NPS Form 10-900-b (Rev. 01/2009) OMB No. 1024-0018 (Expires 5/31/2012)

United States Department of the Interior
National Park Service

National Register of Historic Places Multiple Property Documentation Form

This form is used for documenting property groups relating to one or several historic contexts. See instructions in National Register Bulletin *How to Complete the Multiple Property Documentation Form* (formerly 16B). Complete each item by entering the requested information. For additional space, use continuation sheets (Form 10-900-a). Use a typewriter, word processor, or computer to complete all items

X New Submission _____ Amended Submission

A. Name of Multiple Property Listing

Willamette River Highway Bridges of Portland, Oregon

B. Associated Historic Contexts

(Name each associated historic context, identifying theme, geographical area, and chronological period for each.)

Willamette River Bridges of Portland, Oregon (1910-1973)

C. Form Prepared by

name/title George Kramer, Senior Preservation Specialist
organization Heritage Research Associates, Inc. for ODOT date March 2011
street & number 1997 Garden Avenue telephone (541) 482-9504
city or town Eugene state OR zip code 97403
e-mail george@preserveoregon.com

D. Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this documentation form meets the National Register documentation standards and sets forth requirements for the listing of related properties consistent with the National Register criteria. This submission meets the procedural and professional requirements set forth in 36 CFR 60 and the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation.
(_____ See continuation sheet for additional comments.)

Signature and title of certifying official Oregon Deputy State Historic Preservation Officer	Date 9.20.12
State or Federal Agency or Tribal government	

I hereby certify that this multiple property documentation form has been approved by the National Register as a basis for evaluating related properties for listing in the National Register.

Signature of the Keeper		Date of Action 11/14/12

Table of Contents for Written Narrative

Provide the following information on continuation sheets. Cite the letter and title before each section of the narrative. Assign page numbers according to the instructions for continuation sheets in National Register Bulletin *How to Complete the Multiple Property Documentation Form* (formerly 16B). Fill in page numbers for each section in the space below.

Page Numbers

E. Statement of Historic Contexts

(if more than one historic context is documented, present them in sequential order.)

E. Statement of Historic Contexts

Willamette River Bridges of Portland, Oregon (1910-1973)

INTRODUCTION

Portland, Oregon, bisected by the Willamette River, boasts a collection of ten highway bridges that for more than a century have helped to meld the two halves of the city into one. Those ten spans, from upriver heading downstream by River Mile [RM], with their type and primary engineer, are;

River Mile	Bridge Name	Type	Primary Engineer	Year
16.5	Sellwood	Fixed Truss	Gustav Lindenthal	1925
14.0	Ross Island	Fixed Truss	Gustav Lindenthal	1926
13.5	Marquam	Fixed Truss	ODOT	1966
13.1	Hawthorne	Vertical-Lift Truss	Waddell & Harrington	1910
12.8	Morrison	Bascule Truss	Sverdrup & Parcel	1958
12.4	Burnside	Bascule Truss	Hedrick & Kremers	1926
12.1	Steel	Vertical-Lift Truss	Waddell & Harrington	1912
11.7	Broadway	Bascule Truss	Ralph Modjeski	1913
11.1	Fremont	Fixed Arch	Parsons, Brinkerhoff, Quade & Douglas	1973
5.8	St. Johns	Fixed Suspension	Steinman & Robinson	1931

Portland first developed during the 1850s-1870s on the west bank of the river, while the east bank developed as several separate governmental entities. The modern City of Portland dates from an 1891 vote to consolidate the community, an act that directly stems from the 1887 completion of the first Morrison Street Bridge, the first trans-Willamette River bridge. Since then, as replacement and new bridges have been constructed to meet growing transportation and economic needs, the Willamette River Bridges of Portland, Oregon, have played an enduring role in defining the character of the city known affectionately as "Bridgetown."[1]

Built and owned by private interests, the City of Portland, Multnomah County, and the State of Oregon, the Willamette River Bridges represent more than a century of investment in transportation and are connected with important aspects of local development, funding, politics, and the economy. The city's "free bridge" movement, a refutation of toll charges—along with near-constant debate over need, funding, design, and contracting—have played a significant role in the city's electoral politics. Key individuals, from corporations, builders, and designers, along with neighborhood promoters, have all seen the value and potential of building new or improved bridges in Portland. Trans-Willamette River connectivity has been a major force in the development of the strong multi-nodal community character of Portland, where clearly defined neighborhoods, from St. Johns to Sellwood, continue to complement the central downtown core.

Today, from the oldest of its trans-Willamette spans, the Hawthorne Bridge, completed in 1910, to the most recent, the Fremont Bridge, completed in 1973, Portland's Willamette River Bridges represent a

[1] As used here, "Willamette River Bridges" refers to the ten bridges over the Willamette in Portland, Oregon, that serve automobile, pedestrian, light-rail, or mixed forms of transportation, by definition excluding railroad-*only* bridges.

broad range of bridge technology during the 20th century. These bridges, most designed by nationally recognized firms, represent what Eric DeLony has termed a "who's who" of American bridge engineers. The bridges of the Willamette River provide daily connectivity for automobiles, buses, trains and light rail, as well as an increasing number of bicyclists and pedestrians that travel on Portland's street system and portions of Oregon's Interstate Highway System.

As documented here, Portland's historic development is intrinsically wrapped up in the city's century-plus debate about bridges; whether to build them, where to build them, how to pay for them, and, always, who would and should most benefit from their construction. That relationship with the city's development history alone would be sufficient to make the Willamette River Bridges of Portland significant under the eligibility criterion of the National Register of Historic Places. That the ten major spans covered by this submittal include the work of J. A. L. Waddell, John Lyle Harrington, Ralph Modjeski, David Steinman, Joseph Strauss, and others, some of the most notable names in the history of American bridge engineering, and that individual bridges in Portland remain as exemplary, or even unique, examples of type add considerably to their significance both within Oregon and beyond.

TEMPORAL CONTEXT, 1910–1973

The Willamette River Bridges of Portland, Oregon, were constructed during a 63-year period from 1910 to 1973, that serves as the Period of Significance for this submittal. Informally, the present spans, some of which are the second or even third structure at their location, may be broadly divided into three basic construction eras, each reflecting not only bridge technology of the time and the development history of Portland, but also the changing use patterns in transportation in American society writ large.

These three "sub-groups" are;

1910–1913, the earliest group of construction includes the Hawthorne, Steel, and Broadway bridges, each initially built primarily to serve the city's turn-of-the-century electric trolley system and relying on movable bridge technology to address Portland's role as a major shipping port.

1925–1926, this second, and largest, group of spans includes the Burnside, Ross Island, Sellwood and St. Johns bridges, each built to address the growing reliance upon and importance of automobile connections for both commerce and convenience, and the concurrent decline in public transportation. These bridges include both movable spans as well as the city's first "fixed" high clearance bridges to address changing approaches to river travel.

1958–1973, the most recent group of spans, the Morrison, Marquam and Fremont, generally relate to the post-war ascendency of the automobile and, more importantly, the birth of the Interstate highway system. The Morrison Bridge, the last of the city's movable spans, was also the first of the city's bridges to be designed for connection to the Interstate freeway system. The Morrison, like the later Marquam and Fremont bridges in the third temporal sub-group, reflect design almost entirely driven by automobile traffic concerns. The Marquam and the Fremont bridges represent the two poles of the freeway construction period in Portland. The change in approach between the completion of the Marquam in 1966 and of the Fremont in 1973 demonstrate the public's growing interest in evaluating both cost and aesthetics while still providing for increased transportation efficiency.

GEOGRAPHIC CONTEXT

Defined by the channel of the lower Willamette River, the geographic context for this submittal is accordingly limited to structures that exist across that river within the incorporated boundary of Portland, Multnomah County, Oregon. This is defined by the river boundary between Multnomah and Clackamas counties, between RM 19 and 20, and continuing downstream to RM 0, the confluence of the Willamette and Columbia rivers. The ten bridge spans identified as Willamette River Bridges exist entirely within the roughly eleven river miles between the Sellwood Bridge (at RM 16.5) and the St. Johns Bridge (at RM 5.8).

HISTORIC CONTEXT

William Overton was the first Euro-American to claim land that would become Portland. He was a wanderer who, according to Hubert Howe Bancroft, came to the Oregon Territory about 1843. Overton gave half his claim to Asa Lovejoy, the mayor of Oregon City, in the hopes that the latter would develop it. Overton then sold his remaining half of the claim to Francis W. Pettygrove, a merchant, for $50 worth of supplies. In 1845 Pettygrove and Lovejoy erected the first house in what was then known simply as "the clearing." They almost certainly did not realize the area's full potential for development. "So rarely did shipping come to Oregon in these days, and more rarely still into the Willamette River, that the possibility of need of a seaport or harbor town away from the Columbia does not appear to have been seriously entertained up to this time."[2]

In a legendary event, Pettygrove, from Maine, and Lovejoy, from Massachusetts, had the land surveyed and famously flipped a coin to determine the name of their new city. Pettygrove won the toss, choosing "Portland," over Lovejoy's preferred "Boston." During the Cayuse War (1848-49), as volunteers crossed the Columbia River near Vancouver, "...it began to be apparent that [Portland] was a more convenient point of departure and arrival in regard to the Columbia than Oregon City."[3]

Portland sits at the northern end of the Willamette Valley, a roughly 40-mile-wide fertile valley that lines the river of that name for about 150 miles between what is now Eugene, Oregon and the Columbia River. The Willamette Valley offered a flat and generally easy route of travel north and south between the Oregon and Applegate trails to the main settlements of the Oregon Territory. With flat and fertile farmland, many waterways, and a moderate climate, the valley quickly became the primary focus of regional settlement during the mid-19th century. The Willamette itself offered a water-based shipping route for agricultural goods, an important factor in future development. Soon many towns, including Oregon City, St. Helens, Astoria, and Linnton, vied for the dominant position to connect the interior of the valley with the Pacific Ocean trade route. "But Portland had the advantage of both Willamette and Columbia river frontage as the city grew."[4] As a result, Portland developed into a major shipping center and by 1860 had become Oregon's largest city. From a population of about 800 persons in February 1851, when the city was incorporated, Portland grew to 2,874 residents by 1860 and increased nearly

[2] Bancroft, Hubert Howe. *History of Oregon in Two Volumes.* (San Francisco, CA: The History Company Publishing Company, 1890[II], p. 9.
[3] Ibid, p. 9–10.
[4] Lansing, Jewell. *Portland: People, Politics and Power 1851–2001.* (Corvallis, OR: OSU Press, 2003), 9.

three-fold over the next ten years to 8,293 residents in 1870. By 1880 Portland boasted a population of 17,577.[5]

Portland's success along the west bank of the Willamette River quickly encouraged development along the east bank, opposite the growing community. The City of East Portland was incorporated in 1873. "East Portland shared in the prosperity of the greater city, and having a larger extent of level land for town-site purposes, offered better facilities for building cheap homes for the working classes."[6] North of East Portland another community, Albina, was platted in 1872, largely for real estate speculation. Albina, in the words of E. Kimbark MacColl, operated as "a sort of medieval fiefdom presided over by the lords of the corporate manor, except that manor headquarters was in downtown West Portland."[7]

Both Albina and East Portland benefitted from a flat terrain and, while proximate to Portland's downtown, they additionally benefitted from being outside the city's limits. Portland's politics during this period were rife with cronyism, and political "bosses" controlled much of the city's economic life. Perhaps more importantly, Portland interests had lost out in the race to develop a north-south rail line through the state, with the result that development, both residential and industrial, on the eastside increased significantly when it became the site of the primary rail corridor. By 1890, East Portland's population was estimated at over 11,000 persons. E. Kimbark MacColl wrote,

> The major impetus for East side development came from the Oregon & California Railroad Company.... It built its tracks along the East river bank, purchasing the property for practically nothing. The town site developed back from the river.... Within less than 20 years over 50 percent of the metropolitan population would be residing on the East side.[8]

Albina also grew rapidly, from less than 150 residents in 1880 to more than 3,000 in 1888, although the community was focused primarily upon industrial development centered around the Albina Railroad Yards. Major industries included the Portland Flour Mills and the Pacific Coast Elevator. A correspondent for the *Oregonian* wrote,

> Albina itself strikes one with the general weight and importance of its operations...it is most admirably adapted to railroad work and is the terminal of the O.R. & N. line...almost the whole river front is...occupied by wharf buildings as much as 200 feet deep, with arching roofs as much as fifty feet above the water.[9]

By the late 1880s, although Portland remained by far the dominant community of the lower Willamette's "tri-cities," the growing residential and industrial development to its east created a potential challenge to the city's long-term position. It also, of course, created great opportunities for the future.

---

[5] See historical populations at http://quickfacts.census.gov/qfd/states/41/4159000.html (visited 26-April-2010) and http://www.portland.com/portland/articles/population-of-portland/ (visited 30-April-2010).

[6] Bancroft, op cit, 1890 [II]:752.

[7] E. Kimbark MacColl. *The Shaping of a City: Business and Politics in Portland, Oregon, 1885 to 1915.* (Portland, OR: The Georgian Press Company, 1976), 126.

[8] Ibid., 118.

[9] *Oregonian*, 3-March-1896.

"Connected" April 1887

With flat and less expensive land, East Portland increasingly developed into what today would be termed something of a residential suburb of Portland, while Albina, with its heavy industry and growing employment, provided work for many of Portland's residents. Both circumstances created heavy cross-river travel on a daily basis. Ferries had been in place to move people and goods across the Willamette since 1848, when Israel Mitchell started a ferry from Taylor Street. By the early 1850s Uncle Jimmy Stephens started a regular ferry from the foot of Stark Street, using mule power.[10] "The Stark Street ferry was sold to Joseph Knott in 1861, and the Knott family continued to operate it until it was bought by the city on July 3, 1895, for $40,000."[11] Steam-powered ferries first started operation in 1859 and by 1870 Ben Holladay, the principal behind the Oregon and California Railroad Company, had a fleet of steamers, the *Portland*, the *Black Maria* and the *Katie Ladd*, making regular crossings from the foot of Flanders Street to the east side of the river. Other ferries soon connected Portland to Albina, creating a brisk cross-river trade, connecting downtown to the residential areas on the east bank, and sending goods into Portland.

The private ferries were an expensive and imperfect solution to the growing trans-Willamette travel. Interest in building a Willamette River bridge started almost as quickly as the city's settlement and growth. In the early 1850s Portland business man Joseph Alfred Strowbridge talked of a bridge across the Willamette but made little progress.[12] Twenty years later, talk of a bridge was revived, this time with interest supported in part by the efforts of sign painter and sometimes poet Stephen Maybell, who wrote an eight-stanza poem line on the subject.

Behind the pines had sunk the sun
And darkness hung o'er Oregon
When on the banks o' the Willamette
A youth was seen to set and set
And set and sing unto the moon
A mild, yet sweet, pathetic tune —
They're going to build, I feel it yet,
A bridge across the Willamette.[13]

Despite the power of verse, there was insufficient support for such a project and Portland continued to rely upon ferry service to cross the Willamette. As the city grew, new forms of public transportation added to the congestion of downtown streets. Horse car lines developed in Portland by 1872, under the direction of Ben Holladay. Similar efforts on the east side were not as successful. "As early as 1883 an attempt had been made to build a street railway in East Portland, having in view the joining together the various settlements along the east bank of the river."[14]

---

[10] One first-hand report recalled that Stewart's ferry was "...powered by a paddlewheel treadmill, powered by a mule, which was occasionally powered by some round river stones flung by Uncle Jimmy."

[11] Percy Maddux. *City of the Willamette: The Story of Portland, Oregon*. (Portland, OR: Binfords & Mort, 1952), 175.

[12] Ibid., 176.

[13] As quoted in *Oregonian*, 31-May-1931, 4:1–8, and Maddux, 1952:176. Maybell's verses tell the story of a young man grown old through the years, always convinced that the long-hoped for bridge would eventually be built. The poem was printed in 1876 and widely dispersed, apparently to high acclaim. When the first Morrison Bridge was opened, it was reprinted as part of a celebratory article in the *West Shore Magazine*.

