

**WHIPPLE'S 1841  
BOWSTRING TRUSS  
WORLD'S FIRST  
SCIENTIFICALLY  
DESIGNED TRUSS  
BRIDGE**

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**G'day Melbourne**

Koala: "Help save this supremely important  
Whipple Bowstring Truss Bridge in Claverack, NY"

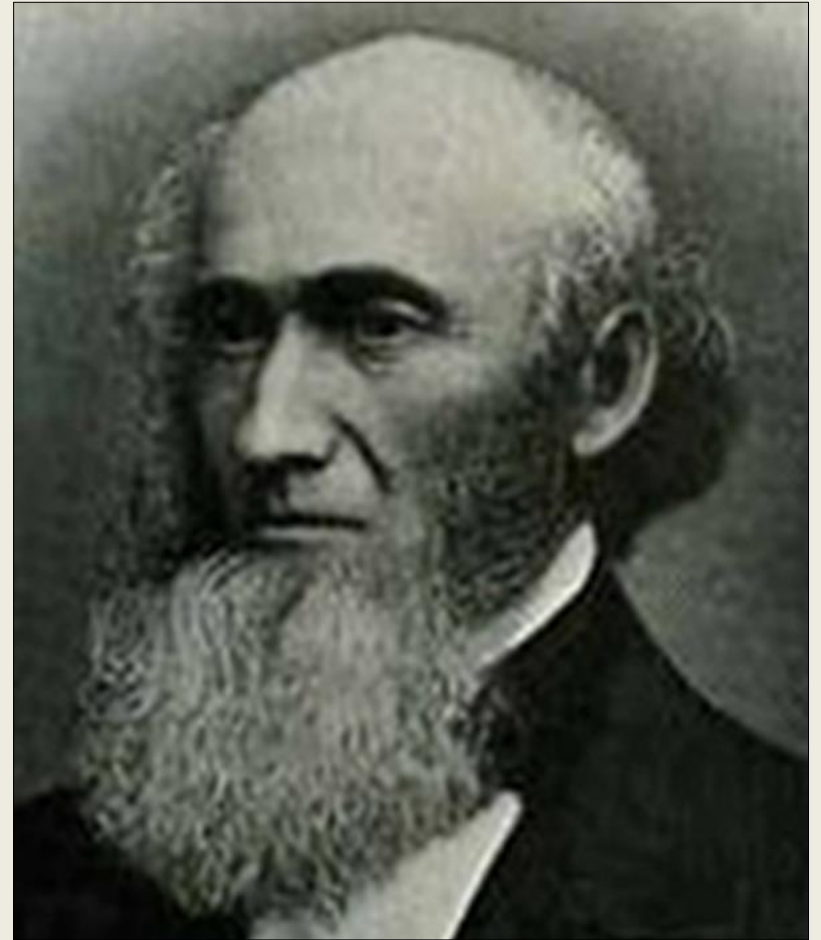
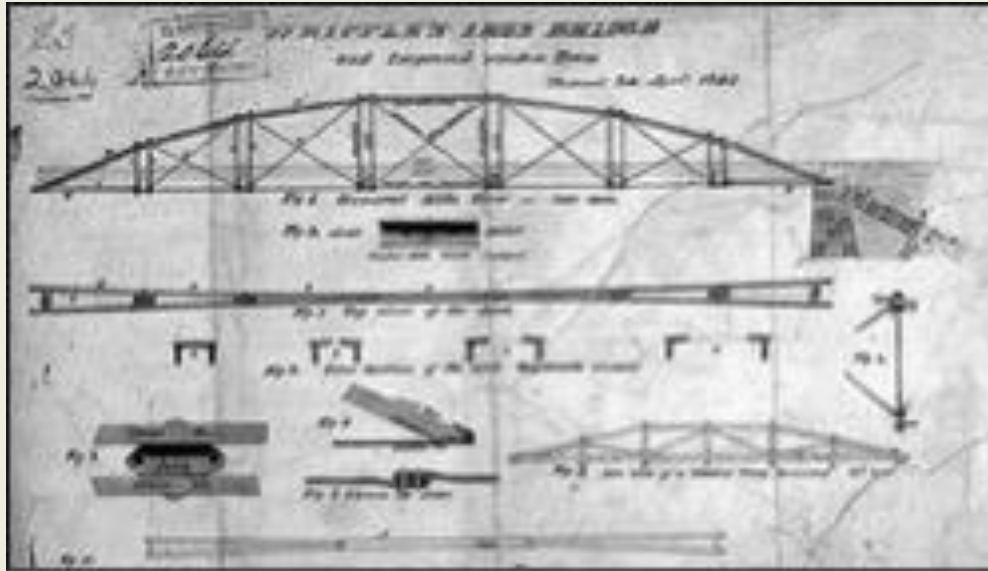


