University of Washington Engineering Experiment Station collection of Tacoma Narrows Bridge moving images, 1938-1984

Overview of the Collection

Filmmaker: Farquharson, F. B. (Frederick Burt)
Title: University of Washington Engineering Experiment Station collection of Tacoma Narrows Bridge moving images
Dates: 1938-1984 (inclusive)
1938 1984
Quantity: 1 video cassette (VHS) (8 minutes) : silent, color
1 video reel (21 minutes, 35 seconds) : silent, color ; 1 inch type C
72 film reels (15365 feet) : sound, silent, black and white, color ; 16 millimeter
Collection Number: PH0950
Summary: Films about the construction, failure, collapse and aftermath of the Tacoma Narrows Bridge including on-site and laboratory testing
Repository: University of Washington Libraries, Special Collections
Special Collections
University of Washington Libraries
Box 352900
Seattle, WA
98195-2900
Telephone: 206-543-1929
Fax: 206-543-1931
speccoll@uw.edu
Access Restrictions: The original films are not accessible due to preservation concerns.
However, viewing copies are available (VC652-VC668) in the Special Collections Division of the University of Washington Libraries.
Languages: English

Biographical Note

Frederick Burt Farquharson was an engineer and professor of engineering. He was born in Boston, Massachusetts in 1895. He studied at the University of Washington, earning his Bachelors of Science in Mechanical Engineering in 1923. He then spent two years working for Boeing Airplane Company, after which he returned to the University of Washington to earn his Masters degree and begin teaching. Farquharson taught in the University of Washington’s Department of Civil Engineering. He was granted the status of instructor in 1927, assistant professor in 1928, associate professor in 1937, and professor in 1940. From 1945 to 1963, Professor Farquharson directed the Engineering Experiment Station of the University of Washington. He retired from the University in 1963, and was made professor emeritus that same year.
Professor Farquharson's professional interests included various aspects of airplane design (especially early in his career), aerodynamics, and the use of wind tunnels for bridge design testing. He is most noted for the use of wind tunnels for his studies of the Tacoma Narrows Bridge collapse and for the development of the new Tacoma Narrows Bridge. He served on a number of committees concerned with engineering education and research for such professional engineering societies as the American Society of Civil Engineers and the American Society for Engineering Education. Professor Farquharson was also a member of the University of Washington Instructor's Association, which created and assessed a survey of salary and promotion facts, and of faculty opinions regarding the fairness of promotions. He was also called for expert testimony in 1957 in a trial concerning a failed spider staging cable used by a painter at the Weyerhauser Pulp Mill in Cosmopolis, Washington.

Farquharson was politically active during the economic depression of the 1930's. He had associations with such organizations as the League for Industrial Democracy and the National Council for the Prevention of War. His wife, Mary, was also active in anti-war and civil liberties movements, and served in the Washington State Senate.

Frederick Burt Farquharson passed away on June 17, 1970.

Historical Background

Construction began on the original Tacoma Narrows Bridge in November 1938. On July 1, 1940, the bridge opened to traffic. Lauded as an essential economic and military portal to the Olympic peninsula, its completion was called a triumph of man's ingenuity and perseverance. It had been completed in record time and, with a 2,800-foot central span, was the third largest span in the world. Immediately upon its opening it began swaying in the wind, which earned it the nickname “Galloping Gertie.” Only four months later, the bridge collapsed on November 7, 1940, in winds of 42 mph (67 km/h), this collapse was deemed “the Pearl Harbor of engineering.”

Contemporary accounts appeared to be shocked by the collapse, although the bridge had begun exhibiting wavelike motions during the final stages of construction. Professor F.B. Farquharson, an engineering professor at the University of Washington, and other University engineers were hired to suggest methods to reduce the movement on the bridge. Over the next few months experiments were conducted on a scale model, but a solution to the problem proved elusive.

On November 7, 1940, Professor Farquharson was there to witness and document the spectacular collapse of what had been the third longest suspension bridge in the world with the longest single span in the country. Farquharson claimed that the bridge “had a lateral twisting motion, in addition to the vertical wave,” which the bridge hadn’t exhibited before. The first span of the bridge to give way did so around 11:02 AM. This began with a 600-foot section towards the West side of the bridge, following this another span dropped. By 11:10 AM the bridge had settled with 30 foot deep sag to it.

Farquharson wasn’t the only man with a movie camera that day. He was accompanied on the East side of the bridge by two attendants from Tacoma’s The Camera Shop, Barney Elliot and Harbine Monroe, and by Walter Miles, a supervisor with the Pacific Bridge Company. On the West side of the bridge, was Dr. Jesse Read whose footage has disappeared.

In the aftermath, many theories were discussed concerning the cause of the bridge's collapse. Ultimately an investigative board for the Washington State Toll Bridge Authority announced the failure was due to the bridge's design reacting to the wind in the Narrows. The only fatality was a family dog, Tubby, who was too afraid to exit the car in which he was seated.

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Although rebuilding the bridge was immediately suggested, investigations on the wreckage found the entire superstructure to be unusable. The onset of World War II further stalled attempts to rebuild. Salvage activity continued on the bridge through 1942 with the materials going to the U.S. war effort and the profits saved for the construction of a new bridge.