[14] John T. Labbe. *Fares Please! Those Portland Trolley Years*. (Caldwell, ID: The Caxton Printers Ltd., 1980), 20.

It was perhaps natural that the trolley lines would provide the impetus for the first bridge across the Willamette River in Multnomah County. The United States Congress had authorized construction of a bridge across the river in 1870 and the first Willamette Bridge Company was incorporated in 1876; however, that company failed. In 1880 the Pacific Bridge Company was formed, under the leadership of William Beck, with a renewed plan to bridge the river. In October of that year they began construction on the span only to be stopped by a U.S. District Court injunction, which targeted the company's bridge as an obstruction to navigation. Undaunted, Beck formed a new concern, the Willamette Iron Bridge Company, the key difference being a new name that freed the investors from the injunction, and resumed construction on August 27, 1880.[15] Six years later the bridge, the first Morrison Bridge, was finally completed.

The 1,650-foot-long Morrison Bridge, including the east and west approaches, was a truss design and included a 308-foot swing section to allow river traffic to continue unimpeded. Of wooden construction, when compared to later bridges the first Morrison Bridge would be considered a modest design. But for its time, and especially for Portland, it was a colossal undertaking; the first Morrison Bridge was the longest and most imposing bridge west of the Rockies when it opened.[16] Built by private investors intent on operating a street trolley across it, the first Morrison Bridge, to the chagrin of many, was also a toll bridge, charging a fee to users to offset its construction costs. Still, the bridge's completion was of considerable note in the city. Finished in early April 1887, under a bold headline that read "CONNECTED — Portland and East Portland Join Hands," *The Morning Oregonian* reported on the bridge's impact on the city,

> This new connection should be, and in our judgment will be, the beginning of very great things for both Portland and East Portland. It brings the two cities into closer relations, and practically annihilates the physical barrier which separates them. It is only to be regretted that the bridge is the property of private company and that it cannot be free.[17]

The Morrison Bridge officially opened on April 12, 1887, with a procession that went from the west side to the east, and ended at the home of William Beck, president of the company that had paid for its construction. While the citizens rejoiced in the new river crossing, they continued to chafe at the toll charged for transit, inserting the issue into local political campaigns in the elections of 1894. Under the banner of "Free Bridges," the City of Portland purchased the Morrison Bridge in 1895 for $150,000, and, with a large celebration on July 4, 1895, it became a "free" bridge.[18]

With this first connection across the Willamette, travel across the river increased significantly. This was, in no small part, due to the expansion of trolley service across the bridge by the Willamette Bridge Railway Company, created and operated by the bridge's owners. Trolley service further cemented the connection and served to tie Portland and East Portland together more directly. "Within the next year horse cars were serving East Portland and steam trains were extending their service eastward into the suburbs."[19]

---

[15] Maddux, *City of the Willamette*, 177.
[16] *Oregonian*, 31-May-1931, 4:1–8.
[17] *Oregonian*, 3-April-1887, 2:1–2.
[18] MacColl, *Shaping of a City*, 155 and Maddux, *City of the Willamette*, 178.
[19] Labbe, *Fares Please!*, 20.

The first railway bridge across the Willamette River opened in 1888–89, allowing for streetcar service to Albina. The movable portion of that bridge was also a swing span but, like the trusses, was built of steel — the first steel span on the west coast of the United States. "The two-deck bridge, which cost $1,000,000, was opened to the first train on July 10, 1888 but not until the following February was it opened to other traffic. Since most other bridges at that time were made of wood, this bridge was known by the distinguishing name of Steel Bridge..."[20]
A third Willamette River bridge, the Madison Bridge, was begun in February 1890 and despite some legal challenges was opened to the public on January 11, 1891. A wooden bridge that, like the Morrison, charged a toll, it was purchased by the city in November 1891 for $145,000 and made free. There would never be another toll bridge on the Willamette River in Portland.

Consolidation, June 1891

Connected by a railway bridge, and two free spans for trolleys, horses, and pedestrians, not to mention the continued ferry operations, the ties between Portland, East Portland and Albina continued to grow in the early 1890s. A movement to unite the three communities took hold in 1890–91. Boosters of a unified city organized into a "Consolidation League" and sought to counter the influence of a small group of influential political and business leaders who were expected to oppose what soon appeared to be a widely supported proposition. Bridges, particularly the Morrison Bridge and its hated "tolls," had played a role in the consolidation issue, and many of the bridge and trolley operations were considered to be part of the "anti-consolidation" faction.[21]

The *Oregonian* reported that,

> Consolidation is supported by an immense majority of the actual citizens who have a stake in the future of the city. It can be beaten only by manipulation of the irresponsible and corrupt vote under the bosses of the municipal rings, backed by those who levy tolls upon the people and consume their revenues.[22]

The consolidation of Portland, East Portland, and Albina into a single unified city was put to the people in June 1891. The Consolidation League need not have worried about the election's outcome. Despite reports of widespread voter corruption and "floater" votes, the citizens of Portland, East Portland and Albina voted resoundingly to consolidate into a single city under the Portland banner.[23] The *Oregonian* called it "a Waterloo." Furthermore, "consolidation was carried by an overwhelming majority, asserting their right to govern their own affairs. The result advances Portland [from] the sixty-first to the forty-first city in the United States and assures its future greatness...."[24]

Overwhelming indeed, consolidation was approved by a near 6–1 margin, with 88 percent of Portland (west) voters in favor, 86 percent of East Portland voters and 71 percent of Albina in support. The consolidation vote was viewed not only as the start of huge new opportunities but the end of the "Bossism" and corruption that had plagued the communities for some time. "The interests that opposed the public...have received a rebuke unexampled in the history of popular will. All that remains to say is

[20] Maddux, *City of the Willamette*, 179.
[21] At this point (Summer 1891) both the Morrison and Madison bridges were still privately owned and, as such, were still charging tolls for cross-river transit.
[22] *Oregonian*, 1-June-1891, 4:1.
[23] A "floater" was apparently the 19th term for what today would be called an "undecided" voter.
[24] *Oregonian*, 2-June-1891, 1:3.

that they met the fate that they deserved."[25] The role that the construction of the bridges across the river had played in uniting the three communities was clearly understood. "Consolidation of east- and west-side governments had been virtually inevitable once the Morrison Bridge opened, especially after promoters promised free bridges as part of the consolidation package."[26] The new City of Portland, now spanning the Willamette River, was three times as large as Portland alone had been. The combined population was nearly 70,000 people.

Following consolidation, the City of Portland continued to grow. Population in 1900, nine years after consolidation, was 90,426, an increase of nearly a third. The ever-expanding trolley system, most of it now running on electricity, encouraged greater cross-river travel and this inspired new bridge construction. In 1894 the original Burnside Bridge opened, the fourth span across the river.

Much of the pressure for the construction of new or improved bridges across the Willamette stemmed from the city's increasing reliance on electric trolleys. As noted earlier, horse-drawn cars made their debut in Portland in the mid-19th century and, with the opening of the Morrison Bridge in 1887, played an important role in stitching the region into a unified community. By 1892, a year after consolidation, Portland boasted a hodge-podge of horse cars, steam-powered cars, cable cars and electric powered trolleys.[27] Soon, with the availability of abundant hydroelectric power from the power house at the Willamette Falls and its growing reliability, almost all the horse and steam-powered lines were either converted to, or replaced by, new electric trolleys that operated on city streets via franchise arrangements with local municipalities.[28]

In 1906 the Portland Railway Light and Power Company was formed, consolidating not only all the power producers in the region into a single entity, but all of the street transportation providers as well. The formerly separate lines of the Portland Railway Company, the Oregon Water Power and Railway Company, and others joined with the electric utility (known as the first Portland General Electric Company) to form what amounted to a monopoly that controlled all power and electric-power trolley and interurban lines in the Portland vicinity.[29]

Historian Arthur H. Grieser wrote,

> Every electrical light, power and traction company in the lower Willamette Valley has been merged into one vast consolidation of interests. Every mile of electric railway, every horsepower of electric energy generated within a 50-mile ratio of Portland have been brought under the same ownership and will be operated by one management.[30]

Portland Railway Light and Power, in total, combined the interests of what were once 36 separate providers. The Portland Railway Company alone, prior to its amalgamation into PRLP, had

---

[25] *Oregonian*, 2-June-1891, 4:1.
[26] Lansing, 2005:196.
[27] Craig Wollner. *Electrifying Eden: Portland General Electric, 1889–1965.* (Portland, OR: Oregon Historical Society, 1990), 33.
[28] Portland and the region had been early proponents of electric power. In 1894 "Station B" at West Linn, a hydroelectric generation project that for its time was of mammoth capacity, was completed, producing virtually all the power used in Portland and much of the region (Robley, 1935:29–32).
[29] Arthur H. Grieser. *PGE: History of the Portland General Electric Company, 1889–1981.* (Portland, OR: Portland General Electric, 1981) 12.
[30] *Oregonian*, 4-May-1906.

incorporated the assets of 28 street railway providers that were supplying transportation service to virtually every part of the city. A vast number of the systems lines took advantage of the city's expanding cross-Willamette bridge system to effectively knit the city together.[31]

These lines included:

Alberta Line	Alder Street to Alberta, via the Steel Bridge
Ankeny Line	NW 3rd Street to Sandy Boulevard, via the Morrison Bridge
Broadway Line	East 21st to 2nd Street, via the Burnside Bridge
Brooklyn Line	From Yamhill Street to Bush, via the Morrison Bridge
Burnside Line	From Union Avenue to Washington, via the Burnside Bridge
Irvington Line	From downtown to East 15th, via the Steel Bridge
Mississippi Line	From Mississippi to downtown, via the Burnside Bridge
Montavilla Line	Yamhill to Hibbard (Stark) street, via the Morrison Bridge
Mt. Tabor Line	One of the first cross-river lines, across the Morrison Bridge
Richmond Line	Yamhill loop to E. 41st and Gladstone, via the Morrison Bridge
Rose City Line	Yamhill loop to Sandy, via the Morrison Bridge
Russell–Shaver Line	16th & Washington to Russell and Shaver, via the Burnside Bridge
St. Johns Line	3rd and Glisan to Albina, via the Steel Bridge (transfer to an auto line at Albina); "This was the first electric street car service in the City of Portland"[32]
Williams Avenue Line	Downtown to Killingsworth, via the Steel Bridge
Woodlawn Line	Downtown to Dekum, via the Burnside Bridge

These lines augmented dozens of others that ran on either side of the Willamette River or connected to ferries at the Columbia River prior to the construction of the first Interstate Bridge. Collectively this extensive network of trolley lines, with connections to interurban lines that expanded the system beyond the city limits, combined to make the Portland street railway system one of the most extensive in the western United States.[33]

A Maturing City, 1900–1920

The first decade of the 20th century was boom time in Portland. The city had profited from the discovery of gold in Alaska, as shipments through the city grew and area merchants prospered. New residents flocked to the city, making Portland the third-fastest-growing major American city in the decade between 1890 and 1900, when population almost doubled, to more than 90,000 residents.[34]

In 1905, between June 1 and October 15, Portland was the host city for the Lewis and Clark Centennial Exposition and more than $2 million dollars of public funding, most from the U.S. Government, was

[31] This catalog of street car lines and their routing is after R. R. Robley. *Portland Electric Power Company with its Predecessor and Subsidiary Companies, December 16, 1860 to December 31, 1935.* (Portland, OR: Portland Electric Power Company, 1936), 112.

[32] Robley, 1936:11.

[33] As late as 1922 the PRLP system was annually transporting more than 90 million paying or transfer riders on its city lines in Portland (PRLP, 1922). Portland's total population in 1922 was only slightly above 250,000.

[34] Ben Olcott. *Oregon Bluebook and Official Directory.* (Salem, OR: State Printing Department, 1914), 146.

invested to transform Guild's Lake in the northwestern portion of the city into a sprawling fair site. New trolley lines were built to serve the fair, and new electrical plants were built to provide sufficient power for its operation. While of only modest financial success as an event, the Lewis and Clark Exposition was clearly a major marketing success for the Pacific Northwest and, in particular, Portland. "[P]ortlanders could be especially satisfied at the impression that the city and its extravaganza made on visitors."[35] The period around the fair marked major political and social changes in Portland, as the city adopted a new charter and set upon a course of rapid development.

Portland's Willamette River bridges at the turn of the century numbered four and were largely vestiges of the past: the 1888 Steel Bridge, the 1894 Burnside Bridge, the rebuilt Madison Bridge (1900), and, in 1905, the second Morrison Bridge. While these spans proved critical in weaving the city together, as is shown by the number of trolley routes that relied upon them to cross the Willamette, most were increasingly insufficient to meet the growing demands being placed upon them by the burgeoning city.

In 1902, as Portland readied to vote on a new city charter, one of the key issues was the limitation in the old charter on bonded indebtedness, restricting Portland's ability to borrow funds and upgrade the existing bridges or, more importantly, build additional ones. By this time the Morrison Bridge, and especially the poorly built Madison Bridge, were both in failing condition but the city was unable to address the issue due to the charter's limits. "We have no money at the present time to make repairs on bridges and under the present charter there is no way to borrow...the people will simply have to wait until the new charter is adopted..." said Portland Mayor George Williams.[36] Portland adopted the new charter, and improvements to the city's bridges were among the first priorities of the city. In April 1903 a special election was held to authorize funding for a series of new and improved Willamette River crossings, including replacement of the 1887 Morrison Bridge and two new ferries, at Sellwood and Albina.

The *Oregon Daily Journal* noted in 1903 that,

> The Morrison street bridge is already heavily overtaxed with traffic and with the city growing at the present rate, what will it be in a few years. ...The present structure was the first of its kind in the city and has outlived its usefulness. ... If the voters of Portland realized the seriousness of the bridge question, there would be almost unanimous vote in favor of the plan..."[37]

The new City of Portland Charter, the city's ninth charter revision since its inception, was adopted by the voters. While the support wasn't unanimous, it was nearly so. "[T]hey approved it by an astounding 90 percent majority."[38] The new charter would not take effect until early 1903, following ratification by the Oregon Legislature.

Empowered with new borrowing authority, the City of Portland constructed a new span in place of the old Morrison Street Bridge. Considerable debate on the bridge's form, whether lift or draw, along with its location, were the subject of debate in late 1903, as river interests voiced concerns about the mid-channel piers, their design, and spacing. Even with the critical role of the Morrison Street span, which

---

[35] Carl Abbott, *Portland: Planning, Politics and Growth in a Twentieth-Century City*. (Lincoln, NE and London: University of Nebraska Press, 1983), 45.
[36] *Oregon Daily Journal*, 7-Nov-1902, 1:1-3.
[37] *Oregon Daily Journal*, 16-April-1903, 5:1.
[38] Lansing, *Portland: People, Politics and Power*, 245.

in this period still carried an estimated 75 percent of the city's horse team and street car traffic, some still advocated for a less expensive wooden span instead of the steel proposed by the city.[39] Ultimately, the new Morrison Bridge, Morrison #2, would be a steel truss with a swing span to allow for river traffic. The new bridge was opened to great fanfare in January 1905.[40]

The *Oregon Daily Journal* reported that,

> The first car crossed the bridge at 6 o'clock this morning, and thereafter the tide of travel surged over the immense structure without interference. Thousands of people availed themselves of the opportunity to cross the river over the new bridge, and all the cars and the one sidewalk open were taxed to their utmost capacity from early morning.[41]

The opening of the new steel Morrison span almost certainly intensified awareness of the problems with the Madison Bridge. The second Madison Bridge, a wooden truss span built in 1900, was still woefully under-structured for the growing trolley traffic that it was expected to carry. Though city-owned, the Portland Railway Light and Power Company (PRL&P) enjoyed a 30-year lease on the bridge at very modest rates, established and never modified as a part of the city's purchase of the Madison Bridge in 1891. PRL&P's opposition to replacing the Madison Bridge (and renegotiating its lease rate) "...delayed the onset of construction [of a replacement span] so long that the rickety 1900 Madison Street structure went out of service before work could start on the new bridge."[42] Legal and political machinations continued to delay the construction of a replacement span for more than two years, all as the old Madison's condition continued to fail. "Haste was now imperative, but so was the assurance that the new bridge would not present the problems that had plagued its predecessors.[43] In the end, the new bridge to replace the Madison, the Hawthorne Bridge, would be notable in Portland's history on multiple levels. Today it remains the oldest extant bridge over the Willamette, the first to be designed with other than a swing span for river passage and, perhaps most critically, the first non-railroad Willamette River bridge in the city to be designed by a major American engineering firm, Waddell & Harrington, of Kansas City, Missouri.

