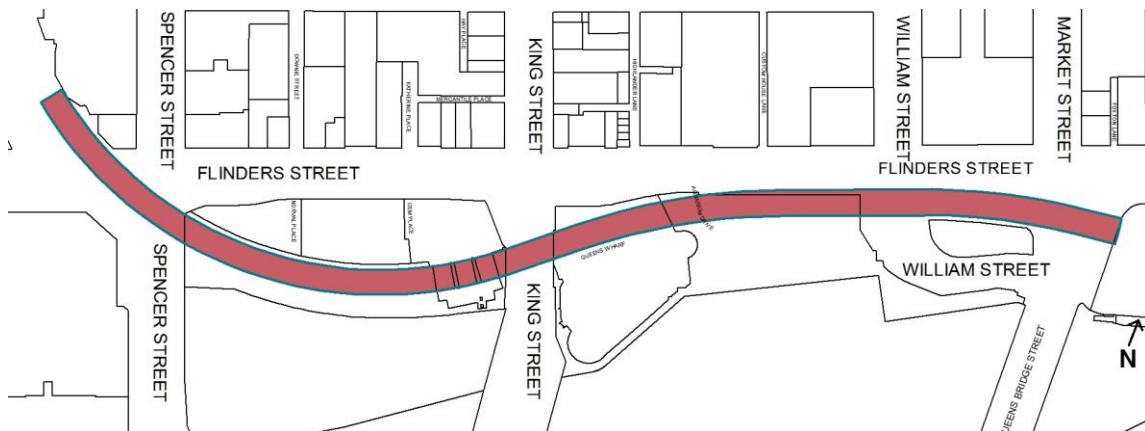
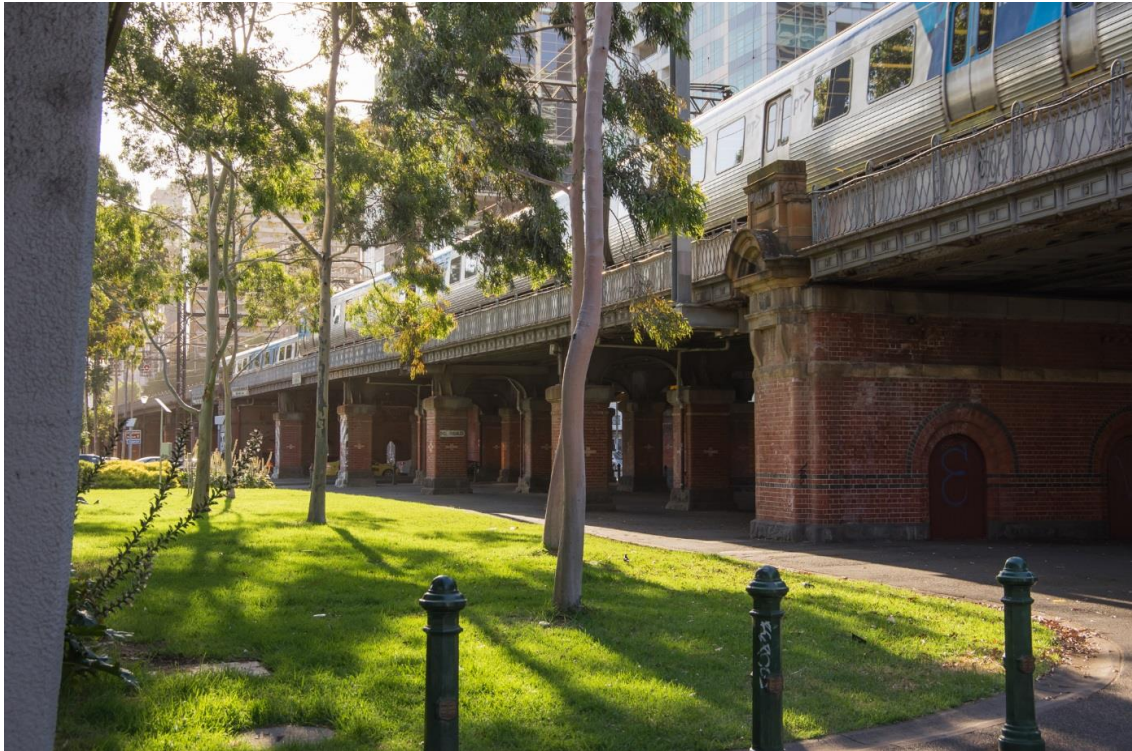


SITE NAME Flinders Street Railway Viaduct

STREET ADDRESS Flinders Street Melbourne

PROPERTY ID -



SURVEY DATE: October 2018

SURVEY BY: Context

HERITAGE INVENTORY N/A

EXISTING HERITAGE OVERLAY No

PLACE TYPE Individual Heritage Place

PROPOSED CATEGORY Significant

FORMER GRADE Ungraded

DESIGNER / ARCHITECT / ARTIST: William Henry Greene (1891), Frederick K Esling (1917)

BUILDER: Mixner, Shaw & Dunlop and Robison Brothers, Campbell & Sloss Ltd

DEVELOPMENT PERIOD: Victorian Period (1851-1901) Victorian Period (1851-1901)

DATE OF CREATION / MAJOR CONSTRUCTION: 1891, 1917

THEMES

ABORIGINAL THEMES	SUB-THEMES
Research undertaken in preparing this citation did not indicate any associations with Aboriginal people or organisations.	Aboriginal Themes (Hoddle Grid Heritage Review, Stage 2 Volume 3 Aboriginal Heritage, March 2019) have therefore not been identified here
HISTORIC THEMES	DOMINANT SUB-THEMES
6 Creating a functioning city	6.7 Transport

LAND USE

HISTORIC LAND USE
Archaeological block no: - Inventory no: Outside study area
THEMATIC MAPPING AND LAND USE
1890s Railway
1920s Railway
1960s Railway

RECOMMENDATIONS

Recommended for inclusion in the Schedule to the Heritage Overlay of the Melbourne Planning Scheme as an Individual Heritage Place.

Considered likely to meet the threshold for State significance and recommended for nomination to the VHR.

Extent of overlay: Refer to map

SUMMARY

The Flinders Street Railway Viaduct is a key component of the Melbourne railway network. Constructed to connect Flinders Street Railway Station with Spencer Street Railway Station in 1888-91, the Viaduct was designed by William Henry Greene, chief engineer of the Victorian Railways and constructed by engineers Mixner, Shaw & Dunlop and Robison Brothers, Campbell & Sloss Ltd. It was expanded in 1911-17 by engineers Mephan Ferguson and Victorian Railways engineer, F K Esling, and again in the 1970s, to meet the increasing demands on Melbourne's railway network.

