

...they gathered together—the most eminent engineers of the day—wi

approval. Next, they would board a train—headed off to see his great works...to

18XX

viverra. Pulvinar neque laoreet

Timelines

XX | Timelines

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## Paul C. King

### Department of Architectural Technology

They gathered together - the most eminent engineers of the day - with a chance to silence him - but instead it was they who would be quiet as they began to understand the greatness of the man and the genius of his ideas. Many questions asked and answered - they marveled at his plans - and nodded their approval. Next, they would board a train- headed off to see his great works....to see what had come "before the bridge."

We all know the Brooklyn Bridge. Taking in the panoramic view from shore with the city behind, we admire the beautiful lines of the cables stretching across the East River, gently curving down from the tops of the towers to meet the gentle curve of the deck. Walking across on the center boardwalk, we are met by the strength of the towers, the two gothic arches and the web of cables, that gives the bridge its iconic look - a look unique to a Roebling Bridge. The Brooklyn Bridge is a suspension bridge, perhaps the greatest example of a modern era, that began with the use of iron for the construction of chain and wire suspension cables.

ROEBLING Before The Bridge

A suspension bridge is a simple concept, string a rope across a span, secure it at both ends and hang a deck below. When we look at the Brooklyn Bridge, we see it as solid and immovable. We cannot image the city without it, and we do not for a moment, doubt its safety. This is a modern perspective; it is not how people of the 1800's viewed suspension bridges. For both the public and for engineers, who did not understand how to build them properly, they were viewed with suspicion and distrust. This view was not without good reason, as they often fell down as quickly as they were put up.





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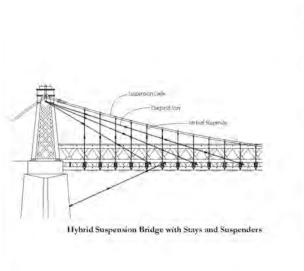
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iver (Brooklyn Bridge)									1870	1883		
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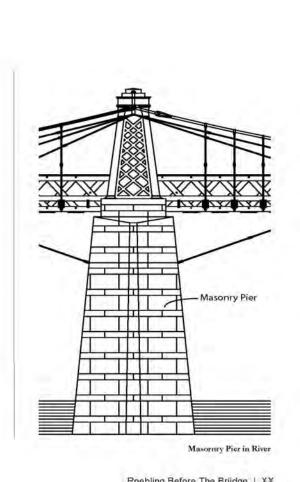


XX | Glossary



Iron (Cast)	A combination of iron and at least 2% carbon. In the 1800's during Roebling's time charcoal was used to add the carbon content. Cast Iron was melted and poured into a mold and allowed to cool. For Roebling's budge the large suspens cable saddles and his anchor chain bars were cast.
Iron (Wrought)	Wrought or "worked" iron which is heated and formed by working with tools. The beams and girders of Roebling's labeling were wrought iron.
Limestone	A hard sedimentary rock. Often used as the outer finish of the masonry was important. It has a more finished look the grante and was often used on the visible portions of the anchorages and towers.
Masonry	For Roebling Masonry referred to the large natural stones that were used in the construction of layer piers, tall towers anchorages.
Oxidation	Oxidation occurs when oxygen takes electrons from iron forming non-oxide or rust. Over time this action weakens metal. Roebling used a combination of paint and wire wrapping to protect his suspension cables from oxidation an combination of pain and cement to protect his iron anchor and anchor chain bars.
Red Lead	A paint is a led based anti-corrosive primer common in the 1800's. Roebling made use of it to protect the iron portiof his bridges from oxidation.

Usually a set of rail tracks and car used for the creation of hemp or wire ropes.