Downstream from the Madison Bridge, in 1908, railroad bridges created increased connections across the Willamette. The St. Johns Railroad Bridge or the Willamette River Bridge is now known as BSNF 5.1, based upon its current ownership, the Burlington Northern Santa Fe, and its distance from Union Station. This bridge was completed as a swing span in 1908, and was reportedly the longest swing span in the world. It was designed by Ralph Modjeski, who also designed other railroad bridges in the Portland area.[44]

---

[39] *Oregon Daily Journal*, 16-April-1903 5:1 and 17-November-1903, 10:1.

[40] Morrison #2 was built by the Pacific Construction Company. The bridge was 1,220 feet long with approaches of 618 feet.

[41] *Oregon Daily Journal*, 16-January-1905, 3:2).

[42] Judith A. McGaw. *Hawthorne Bridge*, HAER No. OR-20, 1999, 9. Portland voters approved a bond to build a new span at this location in 1907 but PRLP refused to accept a modification in its lease with the city that would have raised the annual rent from $1,200 to $15,000.

[43] Judith A. McGaw. *Morrison Bridge*, HAER No. 100, 1999, 10.

[44] In 1989 BSNF 5.1 was modified with Federal funding to improve the efficiency of river transportation. A two-year project replaced the swing span with a 517-foot-long vertical-lift span, one of the highest vertical lifts in the world with clearance of 200 feet. The replacement span was designed by HNTB Engineering, one of the many successor firms to Waddell & Harrington, the original patent holders on the vertical-lift design.

Each of Portland's first generation of Willamette River bridges relied upon a swing span, a movable center section that pivoted on a single pier and turned 90 degrees from the roadbed to create an open channel on each side of the center pier, allowing river passage. By design, swing spans created comparatively narrow river channels, limited to half the truss length, with the swing section itself serving as something of an obstacle for shipping within the channel even when the span was opened. The Hawthorne Bridge represented a new and improved method of addressing the issues of river passage: a vertical lift. This technology played a role in the city's decision to hire Waddell & Harrington, who between them are generally credited with the successful development of the vertical lift, being responsible for multiple patents governing its design. In a vertical lift, as the name implies, the movable section of the span was raised vertically, as a unit, creating far greater clearance above the water than a bascule and, by avoiding the center pier of a swing span, creating a far wider river channel for ease of shipping. The lift span of the Hawthorne Bridge is 244 feet long. Portland's Hawthorne Bridge is a key design in Waddell & Harrington's development of the vertical-lift form, and today remains the oldest operating span of its type in the United States. The Hawthorne was opened to traffic on December 19, 1910.[45]

Construction of the Hawthorne marked a shift in Portland bridge design away from the swing spans. In rapid succession following the 1910 opening of the Hawthorne, the Steel Bridge, just downstream was completed in 1912, replacing the 1888 span of that name. The Steel Bridge, also designed by Waddell & Harrington, provided separate, movable, decks for both trains and trolleys and is the only double vertical-lift bridge of its type in the world. The Port of Portland required construction of the upper, second, deck of the Steel Bridge as a part of the original agreement with the railroad for the right to build the Steel Bridge across the river.

Controversy surrounding the lease of the upper deck of the Steel Bridge brought to a head some of the complex political and financial issues that governed the Willamette bridges and ferries in Oregon's largest city. As noted, the Port of Portland required the O.W.R.N. & Company to build a second, upper, deck on the new Steel Bridge that would allow quasi-public use, being trolleys and other vehicles, as a part of its approval process. That contract, signed on August 17, 1909, "...contemplated compensation to the railroad company from tolls, or payments by the City of Portland or the County of Multnomah."[46] The railroad's initial negotiations with the county broke down over what were termed by the county to be "exorbitant rental costs." This was compounded by the county's legal opinion that the upper deck, in essence, was a "public street" and that as such control of its use was vested with the City of Portland, not the county. The county attorney concluded that "[a]ll future negotiations for public use of the upper deck must therefore be between the city administration and the railroad."[47] The City of Portland took over from the county, but negotiations were still unsettled when the new bridge opened on August 10, 1912. On October 9, 1912, the city signed a lease with the railroad company securing rights to the upper deck of the Steel Bridge, essentially under the same terms that had been rejected by the county as exorbitant. For reasons not entirely certain, Portland voters passed a referendum on November 2, 1912, that shifted responsibility for all bridges and ferries over the Willamette within the city, including the assumption of the newly leased upper deck of the Steel Bridge, to Multnomah County. One can only surmise the county's reaction to this effort, which received scant mention in the local press. As a city election, only voters within the Portland city limits participated. Additionally, while shifting

[45] *Oregonian*, 20-December-1910, 16:1.
[46] ODOT Bridge Files, "Steel Bridge." This quotation comes from *Memo on Highway Deck-Willamette River Bridge*, 1932
[47] *Oregonian*, 4-June-1912, 11:2–3.

responsibility to the county, the city was to keep the payments from the trolley companies for the use of the bridge. Ten days after the election County Judge Thomas J. Cleeton publicly questioned the legality of the vote.

Judge Cleeton stated that, "It is the equivalent of taxation without representation... The county has been made the goat in this matter, it seems to me." He added that, "We must pay for the operation [of the bridge] and get not even running expenses out of the revenue collected [by the city] from the street railway."[48]

By February 1913, new financial arrangements made the transfer of responsibility more palatable to the county, although the action still required legislative approval. On February 17, 1913, the state passed H.B. 263, confirming the November 1912 election outcome. That legislation authorized Multnomah County to take over control of "all bridges and ferries spanning the Willamette River at Portland, but the city is to receive all revenue for streetcars or other cars passing over them."[49] The county's concerns about funding were apparently addressed by Section 6 of the bill, authorizing the court to levy a tax upon all property in Multnomah County in an amount sufficient to operate and maintain the bridges in good repair.[50] With these issues resolved, authority for the control and operation of Portland's Willamette River bridges was passed to Multnomah County on March 1, 1913.[51]

In 1913, a new Broadway span opened, designed by Ralph Modjeski, a nationally recognized bridge engineer based in Chicago, Illinois, who had earlier designed several railroad bridges in the Portland area. Initially the Broadway Bridge was envisioned as a "high span," crossing the river with sufficient clearance below so as to avoid the need for any opening or movable section. This plan, however, was opposed by the Port of Portland which for unexplained reasons pushed for a draw bridge with a minimum 300' clearance between piers. Ultimately Modjeski designed the new bridge with what is called a Rall bascule, a fairly unusual form of the bascule type that allowed the pivoting leafs to also move backward, as they opened. The Broadway's mechanism created a substantial 250-foot-wide river channel when they were open. The Broadway, a steel through-truss, was the longest double-leaf bascule drawbridge in the world when it opened on April 22, 1913, and remains the largest of the unusual Rall bascule form that was ever built. As Portland's noted bridge historian Sharon Wortman Wood commented, the Broadway "...has one of the most complicated and rarest opening methods of any movable bridge type anywhere."[52] The Broadway Bridge was hailed as a "new era" in Portland's bridge construction; a span designed to last 100 years, and was lauded as one of the finest bridges in the western United States.

The *Oregon Daily Journal* noted that, "The great viaduct is part of a greater Portland. It is the beginning of a greater facility in transit between the natural divisions of the city." Furthermore, "It is the bond of closer union between the east and west sides [but] the Broadway Bridge is more. Its completion is the triumph of popular government." Finally, "It is a victory of men over money, of votes over force."[53]

---

[48] *Oregonian*, 12-November-1912, 12:2.
[49] *Oregonian*, 11-February-1913, 9:3, 18-February-1913, 1:5.
[50] General Laws of Oregon, Chapter 141 (1914), pg 249. This section, as subsequently amended and modified, is now a portion of Oregon Revised Statutes, Chapter 382 "Interstate Bridges." See, specifically, 382.305 through 382.345 regarding the operation, construction and finance of bridges across the Willamette River.
[51] *Oregonian*, 1-March-1913, 11:6–7.
[52] Sharon Wood Wortman. *The Portland Bridge Book, 3rd Edition*. (Portland, OR: Urban Adventure Press, 2006), 31.
[53] *Oregon Daily Journal*, 22-April-1913, 8:1.

The Broadway Bridge had been built and funded by the city and, as the result of the new arrangement for bridge management, was immediately transferred to Multnomah County upon its dedication for operation and maintenance.[54] With the completion of the Broadway Bridge, the third new span across the Willamette in as many years, the two sides of the city were better connected than ever. In addition to the new railroad-only span, Portlanders could now get to work, or to home, via the 1894 Burnside, the 1905 Morrison, the 1910 Hawthorne, the 1912 Steel and the 1913 Broadway bridges. With the improved trolley connections between the downtown commercial areas and the growing residential zones on the east side, Portland continued to grow and prosper, as neighborhood commercial areas spread eastward along the trolley routes, and as residential areas for Portland's workers extended ever farther into neighboring Clackamas County. The city's population, just over 90,000 at the turn of the century, more than doubled in the following decade, spurred by the Lewis and Clark Exposition and a strong business climate, to 207,214 residents. While growth tapered off slightly over the next ten years, the city still added more than 50,000 inhabitants, growing to a population of 258,288 in 1920.[55]

More Bridges! 1921–1931

As Portland entered the 1920s, the city's transportation system was under increased pressure, complicated by rapid growth in the use of the personal automobile. More than 75 percent of the city's residents now lived on the east side of the Willamette River, and between 1919 and 1924 bridge traffic over the Willamette doubled, from 45,000 to 90,000 daily crossings. Automobile registrations in Multnomah County increased at an ever greater rate, from 25,000 to 75,000, during the same period.[56] John Labbe, a noted historian of Portland's trolley system, states that 1912 likely marked the highpoint of the city's electric streetcar system.[57] While Portland Railway Light and Power would continue to provide service until 1924, when the company was reorganized as Portland Electric Power Company, or PEPCO, the decline of the trolley system was inevitable, as automobiles and even gasoline powered buses supplanted the trolley lines.

While public interest in additional bridge spans between west and east Portland grew, local politics complicated the government's ability to respond. Multiple jurisdictions, each with overlapping political responsibility, funding capacity, and authority over the development of the river, made decisions regarding the location, design, funding, and, ultimately, operation of Willamette River spans difficult. In addition to the governments of Multnomah County and the City of Portland, the State of Oregon, the Port of Portland, and the U.S. Army Corps of Engineers all had some voice in the issue, and each had their own concerns.

In 1920, the Multnomah County Planning Commission asked the Oregon State Highway Commission to evaluate the congestion on Portland's trans-Willamette crossings and provide it with guidance on the necessity of rebuilding existing spans/approaches along with the advisability of constructing additional bridges in the city. The OSHC bridge engineers report, issued that spring, included multiple recommendations, most notably the construction of a new Burnside Bridge to replace the 1894 span.

---

[54] *Oregon Daily Journal*, 22-April-1913, 1:3.
[55] See http://www.portland.com/portland/articles/population-of-portland/.
[56] MacColl, *Shaping of a City*, 260. For comparison, the entire state of Oregon had only 2,493 registered automobiles in 1910, a figure that grew to 103,000 by 1920.
[57] Labbe, *Fares Please!*, 131.

The *Oregonian* noted that,

> The necessity for a new bridge to replace the Burnside structure is urgent, according to the recent report on the condition of the present bridge. It is intended to reconstruct the Morrison bridge in such a manner that it can handle the traffic requirements for the next 10 or 15 years, but its replacement at the end of that time will be necessary.[58]

During the late summer of 1920, under pressure from local interest groups, the county commissioners announced plans to put a $5.5 million bond on the November ballot, to provide funding for the construction of a new Burnside crossing. Even that amount was nearly $500,000 less than State Bridge Engineer Conde B. McCullough had estimated the cost. McCullough and the state highway department had, at the request of the county, developed plans for a concrete span with a draw opening of more than 200 feet. "You could not build any bridge there which would serve traffic adequately for much less than $6,000,000, [McCullough] told the commissioners."[59] Initial public reaction to the bond request was not positive, as a sampling of citizens polled by the commission supported continued repair of the existing bridge rather than replacement. "If it can be made safe, I believe 90 percent of the people would prefer to leave the present bridge standing" said J.C. Ainsworth.[60] Chastened, the county determined to obtain a second opinion on the Burnside, retaining John Lyle Harrington to evaluate the bridge's condition. "The report of Mr. Harrington shows that the Burnside bridge is in safe condition and will remain so for several years...."[61] The "contemplated election" was delayed.

Two years later, in 1922, the issues at the Burnside Bridge remained unresolved, as the city's traffic continued to grow. Interest in a new Burnside Bridge was coupled with interest in creating additional river crossings. Residents south of Portland, upstream from the Hawthorne Bridge, began to push for new trans-Willamette crossings. Business and community leaders in Sellwood organized to pursue the construction of a span connecting their community to the west side. State highway department engineers apparently drafted a tentative plan for a $400,000 concrete and steel "High Bridge" fixed span; however, several locations in Sellwood remained under consideration.[62] Construction of a Sellwood span was opposed by the Portland Planning Bureau, which remained concerned about the wisdom of a large project so far to the south of downtown. "The proposed bridge would serve Sellwood on one side and Riverview cemetery and Fulton park on the other....The described area is sparsely settled and lies mainly outside the city limits and very largely outside the limits of the county that would have to finance the structure."[63]

Sellwood advocates pointed to the expense of operating the Sellwood Ferry as another reason to build a bridge and continued, at the neighborhood level, to push for decision. By July 1922 plans were in the works for a $1 million bond proposal to build bridges at both Sellwood and Ross Island, farther downstream, where a similar local group was also pushing for a new span. By September 1922 interest had shifted from the proposed re-use of portions of the Burnside Bridge to the construction of

[58] *Oregonian*, 29-June-1920, 11:2-3.
[59] *Oregonian*, 2-September-1920, 13:3.
[60] *Oregonian*, 14-September-1920, 22:1.
[61] *Oregonian*, 22-September-1920, 6:3.
[62] *Oregonian*, 11-March-1922, 8:5.
[63] *Oregonian*, 23-March-1922, 4:3.

an entirely new bridge at Sellwood and designs had been prepared for a bridge estimated to cost $450,000, intended to replace the Sellwood Ferry.[64]

As Sellwood pushed for a bridge, other local interests pushed the county and the city for another bridge entirely at Ross Island, that would connect the west side routes with Beacon Street (ultimately SE Powell), at an estimated cost of $1.6 million.[65] Both the Sellwood and Ross Island spans were to be "fixed," without a draw or movable element, but would be built with a deck height equal to the "lifted" height of the Hawthorne Bridge. The "dire necessity" of adding new routes across the river was pointed to by booster groups that cited the rapid growth of the city and the traffic snarls over the current bridges as detrimental. To a certain degree, Portland had gone "bridge crazy," with communities and business interests all working hard to assure their own futures, by gaining a bridge crossing to support them. Hyperbole was plentiful to say the least, as evidenced by the statements of F. I. Marshall, president of the Mt. Scott Improvement Club, one of the strongest bridge advocates of the time. Marshall stated, in what was called a "final appeal," that "Portland has reached the point where failure to provide these two bridges will serve to retard its growth."[66]

Ultimately the Sellwood span was dropped from the November 1922 bond election. On a crowded ballot dominated by a divisive vote on private schools pushed by the Ku Klux Klan, Multnomah County voters soundly passed two separate measures to fund two new bridges at Burnside and Ross Island, and they passed them with the largest majorities of any issue on the ballot. Funding of the Burnside Bridge passed 66,330 to 9,747. Funding for the new bridge at Ross Island, while of less interest, still passed with a majority of 32,259 votes.[67] Local pundits attributed this support to a unified front that collectively pushed both bridges as being badly needed. "During the last two weeks of the campaign, the two bridge committees joined forces and conducted a joint campaign which probably accounts for the success of both projects."[68]

A week later the retiring members of the county commission announced that they would not to rush to approval of a contract with a bridge engineer. Although Waddell & Harrington were considered a logical choice based on their previous work in Portland, local bridge engineers pushed hard for consideration. The issue soon became somewhat controversial, with charges of favoritism leveled at members of the commission, particularly Chairman Rufus Holman, who was considered overly partial to Waddell & Harrington. Holman had earlier chaired the joint Multnomah County–Clark County committee that had overseen the construction of the first Interstate Bridge across the Columbia, a Waddell & Harrington vertical-lift bridge.[69] By the end of the month, less than three weeks since the passage of the bond to fund the bridge construction, the issue had grown even larger. According to the *Oregonian*,

> Apparently everyone in Portland is interested in bridges, and more particularly in those two structures approved at the recent election.... The substance of this voice is [that] the bridges would be built by local engineers for the promotion of local industry and for the return to trade of

[64] *Oregonian*, 14-September-1922, 4:4.
[65] *Oregonian*, 24-September-1922, 20:1.
[66] *Oregonian*, 5-November-1922, 11:1.
[67] *Oregonian*, 9-November-1922, 9:1.
[68] *Oregonian*, 6-November-1922, 8:1.
[69] *Oregonian*, 26-November-1922, 9:1.