While the salvage work went on, Professor Farquharson was commissioned to test models of the old Narrows Bridge and the new proposed design for the bridge. At the University of Washington's new structural research lab, built specifically to house the models, tests proved that the new design was sound. Construction on the new bridge began in the summer of 1948 and was finished in October 1950. The previous three and a half years spent studying aerodynamics ensured a bridge whose fate would not mimic the first. The Tacoma Narrows Bridge has remained standing.

Content Description

The Tacoma Narrows Bridge film collection consists of footage of the construction, failure, collapse and aftermath of the Tacoma Narrows Bridge, including newsreels, on-site and laboratory testing, and films of the second Tacoma Narrows Bridge. Films were created by Frederick B. Farquharson, head of the University of Washington Engineering Experiment Station, Phil Jacobsen from the University of Washington Campus Studios, as well as, Barney Elliot and Harbine Monroe of the Tacoma Camera Shop. Films from the University of Washington Engineering Experiment Station, the University of Washington Audio Visual Services Materials Library, and the University of Washington Educational Media Center were brought together to form this collection.

Other Descriptive Information

A majority of the films in this collection contain neither title cards nor credits. Individual film titles have been derived from canister and box labels present at the time of donation, when available.

Use of the Collection

Restrictions on Use

Creator’s copyrights transferred to the University of Washington Libraries Special Collections.

Administrative Information

Acquisition Information

Gift of Mary Farquharson

Processing Note


Separated Materials

Material Described Separately:

University of Washington Engineering Experiment Station collection of Tacoma Narrows Bridge moving images, 1938-1984

http://archiveswest.orbiscascade.org/ark:/80444/xv212280
Detailed Description of the Collection

Construction and Opening of the Tacoma Narrows Bridge (1940)

Films showing the construction and opening of the Tacoma Narrows Bridge in 1940.

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<th>Container(s)</th>
<th>Description</th>
<th>Dates</th>
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</table>
| VC652        | Tacoma Narrows Bridge--Construction[view]  
Construction of the Tacoma Narrows Bridge in May 1940, including the building of pillars, constructing cables, metal work, welding, and concrete laying.  
Original: 1 film reel (100 feet) : silent, color ; 16mm ; print. | May 1940 |
| VC652        | Bridge Construction[view]  
Men work on the Tacoma Narrows Bridge construction.  
Smoke tests demonstrate airflow across the bridge.  
Original: 1 film reel (100 feet) : silent, color ; 16mm ; camera original. | 1940? |
| VC652        | Opening Day of the Tacoma Narrows Bridge[view]  
Grand opening of the Tacoma Narrows Bridge with balloons and decorations. Cars drive and people walk across the bridge. A speech is given and people converse.  
The bridge has a slight undulating motion.  
Original: 1 film reel (200 feet) : silent, black and white ; 16mm ; camera original. | 1940 |

Pre-Failure Investigation

The motion of the bridge initiated an investigation into the cause. Films document the bridge motion, development of scale models, and testing on site, at the University of Washington Engineering Experiment Station, and at other research institutions.

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<tr>
<td>Viewcopy</td>
<td>Construction Material Experiments</td>
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<tr>
<td>Container(s)</td>
<td>Description</td>
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</table>
| VC656       | **Structural Test Laboratory** [view]  
A grid over two sections, labeled 1 and 2, moves slightly as though blowing in the wind.  
Original: 1 film reel (200 feet) : optical sound, black and white; 16mm ; print | 1938? |
| VC656       | **Engineering Experiment Station** [view]  
A grid over a section, labeled 12, moves slightly as though blowing in the wind.  
Original: 1 film reel (50 feet) : silent, black and white; 16mm ; print | 1938? |
| VC656       | **Subharmonic Vibrations** [view]  
A plate is set to vibrate at a selected frequency. A cylinder hanging on a spring above the plate is set in motion by the machine's operator. The free motion of the cylinder is affected by the controlled motion of the plate.  
Original: 1 film reel (20 feet) : silent, black and white; 16mm ; camera original | 1939? |
|             | **Model testing at the Structural Research Lab at the University of Washington** | 1939-1940? |
| VC654       | Bridge Model[view]  
Professor Farquharson and a colleague work over a model of the 1940 bridge, a sign reads "hands off test in progress." Farquharson adjusts a point on the main cable. The camera film the model from below and then from one end looking down the roadway.  
Original: 1 film reel (20 feet) : silent, color; 16mm ; camera original | 1939? |
| VC654       | Negative Movement on Model[view]  
The model of the bridge oscillates. The motion is recorded on a cylindrical device  
Original: 1 film reel (50 feet) : silent, black and white; 16mm ; print | 1939? |
| VC654       | Model Blueprints[view]  
Professor Farquharson and another man consult a paper. The blueprints for a P.W.S. Docket No. Wash. 1870-F are flipped through, showing pages labeled: Suspended Structure Girder Details; erection contract with Bethlehem Steel Company; Main Span Lateral System. Farquharson | 1940? |
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<th>Container(s)</th>
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<tr>
<td>VC654 10</td>
<td>Motion on Model <a href="#">view</a> A model bridge oscillates while its motion is recorded on a cylindrical device. Original: 1 film reel (50 feet) : silent, black and white; 16mm ; camera original. The model is of the first Tacoma Narrows Bridge as identified by the shape of the tower in item 35.</td>
<td>1940?</td>
</tr>
<tr>
<td>VC653 11</td>
<td>Tacoma Narrows Bridge--Motion on Bridge <a href="#">view</a> Views of abnormal undulating motion of the deck of Tacoma Narrows Bridge with cars crossing. Original: 1 film reel (400 feet) : silent, black and white; 16mm ; camera original. Note on can: #1 Black + White Early motion on bridge. Good picture of disappearing car about middle of reel.</td>
<td>1940</td>
</tr>
<tr>
<td>VC653 12</td>
<td>Motion on Tacoma Narrows Bridge <a href="#">view</a> Severe resonance resulting in abnormal undulating motion of the deck Tacoma Narrows Bridge. One car crosses. Original: 1 film reel (100 feet) : silent, black and white; 16mm ; camera original.</td>
<td>1940</td>
</tr>
<tr>
<td>VC653 13</td>
<td>Tacoma Narrows Bridge--Vertical Motion in Field <a href="#">view</a> The bridge demonstrates vertical undulating motion as people drive and walk across. Frederick Charnley Smith surveys the motion through a theodolite/transit instrument from a distance. Original: 1 film reel (100 feet) : silent, color/black and white; 16mm ; print with original splices. Frederick Charnley Smith, Assistant Professor of Civil Engineering, worked with Frederick Farquharson at the University of Washington Engineering Experiment Station.</td>
<td>1940</td>
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and collaborated with Farquharson to determine a cause for the unusual motion on the Tacoma Narrows Bridge.

