

Galloping Gertie: A disaster waiting to happen

A Brief History of Galloping Gertie

A BRIDGE ACROSS THE NARROWS

Peninsula residents dreamed of a bridge across The Narrows as far back as the late 1880s. For farmers, a bridge meant an end to having to load their produce onto a ferry in the early hours to reach Tacoma's market by opening time. For merchants, it meant a steady flow of paying customers. For mothers-to-be it meant a quick drive to the hospital maternity ward – on their schedule, not the ferry's. Although the populace had their reasons for a bridge, it wasn't until the threat of war in Europe during the mid-1930s that made the government take notice of the importance of bridging The Narrows. The bridge would reduce the drive from Fort Lewis to the Naval Shipyard in Bremerton by 50 miles. This was no small consideration.

FROM DREAM TO REALITY

In the late 1920s, civic leaders in Gig Harbor and Tacoma began to see the feasibility of bridging The Narrows. The span would ultimately shorten the 2.5 hour drive via Olympia to a mere 12 minutes. Over the next decade, various bridge projects were proposed.

In 1937, the newly formed Washington Toll Bridge Authority planned to move forward with a design by Chief Engineer Clark Eldridge. Much to Eldridge's dismay, in securing financing the bridge authority was forced to make money-saving revisions proposed by Leon Moisseiff, a renowned East Coast designer and contributor to many prominent bridge designs.

COWBOYS IN THE SKY

The construction of the first bridge provided desperately needed work during the economic depression of the 1930s. In November 1939, 150 men labored on the bridge daily. By December, a wooden catwalk had been strung from shore to shore, across the tops of the two towers. It was not a journey for the faint of heart, but for the first time in human history it was possible to walk across The Narrows. By February 1940, the daily employment was up to 263. It was a hard and dangerous job and took a special breed of worker to build the enormous structure. The first bridge was completed July 1, 1940, on time and on budget.

BRIDGE STATISTICS - 1940

Total length of structure:	5,939 feet
Length of the center span:	2,800 feet
Roadway height above water:	208 feet
Diameter of main suspension cable:	17.5 inches
Weight sustained by cables:	11,250 tons
Cost:	\$6.6 million
Toll:	Automobiles 75 cents, Pedestrians 15 cents

More than 12,000 tons of steel were used to construct the bridge. At the time it was the third-longest suspension bridge in the world.

RIDING OUT THE WAVES

Although supposedly designed to withstand 120 mile-per-hour winds, the bridge roadway would undulate, or ripple, even in moderate winds. Engineers worried about the bridge's movement; however they felt the bridge could be modified. Relatively light and flexible, suspension bridges were known to be susceptible to wind.

Engineers, including Clark Eldridge and Professor Farquharson of UW, tried to stabilize the bridge by adding anchor cables (which snapped before the collapse), and plans were underway to install deflective shields.

A MODERN MARVEL GOES UNDER

The 1940 bridge was an engineering wonder on par with the majestic Golden Gate Bridge in San Francisco. The talents of the ironworkers, however, couldn't stop the inevitable collapse of the bridge on November 7, 1940. The design failure that lacked undergirding (firm support underneath) for the narrow roadway, plus the waving and twisting roadway, proved a fatal combination that fateful day.

There was one benefit of the disaster: it taught the world a lesson in how not to build a bridge. The replacement bridge – Sturdy Gertie – wouldn't span The Narrows until 1950, after the country's urgent need for steel and workers due to World War II had subsided.

VIDEO OF THE COLLAPSE

- [Tacoma | 1940 | Tacoma Narrows Bridge Galloping Gertie Collapse, United States](#)
- [Tacoma Bridge Collapse: The Wobbliest Bridge in the World? \(1940\) | British Pathé](#)
- [Tacoma Narrows Bridge Collapse "Gallop'n' Gertie"](#)
- [The Collapse of "Galloping Gertie" \(The Tacoma Narrows Bridge\)](#)
- [New documentary explores mysteries of Galloping Gertie](#)

THE AFTERMATH

The collapse of Galloping Gertie changed the engineering of future suspension bridges. Throughout the 1930s, engineers studied the collapse and concluded that the wind conditions in The Narrows caused the bridge to move vertically and horizontally, causing a twisting motion. Dismantling the broken bridge began almost immediately, with most of the metal sold for scrap. Only the base of the towers were free from damage and remained in place to support the 1950 bridge towers.