> local taxes. They should be built by local men who understand our traffic problems and not by foreign bidders who neither understand these problems or have interest in them. [70]

Ultimately, despite Commissioner Holman's assumed preferences, Commissioner-elect Dow Walker and continuing commissioners Rudeen and Hoyt were "unmistakably on the record for the employment of resident engineers" to design the new spans. "Commissioners-elect Rankin and Walker are also pledged to the support of local bidders."[71] In light of what was to come, the predisposition toward local firms would turn out to be rather prophetic. Three local engineering firms were given hearings before the commissioners; however, it was a fourth local firm, the newly formed partnership of Hedrick and Kremers, that would be given responsibility for the design contract for the Ross Island and Burnside bridges. The commissioners apparently originally selected Robert Kremers, who worked for the county, to design the bridges, despite some objections as to his lack of experience to undertake such a project. In response, Kremers entered into a partnership with Hedrick, who had considerable experience with large bridge design as a former partner of John Alexander Low Waddell in Waddell & Hedrick.[72] The new partners signed contracts for both the Ross Island and Burnside projects in March 1923 and were also asked to consider the possibility of re-using portions of the existing Burnside span for construction of a bridge at Sellwood. Hedrick and Kremers completed their design work for all three projects in June 1923. In November 1923 county voters passed a bond request for $350,000 to fund the Sellwood Bridge by a large majority.[73]

With yet another election in March 1924, city voters were asked to approve bonds to build the necessary approach spans for the Burnside and Ross Island bridges, along with some other bridge modifications, providing the final funding mechanism for the region's ambitious bridge program. "While city and county officials have made no organized campaign in behalf of the bond issue, it is has been made plain that the defeat of the issue today will mean either wide bridges with narrow approaches or a return to the general assessment district, which is unpopular and certain to tie up new bridge construction in long, drawn-out, ligation."[74] The unusual ownership and funding situation — where Multnomah County was to build the bridges, but the City of Portland was responsible for improvements to the street approaches that enabled vehicles to access the spans — was a constant complication, exacerbated even further by the interests of the trolley companies that leased access across the spans. Voters, understandably, were somewhat uncertain about all the bridge-related bond requests. As the *Oregonian* pointed out,

---

[70] *Oregonian*, 29-November-1922, 26:1. As an interesting side note to this sentiment, the noted Portland architect A.E. Doyle (1877–1928), who was responsible for many of Portland's most impressive residences and numerous commercial buildings, was quoted at length in support of hiring local engineers. Said Doyle, "[t]he building of bridges is pure engineering and mathematics. It is ridiculous to assume that we must go outside the state to find engineers equal to the task. It is poppycock and drivel...the West must look out for its own!" See *Oregonian*, 29-November-1922, 26:1.

[71] *Oregonian*, 30-November-1922, 6:1–2.

[72] The Waddell & Herrick firm, based in Kansas City, MO, lasted from 1899 to 1908, after which Waddell entered a partnership with John Lyle Harrington. The firm Waddell & Harrington (1908–1915) was responsible for the designs of both the Hawthorne and Steel bridges over the Willamette, as well as the first Interstate Bridge, connecting Portland and Vancouver. Waddell & Harrington later became Harrington, Howard & Ash, which became today's firm of Howard, Needles, Tammen & Bergendoff (HNTB).

[73] *Oregonian*, 7-November-1923, 1:8.

[74] *Oregonian*, 4-March-1924, 1:4. General Assessment Districts were roughly analogous to the modern-day Local Improvement District or LID, where property owners in the immediate area of the improvement, such as along the roads served by the proposed bridge, were assessed a fee based on frontage or property value. Funding costly bridge construction over the Willamette by city or county-wide bond sales was considered a more equitable method of spreading the costs over all those who would benefit from the project.

> Let it be repeated for emphasis, that the bridges are to be built with county money and that no part of the original fund can legally be expended for widening Portland streets....The bridges we now have do not operate to capacity for the reason that the streets which pour traffic toward them are frequently choked... [75]

Portland voters approved the request for approach funding, and bids for the construction of the bridges were opened by Multnomah County on April 1, 1924. The commissioners swiftly awarded the contract to a joint venture of J. H. Tillman Company, Parker & Banfield, and the Union Bridge Company, all local firms. Under the headline "$5,000,000 Span Contracts Let," the *Oregonian* reported that work was to begin immediately, with the contractors intent upon closing the Burnside Bridge the following day if possible.

> The three firms which were awarded the contracts...were linked into an inseparable triumvirate. It was a condition of their bidding that the three tenders [bids] on the three structures must be accepted or else all of them must be rejected. This brought about a situation...[where] the commissioners were confronted by two bids on the Burnside bridge, one of which [the Tillman bid] on the face of things, was $480,000 higher than the other.[76]

Within days, the joint award of the bridge contract and the near half-million difference between the Pacific Bridge Company's bid on the Burnside project and the successful Tillman bid had become a political controversy. C. F. Swigert of the Pacific Bridge Company, the failed bidder for the Burnside Bridge contract, was threatening legal action.[77] The same day the *Oregonian* editorial column demanded the commissioners rescind the contract. Under a headline "Undo It," the editor castigated the commission, the Tillman Company, and the county's bridge engineers for the irregular contract award process.[78] Three days later, amid rapidly growing controversy, the commissioners did just that, withdrawing the contract by unanimous vote, but the damage had already been done. That same day a recall campaign on Commissioners Rudeen, Rankin and Walker was announced to remove them from office.).[79] The following day Oregon Governor Walter Pierce asked the state attorney general to probe the issue, amid claims of collusion, bribes, kickbacks, and other scandals rocking Portland.

In early May, based upon the state probe, Commissioners Walker and Rudeen, along with bridge engineer Kremers were indicted by the grand jury, and were charged with graft, bribery and malfeasance.[80] In less than a month more than 18,000 signatures had been gathered and a recall election was scheduled for Friday, May 16, 1924. The people of Portland clearly were incensed by the commissioners' actions. By large majorities, three commissioners, Walker, Rudeen and Rankin, were decisively removed from office and replaced by three "recall" candidates pledged to clean government and complete the new bridges.[81] A few days after the election, and largely upon what were reported as

---

[75] *Oregonian*, 4-March-1924, 8:2.
[76] *Oregonian*, 1-April-1924, 1:1.
[77] *Oregonian*, 3-April-1924, 1:1.
[78] *Oregonian*, 3-April-1924, 8:1.
[79] *Oregonian*, 6-April-1924, 1:1 and 6:1–2. All three were considered protégés of the Ku Klux Klan, which during this period of Oregon's history held considerable sway in state politics (see Lansing, 2005:310–11).
[80] *Oregonian*, 11-May-1924, 4:1). Kremers was accused of bribing the commission to obtain the engineering contract, while the Commissioners, most specifically Dow Walker, were accused of negotiating kick-backs in the form of contractor bonds with the Tillman entities.
[81] The vote to remove Dow Walker was 54,802 for, 7,566 against. Rudeen lost by a similar margin, 54,865 to 9,751, and Rankin, while fairing better, still lost by a wide margin, 41,461 to 23,316. See *Oregonian*, 18-May-1924, 1:6.

technicalities, Kremers, Walker and Rudeen were acquitted of all charges, though there seemed little doubt that their actions, if not criminal, were not in the public's best interests. Historian Kimbark MacColl wrote that "A sordid tale of influence peddling was related (at the trial), depicting each commissioner holding out his hand for some kind of pay-off, but the state had a difficult time establishing any direct connections involving bribery."[82]

The newly elected "recall" commissioners immediately voided all previous contracts pertaining to the bridge projects. Then, in order to respond to the clear public need for improved trans-Willamette crossings, they elected to bring in an outside engineer to review the projects and make recommendations about how to proceed. They chose to hire Gustav Lindenthal. Sharon Wood Wortman wrote that,

> [G]ustav Lindenthal was in Portland because Multnomah County needed a "big gun" of impeccable reputation who was also capable of and willing to 1) produce three long-span bridges simultaneously in a short amount of time and, given the financial disorder that had preceded the project, 2) do all the foregoing work within a reduced budget. They could not have done better than Lindenthal.[83]

Gustav Lindenthal, based in New York, was among the leading bridge engineers in the nation, responsible for many significant spans in his own right, mentor to both David Steinman and Othmar Ammann, and even now considered by many to be among the greatest bridge engineers in American history. David Plowden wrote that,"No other man ever designed bridges of such titanic proportions as Lindenthal."[84] Work on Portland's three Willamette spans would be Lindenthal's last commission, completed when he was 78 years old.[85]

In June 1924 Lindenthal signed a preliminary contract with the county, agreeing to review the Hedrick and Kremers plans for the Burnside, Ross Island and Sellwood bridges. Lindenthal's design contract included supervision of the Burnside project, along with redesign and supervision for both the Ross Island and Sellwood bridges.[86] While making some minor changes to the Hedrick and Kremers design for the Burnside Bridge, Lindenthal recommended the project move forward immediately, with the contract offered to C. F. Swigert and the Pacific Bridge Company, the low bidder in the earlier bid process.[87] Within the month, on July 31, "...the old span that had served the community well for 31 years was closed to traffic for the last time."[88]

Lindenthal redesigned the spans for Sellwood and Ross Island, most significantly developing a completely new steel span at Ross Island rather than the concrete one proposed by Hedrick and Kremers, while also lowering the height of that span. Lindenthal also advised against significant re-use of the Burnside's steel for the construction of the Sellwood Bridge, recommending new steel for increased durability and improved design. With three bridges underway, by the start of 1925 Portland was flush with pride and abuzz with both construction and anticipation, as more than $6.5 million dollars

---

[82] MacColl, *Shaping of a City*, 265.
[83] Sharon Wood Wortman. *Burnside Bridge*, HAER No. OR-101, 2000, 43.
[84] David Plowden. *Bridges: The Spans of North America*. (New York, NY: The Viking Press, 1974), 171.
[85] Ibid., 185.
[86] Wood Wortman. *Burnside Bridge*, 45.
[87] *Oregonian*, 11-July-1924, 8:1.
[88] *Oregonian*, 1-January-1925, 6:1–8.

in bridge work was in various stages of progress. The old Burnside Bridge had been removed and a workforce was busily erecting its replacement to maintain a 500-working-day schedule to return that critical link in the city's transportation system to operation. The *Oregonian* reported that "Multnomah County has underway one of the costliest and most extensive bridge construction programs to be found in the United States...by way of financing the three bridge projects the taxpayers have approved five separate bond issues."[89]

Bids for the new Sellwood Bridge were opened on January 7, 1925, with Gilpin Construction securing the contract at a cost of $442,000. The contract called for completion in just 250 working days by year's end, so as to replace the Sellwood Ferry and provide a direct route to serve the southern portion of Portland. On December 15, 1925, the *Caples*, which had served Sellwood for more than two decades, made its last trip across the Willamette. The *Oregonian* noted that,

> During those years Portland has seen the development of the automobile; it has seen a vast increase in motor traffic, bringing with it the harassing problems of vehicular control; it has seen a need for a greater ease of trans-river communication....And so it is that yesterday saw the end of active service at Sellwood for the John F. Caples. In its place now towers the new $550,000 Sellwood Bridge.[90]

The new Sellwood Bridge, the first of the pending triumvirate of new spans to open, gave Portland time to reflect on what it had done and all that it had invested to improve itself. The *Oregonian*, generally a fan of public investments such as this, editorialized on the event of the Sellwood's completion under the headline "The Purpose of Bridges."

> The *Oregonian* is duly impressed, as others doubtless also have been, with the splendid and far-seeing bridge building program now in a fair way toward realization at Portland. The finished bridge at Sellwood already serves a growing and influential part of the community; that at Ross Island should prove largely useful to another neighboring section [and] the enlarged and immensely expanded viaduct at Burnside will give further communication between the east side and heart of the business community.[91]

Having completed just one-third of its bridge campaign, at least some in Portland, including the *Oregonian*, were already considering the possibility of future spans to continue to improve trans-river communication. On December 14, 1925, the day before the opening of the Sellwood Bridge, J.P. Newell of the Portland Planning Commission sent a report to Gustav Lindenthal entitled "Future Bridges Over the Portland Harbor." Newell acknowledged the unique issues of the Willamette River in Portland, noting that "in no other city of comparable size do the majority of citizens find it necessary to cross a wide and deep river in order to go to their daily employment." Newell noted that while improved transportation for specific neighborhoods, such as those soon to be served by the Sellwood and Ross Island bridges, were significant, that in fact the entire city was dependent on bridge capacity. Newell wrote that,

> The controlling factor in the bridge situation is the growth of the entire city, and not that of any particular section. The problem of providing for cross-river traffic is essentially one problem and

[89] Ibid.
[90] *Oregonian*, 16-December-1925, 1:8.
[91] *Oregonian*, 18-December-1925, 12:1.

> not a group of problems each attached to a special bridge location...the problem before us is simply that of providing additional facilities for crossing the river as fast as those now in use come to be fully utilized.[92]

In a similar vein, the *Oregonian*, while lauding the Sellwood opening, called for a comprehensive study of long-term bridge needs in Portland. Writing less than two weeks before the formal opening of the Sellwood crossing, the paper editorialized that "[i]t is even now obvious that as these [three new bridges] are completed there will come demand for reconstruction or a more adequate plan for crossing of the Willamette River at Morrison street. Not right away perhaps; but in any event soon."[93]

Meanwhile, work on the Burnside and Ross Island bridges continued. In July 1924 the Burnside project began with the removal of the 1894 bridge. The first concrete for the new Burnside Bridge was placed in late November, as Pacific Bridge worked diligently to meet the 500-working-day completion time required by its contract. By the first of the year the *Oregonian* reported that "Satisfactory progress is being made on this bridge job and there is reason to believe that the contract will be completed on time and the span opened to use in early 1926."[94]

On May 28, 1926, the new $4.5 million Burnside Bridge was opened amid a half-day celebration, starting with a luncheon at the Benson Hotel and continuing with parades that began on either side of the river. There was also a marine parade, motorboat races, and a city-wide radio broadcast of the formal opening of the new bridge to auto traffic. The *Oregonian* reported that,

> The opening of the new Burnside bridge will doubtless constitute one of those memorable and significant events from which citizens delight to reckon the flight of time. And, indeed, the completion of this fine modern structure, beautiful in design and modern in every detail, is of considerable moment to the city. The bridge is not only the greatest of the three bridges approved by the voters....but is one of the finest bridges in the country...[95]

Just before the end of the year, on December 21, Portland completed the third and last of its voter-funded spans within a year, when the Ross Island Bridge was opened to traffic. Here Lindenthal redesigned the bridge as originally proposed by Hedrick and Kremers, substituting a steel span for the earlier concrete design. Like so much of Portland's bridge construction, that decision was contentious, with the Associated Industries of Oregon opposing the switch because of loss of Oregon jobs. Ultimately most of Lindenthal's design prevailed, although he failed in his attempt to increase the bridge's lane width, a failure that would plague the bridge almost immediately and grow worse over time, as traffic increased. Portland's second fixed span across the Willamette, the Ross Island Bridge was hailed upon its completion as "one of the most outstanding examples of the cantilever type to be constructed in America."[96]

> In 1927, looking back at a construction process that created three fine new spans across the Willamette, two of them entirely new and one, the Burnside, significantly upgraded, Portland had

---

[92] J.P. Newell. *Future Bridges Over Portland Harbor.* (Portland, OR: Letter to Dr. Gustav Lindenthal), December 14, 1925 (in Multnomah County Special Collections).
[93] *Oregonian,* 18-December-1925, 12:1.
[94] *Oregonian,* 1-January-1925, 6:1–8.
[95] *Oregonian,* 28-May-1926, 12:2.
[96] *Oregonian,* 22-December-1926, 1:4.