**Laboratory model testing and on-site pre-failure motion of the bridge**

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<tr>
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| VC655 14     | *Narrows Bridge Prefailure and Lab Models* [view]  
A 1/20 scale model of the Tacoma Narrows Bridge demonstrates aerodynamic instability in a wind tunnel test at the University of Washington labs. The actual Tacoma Narrows Bridge undulates vertically as cars crossed with the motions slowed down in camera.  
Original: 1 film reel (250 feet) : silent, color/black and white; 16mm ; print with original splices | 1940 |
| VC655 15     | Tacoma Narrows Bridge failure and model*[view]*  
A man in a white shirt observes a full scale model of the bridge oscillating. The actual Tacoma Narrows Bridge oscillates.  
Original: 1 film reel (50 feet) : silent, black and white; 16mm ; camera original and print  
Footage of the model is camera original. | 1940? |
| VC655 16     | *Studies of Observed Motion and Air Flow*[view]*  
A model of the 1940 bridge oscillates. Oscillations from the model are recorded. A modeled section of the bridge is tested. The section of the bridge is tested with the addition of circular fairing. A man modifies the experimental setup.  
In the field, a man attaches a smoke flare to the end of a beam extending from the bridge. Smoke is released to demonstrate the air flow patterns around the girder. A US Army air ship flies over the bridge.  
Original: 1 film reel (100 feet) : silent, color/black and white; 16mm ; camera original | 1941? |

**Fluid dynamics testing of girder shapes and other on-site and lab observations**

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<th>Container(s)</th>
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| VC657 17     | *Smoke Tests and Man Surveying Bridge*[view]*  
Testing of girder shapes: flow pattern in water with aluminum dust on surface. Double exposure of film with both fluid dynamics testing. A hand cleans the camera lens as a man sets up theodolite/transit instrument to... | 1940 |

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| VC657 18    | Water Test (60 Frames per Second) [view](#)  
Two girders with a connecting structure undergo testing in water.  
Original: 1 film reel (200 feet) : silent; black and white; 16mm ; camera original | 1940? |
| VC657 19    | Model of Suspended Structure Tested in Water [view](#)  
A girder is subjected to fluid dynamic testing in water. A solid front is added to the girder which disrupts the wake.  
Original: 1 film reel (100 feet) : silent; black and white; 16mm ; camera original | 1940? |
| VC657 20    | *Stanford and Cal Tech March 1941* [view](#)  
In Stanford/Cal Tech labs a bridge section oscillates in a wind tunnel. Views of a model bridge. A model of suspended structure is tested in water: two girders joined by a connecting structure. These tests are repeated at rotated orientation.  
Original: 1 film reel (100 feet) : silent, black and white; 16mm ; camera original  
Testing of suspended structure in water appears to feature the same equipment as used in Reel 19.Included in the donated film canister are the names: Fred Smith, Japben (Stanford), and Dunn (Cal Tech). Louis Dunn (1908-1979) was a Professor of Aeronautics 1945-1954 and the Director of the Jet Propulsion Laboratory 1947-1954. "Japben" could potentially allude to Jack R. Benjamin (1917-1998) who was a colleague of Farquharson, a ssisted with the study of the collapse of the Tacoma Narrows Bridge, and worked at Stanford from 1948-1973. From the notes on the canister it can be concluded that these models observed in this film are from Dunn and Benjamin from Cal Tech and Stanford. | 1940? |
| VC657 21    | *Cal. Tech. Models* [view](#)  
A section of the bridge oscillates, with the camera focusing on the end/cross-section of the two girders with a connecting structure. A ruler indicates the magnitude of oscillation. The model of two connected girders oscillates. | 1941? |
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<td>Original: 1 film reel (150 feet) : silent, black and white; 16mm ; camera original</td>
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**Bridge Pre-Failure Compilation by Tacoma Narrows Camera Shop**