HISTORICAL CONTEXT

Creating a functioning city

Transport

In the 1850s, Melbourne was the gateway for people and goods bound for the prosperous Victorian goldfields. It became the focus of the government-owned Victorian Railways, with railway stations constructed near the wharves and the Customs House located on the Yarra River.

A suburban railway terminus was first established in the vicinity of today's Flinders Street Railway Station when the privately-owned Hobson's Bay Railway Co opened the first railway line in Australia between Flinders Street and Sandridge (Port Melbourne) in 1854. Today's Flinders Street Railway Station was constructed between 1901 and 1910 to a design by two Railways Department employees, architect James Fawcett and engineer H P C Ashworth (Gray 2008).

The Victorian Railways erected the first Spencer Street Railway Station, a timber and iron structure, in 1858, which was extended between 1860 and 1870 to include goods sheds, warehouses and yards. Railway lines were built from Spencer Street Station to suburbs in Melbourne's west and north and to country Victoria. The line to Geelong opened in 1857, to Ballarat via Geelong in 1862, to Bendigo in 1862, and to Wodonga in 1873. The arrival of the railway at Echuca via Bendigo in 1864 connected Melbourne to the riverboat trade along the Murray River, and a direct rail link between Melbourne and Sydney via Albury was completed in 1883. Spencer Street Station became the city terminal for Melbourne's country lines, and inter-colonial (and later its inter-state) rail services (Carroll 2008).

Like in Great Britain, the joint stock system was adopted to finance the railway development in the colony of Victoria, but it did not have enough investors interested in buying railway stock. As a consequence, Melbourne's suburban railway pattern remained static until the 1880s (Carroll 2008).

The government-owned Victorian Railways took over the privately-owned lines in 1878 and substantially extended the railway network in the 1880s and 1890s, an important factor in the city's infamous land boom of the late 1880s. Most of the railway building at this time was authorised by the *Railway Construction Act 1884* under the management of Thomas Bent, minister for railways. The Act, which authorised 66 separate lines, became known as the 'Octopus Act' (Carroll 2008). The greatest contributor to public expenditure in the 1880s was the Victorian Railways, which in the peak year of 1889 let £300 000 worth of contracts to Melbourne engineering firms. In 1888, the Victorian Railways opened its own workshops at Newport, where 548 steam locomotives were built between 1893 and 1951 (Churchward 2008).

Brian Carroll notes that

Important steps in the development of Melbourne's suburban network were the construction of a cutting under Swanston Street in 1865 to allow eastern-suburbs trains to run through to Flinders Street instead of terminating at Princes Bridge, and the construction of the viaduct between Flinders Street and Spencer Street stations, which passenger trains began to use in 1894...Major workshops for building and servicing locomotives and rolling stock developed first at Williamstown, then at Newport, where over 500 steam locomotives were built..At the height of their development, Newport Railway Workshops employed over 3000 people (Carroll 2008).

Melbourne was the first Australian city to electrify its suburban railway network. The first electrified service ran between Essendon and Sandringham on 28 May 1919, with electrification of the system continuing through to 1995 (Carroll 2008).

Plans for building an underground railway in Melbourne were discussed as early as 1929, but the proposed loop did not materialise until the end of the 1970s when work on the underground City Loop was well advanced. Trains began running on the Loop in 1981, when Museum (later renamed Melbourne Central) Station opened. The service improved with the opening of Parliament Station in 1983 and Flagstaff in 1985 (Carroll 2008).

In 1999 the Kennett Liberal Government contracted out the management of Melbourne's suburban train services to two private-enterprise companies: Connex and M>Train. In December 2002 M>Train walked away from its contract, and in April 2003 the Bracks Labor Government approved Connex as the single operator for the entire system (Carroll 2008).

In the early 2000s, Spencer Street Station was redeveloped as Southern Cross Station.

SITE HISTORY

Located near the swamp to the west of Batman's Hill, in 1837 the north bank of the Yarra River near the corner of Flinders and Spencer streets was reserved as 'drainage', and up until the late 1830s the land closest to the river was covered by native tea tree ('Town of Melbourne' c1840). By the mid-1850s, four gauging sheds, three wharves and a dock had been built on the north bank of the river ('Melbourne and its Suburbs' 1855). As noted above, in the 1850s Flinders Street Railway Station was built on the north bank of the Yarra River near Swanston Street, and Spencer Street Railway Station was built near the corner of Spencer Street and Collins Street, with good sheds and stores later constructed near the river.

By 1879, a single-rail track for goods trains at street level had been constructed to connect Flinders Street Railway Station and Spencer Street Railway Station (see **Error! Reference source not found.**). Classified as a tramway and measuring three-quarters of a mile in length, it was only used at night to avoid disrupting street traffic (Ferguson 1985:1).

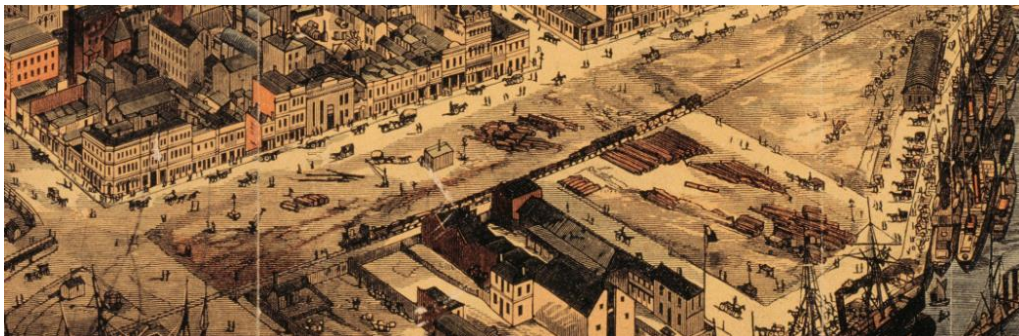


Figure 1. Extract of an 1882 painting of Melbourne, showing the single-line railway between Flinders Street and Spencer Street stations. (Source: 'Melbourne', 1882, SLV)

1888-1901: first construction phase

In September 1888, four years after the passing of the *Railway Construction Act* of 1884, the Victorian Railways announced plans for the building of a railway viaduct between Elizabeth Street and

Market Street to connect Spencer Street Railway Station and Flinders Street Railway Station (see **Error! Reference source not found.**). Designed by William Henry Greene, chief engineer of the Victorian Railways, the project was estimated to cost £73,000 (*Australasian* 15 September 1888:36; *Leader* 13 October 1888:32; May 2008). It was believed that the construction of the new viaduct would be 'immensely advantageous', as it would connect the south-east 'suburban' and north-west 'country' railway systems (*Leader* 13 October 1888:32).