Winner of the Koala photo competition!

# WHO WAS SQUIRE WHIPPLE?

(1804-1888)

He designed and patented the bowstring truss bridge (1841) to be used for the enlarged Erie Canal in New York State.



# WHO WAS SQUIRE WHIPPLE?

## (Continued)

Whipple's Bowstring truss design was adopted by the New York State Canal Commission as standard from 1850s onward



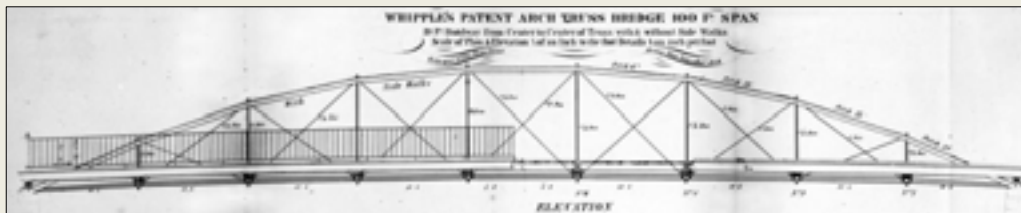
Hundreds of Whipple Bridges were built in cities, villages, and farms over the Erie Canal and waterways

**NEW YORK STATE CANALS.**

**1871.**

**SPECIFICATION**

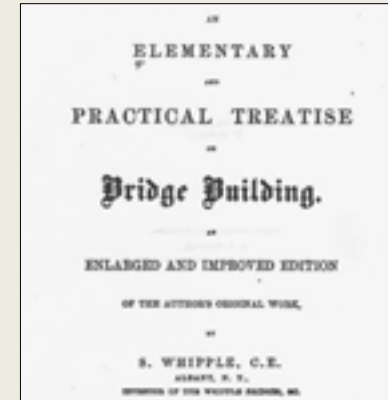
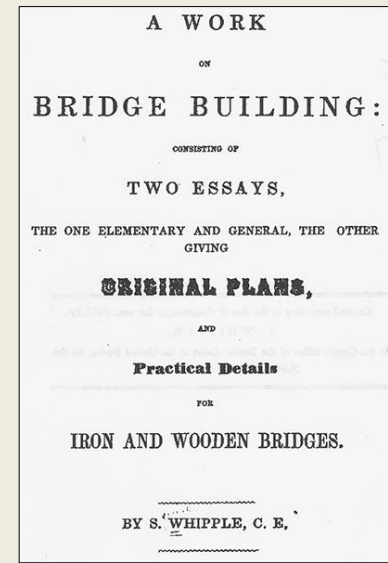
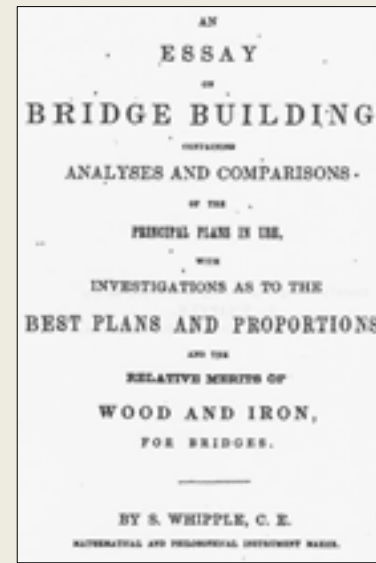
**Of the Manner of Constructing Whipple's Patent Iron Arch  
Truss Bridge Superstructures,**