CONSEQUENCES OF THE COLLAPSE

- Suspension bridge design changes forever.
- Scientists and engineers recognize the importance of aerodynamics.
- Galloping Gertie is known and studied around the world.
- The military went without a direct and short route between Fort Lewis and McChord Field south of Tacoma and the Naval Yard in Bremerton for the entirety of World War II.
- Business owners lost the easy trade route across the bridge.
- Rural residents around Gig Harbor lost their connection to urban centers across the Narrows.

GALLOPING GERTIE'S REMAINS?

The twisted metal pieces on display at Harbor History Museum were gifted to the museum by the Washington State Department of Transportation (WSDOT). They were removed from The Narrows during construction of the third bridge. A WSDOT engineer contacted us after the pieces were recovered, and, due to requirements relating to historic sites, offered the museum what he called "pieces of Galloping Gertie."

So, are they truly pieces of Gertie? Looking through the "as built" drawings for the 1940 bridge, there appears to be some consistency in construction -- reinforcing the engineer's claim. And the mass of steel alone represents something mighty. The twisting pieces certainly spark our imagination. But before we can say for sure that this is Gertie, we have more research ahead.

A Few Characters from Gertie's Story

CLARK ELDRIDGE

A bridge engineer who worked for the State of Washington. The State Highway Department put him in charge of the plan to span the Narrows. He designed the first plan: "a tried and true conventional bridge design." (Engineers now believe it would be still standing today if it had been built). Leon Moisseiff, a consultant from the East Coast hired by the federal Public Works Administration, proposed a cheaper design and it was used for the superstructure – the parts above the water. They used Eldridge's design for the piers under the water. (These were reused for the 1950 bridge). Eldridge's job was to oversee construction of the bridge, despite having serious concerns about its stability from the moment he saw the plans. Later in life he wrote, "I go over the [1950] Tacoma Bridge frequently and always with an ache in my heart. It was my bridge." He felt very angry at those who he felt had decided that not spending a lot of money was the most important factor in the bridge's design. After the collapse Eldridge realized that what they would learn about what happened and aerodynamics would change bridge engineering and design forever.

LEON MOISSEIFF

A famous suspension bridge engineer at the time, Moisseiff was involved in almost every suspension bridge design during the 1920s and '30s. The Public Works Administration (PWA) had insisted that the bridge project hire outside consultants, so he was brought in from New York. His proposed bridge design for the Narrows cost less, so the PWA chose his over Eldridge's. We realize now that his design theory, "wing deflection," did not consider all the ways wind could move a bridge (aerodynamics). His bridge would be lighter and narrower than any ever built and when the state highway department engineers saw the plans, they called it "fundamentally unsound." The Washington Toll Bridge Authority (WTBA) went ahead with the project, despite these concerns and others, basing their confidence on Moisseiff's reputation. When the bridge was built Moisseiff called it "the most beautiful in the world." After first not believing that the bridge's movement was serious, he designed some parts to be added to make it more stable. The devices did not work. After the bridge fell down, he stated that he was "completely at a loss to explain the collapse." The disaster ended his career and he died of a heart attack three years later.

PROFESSOR F. BURT FARQUHARSON

When Clark Eldridge started to have concerns about the bridge, he contacted Farquharson, an associate professor of engineering at the University of Washington. Farquharson realized early on that something was wrong and started testing a bridge model in a wind tunnel, determined to find a way to make it stop its dangerous movements. He suggested cutting holes in the solid girders (sides) of the bridge to allow the wind to pass or deflecting it with curved steel. On November 6th the state decided to accept the plan for wind deflectors. On November 7th it was too late. That day Farquharson took many photos and videos of the collapse and even tried to save Tubby. (You can see him in videos wearing a tan coat and carrying a pipe). As the cables snapped, concrete chunks crashed into the Sound, and the roadway dropped and bounced, he ran for his life off the bridge, the last man off Galloping Gertie. He spent the next ten years studying the collapse and developing and testing designs for the new bridge in his cutting-edge wind tunnel.

LEONARD COATSWORTH AND TUBBY

Coatsworth was the news editor for the *Tacoma News Tribune*. Tubby was his daughter's dog, a cocker spaniel, in the backseat of his Studebaker as he drove across the bridge from Tacoma on that fateful day. As he neared the center of the span the bucking deck tilted sideways and threw his car against the curb. The doors jammed so he crawled out the open window. He tried to get Tubby out, but the dog was too frightened to move as Coatsworth and the car bounced violently with the twisting waves of concrete. Coatsworth staggered and crawled away, trying once to return to get Tubby, but the motion kept throwing him to the ground. Several other people attempted to walk out to get Tubby, but the motion of the bridge was too violent and the flying chunks of concrete too dangerous. Coatsworth survived, but Tubby went down with the bridge.