The Flinders Street Railway Viaduct was constructed between 1888 and 1891 and carried two railway lines on plate girders. In September 1888, the *Age* newspaper described the viaduct structure, to be built between the corporation yards, near Flinders Street Station, and the back of the Victorian Railway offices in Spencer Street:

*From the former place to a point slightly to the west of William-street the viaduct will consist of an iron girder bridge supported by simple brick pillars inlaid with bluestone, there being 16 openings in all. Beyond that point 20 brick and bluestone arches of wide span and substantial workmanship will extend to the foot of Spencer-street, and from thence to the new railway offices the structure will be continued as in the first portion mentioned. The height of the viaduct will be about 20 feet. It is only intended at present to make it sufficiently wide to carry two lines of rails, but eventually it will be widened to carry four lines. The viaduct will follow about the same course as the existing railway along Flinders-street. A new track will be laid to the north of this line to accommodate the traffic whilst the work is in progress... whilst the viaduct itself will trend, on an average, about 60 feet south of the southern alignment of Flinders-street. Although the design of the whole work is plain, an ornamental iron parapet will surmount the superstructure and help to relieve the monotony of its appearance (*Age* 13 September 1888:8).*

The 'brick and bluestone arches' mentioned above are shown in **Error! Reference source not found.**

Tenders for the erection of brickwork piers and arches for the viaduct were advertised in 1888, with separate tenders invited in 1889 for steel and iron work for the girders and flooring of the viaduct. The approaches to the viaduct, both at Flinders and Spencer street stations, were the subject of a third contract (date unknown) (McNicol 1988; *Age* 20 April 1889:6; *Australasian* 15 September 1888:36; *Leader* 6 January 1912:39).

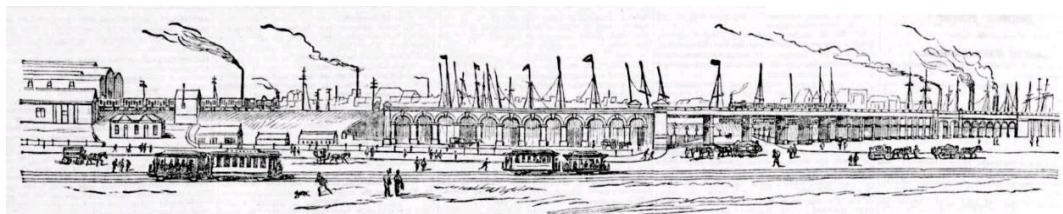


Figure 2. A newspaper illustration published in 1888 shows an interpretation of the viaduct. (Source: *Leader* 13 October 1888:32)

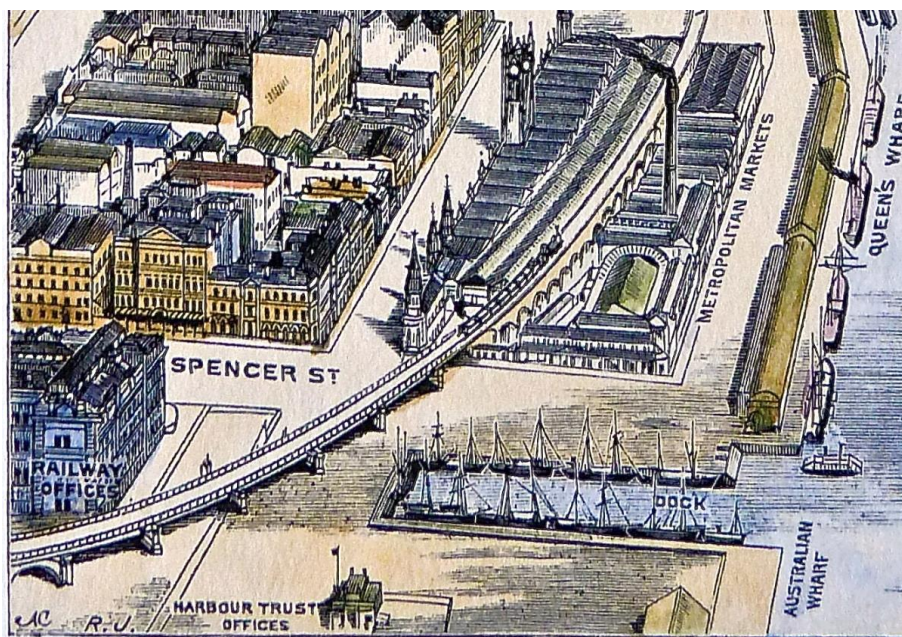


Figure 3. A section of c1906 lithograph showing the western section of the Flinders Street Railway Viaduct constructed as part of the first-phase building works. The arched section near the 'Metropolitan Markets' have been replaced with piers during the second-phase construction in the 1910s. (Source: Brighton Antique Prints and Maps 2019)

The first contract for the erection of the foundations, masonry and brickwork was issued in 1888 to engineers Mixner, Shaw and Dunlop for a sum of £37,662. In 1888 Shaw joined his brother-in-law G H Dunlop as an engineering contractor. Most of the young partners' work during the following six years was for the Railway Department, chiefly bridges and waterworks, the most significant being the Flinders Street railway viaduct (McNicoll 1988).

In 1889, engineers Robison Brothers, Campbell and Sloss Ltd were awarded the contract for the construction of the steel and ironwork girders and flooring for the viaduct for a sum of £32,834 (Ferguson 1985:1; *Age* 20 April 1889:6). The Robison brothers came from Leith in Scotland and established a large engineering business in Melbourne. Apart from structural work and cast iron features, they made locomotives, refrigeration plant and centrifugal pumps. In 1880-81 they amalgamated with Campbell, Sloss and McCann (Ferguson 1985:1).

The Flinders Street Railway Viaduct opened on 23 November 1891 to goods traffic with a speed limit of 15 miles per hour, and passenger trains were introduced in 1894. Although the viaduct was designed to carry four rail lines, this phase of construction included only two lines on the north side of the viaduct because the train traffic between Flinders and Spencer streets was comparably light (*Australasian* 15 September 1888:36; *Leader* 6 January 1912:39). The final construction cost for the railway viaduct was £139,000 (*Leader* 6 January 1912:39). The Flinders Street Railway Viaduct was part of what was named the 'railway extravagance' of the early 1890s, which led to a suspension of the Railway Commissioners in March 1892 (Kellaway 1975:1).

The Flinders Street end of the viaduct was once marked by the largest semaphore signals gantry in Victoria, opened in 1899 and closed by 1981, which controlled railway traffic over the viaduct. At the Spencer Street end, the Viaduct Junction signal box controlled the movement of trains out of the station area. It was opened in 1894 and shut down in 1978 (A Ward, pers comm, 25 January 2019).