# WHO WAS SQUIRE WHIPPLE?

## (Continued)

- He wrote *An Essay on Bridge Building* (1846)
  - Compared bowstring truss with other trusses initiating scientific bridge design
- Essay became part of the seminal book: *A Work on Bridge Building* (1847)
  - **First time in the world, correct methods of analyzing and designing a truss were DOCUMENTED – still taught today**
- Later, he wrote a more formal book: *An Elementary and Practical Treatise on Bridge Building* (1872 reprinted until 1899)





# WHO WAS SQUIRE WHIPPLE?

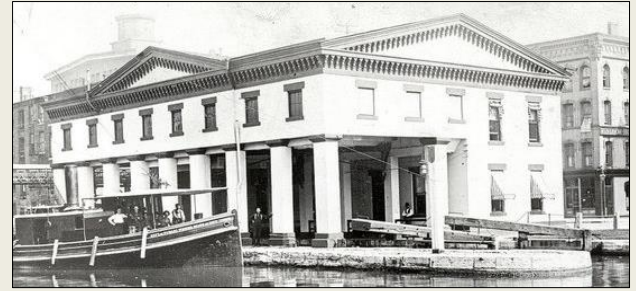
## (Continued)

Whipple also designed and built:

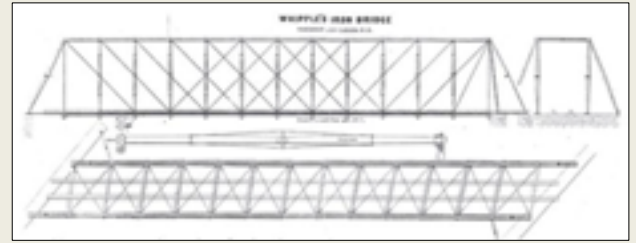
- Weighlock scale (1841) that was adapted elsewhere
- Trapezoidal railway bridges (1853) that became the most common railway truss until 1880s
- First vertical lift bridge (1872)
- Swing bridge (1865)
- Many other types of bridges



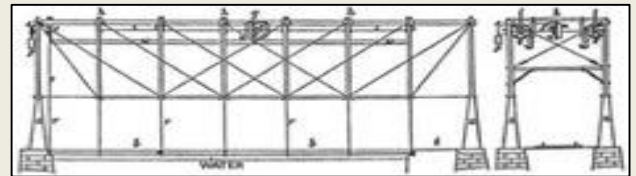
Whipple Swing Bridge, Kentucky, 1865



Weighlock Scale, Syracuse



Whipple West Troy Bridge, 1853

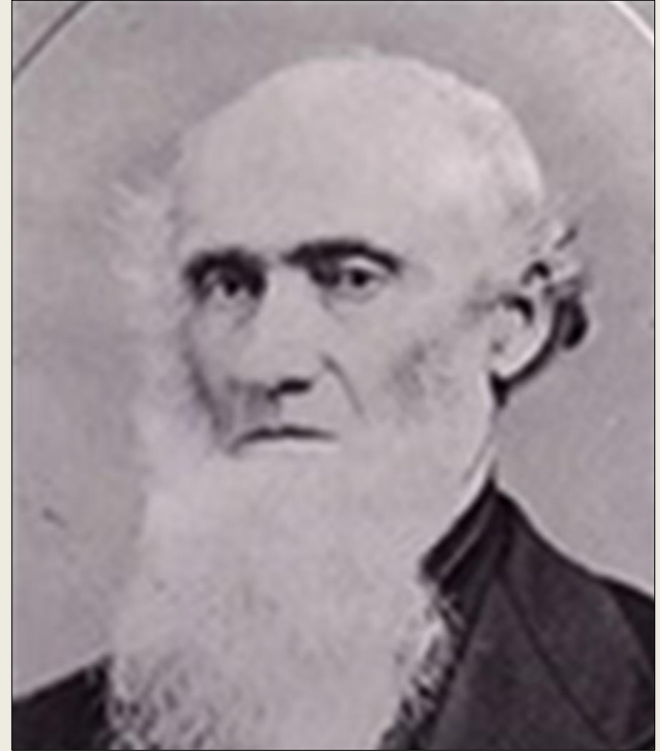


Whipple Lift Bridge, Utica 1872

# WHO WAS SQUIRE WHIPPLE?

## (Continued)

- Died 1888 leaving widow Ann and no children
- **Whipple's importance cannot be overstated**
  - First to document theoretical and mathematical principles for bridge design
  - Promoted use of pre-fabricated iron components for mass production
  - Promoted life-cycle costing
  - Critically important for the development of the Enlarged Erie Canal,
  - Critically important for the development of the early Railway industry
  - Helped make New York State and New York City become world leaders in the 19th century