<table>
<thead>
<tr>
<th>Viewcopy</th>
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<tbody>
<tr>
<td>VC658 22</td>
<td><em>Tacoma Narrows Bridge--Scenes of Failure and Lab Model at U of W Copy A [view]</em></td>
</tr>
<tr>
<td></td>
<td>The bridge undulates rapidly before its collapse. Motion slowed to quarter speed for study. A man surveys the rhythm of the oscillating bridge by observing through a theodolite/transit instrument from a distance. A 1/100 scale model of the bridge is tested at the Structural Laboratory at the University of Washington. Circular fairing is added to the model girders to reduce wind load and suppress the vortex around the body of the bridge. Air flow around the girder is studied with the aid of smoke at the site of the bridge. The bridge moves most violently on November 7th, during a wind speed of 42mph. Original: 1 film reel (350 feet) : silent, black and white; 16mm ; print Credits Photography by B. D. Elliott, T. Harbine Monroe, August Von Boecklin, F. B. Farquharson. Technical description by Professor F. B. Farquharson, Civil Engineering Department, University of Washington. Produced by the Tacoma Camera Shop, Tacoma, Washington. The content is the same as item 23, except this copy includes two additional scenes of smoke tests conducted on the model. Note on can: My copy#1 B+W Short on end</td>
</tr>
<tr>
<td>VC658 23</td>
<td><em>Tacoma Narrows Bridge--Scenes of Failure and Lab Model at U of W Copy B [view]</em></td>
</tr>
<tr>
<td></td>
<td>The bridge has abnormal undulating motion before its collapse. Motion slowed to quarter speed for study. A man surveys the rhythm of the oscillating bridge by observing through a theodolite/transit instrument from a distance. A 1/100 scale model of the bridge is tested at the Structural Laboratory at the University of Washington. Circular fairing is added to the model girders to reduce wind load and suppress the vortex around the body of the bridge. Air flow around the girder is studied with the aid of smoke at the site of the bridge. The bridge oscillates as cars drive across it. Title about events on November 7th with wind of 42mph.</td>
</tr>
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</table>

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Original: 1 film reel (400 feet) : silent, black and white; 16mm ; print
The content is the same as item 22, except it is missing smoke tests included at the beginning and end of item 22. Note on can: 1 end title removed for replacement on ASCE film (American Society of Civil Engineers).

VC658 24  
**Tacoma Narrows Bridge** [view]
The bridge has abnormal motion before its collapse. Motion slowed to quarter speed for study. A man surveys the rhythm of the oscillating bridge by observing through a theodolite/transit instrument from a distance. A 1/100 scale model of the bridge is tested at the Structural Laboratory at the University of Washington. Circular fairing is added to the model girders to reduce wind load and suppress the vortex around the body of the bridge. Air flow around the girder is studied with the aid of smoke at the site of the bridge. The bridge moves most violently on 7th November with wind of 42mph.
Original: 1 film reel (350 feet) : silent, black and white; 16mm ; print
CreditsPhotography by B. D. Elliott, T. Harbine Monroe, August Von Boecklin, F. B. Farquharson. Technical description by Professor F. B. Farquharson, Civil Engineering Department, University of Washington. Produced by the Tacoma Camera Shop, Tacoma, Washington. There is no Reel Two.

VC658 25  
**Tacoma Narrows Bridge--Early Motion and Various Models** [view]
Cars drive across the bridge white it oscillates. The motion of the bridge is slowed down to quarter speed for study. In the Structural Laboratory at the University of Washington a 1/100 scale full model of the Tacoma Narrows Bridge replicates the oscillations observed in the field. A 1/20 scale model of suspended structure is tested in a wind tunnel. A man paints a large section of steel. The 1/20 scale model oscillates with a high frequency.
Original: 1 film reel (200 feet) : silent, color/black and white; 16mm ; print with original splices