The Flinders Street Railway Viaduct bordered the Western Market, which remained Melbourne's wholesale fruit and vegetable market until 1930 (see **Error! Reference source not found.**). Equipped with refrigeration and freezing chambers, the Fish Market, built in 1892 on the south side of Flinders Street between Market and Spencer streets, had direct railway access to the viaduct for transporting fish cargoes (Ruljancich 2008).

In 1892, the City of Melbourne, which owned the land under the viaduct, called for tenders for the construction of buildings at the Flinders Street railway; the tender of Smith and Crawford was accepted (*Argus* 26 April 1892:4). Known as the Viaduct Buildings (today partially surviving as Banana Alley Vaults), the vaults underneath the viaduct were constructed as commercial properties by the Railways Department, to provide the Department with potential rental income (*Argus* 7 July 1892:5). Its early tenants gave the viaduct vaults their colloquial name of Banana Alley (May 2008).

By 1896, a group of 20 warehousing and retail facilities known as the Viaduct Buildings were operating beneath the viaduct from premises addressed as 363-393 Flinders Street (seen in 1911 in **Error! Reference source not found.**, **Error! Reference source not found.** and **Error! Reference source not found.**) (S&Mc 1896). The Viaduct Buildings were sewered in 1907, and extensively renovated in the 1930s due to their dilapidated condition (*Age* 1 February 1907:6; *Age* 11 April 1936:13). In addition, by the early 1900s, a corner shop operated under the viaduct, near the Queen Street intersection (see **Error! Reference source not found.**).



Figure 4. Extract from a c1911 photograph showing the double-line viaduct with a steam locomotive running on it. The viaduct buildings can be seen on the right-hand side. (Source: 'Looking east along Flinders Street', c1911, SLV)



Figure 5. A close up of the viaduct buildings c1911. The buildings were removed and replaced during the 1930s, but some fabric remains, including brick and bluestone remnant walls. (Source: 'Looking east along Flinders Street', c1911, SLV)



Figure 6. Extract of an undated photograph showing the corner shop near the Queen Street intersection, across from the Banana Alley vaults. (Source: 'View south east across Flinders Street', c1891-1914, SLV)

1911-1917: second construction phase

With rapid suburban development in the northern areas of Melbourne during the first decade of the 1900s, suburban and city railway traffic increased by 42.8 per cent, and in 1911 Victorian Railways planned to introduce an additional two tracks to the Flinders Street Railway Viaduct. Construction started in 1911 to plans drawn up by Victorian Railways engineer, Frederick K Esling, who also was author of a technical paper which identified a puzzling problem related to the horizontal forces on the viaduct due to braking, in combination with side forces from wind-pressure (*Argus* 28 February 1911:7; *Leader* 6 January 1912:39; *RVA Journal of Proceedings* 1913:59). The cost of the duplication of lines on the viaduct was estimated at £108,000 (not including the required strengthening of the superstructure), which aimed to increase the carrying capacity to 160 tons (*Age* 24 November 1911:8; *Leader* 6 January 1912:39).

As the ground of the north bank of the Yarra River was not stable, the foundations for some of the piers were constructed through extensive excavation, almost down to bedrock, with work commenced in December 1911 (*Age* 18 September 1911:7; *Age* 24 November 1911:8).

In May 1913, Mephan Ferguson was awarded the contract to duplicate the viaduct for £27,406 (Ferguson 1985:1). Mephan Ferguson was a manufacturer who arrived in Melbourne from Scotland as a teenager with his parents. After being indentured to blacksmith John Price in Ballarat, he returned to Melbourne to establish himself as an iron founder and railway contractor. The successful completion of one of his first large contracts, a bridge over the Yarra River, ensured him ongoing government work. As historian George Parsons notes,

[Ferguson] built twenty bridges on the north-eastern railway and eight on the Clifton Hill line; he manufactured and erected many footbridges, engine traverses and station verandahs, and he also fabricated the wrought-iron and cast-iron work, some 1300 tons in weight, for the Newport railway workshops (Parsons 1972).

Other contractors who worked on the viaduct during this phase of construction were Moreland Smelting Works Pty Ltd and A Callingsworth (Age 16 October 2012:14). Building works were anticipated to take about two years, however the work was delayed due to the outbreak of the World War One. Consequently, the program of duplication and the strengthening and renewal of the original rail lines was not completed until late 1917. When the viaduct opened, the 1889-91 section of the viaduct carried the south pair of lines and the 1911-17 section carried the north pair of lines (Ferguson 1985:1-2).

During the course of work, the fabric of the western section of the viaduct near Market Street was the most affected. Brick arches (in **Error! Reference source not found.**) near the Fish Market were removed and replaced with new bluestone piers and iron girders to provide increased stability (**Error! Reference source not found.** and **Error! Reference source not found.**) (*Herald* 5 April 1917:5; *Argus* 7 April 1917:18). Renewing this section of the viaduct was, 'from an engineering point of view, the most difficult section of the duplication, involving alterations to the existing girders while the traffic was still being carried over the viaduct' (Age 9 April 1915:9). The National Trust (Victoria) citation for the viaduct notes that when completed, there was no sign that the viaduct had been built in two stages, with the design of the girders and other ironwork, bluestone foundations and brick piers built to the same construction and design of the original (Ferguson 1985:1).

As a part of electrification of the suburban railway network from 1913, the electrification of all lines crossing the Flinders Street viaduct was planned by mid-1915 (*Argus* 7 January 1913:6). The current electric substation under the viaduct near the King Street corner may have been an addition at this time.

It is likely that the western end of the viaduct, near the western (rear) elevation of the former Railway Administration Building, was affected by the 1920s building works in the area. The 1920 endorsed plan for the re-arrangement of the Spencer Street Station Yards and a later c1927 photograph show that the terrain at the rear of the former Railway Administration Building was raised, with the highest point being level with the railway superstructure continuing to the Spencer Street Station (**Error! Reference source not found.**). It is most likely that at least part of the structure from the first construction phase was buried under ground in the 1920s, as the 1891 brick work remains partially visible above the sloped terrain.