Discussion Questions

- What is the importance of the story of Galloping Gertie?
- Why do engineers still study Galloping Gertie today?
- How did individuals cause change and influence the story of the bridge?
- What are some examples of cause and effect in the history of Galloping Gertie?
- What are some of the possible different perspectives on the bridge people might have had at the time?
- Imagine what it might have been like to have the bridge available for four months. How might it have affected people's lives? Now imagine how they might have felt after the bridge collapsed and they did not have another one for ten years. (Remind the students that they did have a ferry across the Narrows and also that WWII intervened).
- How does having photos, videos, and artifacts from Galloping Gertie help us investigate the past?

Possible Extensions

- Create a timeline of the work on all three Narrows Bridges. Include significant local, national and world events.
- Write a journal entry as one of the bridge workers, Clark Eldridge, Leon Moisseiff, Leonard Coatsworth, Burt Farquharson, or another person involved with the bridge.
- Investigate how the new bridges affected the way people on both sides of the Narrows lived and/or how they affected commerce and military preparedness.
- Investigate a question that comes up in class discussion.
- Build model bridges.
- Compare and contrast one of or all three Narrows bridges with other suspension bridges around the world or other suspension bridge failures.
- Invite a bridge engineer for a Q&A with the class.
- Investigate the importance of aerodynamics in bridge design.
- Visit Harbor History Museum and see the artifacts in real life!

Further Resources

- [Harbor History Museum online collection](#)
- [University of Washington Libraries Tacoma Narrows Bridge Collection](#)
- [Washington State Department of Transportation](#)
- [Frances Borgen Carlson, Gig Harbor Mail Carrier: the last person to drive across?](#)
- *Catastrophe to Triumph: Bridges of the Tacoma Narrows* by Richard S. Hobbs
- *Images of America: Tacoma Narrows Bridge* by Donald R. Tjossem
- *Galloping Gertie: The True Story of the Tacoma Narrows Bridge Collapse* by Amanda Abler, illustrated by Levi Hastings

Galloping Gertie Slideshow

Check out our slideshow of images and artifacts and use our Investigation and Discussion Questions for Artifacts and Images sheet to discuss what you see with your class. Use any or all of the questions that apply as you go through the slideshow. You will not be able to answer all of them – the questions we cannot answer are what lead historic investigation!

Slideshow Images from the Harbor History Museum Collection



Object Name: Print, Photographic
Date: 1929 - 1950
Description: View looking down on the ferry *Skansonia* leaving Gig Harbor for Point Defiance. The ferry landing was outside the mouth of Gig Harbor. *Skansonia* was built in 1929, 165' long with a 48' beam. After

the collapse of the first Narrows Bridge in November 1940, it shifted to service between Tacoma and Pt. Fosdick until the second Narrows Bridge opened.

Search Terms: Skansonia; Narrows; Gig Harbor

Subjects: Ferries

Catalog Number: 1998.027.018.001



Object Name: Print
Description: David Steinman took a Boland photo as sketched the first Narrows Bridge design over the top of the photograph.

Though this may be the original, it is more likely an early (1940) copy of that original concept drawing. It is the only copy known to exist.

Search Terms: Narrows Bridge; Galloping Gertie Collection; Gig Harbor

Subjects: Bridges

Catalog Number: 2000.065.001



Object Name: Print, Photographic
Date: 1940
Description: Aerial view of the Narrows Bridge looking NE; Tacoma in background.
Photographer: James Bashford
Collection: James Bashford Collection

Search Terms: Galloping Gertie Collection; Galloping Gertie; Narrows Bridge - 1st bridge; Narrows Bridge; Gig Harbor

Subjects: Bridges; Bridge failures

Catalog Number: 1998.027.018.001



Object Name: Camera, Box
Description: 4X5 Graflex R. B. Super D camera (camera used by James Bashford to capture the collapse of the first Narrows Bridge).

Collection: Narrows Bridge

Search Terms: 1st Narrows Bridge; Galloping Gertie Collection

Subjects: photography; cameras

Catalog Number: 1998.027.019.001



Object Name: Print, Photographic
Description: Black and white photograph of an individual standing outside the electric fence looking in at the construction area for the bridge. The two towers of the bridge were the first parts constructed.