> made major improvements to its transportation system. It hoped that the new bridges would relieve congestion that the other Willamette River bridges had handled for years.[97]

One more bridge would be built across the Willamette during the pre-World War II period. Just as local neighborhood and business advocates had pushed for the Ross Island and Sellwood bridges at the city's southern boundary, so too were residents in the northern portion of Portland interested in obtaining the benefits of a direct trans-river span. Mention of a new bridge at St. Johns was sporadic during the early 1920s, pursued with vigor by local advocates but generally receiving limited support due to the high cost of the span and the modest population it would serve.

Newell's 1925 report to Gustav Lindenthal, recognizing the city-wide nature of Portland's traffic problems above the interests of any particular crossing, evaluated two locations for a possible St. Johns Bridge and found traffic insufficient to justify a span at either. Newell concluded that the small number of citizens who would regularly use the proposed St. Johns bridge could easily be accommodated by the Broadway and soon to be completed Burnside spans. Newell noted that at some point in the future a St. Johns span would be justified, but that building now, based upon traffic counts, would realistically be classified as a luxury. Newell wrote that,

> Nevertheless, from a luxury standpoint, a good deal may be said for it. Coupled with the Ross Island Bridge at the opposite end of the harbor, it would form part of an attractive loop drive which would enable the City to be seen to advantage and would be much enjoyed by tourists....How far such considerations will justify the expenditure of three or four million dollars for a bridge is a matter for decision by taxpayers rather than engineers.[98]

In 1924, at the peak of Portland's "bridge fever," as historian Sharon Wood Wortman has termed the period, 26,000 Portlanders signed a petition encouraging the construction of a new bridge at St. Johns.[99] This petition, however, appears to have stalled and no decision or progress was made on a St. Johns or "Peninsular" bridge for several years. In early 1926 Dr. Lindenthal again reviewed Portland's bridge situation, recommending a new span from Interstate Avenue to 20th Street and suggesting a delay for any new bridge at St. Johns. J.P. Newell, formerly of the Portland Planning Bureau and now working as a consultant, recommended repairing and improving existing bridges but suggested avoiding any new bridge construction. Both Newell and Lindenthal were united in dismissing a bridge at St. Johns, suggesting that there simply wasn't a need for the span in that part of city based on current traffic.[100] Nevertheless, three days later, the *Oregonian* reported that bridge advocates had once again met and, in a voice of solidarity, announced a new petition drive, initially for the May ballot.[101] In November 1926 St. Johns proponents were finally successful in getting the issue before the voters, but they were unsuccessful in garnering voter support and were denied funding.

On May 18, 1928, Portlanders were again presented with the opportunity to approve the sale of $4.25 million in bonds to fund the construction of a bridge at St. Johns. Despite opposition as an

---

[97] *Oregonian*, 1-January-1927, 26:1.
[98] Newell, *Future Bridges*, 28–29).
[99] Wood Wortman, *Bridges of Portland*, 16.
[100] *Oregonian*, 5-January-1926, 1:1.
[101] *Oregonian*, 8-January-1926, 6:1..

unnecessary expense from the Portland City Club, the *Oregonian,* and most every other element of Portland's civic leadership, local voters approved the request by a vote of 33,144 for, 26,698 against.[102]

> Residents of the St. Johns and the entire Peninsula District will celebrate their victory in winning the recent election for the right to supplant the St. Johns ferry....Some of the streets will be roped off and there will be dancing.[103]

A highlight of the St. Johns celebration was the symbolic funeral and burial of the St. Johns Ferry. "Mr. Ferry, the grouchy old mossback who has had his way with things out at St. Johns for years and years, was laid boisterously to rest and none mourned his departure."[104] Planning for the new bridge, including a decision on its final location, was estimated to take over a year. Sixteen different engineering firms filed initial applications with the Multnomah County Board of Commissioners for the right to design the project. These included several local firms as well as Harrington and Cortelyou of Kansas City; Conde McCullough, Oregon's famed state bridge engineer; and Ralph Modjeski of New York.[105] The St. Johns Bridge contract was given to David Steinman of the New York firm of Robinson and Steinman for a flat fee of $145,000, to include all design and project management.[106]

In March 1929 siting options for the St. Johns Bridge were finalized, with the Philadelphia Street option being the unanimous choice of the commission, ending "weeks of study."

> The board was a unit in the opinion that the new Philadelphia street site, which is a direct prolongation of Philadelphia street across the Willamette, would yield "the greatest good to the greatest number"....[t]he West terminus will be about 700 feet south of the present ferry landing.[107]

Contracts for the construction of the St. Johns Bridge were awarded in August 1929 and work began in September. Construction proceeded under the darkening economic issues following the October 1929 crash of the New York Stock Exchange that marks the beginning of the Great Depression in the United States. Construction of the St. Johns Bridge was completed in less than 22 months.

The dedication of the St. Johns Bridge was the focus of Portland's Rose Parade Festival on June 13, 1931. The city, which had only grudgingly acceded to the requests of the St. Johns neighborhood, embraced the graceful new span with excitement. The aptly named Stanhope Pier, Portland's acting mayor, encouraged all business in the city to be suspended for the opening celebration. "The event will mark an improved stride in the advancement of Portland and will offer a striking testimonial to the civic price and enterprise of the people of this city."[108]

> Human ingenuity has created nothing more arresting and, in a limited way, nothing more beautiful, than the modern suspension bridge of which the new St. Johns edifice being opened

---

[102] *Oregonian,* 20-May-1929, 1:5.
[103] *Oregonian,* 26-May-1928, 4:1.
[104] *Oregonian,* 27-May-1929, 19:1.
[105] *Oregonian,* 23-October-1928, 4:5–6.
[106] *Oregonian,* 15-November-1928, 16:1. Robeson and Steinman's bid was the second lowest of the seven bids the county received and the award was not unanimous, as one member, Clay S. Morse, dissented and stated he was in favor of the selection of C. B. McCullough and R. M. Murray.
[107] *Oregonian,* 24-March-1929, 1:3.
[108] *Oregonian,* 9-June-1931, 16:1.

> to traffic today is pointed to as an outstanding example...the St. Johns Bridge will give the city its eighth roadway across the Willamette River....The new structure is the only suspension bridge of any great importance west of the Mississippi.[109]

The St. Johns, a "Great Symphony of Steel and Stone," was opened to a serenade of boat whistles and automobile horns by Queen Rachel of the Rose Festival. Portland's east side, along with much of its west, joined in a parade of pedestrians and autos that stretched out over an eight-mile route from the Grand Avenue business district, heading toward the bridge's eastern approach. Despite the fractious process that led the bridge's construction, Stanhope Pier, city commissioner and acting mayor, enthused about its completion. The *Oregonian* called it "the finest bridge in the city of Portland." The newspaper added that, "This work is the result of your foresight, people of St. Johns, it is a monument to your hard work."[110]

The completion of the St. Johns Bridge, coupled with the deepening of the Great Depression, largely calmed Portland's "Bridge Fever," and, as the United States moved increasingly toward a wartime economy after 1937, talk of any new bridges across the Willamette was stilled. Portland boomed during WWII, as hundreds of thousands of new residents came to the region to work in shipyards and other defense-related industries that were developed to support the Allied military effort. The city's transportation system, in an era of gas and rubber rationing that made private automobile use challenging, was stretched thin. Old trolley lines were put back into service, along with new gasoline-powered bus routes, all in an effort to reduce traffic congestion as workers streamed across the Willamette and the Columbia, to work multiple shifts at the three massive shipyards developed by Henry Kaiser. The city's bus lines adopted "skip-stop" schedules, to reduce gas consumption and tire wear while the city actually brought back ferry lines across the Willamette to ease traffic on the increasingly over-burdened roads and bridges.[111]

Bridges for Cars: 1958–1973

Portland and Multnomah County, along with the rest of Oregon and the western United States, grew at a phenomenal pace in the decade after the end of World War II. Multnomah County population grew from 355,099 in 1940 to 471,537 in 1950 and ballooned to more than 522,000 by 1960. The City of Portland population, while growing slower than the county, expanded by more than 70,000 residents between 1940 and 1960.[112]

In 1923 J. P. Newell, of the Portland Planning Bureau, reporting upon the condition of the then-current Willamette spans, noted that all of the city's trans-Willamette crossings up to that point had been designed for horse or trolley use, not automobiles, adding that as a result they suffered from multiple deficits that reduced their functionality. Newell paid only scant attention to the Morrison Bridge, concluding in that period of "bridge fever" that the outdated span would probably have to be replaced in a few years anyway and so did not justify any major improvements.[113]

---

[109] *Oregonian*, 13-June-1931, 4:1–2. The *Oregonian* noted that the only two other "exceptionally large bridges" in the West — the Carquinez Strait bridge at Vallejo, CA and the Longview Bridge, over the Columbia, near Longview, WA — were both cantilever design. Work on the Golden Gate Bridge, another notable suspension bridge with a main span considerably longer than St. Johns, started in January 1933, two years after the St. Johns opening.

[110] *Oregonian*, 14-June-1931, 14:1–5.

[111] For more information on the WWII Homefront in the Portland–Vancouver area see Kramer (2007).

[112] Clay Meyers. *Oregon Bluebook and Official Directory*. (Salem, OR: State Printing Office, 1971), 205.

[113] Newell, *Future Bridges*, 20.

In 1931, with the opening of Portland's newest bridge at St. Johns, the Morrison was the oldest structure still in use and the only swing span remaining in the downtown area.[114] Low above the river and slow, both to open and to close, which it had to do frequently to accommodate river traffic, the 1905 Morrison Bridge was increasingly an obstacle to efficient movement of both ships and cars. In 1943 Robert Moses, the famed "master builder" of modern New York City, was hired by Portland to recommend improvements to the city's infrastructure.[115] Moses and his team of consulting engineers evaluated the eight Willamette River bridges, as well as their approaches and connections to the street grid, with a goal of developing a more efficient "thruway" system to relieve war-time and post-war traffic congestion. Moses, like Newell two decades earlier, saw little to recommend in the 1905 Morrison Bridge. Noting its low clearance, barely 33 feet above waterline, and narrow road width, Moses concluded that the bridge "...although located about opposite the center of the business district, carries only about 20,000 vehicles daily, due to the narrow and unsatisfactory approaches."[116]

Yet despite having been identified as being outdated for almost thirty years, the 1905 Morrison continued to serve Portland's downtown due to political lethargy and fiscal caution. Finally, after the low clearance of the Morrison rendered it unusable for an entire month as the result of high water during the Vanport Flood in 1948, public and official frustration finally grew to the point where reconstruction and replacement of the Morrison Bridge led the commissioners to call for a $12 million bond election, which the public passed by a large margin.[117] The replacement of the Morrison Bridge would be the first post-WWII bridge across the Willamette.

The new, third Morrison Bridge would be designed entirely for automobile traffic.[118] Pressure for local work resulted in the Morrison becoming Portland's first Willamette span built without the involvement of a nationally prominent bridge engineer since the beginning of the 20th century. "As befit the decade of The Organization Man, the Morrison Bridge would, instead, be a corporate product."[119] In June 1954, the Board of Commissioners awarded the contract to the Portland engineering firm of Moffat, Nichol, and Taylor working in partnership with Sverdrup and Parcel of St. Louis and San Francisco. Both firms had strong roots in the US Army Corps of Engineers and in aviation design, and, unlike any of Portland's previous bridge designers, it had relatively little large-bridge experience.

The design, as might be expected, reflected the differing times, and was built almost entirely around function, interpreted in a modern, business-like fashion without the conscious aesthetic flourishes of Portland's last bridge project, the St. Johns. The low, wide deck includes two deck spans and a double-leaf bascule that creates an opening almost 300 feet wide. Construction on the project began in 1956 and the bridge was built slightly upstream from the 1905 Morrison Bridge, a huge boon to travelers during construction, since they could continue to use the old span. There was some discussion about renaming the bridge, since it no longer would actually connect to Morrison Street.

---

[114] BNSF 5.1, below the St. Johns, a railroad-only bridge, was still a swing span at this time.

[115] Moses (1888–1981) was involved with, among other projects, the development of New York's highway system, the 1939 and 1964 New York World's fairs, the United Nations complex and most of New York's 20th century bridge construction including the Tri-borough Bridge, the Verrazano–Narrows Bridge and the Long Island parkway system. "Robert Moses was, in every sense of the word, New York's master builder" (See *NYTimes*, 30-July-1981).

[116] Robert Moses. *Portland Improvement.* (New York, NY: Prepared for the City of Portland, November 10, 1943), 28.

[117] *Oregonian,* 1-May-1955, 46:5–8.

[118] The 1905 Morrison bridge had been designed and completed when Portland's entire complement of automobiles totaled a mere 242. See *Oregonian*, 23-May-1958, 23:5–7.

[119] McGaw, *Morrison Bridge*, 12.

The *Oregonian* actually held a "contest" to solicit alternative bridge names but in the end the commissioners simply dropped "Street" from the bridge's formal name, keeping it as the "Morrison Bridge."

The new Morrison Bridge was formally opened on May 24, 1958. The wives the Multnomah County's three commissioners cut the ribbon to open the span, and the sounds of aerial bombs, the music of the Wilson and Benson high school bands, and speeches were heard. Portland's fire boats shot high sprays into the water to commemorate the event. The golden scissors used by the ladies were donated to the Oregon Historical Society for posterity. Among a full dais of Portland's mayor, representatives of the Chamber of Commerce, the East Side Commercial Club, and the Portland Retail Trade Bureau, Multnomah Commissioner Jack Bain made the keynote remarks and the new six-lane bridge, anticipated to carry more than 50,000 average daily trips to significantly improve the city's transportation system, was thrown open to the public. The old Morrison Bridge was barricaded off, preparatory to its removal.

According to the *Oregonian*,

> While pointing out the beneficial role which the new span will play in Portland's traffic scheme, Bain emphasized that there is still need for more such developments...the Oregon State Highway Commission, he explained, contemplates a new bridge, known as the Marquam Bridge, to be located between the Hawthorne and Ross Island Bridge.[120]

Portland's next bridge, the Marquam, would be its first freeway span, and would provide a direct link between what were then known as the Baldock (I-5), the Sunset (OR-47) and the Stadium (I-405) freeways on the west with the Banfield Expressway (I-84), on the east.[121] The dual-deck, fixed bridge would offer three lanes of travel in either direction over a fixed span almost 100 feet above the water.[122]

Oregon had long been a leader in highway and road construction.[123] In 1919 Oregon instituted the nation's first "gas tax" to pay for road improvements and, in 1923 with the completion of the Pacific Highway, it became the first state west of the Mississippi to have a paved route for its entire length[124]. Even prior to the passage of the Federal-Aid Highway Act in 1956, Oregon's state highway department had been developing new and improved "freeways," including the Baldock, that would eventually become the Interstate 5 corridor between Portland and Salem. With passage of the Federal Highway Act, the progress of each states' percentage of its total freeway miles was tracked nationally, with Oregon usually being the leader. The last two portions of Oregon's highway system were the steep grades up the Siskiyou Mountains in southern Oregon and, in Portland, the trans-Willamette connection — the Marquam Bridge.