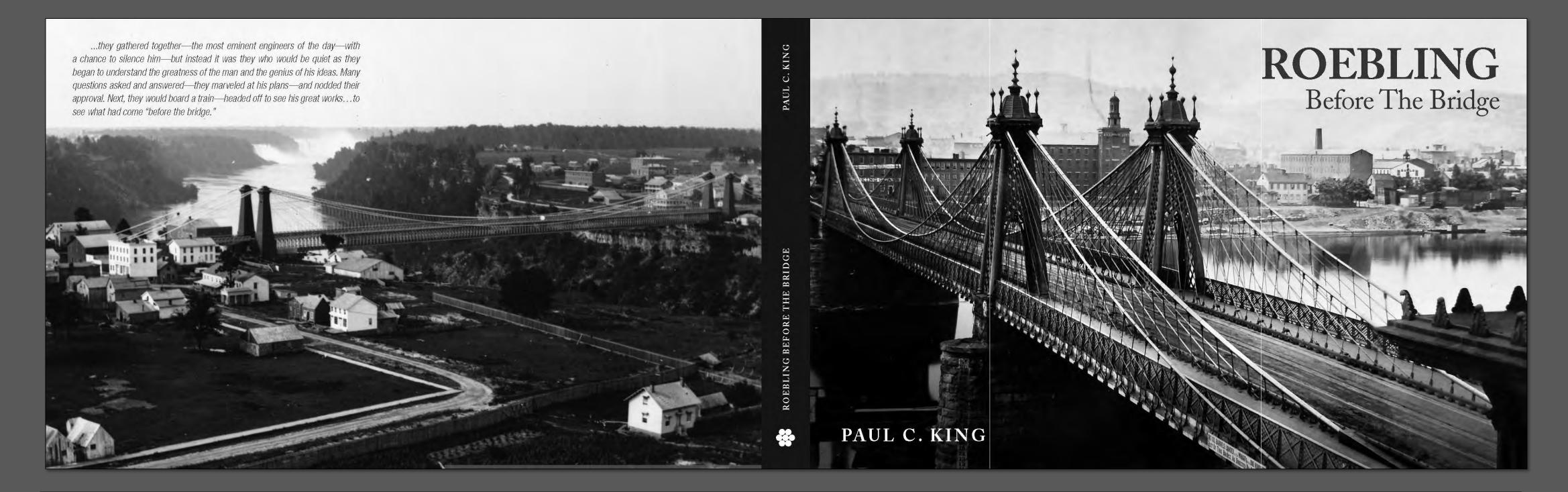
Roebling Before The Briidge | XX

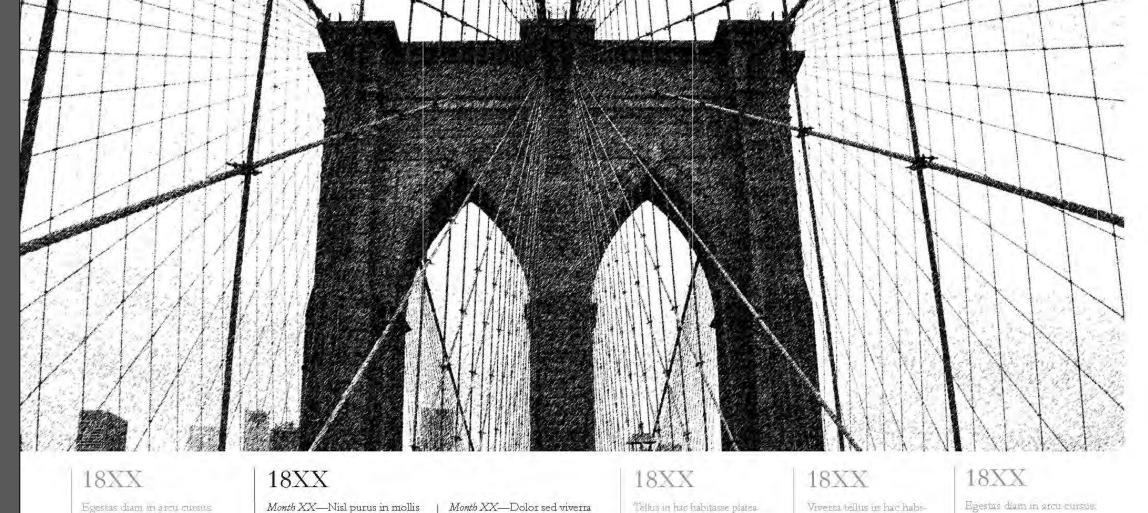
# Roebling before the bridge Paul C. King