Photographer: James Bashford

Collection: James Bashford Collection

Search Terms: Galloping Gertie Collection;

Galloping Gertie; Narrows Bridge - 1st bridge; Narrows Bridge; Gig Harbor

Subjects: Bridge failures; Bridges

Year Range from: 1938, Year Range to: 1940

Catalog Number: 1998.027.015.005



Object Name: Print, Photographic
Date: ca 1939
Description: Tower and sides under construction
Photographer: James Bashford
Collection: James Bashford Collection
Search Terms: Galloping Gertie Collection;
Galloping Gertie; Narrows Bridge - 1st
bridge; Narrows Bridge; Gig Harbor

Subjects: Bridges; Bridge failures

Year Range from: 1938, Year Range to: 1940

Catalog Number: 1998.027.015.053



Object Name: Print, Photographic
Description: bridge construction
Photographer: James Bashford
Collection: James Bashford Collection
Search Terms: Galloping Gertie Collection;
Galloping Gertie; Narrows Bridge - 1st
bridge; Narrows Bridge; Gig Harbor
Subjects: Bridges; Bridge failures
Year Range from: 1938,

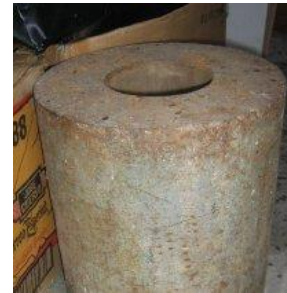
Year Range to: 1940

Catalog Number: 1998.027.015.054



Object Name: Print, Photographic
Description: First Narrows bridge, also
known as Galloping Gertie under
construction. Large metal part of the deck
being lifted into place between the two
towers; Tacoma's hillside in background.
Photographer: Bashford, James
Print size: 8" x 10"
Copyright: Photograph by James Bashford

Collection: James Bashford Collection
Search Terms: Galloping Gertie Collection; Galloping Gertie; Narrows
Bridge - 1st bridge; Narrows Bridge; Gig Harbor
Subjects: Bridges; Bridge failures; photography; bridge construction
Year Range from: 1938, Year Range to: 1940
Catalog Number: 1998.027.016.038



Object Name: Spool
Date: ca 1940
Description: Cable spool from 1st Narrows
Bridge. Found by a scuba diver in 1950s.
Cable went through hole in the middle of
spool.
Dimensions: H-10.5 Dia-10 inches
Collection: Narrows Bridge
People: Rembert Family

Search Terms: Narrows Bridge - 1st; Galloping Gertie Collection
Subjects: Spools; Cable industry
Catalog Number: 2003.035.001



Object Name: Print, Photographic
Description: First Narrows Bridge (Also
known as Galloping Gertie) under
construction looking at the tower, part of
the deck/roadbed and part of catwalk.
Photographer: Bashford, James
Print size: 8" x 10"
Copyright: Photograph by James Bashford
Collection: James Bashford Collection

Search Terms: Galloping Gertie Collection; Galloping Gertie; Narrows
Bridge - 1st bridge; Narrows Bridge; Gig Harbor
Subjects: Bridges; Bridge failures; photography; bridge construction
Year Range from: 1938, Year Range to: 1940
Catalog Number: 1998.027.016.048



Object Name: Print, Photographic
 Description: First Narrows Bridge (Also known as Galloping Gertie) under construction looking west, toward Gig Harbor, while on and from east anchorage.
 Photographer: Bashford, James
 Print size: 8" x 10"
 Copyright: Photograph by James Bashford
 Collection: James Bashford Collection

Search Terms: Galloping Gertie Collection; Galloping Gertie; Narrows Bridge - 1st bridge; Narrows Bridge; Gig Harbor
 Subjects: Bridges; Bridge failures; photography; bridge construction
 Year Range from: 1938, Year Range to: 1940
 Catalog Number: 1998.027.016.049

bridge fell. Had been stored in Clarence's home since 1940.
 Dimensions: H-7 W-7 L-34 inches
 Collection: Narrows Bridge
 Search Terms: 1st Narrows Bridge; Galloping Gertie Collection
 Subjects: Bridge construction
 Material: Steel
 Year Range from: 1940
 Catalog Number: 2003.052.001