Figure 7. The arches near the Fish Market were demolished in 1916 and replaced with iron girders. (*Australasian* 23 September 1916:54)

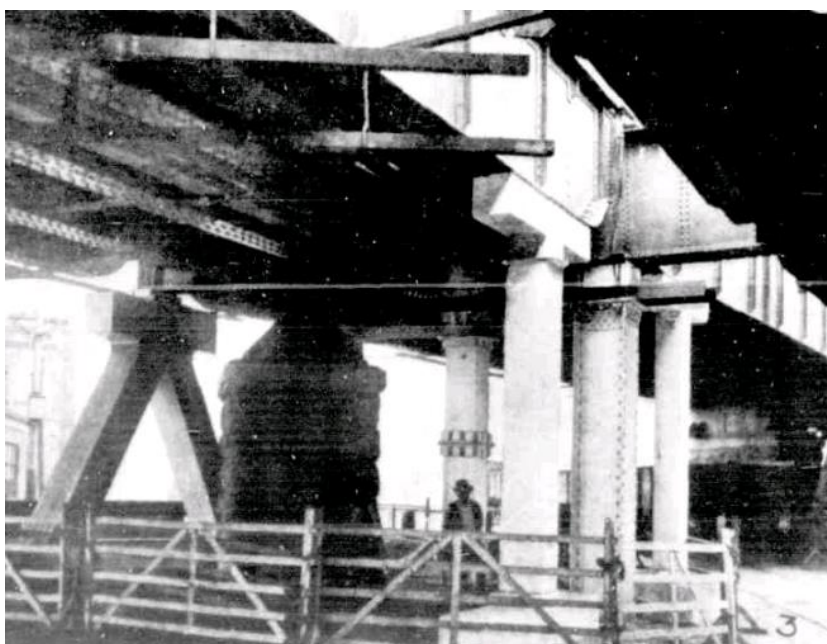


Figure 8. Construction near the corner of Flinders and Spencer streets in 1916. (*Australasian* 23 September 1916:54)



Figure 9. View of the Yarra River showing the Flinders Street Railway Viaduct and the Sandridge Rail Bridge crossing the river on an angle. The Yarra River turning basin can also be seen in the foreground. (Source: Airspy 1927-28, SLV)

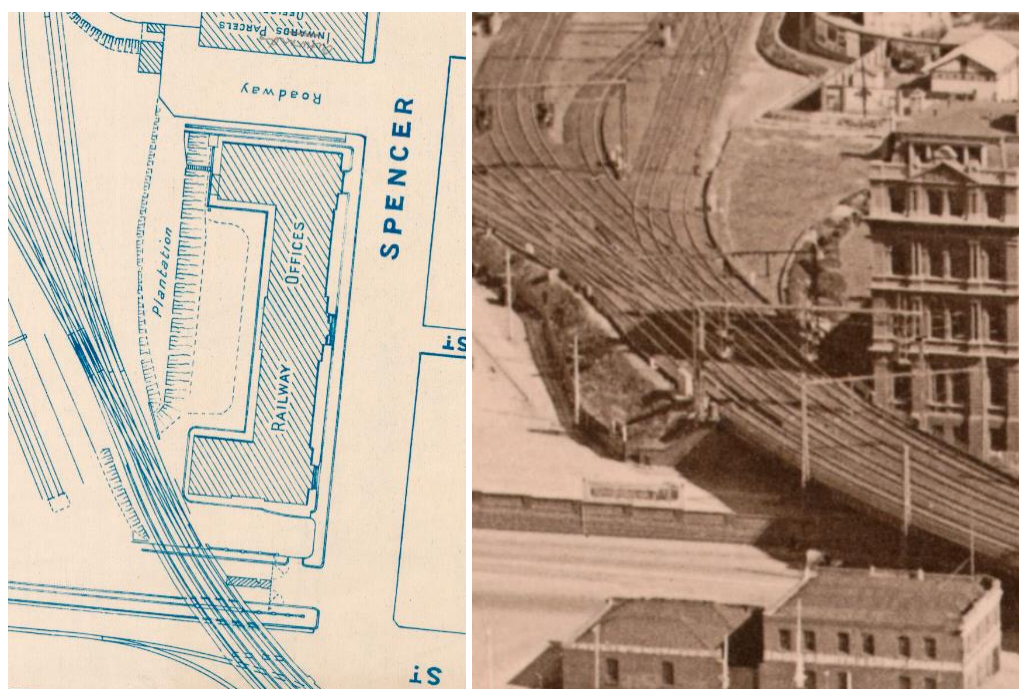


Figure 10. An extract of 1920 plan of the Spencer Street Station Yards (left-hand side) and an extract of 1927 photograph of same section, showing the raised terrain with plantation at the rear of the former Railway Administration Building. (Source: Victorian Railways 1920, SLV; Airspy c1927, SLV)

1959: demolition of the Fish Market and Viaduct Buildings

In 1959, upon the Fish Market's relocation to Footscray Road, West Melbourne, the old market buildings and the Viaduct Buildings were demolished. The site, valued at more than £1 million, was cleared and used as a car park by the City of Melbourne (Age 18 November 1959:23). Some of the nineteenth century load-bearing brick walls of the former Viaduct Buildings and the Fish Market were retained and can be seen today.

1978-2000s: third construction phase

As part of the City Loop railway construction undertaken in the 1970s, the viaduct was upgraded with a new precast concrete viaduct with box girders. This was constructed to the south of the existing structure, increasing the rail lines from four to six and leaving the 1891 and 1917 viaduct structures in situ. Completed in 1978, the total length of the new viaduct was 722 metres, with an average span of 30 metres. The new viaduct took a straighter line than the earlier structures as it did not have to avoid the turning basin on the Yarra River (a wide body of water that allowed ships to turn and reverse their direction of travel), which had been filled in (see **Error! Reference source not found.**).

In 1984 the state government committed \$1 million to the refurbishment of the vaulted stores beneath the railway line (May 2008).

Between 1998 and 2000, the Sea Life Melbourne Aquarium was built under the viaduct to a design by Peddle Thorp. The Flinders Street elevation of the new building incorporated some of the remnant load-bearing viaduct pillars between William and King streets.

In 2000, beams and timber decked sections of the viaduct, from near Spencer Street to near Market Street, were replaced, as seen in **Error! Reference source not found.** (VICSIG 2000; Age 10 April 1999:44).

In 2009, the former Fish Market site was developed with three high-rise mixed-use towers together with a car park under the viaduct. A new commercial space, Rebecca Walk, was constructed under the section of the viaduct near Batman Park (Rebecca Walk 2016).

Today the Flinders Street Railway Viaduct adjoins two urban parklands (Enterprise Park and Batman Park), and incorporates the Sea Life Melbourne Aquarium. Two tram stops operate under the viaduct, one near the Market Street intersection and the other near the Spencer Street intersection.

Comprising six tracks, the viaduct continues to play an important role in Melbourne's rail network by linking Flinders Street Station to Spencer Street Station (renamed in 2000s as Southern Cross Station) and forming the main link between the eastern and western parts of the Victorian rail network.



Figure 11. Re-decking of the viaduct was carried out in 2000. (Source: VICSIG 2010)

SITE DESCRIPTION

The Flinders Street Railway Viaduct is made up of six tracks of varying ages (each pair completed in 1891, 1917 and 1978), which links Flinders Street station to Southern Cross Station (the former Spencer Street Station) and forms the main link between the eastern and western parts of the Victorian rail network. Constructed along a curved path, the raised viaduct structure comprising superstructure and masonry substructure commences behind the former Victorian Railways headquarters at 67 Spencer Street, taking a sharp 90 degree turn east from Spencer Street, swinging southward around the back of the former Fish Market (now Northbank Place and Rebecca Walk) beside Batman Park, then north-east to avoid what was the original swinging basin on the Yarra River, then crossing over the Banana Alley Vaults before entering Flinders Street.

