commissioner in the 1890s. The foundation stone has GB Giletti as the contractor but Celso Giri, an Italian contractor who worked for the ZAR DPW is also mentioned. The contract was awarded under Act No. 201, passed on 11 March 1896. It is constructed of local dolerite, initially planned for three stone arches of 9m each but extended by one to the current four. It suffered storm damage to the eastern buttress in 1909 which was reconstructed. The bridge was proclaimed a National Monument in 1968, now a Provincial Heritage Resource in the Mpumalanga Province since 1999. It is still functional on the route from Pilgrim’s Rest to Orighstad.
Bridge over the Vaal River

*(Begin-der-Lijn Bridge) Ermelo District, Mpumalanga (1898)*

About midway between Ermelo and Amersfoort the road crosses the Vaal River by the Begin-der-Lijn Bridge. The bridge (figures 05.01, 05.07, 05.24–05.26) owes its name to the fact that the old boundary line between the Transvaal and Swaziland began in that vicinity.

The bridge was constructed after Wierda, in his annual report for 1895, had argued strongly for building stone bridges. This bridge was built in accordance with a resolution passed by the Executive Council of the ZAR on 5th June, 1896. The contractor was Leendert De Waard, incorrectly recorded as Johannes on the site plaque, although such a contractor existed and was responsible for the Grobler Bridge.

The bridge is built of sandstone from the Vaal River and consists of ten 9.14m arches resting on solid sandstone; the apex of each arch is 10.66m above the foundations, and between high water mark and the apices of the arches there is an allowance of three metres. The bridge, which is 6.7m wide, is the longest arched stone bridge on the Highveld, measuring in all 124m in length. It was officially opened to traffic by Commandant-General Piet Joubert on 12th April, 1898. The road has since been re-aligned but the bridge still does service as a rural connecting road. It was declared a National Monument in 1955, now a Provincial Heritage Resource in Mpumalanga Province since 1999.
Bridge over the Pevaan (Pivaan/Bevaan/Bevane) River
(Kruger Bridge) Paulpietersburg District, KwaZulu-Natal (1895)

Since the southern area of the former ZAR was ceded to the then Natal Colony after the Second Anglo-Boer War, this Provincial Heritage Resource, once a National Monument, resorts, as do other structures of the ZAR DPW in similar towns such as Utrecht, Vryheid and Wakkerstroom, under the jurisdiction of Amafa, the heritage resource agency of the KwaZulu-Natal Province, the only Province in South Africa to have thus far promulgated its own heritage legislation.

The soubriquet Kruger Bridge (figures 04.22 and 05.27–05.29), although confusing it with that of the same name at Standerton, is local to distinguish it from another over the same river. This example, built in 1898, is one of the later fine stone bridges, following Wierda’s recommendations of 1895 in order to save costs on imported steel. The contractor was one AL Klute. It comprises a sequence of three arches, two of which span 18m, the other 6m, the only irregularly constructed sequence of arches of the period, with a passage of 6m. This crossetted arch bridge is one of only two bridges where this construction method was applied, the Meyer Bridge at Middelburg being the other (figures 05.14 and 05.15). The metal barriers are of wrought and cast-iron prefabricated sections, all of which demonstrates a progression and refinement of the type and style.

Unfortunately the ironwork is being vandalized; the bronze National Monuments badge and plaque already plundered. The outbreak of the runderpest pandemic impacted on the period of construction. The stone structure is in fine repair and serves local secondary rural traffic, chiefly farmers and foresters, although when the concrete bridge on the same river was washed away in the Cyclone Domoina of 1984 this bridge remained standing and became the alternative route.