Object Name: Print, Photographic
 Date: 1940
 Description: Roadway form work on east side span.
 Photographer: Bashford, James
 Copyright: Photograph by James Bashford
 Collection: James Bashford Collection
 Search Terms: Narrows Bridge; Gig Harbor; Galloping Gertie; Galloping Gertie

Collection; Narrows Bridge - 1st bridge
 Subjects: Bridges; photography; bridge construction; bridge failures
 Catalog Number: 1998.027.017.016



Object Name: Print, Photographic
 Date: 1940
 Description: Bridge construction; worker climbing wires; man on deck
 Photographer: Bashford, James
 Copyright: Photograph by James Bashford
 Collection: James Bashford Collection
 Search Terms: Galloping Gertie Collection; Narrows Bridge - 1st bridge; Narrows

Bridge; Gig Harbor
 Subjects: Bridges; photography; bridge construction
 Catalog Number: 1998.027.017.001



Object Name: Print, Photographic
 Date: 1940
 Description: Aerial view of the Narrows bridge looking from University Place toward Gig Harbor. Roadway in Gig Harbor in the foreground.
 Photographer: Bashford, James
 Copyright: Photograph by James Bashford
 Collection: James Bashford Collection

Search Terms: Galloping Gertie Collection; Narrows Bridge
 Subjects: Bridges; photography; bridge construction
 Catalog Number: 1998.027.018.007



Object Name: Bridge
 Date: 1940
 Description: Piece of support from the 1st Narrows Bridge. Picked up from the beach by Clarence Mullenix shortly after the



Object Name: Print, Photographic
 Date: 7/1/1940, Opening Day
 Description: Looking from the bridge back toward Tacoma, convertibles with flags and dignitaries have passed under the toll booth and are starting to cross the bridge. A large crowd can be seen in the background and several people are on top of the toll booth.

Photographer: Bashford, James
 Copyright: Photograph by James Bashford
 Collection: James Bashford Collection
 Search Terms: Galloping Gertie Collection; Narrows Bridge
 Subjects: Bridges; photography; bridge construction
 Catalog Number: 1998.027.018.019



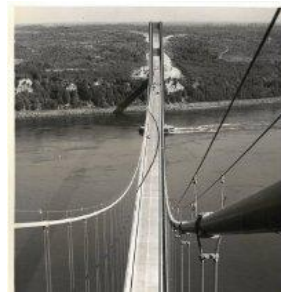
Object Name: Booklet
 Date: June 30-July 4, 1940
 Scope & Content: Souvenir booklet for opening of the 1940 Tacoma Narrows Bridge and McChord Field
 Catalog type: Archive
 Title: Official Opening Tacoma Narrows Bridge and McChord Field

Collection: Tacoma Narrows Bridge
 Search Terms: Tacoma Narrows Bridge; Narrows Bridge -- 1st bridge; Narrows Bridge; Galloping Gertie; Galloping Gertie Collection
 Subjects: Bridges; Celebrations; Air forces; Air bases
 Catalog Number: 2007.042.001

Object Name: Print, Photographic
 Date: 8/6/1940
 Description: Aerial view taken from the bridge tower itself, looking down the middle of the bridge. Gig Harbor, the construction site can



be seen in the background as well as two cars and some people on the bridge below.
 Photographer: Bashford, James
 Copyright: Photograph by James Bashford
 Collection: James Bashford Collection
 Search Terms: Galloping Gertie Collection; Narrows Bridge
 Subjects: Bridges; photography; bridge construction



Object Name: Print, Photographic
 Date: 8/6/1940
 Catalog Number: 1998.027.018.038
 Description: Aerial view taken from the bridge tower, looking down the cable at the bridge span below. Tacoma side of the bridge can be seen in the background as well as a cars on the bridge below.
 Photographer: Bashford, James

Copyright: Photograph by James Bashford
 Collection: James Bashford Collection
 Search Terms: Galloping Gertie Collection; Galloping Gertie; Narrows Bridge
 Subjects: Bridges; photography; bridge construction
 Catalog Number: 1998.027.018.042



Object Name: Print, Photographic
 Date: 1940
 Description: Bridge entrance - the cement sign reads "Tacoma Narrows Bridge." The toll booth can be seen in the background.
 Photographer: Bashford, James
 Copyright: Photograph by James Bashford
 Collection: James Bashford Collection

Search Terms: Galloping Gertie Collection; Narrows Bridge
Subjects: Bridges; photography; bridge construction
Catalog Number: 1998.027.018.078