# WHAT IS THE SIGNIFICANCE OF THE SHAW BRIDGE?

- Built, according to Whipple's bowstring truss bridge patent, along the important New York City to Albany Post Road by J. D. Hutchinson in 1870
- Bridge named after a nearby farmer William Shaw whose house still stands
- Crosses idyllic Claverack Creek, a tributary of the Hudson River
- ***Of the hundreds of Whipple bowstring truss bridges built, only eight survive to the present, and the Shaw Bridge is the only one left in its original location and the only double span***



Whipple Double-Span Bowstring Truss Bridge



J. D. Hutchinson, Builder



William Shaw House 1892 and 2017

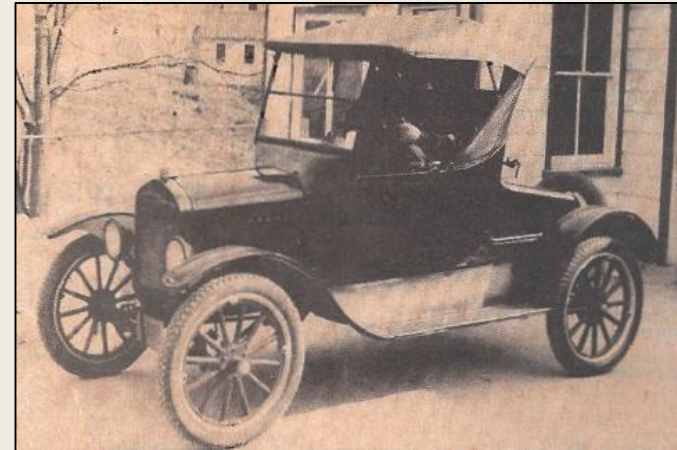
# SHAW BRIDGE EARLY HISTORY

## (1870-1980)

- 1900 Bridge photographed and featured on a color postcard documenting the original state of the bridge
  - Postcard shows that the wooden deck reaches through the trusses
  - The *New York State Canals – 1871 – Specifications* provides guidance on exactly how the wooden deck can be meticulously restored
- 1966 Last time the deck was replaced (not exactly to original specifications)
- 1967 Last time iron work painted
- 1980 ceremony celebrated Shaw Bridge's listing on National Register of Historic Places with parade of antique cars over the bridge led by a horse drawn buckboard and T Model Ford



1900 Postcard



T Model Ford



# SHAW BRIDGE RECENT HISTORY

## (1981-2018)

- 1989 Bridge closed to all traffic
- 1990 restoration efforts unsuccessful
- 1994 Historic American Engineering Record photo
- 2010 Photo shows deplorable overgrown state
- 2012 new restoration efforts initiated
- 2016 New York State grant awarded for half restoration funds (\$170,000)
- 2018 fundraising begins to match \$170,000



1994 HAER Photo



2010 Photo

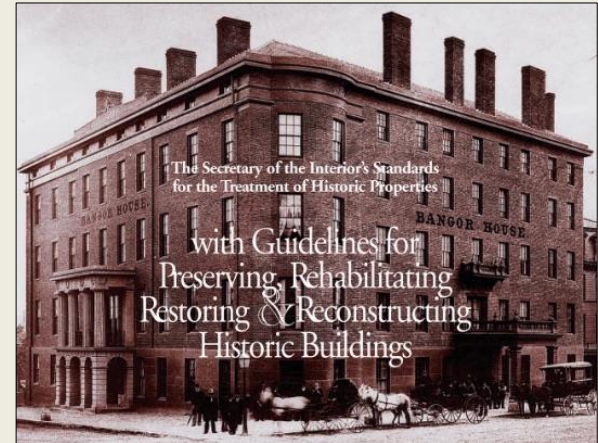
# SHAW BRIDGE CURRENT STATE

## (2018)

- Despite neglect, the bridge is in remarkably good condition (except for the non-original wood deck, which was designed to be replaced) and can be restored to original 1871 specifications and circa 1900 photograph
  - Speaks well for Whipple's design and materials
  - 19th century cast & wrought iron more rust resistant than most modern steel
- *Secretary of the Interior's Standards for the Treatment of Historic Properties* will be followed
  - Will use **Restoration** approach to retain materials from most significant period (circa 1870-1900)