**Failure day footage from November 7, 1940**
Films documenting the failure of the Tacoma Narrows Bridge.

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<td>Newsreels</td>
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<td>Viewcopy</td>
<td>Item</td>
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<tr>
<td>VC659 26</td>
<td><strong>News of the Day - Collapse of the Tacoma Bridge!</strong> [view] Professor Farquharson stands in front of the collapsed bridge. The deck hangs down from the bridge into the water. He speaks to the camera. The bridge resonates violently pre-collapse. Farquharson looks through a Cine Kodak Special camera. Farquharson returns to land from the undulating bridge. Farquharson concludes the news report. Original: 1 film reel (100 feet) : silent, black and white; 16mm ; print Metro Goldwyn Mayer newsreel.</td>
<td>1940</td>
</tr>
<tr>
<td>VC659 27</td>
<td><strong>Nov. 7, 1940 Narrows Bridge Collapse!</strong> [view] Short film titled: Nov. 7, 1940 Narrows Bridge Collapse! A man sets up a camera to film the bridge which is oscillating at high amplitude with a node in the center of the main span. The east hold-down shows unwanted movement. Professor Farquharson runs from the lone car on the bridge to land as the bridge collapses behind him. The deck hangs down from the main span in the mid-section of the bridge. A closed toll booth sign blocks access to the collapsed bridge. Original: 1 film reel (400 feet) : silent, color; 16mm ; print with original splices</td>
<td>1944?</td>
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<tr>
<td>Viewcopy</td>
<td>Item</td>
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<tr>
<td>VC659 28</td>
<td><strong>Narrows Bridge Reel Two</strong> [view] The Tacoma Narrows Bridge oscillates violently with a lone car on its main span. Professor Farquharson sets up a camera. The bridge oscillates as cars drive over it pre-failure. Original: 1 film reel (400 feet) : silent, black and white; 16mm ; print with original splices</td>
<td>1940?</td>
</tr>
<tr>
<td>VC659 29</td>
<td><strong>Day of Failure</strong> [view] The Tacoma Narrows Bridge is filmed on the day of its collapse as it oscillates in the wind. A man sets up his camera.</td>
<td>1940</td>
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<table>
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| VC659 30    | Mid-Section Pre-Failure[view]  
The deck of the midsection of the bridge undulates and twists violently.  
Original: 1 film reel (20 feet) : silent, color; 16mm ; print | 1940 |
| VC659 31    | Narrows Bridge Failure Reel III [view]  
A man sets up a camera to film the bridge which is oscillating at high amplitude with a node in the center of the main span. The east hold-down shows unwanted movement. Professor Farquharson runs from the lone car on the bridge to land as the bridge collapses behind him. The deck hangs down from the main span in the mid-section of the bridge. A closed toll booth sign blocks access to the collapsed bridge. After the collapse, the Public Works Administration (PWA) investigates the bridge remnants, looking at cracked sidewalks and bent metal.  
Original: 1 film reel (400 feet) : silent, black and white; 16mm ; print | 1945? |
| VC659 32    | Pre- and Post-TNB Failure[view]  
An abandoned car on the bridge is rocked up and down as the deck of the bridge oscillates. The roadway moves up and down rapidly. The mid-span of the bridge has collapsed and hangs into the water.  
Original: 1 film reel (100 feet) : silent, black and white; 16mm ; print  
The car belonged to Leonard Coatsworth. His daughter's cocker spaniel, Tubby, was trapped in the car and became the only victim of the bridge collapse. (Hobbs, 2006) | 1959? |
| VC659 33    | Bridge Collapse [view]  
The bridge oscillates and twists violently. The deck of the mid-section of the bridge hangs down into the water.  
Original: 1 film reel (100 feet) : silent, black and white; 16mm ; print | 1940? |
| VC659 34    | Failure and Post-Failure[view]  
November 7, 1940. Views of the road leading down to the bridge. The bridge spans the narrows. Cars drive over the bridge as the surface moves up and down. Boats bob around in their docks with the bridge in the background. The bridge's mid-span is undulating and twisting rapidly. The mid-span twists more violently. The deck of the mid-span breaks away from the bridge and falls into the water. The damage to the bridge is inspected: steel girders are... | 1959? |
bent, the roadway is ruptured. The mid-span of the bridge is absent. Original: 1 film reel (100 feet) : silent, black and white; 16mm ; print This footage is different than the most common footage of the bridge failure.

Aftermath: investigations on site

Films of the aftermath of the bridge collapse. Some investigations were conducted by the Public Works Administration.

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<tr>
<td>VC660 35</td>
<td>Inspecting Tacoma Narrows Bridge Collapse [view] The Public Works Administration committee investigates the bent and warped metal after the collapse. Blueprints and a map are examined. A 1/100 scale model bridge oscillates. Newspapers are shown, with headlines reporting on the bridge collapse. A hand opens a filing cabinet. Original: 1 film reel (100 feet) : silent, color; 16mm ; camera original</td>
</tr>
<tr>
<td>VC660 36</td>
<td>Personal Pictures at Crash Site [view] Professor Farquharson observes the damaged bridge. Farquharson and the Public Works Administration committee investigate parts of the collapsed Tacoma Narrows bridge. Original: 1 film reel (25 feet) : silent, color; 16mm ; print with original splices</td>
</tr>
<tr>
<td>VC660 37</td>
<td>TNB Failure - Model Setup [view] Professor Farquharson observes the entire damaged bridge. Farquharson and the Public Works Administration committee investigate parts of the collapsed Tacoma Narrows bridge. Sizes from blueprints of the bridge are converted with a scale slide rule for model construction. A scale model of the bridge is constructed and weights are added to anchor the ends. The model oscillates. A paper by Professor Farquharson, A Dynamic Model for the Tacoma Narrows Suspension Bridge, is presented to the camera. Two textbooks are presented to the camera, Civil Engineering by American Society of Civil Engineers and Engineering News Record.</td>
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**Fluid dynamics testing**

After the first bridge collapsed, and before the second was built, a series of experiments were conducted to explain the failure of the first bridge and ensure the structural integrity of the second bridge.