The brick viaduct dating from the first and second phases consists of riveted steel superstructure, of varying forms, supported on masonry substructure.

The first (1888-1891) and second (primarily 1911-17 but extending until 1959) construction phases were carried out to a fairly consistent design and palette of materials, although the detail of the earlier phase is somewhat more elaborate and decorative. Each pier is constructed of red face brickwork set on a bluestone plinth. The brickwork of the second phase piers appears to be consistent with the earlier piers, although lacking some of the detail such as end pediments and polychrome details to the brickwork. The latter-phase brickwork has slightly smoother surface (see **Error! Reference source not found.**). The ironwork of the balustrade on the either side of the superstructure is also similar.

There are nevertheless a number of different types of piers and substructures that were constructed at later stages to upgrade or strengthen the viaduct. From Market Street to near the Sealife Melbourne Aquarium, rows of five separate masonry piers support the superstructure. Three piers to the north are of earlier construction (1891) and the other two to the south are from 1917 (**Error! Reference source not found.**). In this section, the thicker block supports (**Error! Reference source not found.**) with two single courses of brown bricks and an arched pediment of sandstone that sits on top (between Market and King streets) may be additions from the second phase construction, as these are not seen in the historic photographs. This section adjoins the Custom Square, a small green square between Queens Bridge and the viaduct.



Figure 12. One of the earlier-constructed piers completed by 1891 (left-hand side) and one of the later piers completed by 1917 (right-hand side). Note more uneven and rough surface on the left-hand side example. (Source: Context 2019)

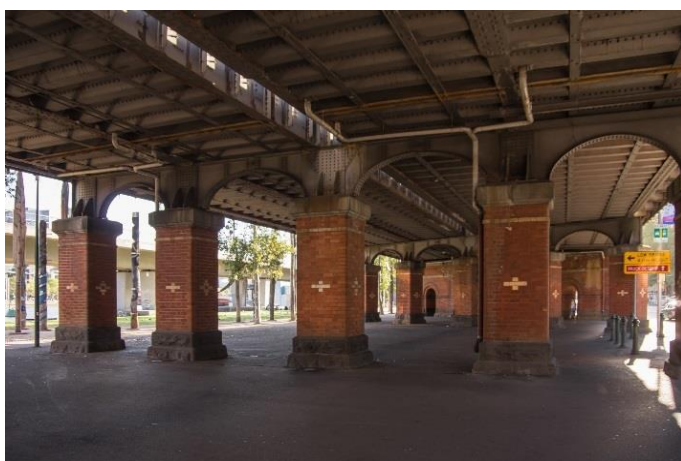


Figure 13. View towards west, near intersection of William and Flinders streets. Three piers on the left-hand side are from 1891 and one on the right-hand side is from 1917. (Source: Context 2019)



Figure 14. Brick structure with decorative sandstone end pediment (corner Market St). (Source: Context 2019)

West of the Sealife Melbourne Aquarium to King Street, the thick brick piers originally part of the Viaduct Buildings completed in 1891 (**Error! Reference source not found.**) (since demolished) are partially retained and have been incorporated into the Flinders Street elevation of the aquarium.

These piers sit on bluestone plinths and feature bluestone quoining at their northern ends (**Error! Reference source not found.**), while the southern sections are of plain face brickwork. To the immediate south of this section is the Enterprize Park, an urban park.



Figure 15. One of the piers partially retained, now incorporated into the shell of the aquarium. (Source: Context 2019)



Figure 16. Bluestone foundation and quoining evident in one of the substructure. (Source: Context 2019)

Between King and Spencer streets, the original piers have a similar appearance to the above, with bluestone plinths and quoins only to their northern ends. The view of this section from the southern side is obscured by the recently developed Rebecca Walk shops and the 1978 concrete addition. There is an electricity substation near the Spencer Street intersection (Figure 15). The substation presumably dating from the 1910s is of the typical utilitarian design, characterised with simple brick masonry and the use of cement lintels. Adjacent to this substation is an undercroft (**Error! Reference source not found.**), or former storage, which has some decorative elements such as cross motif, renders and bluestone quoining. The design of this structure is similar to the former Viaduct Buildings, which suggests an early construction date in the late 1880s.

In the sections dating from the first and early second phase of construction, composite steel/iron superstructure that carries the rail lines continues the geometric and detail themes of the brick supports. These spans feature arched beams spanning the space between the piers, elegant curved beams and outrigger supports.



Figure 17. CitiPower substation (c1910s). (Source: Context 2019)



Figure 18. Close up of the undercroft (perhaps part of the 1890s construction). (Source: Context 2019)

At the intersection of the Spencer and Flinders streets, substantial bluestone piers (Figure 17) support the superstructure that curves onto Spencer Street and continues to the west of the former Railway Administration Building. Adjacent to the latter building, the original piers and undercroft, built in face brick masonry on a bluestone plinth with a spandrel and quoins in the same material, are extant. The undercroft (Figure 18) at the western boundary of the former Victorian Railways Administration Building appears to be more intact than the other example near the King Street intersection. The brick masonry with ornamental iron parapet terminates near the southwestern corner of the former Railways Administration Building, and the section of railway tracks between this point and the Southern Cross Station runs above the raised terrain (see **Error! Reference source not found.**). The 1891 brick work remains partially visible above the sloped terrain.



Figure 19. Spencer Street tram stop. Concrete piers dating from the 1970s, and the bluestone pier from 1917. (Source: Context 2019)



Figure 20. The former Vic Railway Administration Building (RHS) and the viaduct running behind it. (Source: Context 2019)

INTEGRITY

The Flinders Street Railway Viaduct has undergone a number of duplications and extensions since the opening of the first phase in 1891. Despite opening as a single track in November 1891 the line was duplicated one month later. The viaduct was duplicated again in 1911-15 to provide four tracks with a new bridge built to its southern side. The original bridge was closed and strengthened but reopened in 1917. In the 1970s, as part of the City Loop project, an additional bridge was built alongside the two earlier bridges opening in 1978. The existing older bridges underwent restoration and upgrading at this time.

The major section of the viaduct, from behind the southwestern corner of the former Victorian Railways headquarters at 67 Spencer Street to the Banana Alley Vaults, dating from the first and early part of the second construction phases is highly intact, with a substantial portion of the original substructure of red face brickwork set on bluestone plinths remaining. The viaduct retains the original form and scale, materials and stylistic details and early subsidiary structures such as the electric substation and former undercrofts.