Current Photo



Restoration Standards

# SHAW BRIDGE – A POSSIBLE WORLD HERITAGE BRIDGE?

- To be included on the World Heritage List, sites must be of outstanding universal value and meet at least one out of ten selection criteria (see <http://whc.unesco.org/en/criteria/> )
- The Shaw Bridge may satisfy four of the selection criteria: (i), (ii), (iv), and (vi)



## The Criteria for Selection

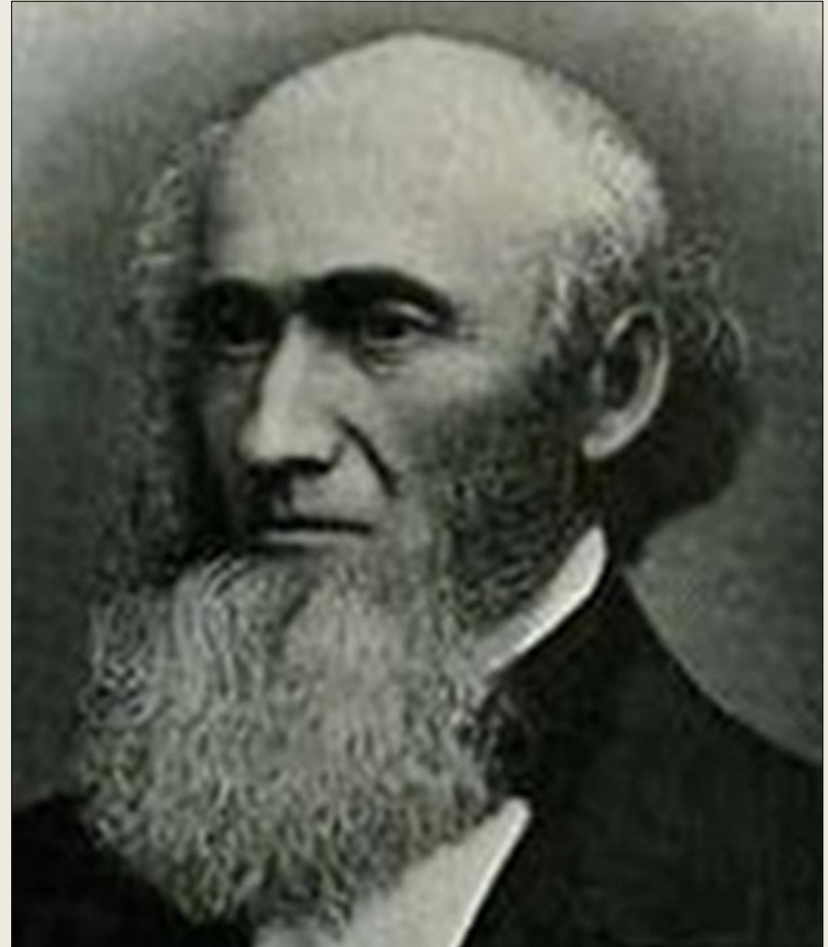
To be included on the World Heritage List, sites must be of outstanding universal value and meet at least one out of ten selection criteria

# SHAW BRIDGE – A POSSIBLE WORLD HERITAGE BRIDGE?

(Continued)

*(i) Represents a masterpiece of human creative genius*

- As outlined earlier, the Shaw Bridge represents the best example of a Whipple Bowstring Truss Bridge, which is considered a masterpiece of human creative genius, the first truss bridge in the world designed using scientific principles to provide simple, safe, durable, and economical bridges across canals, creeks, and other similar waterways.