---

[120] *Oregonian*, 25-May-1958, 1:1–4, 26:7–8.

[121] In the mid-1960s the Banfield Freeway was designated as I-80N and was redesignated I-84 in 1980.

[122] *Oregonian*, 26-July-1958, 6M:5. The Marquam Bridge was subsequently modified and re-striped to carry four lanes in either direction by utilizing original shoulder areas.

[123] The Oregon State Highway Commission and the Oregon State Highway Department it oversaw became a part of the Oregon Transportation Commission and the Oregon Department of Transportation, respectively, in 1969. ODOT also included the formerly separate Department of Motor Vehicles, State Board of Aeronautics, State Ports Commission, and other related entities.

[124] ODOT, 2009:1926.

Continuing the auto-centric design focus of the Morrison Bridge, the Marquam, named for Marquam Gulch which it traversed on the west end, was designed primarily to meet its complex function of seamlessly connecting high speed traffic without any of the typical connections to the street grid. "The Marquam, deemed a 'transportation corridor,' was designed by ODOT for utility, rather than beauty."[125] Like much of the early freeway system, governed by and largely paid for by the federal government, the Marquam Bridge was the product of a far different process than any of Portland's previous trans-Willamette crossings. Its construction was tied up with major freeway construction on both banks of the river, extending the Baldock Freeway into Portland from Harbor Drive and then crossing the river and continuing along its east bank to connect to what had been called the Minnesota Freeway, that bisected Northeast Portland.

The preliminary design for the Marquam, like so much of Portland's bridge history, had created opposition from river-shipping interests, who complained about its "low clearance" of 110 feet above water level and wanted it made considerably higher. According to the *Oregonian*, "John J. Winn, general manager of the Port of Portland, led the protest" He "pointed out the Hawthorne Bridge provides 165 feet of clearance above low water [when fully opened] and the Ross Island Bridge 120 feet. He said the port would oppose anything less than 120 feet of clearance."[126]

Glenn S. Paxson, Oregon's assistant state highway engineer, pointed out that it would cost more than $200,000 to raise the span ten feet to meet the Port's concerns. Ultimately, as it was built, the Port must have been pleased since the final design offers clearance of 130 feet. But while concerns about clearance were addressed, much of Portland found little to be happy with about the Marquam. Many simply thought bridge's three-span, double decked, cantilever truss, functional design was ugly. The Portland Art Commission complained to Governor Mark Hatfield, referring to the proposed span as the "Erector Set Bridge."[127]

Disdain for the Marquam's functional design led to local criticism of the project when issues complicated the acquisition of the land from the Union Pacific Railroad and the Portland Traction Company (the bus company) needed for the eastern approach spans. This delay resulted in the largely completed bridge standing disconnected from the shore for a time in early 1965, a situation that led to local wags, including the newspaper, to call the Marquam the "Bridge to Nowhere." The *Oregonian* pointed out that the land negotiations could take months while the bridge "...just sits there, doing nothing, and having nothing done to its eastside."[128]

Ultimately, of course, the negotiations were finalized and construction of the approaches completed. The lower deck of the Marquam Bridge was opened with little ceremony on October 5, 1966. The upper deck was opened two weeks later, on October 18, largely completing the $20 million dollar project. While the Marquam has remained the proverbial "ugly duckling" of Portland's Willamette River bridges, even the *Oregonian* relented editorially. The paper published a cartoon titled "At Long Last" depicting a workman crossing out the words "Nowhere" on a sign overlooking pleased motorists zooming hither and yon, stenciling in, in its place, words that read the "Bridge to EVERYWHERE."[129]

---

[125] Wood Wortman, *Portland Bridge Book*, 69.
[126] *Oregonian*, 18-October-1960, 1:3.
[127] *Oregonian*, 11-August-1963, 1:6–7.
[128] *Oregonian*, 15-February-1965, 1:4–5.
[129] *Oregonian*, 19-October-1966, 3M:5–6.

The opening of the Marquam Bridge marked the completion of one of the last portions of Interstate 5 through Oregon. The state would soon complete its entire section of the route and in so doing, became the first state west of the Mississippi River to have a completely paved freeway for its entire length. During its planning, Glenn Paxson estimated that the new Marquam would carry more than 66,000 vehicles per day. By 2006 the span was carrying average daily traffic more than double that, clearly serving as "the very important link in the Interstate 5 highway system" that Mr. Paxson had envisioned.[130] By 2008, the Marquam carried nearly 136,000 vehicles per day, making it the busiest bridge in Oregon.

Portland's most recent bridge would also be a freeway span. The idea of a Fremont Bridge, to connect downtown and the east side between the Broadway Bridge and Swan Island, had been raised earlier, in 1930. A bond election to build a span in this location was opposed by the Portland City Club and the Port, as an unnecessary obstacle to both shipping and aviation, given that Portland's airport was at this time located on Swan Island.[131] The bond failed with the voters in May 1930 and the idea of a Fremont bridge lay dormant for the next four decades, until the need for a new freeway connection revived it. While Portland in the 1960s had clearly ceded its earlier public transportation focus toward private automobiles, the Marquam Bridge process was evidence that the city retained strong ideas about the visual role its multiple trans-Willamette bridges played in its character. As Oregon began planning for the next freeway bridge to connect the Stadium Freeway (I-405) to Interstate 5 and completing the downtown "loop," it was obvious that another functional Marquam-like design was not going to be acceptable. In February 1963 Portland's Mayor Terry Schrunk appealed to the State Highway Commission that beauty, as well as utility, be considered in the design of the Fremont span. "He suggested that design and architectural characteristics of the St. Johns Bridge, one of the most graceful ever built, be incorporated into the Fremont Bridge."[132]

To address the Mayor's concerns and provide engineering and design input, the state contracted with Parsons, Brinkerhoff, Quade and Douglas, of New York, in October 1963. While not generally considered in league with the iconic bridge engineering names responsible for Portland's earlier bridges, Parsons Brinkerhoff was a well-established firm that traced its roots to 1885 and had been responsible for projects such as New York's first subway line, a famed 1,000-mile-long railroad line in China, and the original design for the San Francisco Bay Area Rapid Transit System or BART. The Portland Art Commission (PAC), who had so vilified the "erector-set" design of the Marquam, would play a significant role in the design of the new Fremont bridge through the work of Werner Storch of Storch Engineering, located in Portland. Storch, on the PAC's behalf, provided design concepts based upon the Port Mann Bridge in Vancouver, B.C. to ODOT, and via ODOT to Parsons Brinkerhoff.[133]

In August 1964 Parsons Brinkerhoff presented four designs, each with several options, representing a total of eight variations, to the state, as options for the Stadium Freeway bridge. Designs included a cantilevered span, an orthotropic deck-girder and several truss options. Design No. 4, a single-span tied arch, was largely dismissed by the engineers since its erection would be "very difficult."[134] The report, which recommended the selection of Design No. 6, a continuous tied arch design, documented

[130] *Oregonian*, 18-October-1960, 1:3.
[131] Jack Ostergren. "Across the Willamette in Ten Parts," *Oregon Journal*, 30-July-1968.
[132] *Oregonian*, 14-August-1963, 24:2.
[133] Wood Wortman, *Portland Bridge Book*, 30.
[134] Parsons et al. "Alternate Designs for the Fremont Bridge over the Willamette River, Portland, Oregon, Interstate 405, Federal Aid Project I-405-1 (1) 301, August 1964 through July 1965 (in ODOT Library), 25.

a clear understanding that appearance, not simple function, would also be a consideration in the design. Parsons Brinkerhoff noted that,

> The aesthetics of the problem and the selection of a particular design because of its appearance are so much a matter of individual opinion that evaluation from this point of view alone becomes difficult. To the bridge engineer, the design must suggest adequate strength for the intended service, but even he has his own individual ideas about appearance and likes to see his bridges "look nice."...[in that regard] the single span tied arch, Design 4, is somewhat of a disappointment in appearance. This is probably because of the double deck truss spans that, of necessity, flank it.[135]

In late October 1964, the City of Portland's Planning Commission reviewed the bridge proposals and decided to recommend an "orthotropic deck-plate girder," Design No. 7, for the new bridge. The commission also requested, however, that the state study a suspension bridge design before making a final decision.[136] The commission dismissed Parson Brinkerhoff's recommendation outright. According to the *Oregonian*, "Design No. 6, recommended by the engineers...was considered to have too much sheer mass which would block many attractive views of the city and was essentially an 'erector set' design similar to the Marquam Bridge, which was termed an "obvious mistake."[137]

A year later a cantilevered-truss bridge design had gained favor, at least at the state level. This design, similar to that of the Megler Bridge in Astoria, was "hotly opposed" by Alex Pierce, chair of Portland's Civic Design Committee, who referred to the proposal as "...a gigantic eyesore." "I don't get it," he continued, "there's no reason why an engineer has to be a clod when it comes to aesthetics."[138] At least one report states the Arts Commission and the Planning Commission, largely favored a "rather plain and angular" orthotropic deck plate girder design but "...city fathers and one dissident Arts Commission member, the late Francis J. Murnane, preferred the stiffened tied arch plan similar to the Port Mann Bridge...designed by Walter Storch & Associates."[139] In July 1965 the Parsons Brinkerhoff engineers presented the state with three additional designs for the Fremont Bridge, all of which were designed with the main piers on land, to avoid any in-stream obstacles and reduce costs. Design S1, a modified version of the earlier orthotropic tied arch Design No. 4 with an even longer single main span, was not favored by the engineers. They recommended Design S3, a cantilevered thru truss, as being both less expensive and less problematic to construct. These designs were further refined in April 1966 and S1, more costly than S3, was the preferred choice of the City of Portland "because of its aesthetic advantages...despite its greater cost and certain structural disadvantages that have been pointed out by the Consultants."[140]

---

[135] Ibid., 35.
[136] *Oregonian*, 21-October-1964, 11:3–5.
[137] *Oregonian*, 21-October-1964, 11:3–5.
[138] *Oregonian*, 17-August-1965, 38:1–3.
[139] Ostergren, op. cit. The Port Mann Bridge, completed in 1964, is visually nearly identical to the Fremont Bridge, although its main span is slightly smaller at 1,000 feet (vs 1,255 feet for the Fremont). The Port Mann Bridge, modified in 2001 with a new High Occupancy Vehicle lane cantilevered off the main deck, is part of Vancouver's Gateway Program, which had originally proposed "twinning" the span with a second, new bridge to relieve congestion. Ultimately that plan was modified to entirely replace the Port Mann Bridge with a larger ten-lane toll bridge that is expected to be completed in 2012, at which time the Port Mann Bridge will be removed (*Vancouver Sun*, 4-February-2009, http://en.wikipedia.org/wiki/Port_Mann_Bridge, visited 4-Jun-2010). The Port Mann Bridge design is generally credited to CBA Engineering (see also Eric Bolton, "Portland's Triumphal Arch," *Constructor*, October 1975).
[140] Parsons et al, op. cit., 2.

Design S1 originally would be the chosen design, with aesthetics and cost trumping the engineering consultant's recommendations. Initial, woefully unrealistic estimates of the costs were set at $19 million. Construction on the bridge began in late 1968, when contracts for what by then had become a $20-million main span and more than $40 million for the approach spans, were let by the state. Combined, the construction of the Fremont Bridge would cost more than the total cost of all eighteen trans-Willamette River spans in Portland's history, including those removed and those still standing, combined. By the time the Fremont Bridge and its complex approach spans was actually finished, total costs would reach $82 million.

The steel for the center span of the Fremont Bridge, 902 feet long, was fabricated in California and then assembled into a single unit at Swan Island, before being barged up the Willamette River to the bridge site, where it was to be installed in one "big lift." One journalist noted that,

> In terms of bridge building, the engineering feat in hoisting the 6000-ton, 902-foot-long center span of the Fremont Bridge in Portland, Oregon is comparable to landing on the moon. It is an unprecedented achievement of awesome proportions that is destined to stand as a milestone in man's long history of crossing rivers with bridges.[141]

The Fremont Bridge was formally opened to traffic on November 15, 1973. In 1974 the Fremont Bridge was selected as one of eight awardees by the American Institute of Steel Construction.

Designers and Builders

Portland's Willamette River Bridges represent the work of some America's most notable bridge engineers and designers over a near century of construction. Early in its history, facing the design issues surrounding long, movable spans that would both connect its shores for "communication" between its primary commercial and residential districts while providing minimal interruption to an important shipping lane, Portland turned to a series of nationally prominent designers. In the process Portland forged a collection of bridges that in the words of Eric DeLony, retired Chief of the Historic American Engineering Record "...read like a Who's Who of early 20th century engineering."[142] Portland's later, post-WWII bridges, mostly fixed spans, tended to rely on local, or at least less-influential, talent, but each design still left its visual mark on the city, even though, for some of the Postwar bridges, many may debate whether that mark was a positive one.

The following presents a brief synopsis of the engineers and firms associated with Portland's Willamette River Bridges

American Bridge Division of US Steel (Pittsburgh, PA): Contractors for the superstructure, including the bascule, of the Morrison Bridge, American Bridge is a legendary company that traces its roots to 1870 and was part of the steel/bridge conglomerate operated by Andrew Carnegie. Fabricators of some of America's most famed structures, including the Eads Bridge in St. Louis (built by Keystone Bridge in 1874), American Bridge was formed in 1900 by the merger of 27 former bridge builders that then controlled 90% of the nation's steel bridge market. American Bridge built the famed Hell Gate Arch Bridge, designed

[141] See ODOT Files, ORG 7, 1973. This material comes from an unidentified magazine article entitled "The Big Lift in Portland," published on May 4, 1973.
[142] Eric DeLony, *Foreward*, in Wood Wortman, *Bridges of Portland*, xi.

by Gustav Lindenthal, with assistance from both Othmar Ammann and David B. Steinman, as well as the San Francisco–Oakland Bay Bridge, the Verrazano–Narrows Bridge, the George Washington Bridge, and the Vehicular Assembly Building at Cape Kennedy.[143]

Othmar Ammann (1879–1965): Born in Switzerland, Ammann migrated to the US in 1904 and secured an appointment as chief assistant to Gustav Lindenthal, a position he held from 1912 to 1923.[144] Ammann worked on a variety of bridges but is best known for his six spans, including the George Washington Bridge (1931) and the Verrazano–Narrows Bridge (1964/1969), in New York City. His Portland connection, while somewhat minimal, comes through his association with Lindenthal.