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<td>VC661 38</td>
<td><em>Narrows Bridge Failure--Lab Studies (Reel II)</em> [view]</td>
<td>between 1941 and Dec 1942?</td>
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<tr>
<td>VC661 39</td>
<td><em>Engineering Structural Experiment</em> [view]</td>
<td>1941?</td>
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<tr>
<td>VC662 40</td>
<td><em>Open deck model (full span)</em> [view]</td>
<td>1942?</td>
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</table>
| VC662      | Wind Flow over Open Deck Model (Section) [view]  
Stannic chloride smoke reveals airflow over a section of the model with an open wind grating deck. First test: 1 Node Tors 525 RPM LC Full Open Deck. Second test: 1 Node Tors 700 RPM LC Open Side Walk.  
Original: 1 film reel (100 feet) : silent, black and white; 16mm ; camera original  
These tests were conducted at the Structural Research Labatory at the University of Washington by Professor B. Farquharson to confirm the stability of Dexter R. Smith's design for the replacement Tacoma Narrows Bridge, opened in 1950 (Hobbs, 2006, p.95). | 1942?                                      |
| VC662      | Wind Flow Studies Early Open Deck [view]  
Stannic chloride smoke reveals air flow over, and then under, a section of the bridge model. Inter-titles describe the change in frequency, nodes and frame rate.  
Original: 1 film reel (150 feet) : silent, black and white; 16mm ; camera original  
These tests were conducted at the Structural Research Labatory at the University of Washington by Professor B. Farquharson to confirm the stability of Dexter R. Smith's design for the replacement Tacoma Narrows Bridge, opened in 1950 (Hobbs, 2006, p.95). | between January 2, 1943 and March 27, 1943 |
| VC662      | Wind Flow over Open Deck Model (Section) [view]  
Stannic chloride smoke reveals air flow over, and then under, a section of the open deck bridge model. Cards describing the number of nodes and the date are held in frame.  
Original: 1 film reel (150 feet) : silent, black and white; 16mm ; camera original  
These tests were conducted at the Structural Research Labatory at the University of Washington by Professor B. Farquharson to confirm the stability of Dexter R. Smith's design for the replacement Tacoma Narrows Bridge, opened in 1950 (Hobbs, 2006, p.95). | between January 2, 1943 and March 27, 1943 |

**Smoke Flow On Site**

| Viewcopy | Item | Narrows Bridge--Wind studies in field (smoke pictures) [view] | 1941? |

University of Washington Engineering Experiment Station collection of Tacoma Narrows Bridge moving images, 1938-1984  
http://archiveswest.orbiscascade.org/ark:/80444/xv212280
<table>
<thead>
<tr>
<th>Container(s)</th>
<th>Description</th>
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</tr>
</thead>
<tbody>
<tr>
<td>VC663 45</td>
<td><em>Tacoma Narrows Bridge Aerodynamic Testing</em> [view] Wind-induced spread of smoke to demonstrate airflow, filmed from a boat below the bridge. Four streams of smoke are released from and next to the bridge tower. Original: 1 film reel (200 feet) : silent, color; 16mm ; camera original Camera original, however not taken with Farquharson's camera. The floor systems of the bridge were removed December 1940. Dismantling officially began September 1941. (Hobbs, 2006, p.94).</td>
<td>1941?</td>
</tr>
<tr>
<td>VC663 46</td>
<td><em>Narrows Bridge--Wind studies in field</em> [view] May 1st 1942, Wind Approx. 25mph. Smoke is released from the eastern tower to demonstrate airflow. Original: 1 film reel (100 feet) : silent, color; 16mm ; camera original</td>
<td>between 1941 and May 1, 1942?</td>
</tr>
<tr>
<td>VC663 47</td>
<td>1942 Narrows Bridge Wind Flow Studies [view] Smoke is released from the base of the eastern tower. The source of the smoke rises up the tower until at the level of the former deck. Original: 1 film reel (50 feet) : silent, color; 16mm ; camera original</td>
<td>May 26, 1942</td>
</tr>
</tbody>
</table>

**Investigating the wake and recirculation of different shapes placed in a fluid**

<table>
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<tr>
<th>Viewcopy</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>VC664 48</td>
<td>August 6, 1941 Lab Tests #1 [view] Fluid dynamic testing of different girder shapes and orientations in a fluid.</td>
</tr>
</tbody>
</table>