Changes and additions include an additional precast concrete supports on the corner of Aquarium Drive (formerly Queens Wharf Road) and impact protection beams and supports added at both Queens Bridge Street entries and King Street. Also, a new third phase reinforced concrete viaduct was constructed in the 1970s running along its southern side.

However, the updates to the superstructure including the strengthening and replacement of old beams and girders do not affect the overall integrity and nature of the place. Overall, the Flinders Street Railway Viaduct has high integrity.

COMPARATIVE ANALYSIS

Due to the quality of its design and detail, scale, use and location, the Flinders Street Viaduct does not have any direct equivalents within the City of Melbourne or even in Victoria. Some other examples of the historical railway or road and tramway infrastructure in the vicinity of the Flinders Street Railway Station that connect central Melbourne to other areas are currently protected under the Heritage Overlay and Flinders Street Station is on the Victorian Heritage Register (VHR). The examples below are of some relevance in a comparative analysis with the Flinders Street Viaduct as examples of historical transport infrastructure. They are from the Victorian Heritage Database unless otherwise noted.

In the City of Melbourne, the historical transport infrastructure includes:

Sandridge Railway Line Bridge, 1886, 1888 (VHR H0994, HO994)

The Sandridge Railway Line Bridge was the third successive bridge at this location to carry the rail link from Flinders Street Station to Port Melbourne and St Kilda. The bridge is on the line of the original Hobson's Bay Railway Company line to Sandridge, the first passenger railway line in Australia in 1854. The bridge was designed by the Victorian Railways Department and the contract let to David Munro & Co in 1886. It is a metal girder bridge with five spans totalling 178m and with a maximum span of 36.9m. The four railway lines were opened for railway traffic in 1888. The Sandridge Railway Line Bridge is constructed from steel with hollow iron columns filled with concrete to support the plate girders and cross girders.

Sandridge Railway Bridge is of historical, architectural and technical significance to the State of Victoria.



Figure 21. Sandridge Railway Line Bridge, 1886.

Queens Bridge, 1890 (VHR H1448, HO791)

Queens Bridge which crosses the Yarra at the southern extension of Market Street, replaced an earlier timber footbridge erected in 1860, known as Falls Bridge. The present structure, named after Queen Victoria, was designed by Frederick M Hynes, the Chief Design Engineer for the "Harbour Jetties and Coast Works Department" of the Public Works Department. The chief contractor for its construction was David Munro, who also erected Princes Bridge, and the Sandridge Railway Bridge

over the Yarra River. The bridge was officially opened by the Governor, Lord Hopetoun, on 18 April 1890. Queens Bridge is built in a very flat arch, reflecting the minimal rise and fall of the Yarra River.

Queens Bridge is of historical, architectural and aesthetic significance to the State of Victoria.



Figure 22. Queens Bridge, 1890.

Princes Bridge, 1888 (VHR H1447, HO790)

Princes Bridge was designed by Jenkins, D'Ebro and Grainger and constructed in 1886-88 by David Munro. The bridge, completed in 1888, was the third bridge across the Yarra at that location. The first two bridges had been built in 1845 (timber) and 1850 (stone) in response to the need for a permanent river crossing into the city. The earlier bridge was named after the Prince of Wales, later Edward VII, and the name has survived through to the current bridge. Princes Bridge is a three-span curved iron plate girder bridge with coursed rock-face bluestone block-work piers, abutments and wing walls. The upper sections of these have dressed granite and sandstone details.

Princes Bridge is of historical, architectural and aesthetic significance to the State of Victoria.



Figure 23. Princes Bridge, 1888.

The Flinders Street Railway Viaduct is distinguished from all the examples above, for being larger in scale and continually used as a railway viaduct by high-volume rail traffic on a daily basis. The examples of public infrastructure connecting central Melbourne to the south bank of the Yarra River have only limited direct comparison with the Flinders Street Railway Viaduct. Only the Sandridge Railway Bridge carried railway traffic, while the Queens Bridge and Princes Bridge are mixed-use bridges shared by cars and trams. Their fundamental linear design and their function as bridges across the river do not feature the complex geometry of a railway viaduct that was required to thread

its way through the edge of central Melbourne. Thus, while these are highly significant examples of historical transport infrastructure that serve daily traffic into and from the central Melbourne, they essentially have different functions and purposes. Purpose-built as a railway viaduct connecting Melbourne's two earliest urban railway stations, and passing over one of the busiest parts of the central Melbourne area rather than over a river or creek. The Flinders Street Railway Viaduct is an uncommon example of its type in the City of Melbourne.

Railway heritage architect, Andrew Ward, notes that the spans of riveted steel superstructure that comprise the Flinders Street Railway Viaduct are a very early use of structural steel in bridge making. The Sandridge Railway Line Bridge, built across the Yarra River by David Munro & Co for the Victorian Railways and opened in 1888, is acknowledged as possibly the earliest example of the use of steel bridge girders on the Victorian railway system (see Figure 19) (VHD 2000). The use of steel in the girders of the Flinders Street Railway Viaduct followed soon after. In addition, the span over the Spencer Street-Flinders Street corner of the viaduct is something of an engineering feat because of a lack of a supporting pier. It is known in some engineering circles as the 'Great Melbourne Skyhook' (A Ward, pers comm, 25 January 2019).

Overall, the Flinders Street Railway Viaduct remains a significant and complex work of railway infrastructure in the Melbourne metropolitan network that remains in use.

ASSESSMENT AGAINST CRITERIA

✓	CRITERION A Importance to the course or pattern of our cultural or natural history (historical significance).
✓	CRITERION B Possession of uncommon rare or endangered aspects of our cultural or natural history (rarity).
	CRITERION C Potential to yield information that will contribute to an understanding of our cultural or natural history (research potential).
	CRITERION D Importance in demonstrating the principal characteristics of a class of cultural or natural places or environments (representativeness).
✓	CRITERION E Importance of exhibiting particular aesthetic characteristics (aesthetic significance).
✓	CRITERION F Importance in demonstrating a high degree of creative or technical achievement at a particular period (technical significance)
	CRITERION G Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons. This includes the significance of a place to Indigenous peoples as part of their continuing and developing cultural traditions (social significance).
	CRITERION H Special association with the life or works of a person, or group of persons, of importance in our history (associative significance).

RECOMMENDATIONS

Recommended for inclusion in the Schedule to the Heritage Overlay of the Melbourne Planning Scheme as an Individual Heritage Place.

Considered likely to meet the threshold for State significance and recommended for nomination to the VHR.