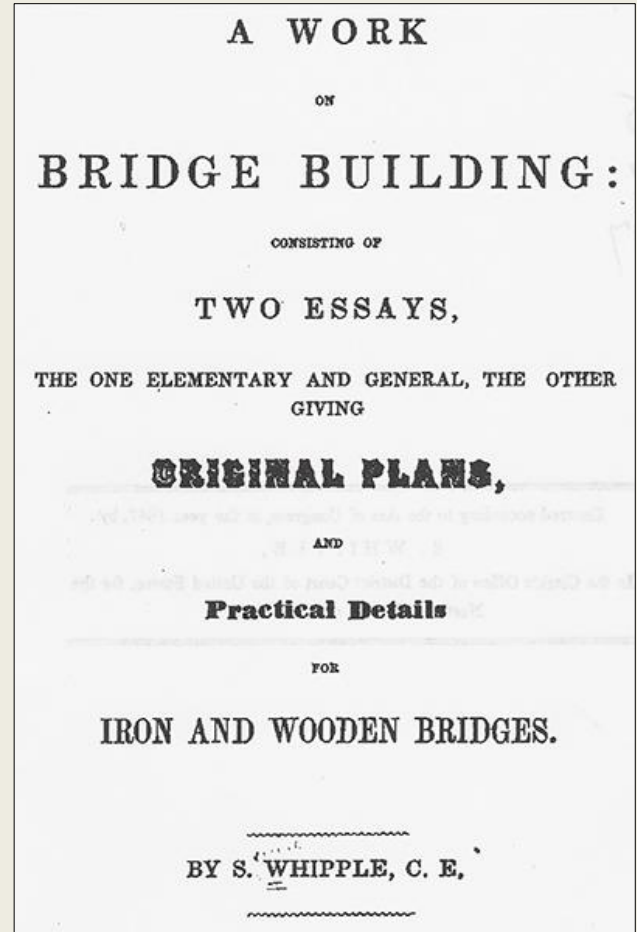


# SHAW BRIDGE – A POSSIBLE WORLD HERITAGE BRIDGE?

(Continued)

(ii) *Exhibits an important interchange of human values, over a span of time or within a cultural area of the world, on developments in... technology*

- Whipple's 1847 book *A Work on Bridge Building* was the first to document scientific design principles for truss bridges and compares his first design (Bowstring Truss Bridge) with other bridge designs including the long span trapezoidal railroad bridges that he also designed



# SHAW BRIDGE – A POSSIBLE WORLD HERITAGE BRIDGE?

(Continued)

*(iv) An outstanding example of a type of ...  
technological ensemble which illustrates a significant  
stage in human history*

- The supremely important Shaw Bridge may be considered the forerunner of other famous scientifically designed arch truss bridges



1932 Sydney Harbor Bridge



1870 Shaw Bridge (1841 Design)



1917 Hell Gate Bridge  
(Note Also: Reverse Bowstring Arches)

# SHAW BRIDGE – A POSSIBLE WORLD HERITAGE BRIDGE?

(Continued)

*(vi) Directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance (preferably used in conjunction with other criteria)*

- Whipple's Bowstring Truss Bridges contributed to the success of the enlarged Erie Canal that opened western United States to the world through Albany, the Hudson River, and New York City and so contributed to the world-wide prominence of 19th century New York State and New York City



Syracuse NY Whipple Bridge (1878)



19th Century New York City  
(Before the Brooklyn Bridge)

# THE SUPREMEMLY IMPORTANT SHAW BRIDGE NEEDS YOUR HELP

“As the only known Whipple twin-span bowstring in the world, it would be a shame – no, crime, really – to NOT properly restore this bridge. It is a living piece of history, from a time when America’s technical, engineering, and manufacturing prowess were just starting to bloom – and Squire Whipple was at the forefront” – Rick Ehrenberg

- To restore this historic Whipple bridge, we need to match the New York State \$170,000 grant with cash, in-kind services, and/or materials.
- Please consider a United States tax deductible donation at [ClaverackPathways.org](http://ClaverackPathways.org), a project of the nonprofit 510(c)(3) Open Space Institute
- THANK YOU
- ANY QUESTIONS?