John Lyle Harrington (1868–1942): Harrington began working with J. A. L. Waddell as an intern while studying engineering at the University of Kansas in the early 1890s. In 1898 he replaced Ira G. Hedrick as Waddell's business partner and the firm became known as Waddell & Harrington, responsible for a number of bridges worldwide. Waddell & Harrington shared several important patents for lift bridge designs and are both considered the inventors of the modern lift-bridge form. Harrington left the Waddell partnership in 1914. He later formed two other partnerships, one with Ernest Howard and Henry Tammen and another with his former assistant Frank Cortelyou, and both of these firms survive and remain active in movable bridge design.[145] "Since entering the construction practice and developing the vertical lift bridge now in general use, [Harrington has] designed over 200 bridges."[146]

Ira G. Hedrick (1868–1937): Hedrick was born in Illinois and educated in both Canada and Arkansas before becoming an assistant to John Alexander Low Waddell, in Kansas City, Missouri. Between 1899 and 1907 he was a partner in Waddell & Hedrick, responsible for the design of the Boston Elevated Railroad along with numerous bridges over the Missouri River. Predominately associated with railroad spans, Hedrick formed a brief, if ill-fated, partnership with Robert Kremers in order to secure the contracts for Portland's 1923 bridge program. Hedrick and Kremers designed the Burnside Bridge, somewhat modified by Gustav Lindenthal in the aftermath of the recall election that surrounded the award of the construction contracts to build the Burnside, Ross Island and Sellwood spans.[147]

Robert C. Kremers (1882–1962): Born in Missouri, Kremers was schooled in Illinois and worked in Utah prior to arriving in Oregon, where he was employed by the Oregon Short Line Railroad. In 1911 he was hired by the City of Portland as a building inspector and later moved to the office of the city engineer, serving intermittently as the chief of the Highway and Bridge Department. Kremers resigned in 1923 and immediately entered into a partnership with Ira G. Hedrick to design the Sellwood, Ross Island and Burnside

[143] See http://www.americanbridge.net/aboutus/timeline.php (visited 7-June-2010).
[144] Plowden, 1974:247.
[145] See www.heavymovablestructures.org/.../hall_of_fame/pdf/Harrington.PDF (visited 7-June-2010). HNTB, a successor to one of Harrington's partnerships, was responsible for the lift design of BNSF 5.1 in 1989.
[146] Winifred Scott Downs. Who's Who in Engineering. (New York, NY: Lewis Historical Publishing, 1948), 756.
[147] Wood Wortman, *Burnside Bridge*, 41–42.

bridges approved by voters in May of that year. His lack of experience raised questions and his dealings ultimately led to his indictment along with members of the county board of commissioners. Kremers later worked as a project engineer for L. H. Hoffman, one of Portland's leading construction companies.[148]

Gilpin Construction Company: Contractors for both the St. Johns and Sellwood bridges, Gilpin Construction Company built a number of other spans in the Pacific Northwest, including the North Yamhill River Bridge (1921), the Sauvie Island Bridge (1948, replaced in 2008), the Yale Bridge (1932) in Clark County, Washington and, perhaps most notably, the Yaquina Bay Bridge (1934) in Lincoln County, Oregon.[149] Gilpin later merged with General Construction Company and is now a part of the Peter Kiewit Construction Company.[150]

Gustav Lindenthal (1850–1935): Born in what is now the Czech Republic, Lindenthal was an entirely self-taught engineer. He began building bridges in Austria and Switzerland before emigrating to the United States in 1874, almost immediately establishing himself a major talent. In 1902 he was appointed commissioner of New York Bridges and in that capacity designed the Manhattan Bridge. His 1916 Hells Gate Bridge is among his most famous works but Lindenthal's influence is considerably enhanced by his two assistants on that project. "Lindenthal had two successive assistants on the Hell Gate who, like himself, rank among the world's greatest bridge engineers, Othmarr Ammann and David B. Steinman."[151] Lindenthal, as noted above, was the "big gun" brought to Portland to provide rationality to the design of the Burnside, Sellwood, and Ross Island spans in the wake of the 1924 recall election. Lindenthal, who managed the construction of all three bridges, is credited with the design of the Ross Island and Sellwood bridges, while making significant contributions to revise the Hedrick and Kremers–designed Burnside Bridge.

Ralph Modjeski (1861–1940): Born in Cracow, Poland, Modjeski's mother was a famous actress of the period. Schooled in France, Modjeski arrived in America in 1883, working first with George S. Morison, a prominent bridge designer.[152] Modjeski established his own engineering firm in 1893, located in Chicago, and quickly developed a reputation for the design of steel railway bridges in the Midwest. "Modjeski designed and built over 50 great bridges that included railroad trusses and suspension-type bridges across North America."[153] His best known bridges include the Quebec Bridge, over the St. Lawrence, the Ben Franklin Bridge and the Mid–Hudson Bridge. Modjeski, who designed Portland's Broadway Bridge as well as the Oregon Trunk Railway Bridge (Crooked River Bridge) in Jefferson County,[154] was the first nationally prominent engineer to consult on a Portland highway bridge. "Modjeski's local presence as the consulting engineer for

[148] McGaw, *Burnside Bridge*, 43.
[149] See http://bridgehunter.com/category/builder/gilpin-construction, visited 7-June-2010.
[150] See www.generalconstruction.com, visited 7-June-2010.
[151] Plowden, op. cit., 184.
[152] Morrison designed the first Steel Bridge, in Portland, under contract to the railroad line (see McGaw, Morrison Bridge, 14).
[153] See http://iehof.com/Modjeski.aspx, visited 7-June-2010.
[154] Dwight A. Smith, James B. Norman and Pieter T. Dykman. *Historic Highway Bridges of Oregon*. (Portland, OR: Oregon Historical Society Press), Second Ed., Rev., 1989, p 100.

James J. Hill's Vancouver–Portland Bridges initially brought him into contact with Portland civic leaders."[155]

Moffatt, Nichol & Taylor, with Sverdrup & Parcel: The first local engineering firm to design a major trans-Willamette bridge in Portland, Moffatt, Nichol and Taylor had been founded in Long Beach, California in 1945 and opened an office in Portland the following year. "Guy Taylor, in charge of their work in the Pacific Northwest, had come directly from active duty with the Army Corps of Engineers to join the new firm..."[156] Moffatt and Nichol, as the firm is now known, has since designed more than 500 bridges, including one the world's largest freeway interchanges, the El Toro "Y" in Irvine, California and the $5.5 billion dollar proposed replacement of the Oakland (CA) Bay Bridge.[157] Sverdrup and Parcel also traced its roots, at least in part, to the military, and had extensive experience in airbase design, working as a consultant to the Army Corps. The firm had been founded in 1928 and worked on numerous highway bridges and tunnels prior to its involvement with the 1958 Morrison Bridge project. Sverdrup & Parcel designed the Chesapeake Bay Bridge-Tunnel, completed in 1964 and, perhaps most notoriously, the I35W Mississippi River Bridge in Minneapolis that collapsed in August 2007. The firm was merged into what is now Jacobs Engineering in 1999.[158]

OSHC/ODOT (Glenn S. Paxson): The State of Oregon, first established the State Highway Commission in 1913, that was staffed by the Oregon State Highway Department (OSHD). Henry L. Bowlby was the state's first highway engineer, with Charles Purcell as the first bridge engineer.[159] Purcell's replacement, Conde B. McCullough, served as Oregon's state bridge engineer from 1919 to 1936 (and as assistant state highway engineer from 1932 to 1946). Widely regarded as a preeminent designer of reinforced-concrete arch bridges, McCullough was involved with several trans-Willamette bridge designs in Multnomah County, although none were built.[160] Glenn S. Paxson (1893–1973) had begun work for the state highway department in 1919 as a transitman and by 1922 was appointed assistant bridge engineer under McCullough, replacing him in 1935 and retaining that position until 1955 when, like McCullough before him, he was named assistant state highway engineer. Paxson supervised the design and construction of the Marquam Bridge, among many other spans related to Oregon's massive road expansion during the construction of the Interstate Highway system.[161] Ivan Merchant, another long time OSHD employee, also played a prominent role in the Marquam Bridge project and served as the state's bridge engineer during the construction of the Fremont Bridge.

---

[155] McGaw, *Broadway Bridge*, 14.
[156] McGaw, *Morrsion Bridge*, 13).
[157] See www.moffattnichol.com/transportation.php?pageno=2 (visited 7-June-2010).
[158] See http://en.wikipedia.org/wiki/Sverdrup_&_Parcel (visited 7-June-2010).
[159] Purcell (1891–1951), was born in Nebraska and began his career as a highway and bridge engineer in 1906. Purcell designed bridges for the Columbia River Highway as well as all of Oregon's early "standard" highway bridges. Upon leaving OSHD he became the District Engineer for the U.S. Bureau of Public Roads, and then, in 1928, the California State Highway Engineer. Purcell is today best remembered as the engineer of the Bay Bridge, connecting Oakland and Yerba Buena, California (www.nsea.org/news/Purcell.htm, visited 7-June-2010).
[160] McCullough's design for the Oregon City Bridge in Clackamas County was competed in 1922.
[161] See http://cedb.asce.org/cgi/WWWdisplay.cgi?23320 (visited 7-June-2010).

Pacific Bridge, Portland: Pacific Bridge built Portland's first Willamette River crossings and, following the recall election of May 1924, was the successful bidder for the construction of the Burnside Bridge as well as serving as subcontractor for the Ross Island Bridge. The firm is also responsible for the first Interstate Bridge across the Columbia River, completed in 1917. C.F. Swigert, the head of Pacific Bridge during the 1920s, threatened a legal suit against the board over the contested contract award for the Burnside bridge project.

Parsons, Brinkerhoff, Quade and Douglas: Parsons, Brinkerhoff, Quade and Douglas was the successor firm to the consulting engineering firm founded by General William Barclay Parsons in 1885 in New York City. Today known as Parsons Brinkerhoff, the firm remains a multi-national engineering concern with work ranging from the "Big Dig" on the Massachusetts Turnpike to an expansion project for the Panama Canal. Parsons, Brinkerhoff, Quade and Douglas' design for the Fremont Bridge in Portland represents the last new trans-Willamette span in Multnomah County and, after the designs of the Morrison and Marquam bridges, marked a return to the use of nationally known engineering firms for the design of bridges on the Willamette River.

Pennsylvania Steel Company (Steelton, PA): Pennsylvania Steel, founded in 1865, was among the largest steel fabricators in the nation at the time they provided the structural steel and built the superstructure for the Broadway Bridge in 1912. They also built the Beverly Railroad Bridge across the Columbia River in Grant County, Washington.

David B. Steinman (1886–1960): The second of Lindenthal's influential assistants, Steinman is widely regarded as one of the major bridge engineers of the 20th century and is particularly notable for his suspension-bridge design that utilized pre-stressed twisted wire rope-strand cabling. "This innovation made its debut in the United States with the simultaneous completion of the St. John's Bridge across the Willamette River at Portland, Oregon and the Waldo–Hancock Bridge...near Buckport, Maine."[162] Both spans were designed in partnership with Holton D. Robinson (1863–1945). Later in his career Steinman designed the Mackinac Bridge and a rehabilitation of the Brooklyn Bridge. The St. John's Bridge, with a main span of 1,207 feet, was for some years one of the longest spans of its type in the world and, reportedly, was Steinman's favorite among his many designs.[163]

Joseph B. Strauss (1870–1938): Born in Ohio, Strauss initially established himself as a significant designer by making major improvements in the trunnion design of bascule bridge mechanisms while working at the office of Ralph Modjeski. Strauss designed and held the patent on the bascules of the Burnside Bridge in Portland, but in Oregon he is probably better known as the designer of the Lewis and Clark Bridge, a large steel cantilever truss bridge that spans the Columbia River between Longview, Washington and Rainier, Oregon. Strauss gained lasting international fame as the chief engineer of the Golden Gate Bridge in California.[164]

---

[162] Plowden, 1974:291.
[163] Plowden, op. cit., 291.
[164] Plowden, op. cit., 244.

Stroebel Engineering (Chicago): Founded by Charles Louis Stroebel and a division of Stroebel Steel Construction, this firm designed the bascule span of the Broadway Bridge, relying upon their patented Rall rolling lift. C. L. Stroebel (1852–1936) worked for the American Bridge Company as well as being the consulting engineer for Carnegie, Phipps and Company, Burnham & Root, and Adler and Sullivan architects. He is generally credited with the design of the standard sections for I-beams and channels and is considered the engineer most responsible for the initial development of the "skyscraper" in late 19th-century Chicago.[165] In addition to the Broadway Bridge, among the hundreds of other bridges by Strobel Steel Construction are the Adams Street and Jackson Street bridges, both over the Chicago River, in downtown Chicago, Illinois.

United Engineering and Construction (Portland): The principal contractor for the Hawthorne Bridge, United was based in Portland and managed by Drake C. Reilly, who started his career working for the Union Pacific Railroad before arriving in Portland in 1891.[166]

John Alexander Low Waddell (1854–1938): Born in Canada and educated at Rensselaer Polytechnic Institute, in Troy, New York, Waddell was among the most prolific bridge designers in American history, responsible for more than a thousand structures throughout North America, as well as in Europe, Asia and elsewhere. Best known for his invention and shared patent (with John Lyle Harrington) of the span-drive lift bridge in 1909, Waddell worked on several Portland-area spans including the Steel Bridge and the Hawthorne Bridge, both in partnership with Harrington. "[I]t is important to remember that the firm Portland hired to design its Hawthorne Bridge was not the Waddell & Harrington famed for creating the modern vertical-lift bridge. In May 1909 the firm had completed no lift bridges."[167]

Wallace Bridge & Steel Company, Seattle: The primary steel fabricator for the St. Johns Bridge, Wallace Bridge and Steel, also provided the structural steel for the Canoe Pass and Deception Pass bridges in the State of Washington.

SUMMARY

> *[I]n Portland, people never have taken their bridges for granted. The big spans are the ventricles in the many-chambered heart of the city...*[168]

Since before the opening of the Morrison Bridge in 1887, which offered the first direct traffic route across the Willamette River, the waterway that bisects the heart of Portland has been a major economic boon, a character-defining feature, and, conversely, an obstacle. For over a century, private investors and railroad or trolley operators, followed by the City of Portland, Multnomah County, and finally the State of Oregon, have built a series of bridges that knit the two halves of Portland together

[165] Frank Alfred Randall and John D. Randall. Historic of the Development of Building Construction in Chicago. (Chicago, IL: University of Illinois Press, 1999), 34–5. See also McGaw, 1999, Broadway Bridge, 20.
[166] McGaw, *Hawthorne Bridge*, 17.
[167] McGaw, *Hawthorne Bridge*, 12.
[168] *Oregonian*, 2-May-1955, 46:5–8.

and allowed goods and citizens to move from one side of the river to the other for work, for residency, or other purposes. Throughout the first half of the 20th century, City of Portland and Multnomah County citizens regularly voted in the affirmative to invest and improve the city's free bridge crossings and to boost access between downtown and their neighborhoods. Often these investments went against the advice of traffic engineers but still the voters wanted more bridges, a testament to the value the city's voters placed on their bridges, and a tangible acknowledgment of just how important it is to easily cross the Willamette.

From its early under- or poorly-built spans, Portland soon adopted a pattern of high-quality bridge construction that relied upon the latest technologies, particularly for movable spans, and benefitted from the genius of some of America's foremost bridge engineers. The juxtaposition of a major population center with high cross-river commuter traffic and a major seaport located on a comparatively narrow and shallow river channel, presented a challenging set of forces. Those forces, and Portland's response to them, have resulted in what may well be one of the greatest collections of bridge technology within any eleven-mile-long stretch of river anywhere in the United States.

Portland, as the result of its geography, has by necessity incorporated cross-river connection as a significant element of its civic and commercial character since the completion of the first Morrison Bridge in 1887. Over the succeeding century, as Portland's population grew and as the original city merged with East Portland and Albina to form the core of the government as it exists today, the value of the trans-Willamette Bridges to the larger area brought first Multnomah County and then the State of Oregon into larger responsibilities for these bridges. Portland's bridges have, quite literally, played a major role in the transformation of the region from the horse and buggy era to auto-centric highway travel. Portland's downtown is characterized by its waterfront and its multiple bridges. As major construction projects, universally undertaken by government, Portland's bridges singularly and collectively trace the development of Portland and the larger Multnomah County metropolitan area.

In Portland, Oregon, a boat heading downstream from Oregon City on the Willamette River enters Multnomah County and soon glides beneath the high, fixed spans of the Sellwood, Ross Island, and Marquam bridges, heading toward the 1910 Hawthorne Bridge, the oldest of Portland's highway bridges on the Willamette River and the oldest vertical-lift bridge of its type still in operation in the United States. Continuing downstream, past the 1958 Morrison Bridge, with its double-leaf bascule, past the similarly designed Burnside Bridge, one of the heaviest bascule bridges in the country, that boat soon arrives at the Steel Bridge, the only double-deck vertical-lift bridge of its type in the world — a span that opened in 1912, and the second oldest vertical lift in the United States after the Hawthorne Bridge. The Steel Bridge has seen its share of change, having been designed to carry the heavy trains of the Oregon–Washington Railway and Navigation Company on its lower deck, and to carry electric trolleys, horse-drawn vehicles and gasoline powered cars on its upper deck. It has now been modified to carry highway traffic and the MAX light rail on the upper deck, while trains, as well as RiverWalk, a bike and pedestrian corridor, utilize the lower deck.