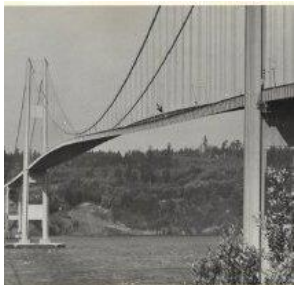
Object Name: Coupon
Date: 1940
Scope & Content: Tacoma Narrows Bridge toll coupon book, Nov. 1 to 15, 1940
Catalog type: Archive
Dates of Creation: Nov. 1 to 15, 1940

Collection: Tacoma Narrows Bridge

Search Terms: Tacoma Narrows Bridge; Narrows Bridge; Narrows Bridge -- 1st bridge; Narrows Bridge; Galloping Gertie; Galloping Gertie Collection

Subjects: Books; Bridges; Bridge failures; Transportation; Tickets; Toll bridges; Tolls

Catalog Number: 1987.015.001



Object Name: Print, Photographic
Date: 11/7/1940
Description: Bridge undulating, the beginning of the collapse. An arrow drawn in the middle of the photograph points to what is probably a car on the bridge. Photograph taken from the embankment looking toward Gig Harbor.
Photographer: Bashford, James

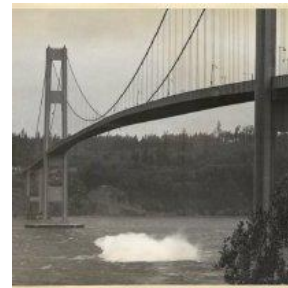
Copyright: Photograph by James Bashford

Collection: James Bashford Collection

Search Terms: Galloping Gertie Collection; Narrows Bridge

Subjects: Bridges; photography; bridge construction

Catalog Number: 1998.027.018.082

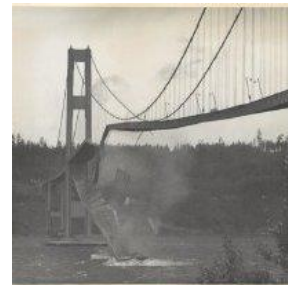


Object Name: Print, Photographic
Date: 11/7/1940
Description: Bridge at the beginning of the collapse- a large splash of water beneath. Photograph taken from the embankment looking toward Gig Harbor.
Photographer: Bashford, James
Copyright: Photograph by James Bashford
Collection: James Bashford Collection

Search Terms: Galloping Gertie; Galloping Gertie Collection; Narrows Bridge

Subjects: Bridges; photography; bridge construction

Catalog Number: 1998.027.018.083



Object Name: Print, Photographic
Date: 11/7/1940
Description: Galloping Gertie, the first Narrows Bridge collapsing. Photograph taken from the embankment looking toward Gig Harbor.
Photographer: Bashford, James
Copyright: Photograph by James Bashford
Collection: James Bashford Collection

Search Terms: Galloping Gertie; Galloping Gertie Collection; Narrows Bridge

Subjects: Bridges; photography; bridge construction

Catalog Number: 1998.027.018.085



Object Name: Print, Photographic
Date: 1940
Description: Galloping Gertie - piece of deck hanging down into the water.
Photographer: Bashford, James
Copyright: Photograph by James Bashford
Collection: James Bashford Collection
Search Terms: Galloping Gertie; Galloping Gertie Collection; Narrows Bridge

Subjects: Bridges; photography; bridge construction
Catalog Number: 1998.027.018.088



Pieces of steel believed to be from Galloping Gertie. Found underwater while building the 2007 bridge. On display at Harbor History Museum. Donated to HHM by the Washington State Department of Transportation, which operates and maintains the bridges today.



Object Name: Print, Photographic
Date: 1940
Description: Narrows Bridge cement support with a large crack; part of the bridge above.
Photographer: Bashford, James
Copyright: Photograph by James Bashford
Collection: James Bashford Collection
Search Terms: Galloping Gertie Collection;

Narrows Bridge
Subjects: Bridges; photography; bridge construction; bridge failures
Catalog Number: 1998.027.018.090



Object Name: Print, Photographic
Description: Pt. Fosdick ferry landing.
Titlow Beach – 6th Ave in Tacoma. Ferries ran from Pt. Fosdick to Titlow Beach after Narrows Bridge collapsed.
Search Terms: Narrows Bridge; ferries

Subjects: Ferries; photography
Catalog Number: 2018.001.070.060