University of Washington Engineering Experiment Station collection of Tacoma Narrows Bridge moving images, 1938-1984
http://archiveswest.orbiscascade.org/ark:/80444/xv212280 16
<table>
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<tr>
<th>Container(s)</th>
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<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>VC664 49</td>
<td>Model of suspended structure tested in water<a href="#">view</a> Fluid dynamics test 5: equilateral triangle with beam extended from base. Ruler present. Original: 1 film reel (50 feet) : silent, black and white; 16mm ; negative</td>
<td>1947?</td>
</tr>
<tr>
<td>VC664 50</td>
<td>Various Tests with Model<a href="#">view</a> Fluid dynamics test 6: equilateral triangle with beam extended from base. Ruler present. Original: 1 film reel (50 feet) : silent, black and white; 16mm ; negative</td>
<td>1947?</td>
</tr>
<tr>
<td>VC664 51</td>
<td>Studies of Observed Motion and Air Flow<a href="#">view</a> Fluid dynamics test 7: circle. Ruler present. Original: 1 film reel (50 feet) : silent, black and white; 16mm ; negative</td>
<td>1947?</td>
</tr>
<tr>
<td>VC664 52</td>
<td>Wind Study, Smoke Pictures<a href="#">view</a> Fluid dynamics test 8: circle. Ruler present. Original: 1 film reel (50 feet) : silent, black and white; 16mm ; negative</td>
<td>1947?</td>
</tr>
<tr>
<td>VC664 53</td>
<td>Wind flow studies on model<a href="#">view</a> Fluid dynamics test 9: large circle. Ruler present. Original: 1 film reel (20 feet) : silent, black and white; 16mm ; negative</td>
<td>1947?</td>
</tr>
<tr>
<td>VC664 54</td>
<td>Farquharson Motion Tests ca. 1947<a href="#">view</a> Fluid dynamics test 10: large circle. Ruler present. Original: 1 film reel (50 feet) : silent, black and white; 16mm ; negative</td>
<td>1947?</td>
</tr>
<tr>
<td>VC664 55</td>
<td>Wind Flow Studies with Smoke and Ruler<a href="#">view</a> Fluid dynamics test 12: part of a large equilateral triangle. Ruler present. Original: 1 film reel (100 feet) : silent, black and white; 16mm ; negative</td>
<td>1947?</td>
</tr>
<tr>
<td>VC664 56</td>
<td><em>In Lab Smoke Test</em> <a href="#">view</a> Fluid dynamics test 13: semi-circle. Ruler present. Original: 1 film reel (20 feet) : silent, black and white; 16mm ; negative</td>
<td>1947?</td>
</tr>
<tr>
<td>VC664 57</td>
<td><em>Water Tests</em> <a href="#">view</a></td>
<td>1947?</td>
</tr>
</tbody>
</table>
Fluid dynamics test 19: equilateral triangle. Ruler present. Original: 1 film reel (20 feet): silent, black and white; 16mm; negative

Model of Structure Tested Underwater
Fluid dynamics test 20: equilateral triangle. Ruler present. Original: 1 film reel (20 feet): silent, black and white; 16mm; negative

Motion on Model (Water Tests)
Fluid dynamics test 21: equilateral triangle. Ruler present. Original: 1 film reel (50 feet): silent, black and white; 16mm; negative

Tacoma Narrows Bridge (1940) Construction, Failure and Testing Compilation Films

Tacoma Narrows Bridge Failure Film
This series includes several versions of a film compiled by Frederick Farquaharson, consisting of existing footage, which gives an overview of the construction, failure, and collapse of the Tacoma Narrows Bridge.

Work on Piers began November 26, 1930. 510 ton anchors hold caissons in place. Men prepare and drop anchors into the Narrows. Completion of the construction of the bridge: workmen install cables. The bridge is opened with a speech and a guided precession. The bridges moves with abnormal motion for a suspension bridge. On November 7th, the bridge’s motion is exceptionally violent until the main span crashes. A 1/50 scale model of the bridge is tested in a lab at the University of Washington for nodes of motion at various wind speeds. Fluid dynamics tests are conducted over parts of the model. Original: 1 film reel (700 feet): silent, color; 16mm; print

This is the only reel with the title: Work on Piers began...
install cables. The bridge is opened with a speech and a guided precession. The bridges moves with abnormal motion for a suspension bridge. On November 7th, the bridge’s motion is exceptionally violent until the main span crashes. A 1/50 scale model of the bridge is tested in a lab at the University of Washington for nodes of motion at various wind speeds. Fluid dynamics tests are conducted over parts of the model.
Original: 1 film reel (700 feet) : silent, color; 16mm ; print
The beginning of this reel differs from the other reels in this series. There is no title or introduction.

VC665  62  Tacoma Narrows Bridge Failure Negative[view]
Completion of the construction of the bridge: workmen install cables. The bridge is opened with a speech and a guided precession. The bridges moves with abnormal motion for a suspension bridge. On November 7th, the bridge’s motion is exceptionally violent until the main span crashes. A 1/50 scale model of the bridge is tested in a lab at the University of Washington for nodes of motion at various wind speeds. Fluid dynamics tests are conducted over parts of the model. Air flow studied with aid of smoke at the site of the former bridge.
Original: 1 film reel (700 feet) : silent, black and white ; 16mm ; negative
The beginning of the film is missing compared to master reel.

VC665  63  Tacoma Narrows Bridge Failure[view]
Work on Piers began November 26, 1930. 510 ton anchors hold caissons in place. Men prepare and drop anchors into the Narrows. Completion of the construction of the bridge: workmen install cables. The bridge is opened with a speech and a guided precession. The bridges moves with abnormal motion for a suspension bridge. On November 7th, the bridge’s motion is exceptionally violent until the main span crashes. A 1/50 scale model of the bridge is tested in a lab at the University of Washington for nodes of motion at various wind speeds. Fluid dynamics tests are conducted over parts of the model.
Original: 1 film reel (700 feet) : silent, color; 16mm ; print
Print from negative item 62.