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enim. Eu consequat ac felis

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Introduction

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### Timelines

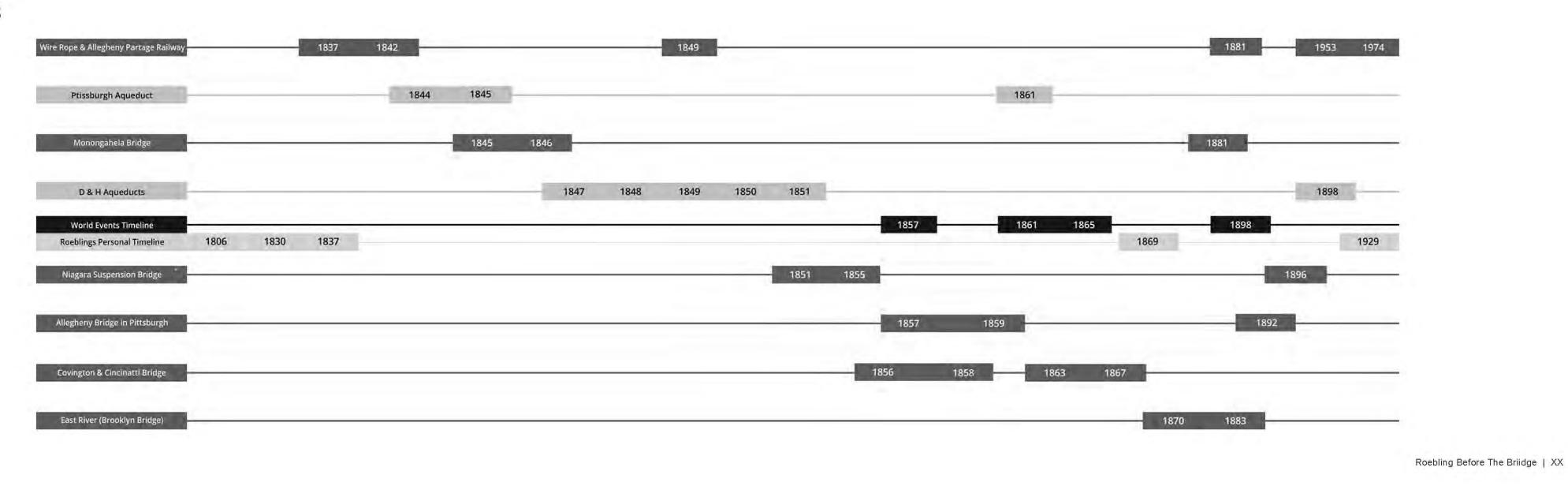
XX | Timelines

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Mattis thoncus uma neque viverra. Pulvinar neque laore

iaculis nunc sed. Ullamcorper

eget nulla facilisi etiam.



Glossary to secure the ends of suspension cables. Roebling's patented artificial anchorage consisted of large anchor plate. held in place by alternating layers of wood timbers. The anchor plate was secured by a long pin to a series of parallel anchor chain bars which ran up vertically and then curved to be in line tangent to the main suspension cable. The anchor chains bars were made of large cast iron or wrought iron. Anchor pins connect the separate pieces of the anchor plate, anchor chains and cable shoes. These pins vary in length and diameter depending upon the design of the bridge. For the anchor plate connection the large anchor chain bars would be slipped through slots in the center of the anchor plate and then pinned from below. Where sets of anchor chain bars met they were pinned together using the "eye" holes at the ends of each bar. In the anchorage these connections rested upon large masonry blocks to keep them in proper alignments. At the top of the anchor chain the cable shoes holding the strands of the suspension cables were pinned to the end of the last anchor bar. Anchor Plate A large heavy plate that anchors the end of the anchor chains. For Roebling the anchor plate was typically held in place by arger timbers which alternated in direction each layer and had a large weight of masonry placed on top. Cable Deflection The sag of a cable from the top of the tower saddle to the lowest point at the middle of the bridge span. Suspension bridge cables form a catenary curve, which is the curve a cable forms under its own weight. Cable Shoe In the construction of Roebling's anchorages the shoe was a cast iron u-shaped form that connected the end of a suspension cable strand to the anchor chains. When Roebling made his suspension cables using aerial spinning, a single wire was carried back and from anchorage to anchorage and a single continuous wire was looped around the shoes at each end. When an individual strand of wires was complete, the shoe would be lowered into place and pinned to the

means of transportation popular in the 1800's. Boats were pulled along the canal from tow ropes attached to horses and mules that walked along the side on a tow path. It was common that the horses were led by young boys. A typical canal was a trapezoid shape, wider at the top. Canals were seasonal transportation as they were relatively shallow (4-6')

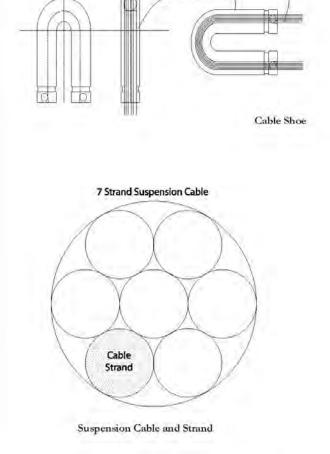
A shallow long boat used to transport cargo along a canal. Canal boats were often as wide as the canal allowing only one way movement. At points along the canal it would widen to allow boats to pass each other in opposite directions. It was common that boat owners and their families lived on the boat during the active season. Canal locks were used to allow a canal to navigate up and down chances in grade. During the 1800's they were made of stone with large wooden doors that were manually operated. The lock tender and their families often lived in a house

> built at the locks. Locks were gravity fed and worked by opening and closing doors to allow water to flow in an out. For a boat to be lowered using a lock water would be permitted to flow into the lock until it was the same level as the upper

canal. The upper doors open while the lower door is closed and the boat moves into the lock. The upper door closes and then the water from the lock is allowed to flow into the lower portion of the canal. When the levels inside the lock matches the lower level the lower doors are opened and the boat continues on its way. An aqueduct is a trough for carrying water. When a canal route crossed a stream or river, an elevated aqueduct would be built to allow boats to pass over. The trough of the aqueduct matched the trapezoid shape of the canal. Early aque-

anchor chains and anchor plates from oxidation.

ducts were made of stone or wood. Roebling build the first wooden trough aqueduct supported by a wire suspension superstructure. In some Roebling writings this was spelled as aquaduct. A cement made with calcium carbonate. A combination of powdered limestone or chalk mixed with clay, sand and water. Roebling often referred to this as hydraulic cement. He made use of it in his anchorages to protect his cable ends,



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