Recommendations for the Schedule to the Heritage Overlay (Clause 43.01) in the Melbourne Planning Scheme:

MELBOURNE PLANNING SCHEME

EXTERNAL PAINT CONTROLS	No
INTERNAL ALTERATION CONTROLS	No
TREE CONTROLS	No
OUTBUILDINGS OR FENCES (Which are not exempt under Clause 43.01-3)	No
TO BE INCLUDED ON THE VICTORIAN HERITAGE REGISTER	No
PROHIBITED USES MAY BE PERMITTED	No
ABORIGINAL HERITAGE PLACE	No

OTHER

N/A

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PREVIOUS STUDIES

Central Activities District Conservation Study 1985	Ungraded
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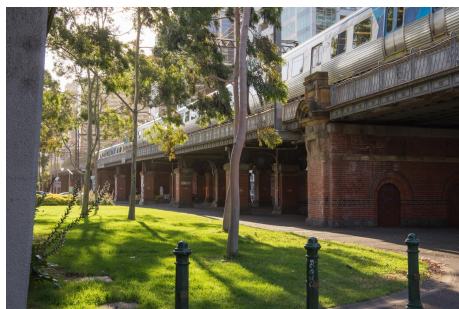
Central City Heritage Study 1993	Ungraded
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Review of Heritage overlay listings in the CBD 2002	Ungraded
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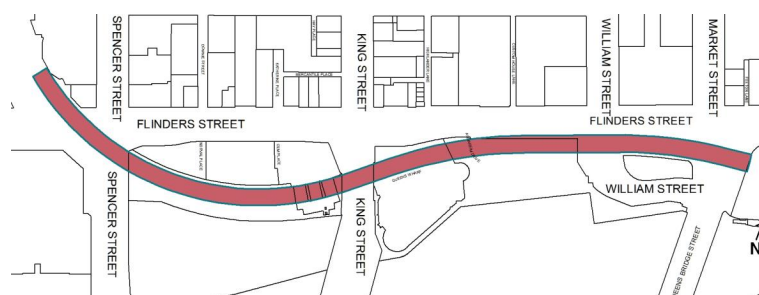
Central City Heritage Review 2011	Ungraded
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STATEMENT OF SIGNIFICANCE

Heritage Place: Flinders Street Railway Viaduct



PS ref no: HOXXXX



What is significant?

The Flinders Street Railway Viaduct, expanded in three major stages completed in 1891, 1917 and 1978.

Elements that contribute to the significance of the place include (but are not limited to):

- The overall form and geometry of the viaduct;
- The main steel/iron riveted composite post and beam structure, balustrades etc;
- The face brick piers including bluestone and sandstone detailing such as plinths, end pediments with sandstone detailing, spandrels and quoins, and double-blind arches;
- The brick vaults and undercrofts; and
- The substation.

How it is significant?

The Flinders Street Railway Viaduct, Flinders Street, Melbourne is of local historic, rarity, aesthetic and technical significance to the City of Melbourne.

Why it is significant?

The Flinders Street Railway Viaduct is historically significant as a key component of the Melbourne railway network. Constructed to connect Flinders Street and Spencer Street railway stations in 1888-91. The Viaduct was constructed by engineers Mixner, Shaw & Dunlop, and Robison Brothers, Campbell & Sloss Ltd to a design by William Henry Greene, chief engineer of the Victorian Railways and carried two lines. It was a substantial structure for its time, spanning Flinders, Spencer and Market streets. The viaduct provides important evidence of the expansion of the rail network in the 1880s and 1890s under the management of Victorian Railways, and in 1911-17 by engineer Mephan Ferguson and Victorian Railways engineer, F K Esling as demands on Melbourne's railway system increased. Another two lines were added to the existing four lines of the viaduct in 1978 as part of the construction of Melbourne's underground City Loop railway project. The Viaduct is historically significant as a major work of public infrastructure constructed in central Melbourne in the late nineteenth century. Such works comprised the railway system, including stations such as Flinders Street and Spencer Street, and other elements such

as Princes Bridge. These projects not only provided well-engineered solutions to public transport needs, they utilised high quality designs and materials and demonstrated high levels of attention to detail. Despite the many, in some cases insensitive, alterations and upgrades that have occurred during the second half of the twentieth century, the viaduct continues to demonstrate these qualitative characteristics. (Criterion A)

The Flinders Street Railway Viaduct is significant as the only major-scale railway viaduct constructed in central Melbourne in the late nineteenth century. The complex geometry of the railway viaduct that was required to thread its way through the edge of central Melbourne is highly significant. Constructed in the similar time period, the Sandridge Railway Bridge (1888), Princes Bridge (1888) and Queens Bridge (1890) feature linear designs and serve different functions and purposes. The Flinders Street Railway Viaduct was purpose-built as a railway viaduct above the busy city streets connecting Melbourne's two earliest urban railway stations, whereas the other examples were built to cross water. (Criterion B)

The Flinders Street Railway Viaduct is aesthetically significant for the application of high-quality design, attention to detail and use of materials to a major work of public infrastructure which forms a prominent element on the southern edge of central Melbourne. The brick piers in particular, dating from the first and early part of the second construction phases, are of high-quality orange face brickwork. They exhibit design features such as bluestone plinths, double blind arches, end pediments with sandstone detailing, spandrels and quoins in both bluestone and sandstone, and decorative details such as crosses picked out in contrasting coloured bricks. The composite steel/iron superstructure carrying the rail lines continues the geometric and detail themes of the brick supports, and features arched beams spanning the space between the piers and elegant curved beams and outrigger supports. While this attention to detail and use of high-quality materials was not unusual for major public works dating from the second half of the nineteenth century, the viaduct exhibits these characteristics to a high degree notwithstanding the extent of later insensitive alterations and upgrades. (Criterion E)

The Flinders Street Railway Viaduct is technically significant as an early example of the combination of traditional and 'modern' materials to provide a structure capable of carrying the significant loads imposed by what was at the time a modern railway system. Traditional construction methods and materials were not able to meet these requirements, so for the viaduct constructed during the first and early second phases, the use of an engineered steel/iron structure made up of riveted composite post and beam elements provided the carrying capacity of 160 tons. The spans of riveted steel superstructure that comprise the Flinders Street Railway Viaduct are a very early use of structural steel in bridge making. In addition, the span over the Spencer Street-Flinders Street corner of the viaduct is recognised for its accomplished engineering because of a lack of a supporting pier; known in engineering circles as the 'Great Melbourne Skyhook'. The supporting piers were 'dressed' with an external cladding of face brick with stone detailing to provide the aesthetic delicacy required to meet late Victorian and early Edwardian tastes. The steel/iron superstructure also incorporated some of these details, and features arched beams spanning the space between the piers and elegant curved beams and outrigger supports. (Criterion F)

Primary source

Hoddle Grid Heritage Review (Context & GJM Heritage, 2020)