VC665  64  Tacoma Narrow's Bridge Failure Film[view]
Content from Tacoma Narrows Bridge Failure Master transferred to videotape with interpretive titles. The motion
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<tr>
<td>Viewcopy Item</td>
<td>of the film is slowed down in certain places to illustrate the movement of the bridge. Original: 1 film reel (21 minutes) : silent, color; Type C 1&quot; open reel videotape</td>
<td></td>
</tr>
</tbody>
</table>

Cassette

64A 64A  *The Story of the Tacoma Narrows Bridge* 1 videocassette (8 minutes) : silent, color ; VHS Scenes of the collapse of the Tacoma Narrows Bridge. Credits: Published by the Tacoma Camera Shop. 1940

Film Elements: titles, audio, cuttings

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<td>Viewcopy Item</td>
<td><strong>Negative Cuttings Tacoma</strong> <a href="#">view</a> A montage of clips from before, during, and after the collapse, with no clear order assigned. The 1/100 scale model in the University of Washington Structural Laboratory oscillates. The Tacoma Narrows Bridge oscillates pre-failure. The bridge oscillates aggressively on its day of failure. People survey the damage. Professor Farquharson observes the entire bridge with a collapsed mid-section. People and cars cross the mildly oscillating bridge before it fails. The camera surveys the remains of the collapsed bridge. A man walks off of the wildly oscillating bridge on the day of collapse. The roadway breaks. Original: 1 film reel (200 feet) : silent, black and white; 16mm ; negative</td>
<td>between 1939 and 1940?</td>
</tr>
<tr>
<td>VC666 65</td>
<td><strong>Titles Tacoma Bridge</strong> <a href="#">view</a> Titles: &quot;Total Collapse; On the morning of November 7 the frequency was 36 cycle per minute with the wind blowing at 42 mph; On the morning of November 7 the frequency was 36 cycle per minute with the wind blowing at 42 mph; The PWA Investigates; Prof. Farquharson risks life to save dog in car; Gail causes bridge to sway; The only damage sustained by the concrete prior to the final failure was in the curb and sidewalk.&quot; Original: 1 film reel (50 feet) : silent, black and white; 16mm; print</td>
<td>1940?</td>
</tr>
</tbody>
</table>
### Container(s) | Description | Dates
--- | --- | ---
VC666 67 | **VC666 67**
*Title Part 1 and 2 [view]*
Contains two titles: "End Part 1" and "End Part 2."
Original: 1 film reel (10 feet) : silent, black and white; 16mm ; print | 1945?  

VC666 68 | **VC666 68**
*Mag: Heartbeat like Sound [view]*
Repetitive "wub wub" sound
Original: 1 film reel (10 feet) : sound; 16mm ; magnetic audio | between 1939 and 1945?  

VC666 69 | **VC666 69**
*Doppler #3 [view]*
Continuous"wub wub" sound.
Original: 1 film reel (100 feet) : sound; 16mm ; magnetic audio | between 1939 and 1945?  

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**Tacoma Narrows Bridge (1950)**

### Container(s) | Description | Dates
--- | --- | ---
Viewcopy Item | **Viewcopy Item**

VC667 70 | **VC667 70**
*Narrows Bridge Structural tests in lab [view]*
A model made from warren truss oscillates. Two men walk along and point at the model, with one of them taking photos. A man holds his finger by a device being used on the bridge. Farquharson explains the model to a group of four men.
Original: 1 film reel (50 feet) : silent, black and white; 16mm ; camera original
Warren truss was used on the 1950 Tacoma Narrows Bridge | 1943?  

VC667 71 | **VC667 71**
*Tacoma Narrows Bridge Cable Spinning [view]*
Wires are measured. Workers rub their hands to warm up and open their mail. Wires are moved across the bridge by a spinning wheel on a pilot line. A worker climbs along a catwalk to adjust the wire. Snow covers the landscape surrounding the cable anchorage.
Original: 1 film reel (200 feet) : silent, color ; 16mm ; camera original
Camera original, but not from Farquharson's camera. This was the second bridge's construction, determined by the crosses located in the suspension towers, whereas the first one was solid. | 1949?  

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VC667 72 | **VC667 72**
*Tacoma Narrows Bridge 2 Construction [view]* | 1949?  

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A group of people walk across the partially constructed 1950 bridge. The group pose in front of one of the main cables. Workers tie metal cables to secure the "cable band" around the wires that make up the main cable. The camera examines the warren truss of the bridge from below. Cars drive across the bridge with Mt. Rainier in the background. The bridge is filmed from the perspective of those driving over it. A worker attached to one of the main cables waves to the camera. Cars pass through the toll station. Two men converse. A procession of cars crosses the bridge to celebrate its opening.

Original: 1 film reel (300 feet) : silent, color ; 16mm ; camera original

VC667    73  
Cable Spinning [view]
The 1950 Tacoma Narrows Bridge is opened with a speech and crowds celebrating. A team of people involved in the project pose in front of a main cable during construction. A painted model demonstrates how wires are carried across the span. Reels of wires are processed on site during construction. Wires are moved across the bridge by a spinning wheel on a pilot line. Workers tie the wires together to make the cable. Workers on a catwalk tie metal cables to secure the "cable band" around the wires that make up the main cable. The cables are painted orange. The bridge is operational with Mt Rainier in the background.

Original: 1 film reel (800 feet) : sound, color ; 16mm ; print

Names and Subjects

Subject Terms :
Moving Image Collections (University of Washington)
Visual Materials Collections (University of Washington)

2019 (Last modified: 1/31/2020)

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