And still that downstream boat is not in "open water" as it heads toward the Columbia. Downstream from the Steel Bridge, a boat passes under the double-leaf Rall bascule of the Broadway Bridge, the largest Rall ever built. Next that boat passes beneath the soaring tied arch of the Fremont Bridge, the longest bridge span in Oregon and for almost thirty years the longest tied arch span in the world. Only when the St. Johns Bridge, a suspension span that was the longest such span in the world when it was completed in 1931, is behind has the boat passed beneath the last of Portland's ten downtown highway

bridges.[169] That's ten major bridges, each with an overall length of more than 1,000 feet, in just under eleven miles of the Willamette River. Ten bridges that carry pedestrians, bicyclists, automobiles, trucks, buses, light rail, and trains. Ten bridges that range in date of construction from 1910 to 1973, representing a broad range of engineering and the work of a veritable Who's Who of 20th century bridge engineers. Without much dispute, as Eric DeLony, the retired chief of the Historic American Engineering Record has said, "Portland is one of the world's great bridge cities...."[170]

The Willamette River Bridges of Portland, Oregon, a city that counts "Bridgetown" among its many nicknames, collectively relate the high value of trans-river connectivity in the region and more than a century of private and public investment to assure that connectivity is adequate to increasing traffic demands. The funding, siting issues, and social impacts of the decision to build each of these ten bridges has played a major role in Portland and Multnomah county politics since the region's earliest Euro-American settlement period. Each of Portland's trans-Willamette bridges has expanded interaction across the river, brought new life and economic vitality to the neighborhoods on either side, and created increased opportunities for citizens throughout Oregon by improving transportation access. While the earliest bridges across the river were built and operated by private interests, the people soon took control to assure that both public safety and free access was available to all. Growing recognition of the importance of these bridges has led to nearly a century of operation and maintenance under the aegis of Multnomah County and the State of Oregon.

Portland's relationship to the Willamette River goes back to the town's founding. Over a century and half of development, the river, and the bridges that cross it, have played a major role in defining the city economically, socially, and visually. In "Bridgetown," these major bridges over the Willamette are, and always will be, significant.

> Some day, when the river is clean and all its frontage is sightly, all the bridges will be beautiful and the Willamette will flow like a song through the heart of the city. That, if it pleases you, is one of the promises the new bridge extends.[171]

[169] A downstream boat will still have to pass beneath the BSNF 5.1 railroad bridge before hitting the Columbia River and its own multiple crossings below the Willamette.
[170] DeLony, op. cit., ix.
[171] "The New Bridge," *Oregonian*, 28-May-1926, 12:1, written upon the opening of the new Burnside Bridge.

F. Associated Property Types

Portland's trans-Willamette bridges under this submittal, *by definition*, reflect a limited, known universe of potentially eligible resources. All resources eligible under this submittal are of a single property type — bridges — and there are no other associated property types. While a bridge typically includes multiple elements, with multiple spans, piers or support structure, decking, railings, control features, etc., as discussed below, each named bridge is considered a single resource for purposes of evaluation here.

Description:

The Willamette River Bridges of Portland, Oregon (1910–73) are a tightly defined group of built resources, entirely limited to those spans, across that river, in that community, with a *primary* function related to a non-railroad transportation system. Only bridges built between 1910 and 1973 qualify for registration under this submittal, however, it should be stated that this limitation encompasses all extant bridges within the scope.

Bridges within this group take multiple forms and employ multiple materials. While each bridge is an identifiable and discrete entity from a structural standpoint, in another sense each is seamlessly integrated into the adjacent transportation plan through connecting approach spans and as such is integrated into the city, county, state and federal road systems. This submittal is limited to the "bridge" itself, defined as the main span(s) between the approach spans, independent of its multiple connecting elements. The nominated area, in all cases, is appropriately limited to the main span or spans of the bridge structure itself and any limited ground area on shore or mid-channel that lie directly below supporting piers and abutments.

Although neither Criteria B nor D are deemed appropriate as the primary criteria for nomination under this submittal, either may potentially be used to support nominations if appropriate for the specific bridge being nominated.

Variation:

All resources eligible under this submittal are bridges, and while essentially similar they exhibit broad variation within that type. Multiple bridge forms — including movable bridges (lift and draw) and fixed bridges (truss, suspension, and arch) — are found across the Willamette River within the geographic context. Bridges are built of multiple materials — steel, concrete, and combinations thereof — and exhibit multiple design elements. Variations on movable bridge technologies in terms of design and construction are also found, each reflecting bridge design and transportation needs at the time of construction. Minor variation exists in primary function, with some bridges carrying local automobile and bus traffic, bike and pedestrians, while other bridges are limited entirely to freeway traffic or to a combination of local traffic and light-rail mass transit.

Bridges are owned or controlled by various governmental entities, including the City of Portland, Multnomah County, and the State of Oregon. The Steel Bridge is privately owned but there has been a government lease (the City of Portland and Multnomah County, followed by the state) of the upper deck since 1912.

Erected over more than six decades of the 20th century, a period that saw a transformation of the American transportation system from one reliant upon horse-drawn vehicles and electric-powered trolley systems, to one largely dominated by individual internal combustion-powered automobiles, the Willamette River Bridges of Portland reflect changing bridge technologies developed to serve evolving transportation needs. The primary variations relate to the city's continuing interest in providing efficient shipping on the river itself, as bridge technology and design shifted from swing bridges, to lift, and finally draw bridges before the construction of so-called "high" fixed bridges that allowed cross-river and in-river traffic to each flow unimpeded. The engineers of Portland's bridges include a variety of different movable technologies, several of which represent significant examples of their type.

In addition to the movable technologies of Portland's bridges, the spans over the Willamette reflect several variations on the major bridge forms — arch, suspension, and beam or truss — as well as different materials (concrete, steel). How these three elements of design (type, material, and movable bridge technology) combine accounts for the wide range of bridge technology that is present in Portland.

Specific bridge technologies associated with Portland's Willamette River Bridges are:

Suspension (St. Johns): In a suspension bridge, cables made of multiple bundles of wire are suspended between support towers located between the abutments. The draped shape of the cable, in either a catenary or parabolic arch, supports vertical "suspenders" that themselves hold the roadway. Suspension bridges are often chosen for long spans and, as a result of their elegant form (and often prominent locations) account for many of the world's most famous bridges including the Golden Gate Bridge, at the entrance to the San Francisco Bay, and the Brooklyn Bridge, in New York City.

Tied Arch (Fremont): A tied arch is shaped something a bow with the "string" at the bottom, parallel to the river, tying the two ends of the bow together. In this form of bridge, the outward forces of the arch are carried in tension by the tie, the "string" or the bottom chord, which can be either ties or the road deck itself. This reduces forces on the abutments, and so lessens the need for massive foundations and instream obstacles.

Orthotropic Deck (Fremont): "Orthotropic," refers to an entity with dissimilar elastic properties in mutually perpendicular directions. In engineering terms it typically refers to a bridge or bridge deck that is stiffened either longitudinally (along its length) or transversely (width), or both, allowing the deck to add to the overall load capacity of the structure.

Thru-Truss (Broadway): Thru-trusses (also through-truss), as the name implies, are truss bridges in which the roadway forms the bottom of a box-like shape that traffic passes through. Such bridges are almost universally built of individual steel members and so are often called "Steel Thru-Truss" bridges. Thru-trusses differ from a standard truss span in that they have additional stiffening members between the upper chords of the parallel trusses, across the roadway. As with all truss forms, a variety of truss designs (Howe, Warren, Parker, Pratt, Petit) can be used.

Deck Truss (Steel, Burnside, Morrison, Marquam, Ross Island, Sellwood): A deck truss, in whatever design, is simply a truss bridge where the roadway is on top of the truss.

Vertical Lift (Steel, Hawthorne): As the name implies, in a vertical-lift bridge a movable span can be raised between two towers to increase clearance beneath the roadway. A "Double Vertical Lift," as in the Steel Bridge, is simply, as the name implies, a bridge with the ability to move two levels of traffic through a vertical-lift mechanism. The Steel Bridge is the only surviving double-deck vertical lift in the world, while the Hawthorne Bridge is the oldest operating vertical-lift bridge in the United States.

Drawbridge (Burnside, Morrison): A drawbridge is a form of movable span in which a portion of the road deck pivots upward toward vertical to create a passage (or to eliminate that opportunity, as in a medieval castle). In modern bridges, two opposing draw elements (or leaves) are opened in unison to create a gap. Such bridges, which can employ various, often patented, counterweights and mechanisms used in their operation, are also called bascule bridges.

Bascule Bridge (See *Drawbridge*)

Rall Bascule (Broadway): Patented by Theodor Rall in 1901, the Rall type of bascule bridge is also known as a "rolling lift bascule" because of the fact that the leaves roll backward in addition to pivoting open. "The basis of the Rall patent and the chief characteristic of this bridge type is that the trunnion of the span (i.e., the pivot point) is installed in a large steel roller or wheel that recedes from the channel as the span is rotated upward."[172] (Parsons Brinkerhoff, 2010). The Broadway Bridge is one of only six Rall-patent bascule bridges ever constructed, all of which remain in operation. In a Rall-type bascule the counterweights required for operation, along with the equipment to operate it, is located above the roadway.

Strauss Bascule (Morrison, Burnside): A variation related to the "Chicago bascule" after the city where the design first became popular, the mechanism for a Strauss bascule was patented by Josef Baermann Strauss in 1902. In a Strauss-type bascule the counterweights are located below the roadway, inside the piers, creating a clean looking structure.

[172] Parsons Brinckerhoff, 2012.

Significance:

Bridges eligible for listing under this submittal will have demonstrated significance in one or more of the following areas:

- Community Planning & Development: Significance related to the process and development of social, civic, and political events that shaped the character of Portland, Multnomah County and the State of Oregon, including the expansion of economic opportunity, neighborhood development, or the physical growth of the region.

- Transportation: Significance related to the process and development of transportation systems that enabled the movement of people, goods and services within the city, county and state.

- Engineering: Significance related to the development of new or improved technologies or construction techniques related to bridge design and construction.

Criterion A

Each of the trans-Willamette bridges, ranging from the earliest standing structure (the Hawthorne, 1910) to the most recent (the Fremont, 1973) are the direct result of significant political, economic, commercial, and social forces that governed their design, location, construction history, and the function that they play and have played in moving traffic between multiple points of the road system. Bridge construction across the Willamette River in Portland, to the exclusion of almost any other single resource type, reflects a microcosm of the region's development history, as various efforts that sought to improve connectivity for the benefit of specific neighborhoods, the city at large, the county, and the state.

Portland is the largest city in Oregon and the lower Willamette River plays an important role in the movement of people and goods for a large percentage of Oregon's residents. Compounded by the scale and pattern of public demand, debate, and votes that resulted in their funding and construction, any bridge eligible under this submittal is considered to be of *statewide* significance under Criterion A.

Determining the Period Significance for individual bridges eligible under this submittal is largely based on the selected eligibility criteria, being Criterion A, with or without additional significance under Criterion C. For Criterion A eligibility, the period of significance begins with the end of construction and the bridge dedication and then continues through the end of the MPD context in 1973. This period reflects the initial addition of the bridge to the city's trans-Willamette infrastructure and reflects the the bridge's continuing and significant role in the history and development of Oregon during the entire six-decade plus period that is defined by this context.

Criterion C

Under Criterion C, eligible bridges under this submittal will demonstrate *national* significance as rare or unique examples of particular bridge technologies. Bridges may be of national significance due to their scale or as the oldest, largest, or even only example of a particular technology to survive. Such bridges will, as a result of their representative value in the history of American engineering and bridge construction, have national significance for those reasons.

Willamette River bridges that are strongly associated with significant engineers or firms such as Waddell & Harrington, Ralph Modjeski, Gustav Lindenthal, and David Steinman *may* have national significance as the Work of a Master under Criterion C. Determining significance as the work of a master, as detailed under Specific Criterion C Standard 5, will require far more detailed evaluation than is presented within this submittal.

For bridges significant under Criterion C, where technology and design are the key elements in establishing significance, the standard NRHP process of defining Period of Significance as the day of completion (in this case the bridge's formal opening day) will be used. All bridges determined to be significant under Criterion C are additionally significant under Criterion A, and so will have two identified periods, each related to the appropriate criterion.

Criteria Consideration G

Depending upon timing, the future nomination of certain resources that are potentially eligible under this submittal may necessitate a Criteria G Consideration for properties achieving significance within the last 50 years. The temporal boundaries of this submittal, including the construction of all the highway bridges spanning the Willamette within the defined geographic area at the time of submittal, includes the Marquam Bridge, completed in 1966, and the Fremont Bridge, completed in 1973, each currently outside the normal 50-year window associated with National Register evaluations.

However, based upon the guidance of National Register Bulletin 22 (*Guidelines for Evaluating and Nominating Properties that Have Achieved Significance within the last Fifty Years)*, and of Bulletin 15 (*How to Apply the National Register Criteria for Evaluation)*, both the Marquam and the Fremont bridges may logically be seen as the continuation and culmination of the social, political and economic forces that established the pattern of publicly-owned bridge building across the Willamette River, expanding cross-river connectivity in response to growing need. In the case of each of these bridges, the last two spans constructed over the Willamette, their construction is directly tied to statewide and regional transportation development planning that followed the passage of Federal Highways Act of 1956. That funding mechanism led to the development of both Interstate 5 and Interstate 405, the road systems carried by Marquam and Fremont, respectively. As such, both the Marquam and the Fremont, when evaluated for significance under Eligibility Criterion A, appear to logically represent the continuation of bridge building established by this submittal and mark the completion of the transformation from a road system that began with structures developed to serve trolleys and rail to one that is now primarily devoted to the needs of private automobiles and truck freight.

Registration Requirements:

The following requirements govern evaluation of eligibility and appropriateness for registration under the Willamette River Bridges of Portland, Oregon (1910–73) Multiple Property Submittal.
Resources eligible to nomination under this submittal must, at minimum, meet <u>all</u> of the following requirements.

1. <u>Location:</u> The bridge must be located on the Willamette River, between River Mile 5.8 and River Mile 16.5, within the City of Portland, Multnomah County, Oregon.
2. <u>Function</u>: The bridge must primarily serve (or have served) highway transportation needs. This may include (in addition to individual automobile, truck, or bus traffic) pedestrian, bicycle or mass-transit. Railroad use does not preclude registration unless it is exclusive.

The bridge must continue to play a significant role in the regional transportation grid, providing connectivity between public travel routes across the Willamette River and allowing the movement of people, goods, services and other commodities that are important to the economic, social and civic character of the city.

3. Ownership: The bridge must be owned or leased by a public entity, as in local, county, state, or federal government. Joint ownership, including joint public-private partnerships, is consistent with this standard.
4. Construction: The bridge must have been constructed within the defined temporal context, 1910 to 1973.

Criterion A

Resources meeting the minimum eligibility requirements must additionally demonstrate minimum integrity as follows:

1. Location/Setting: Bridges retain integrity when all portions of the span between the non-contributing approaches remain upon the original alignment and supporting structures.
2. Design/Materials/Workmanship: Bridges retain integrity when the main span continues to exhibit the primary use of materials and workmanship of original construction. Minor modifications, alterations, or maintenance to address safety or operational needs do not normally impact this minimum integrity provided they are designed and accomplished in a generally compatible fashion using original or visually similar design/materials/workmanship. Typical minor modifications include but are not limited to:
    - Replacement of bridge decking/road surfaces
    - Re-striping, or modifications related to lane configurations
    - Modification to bridge railings to address safety pedestrian safety uses
    - Enhanced/enlarged sidewalks provided they do not visually impact the original bridge structure
    - Upgrade/replacement or repair of operating mechanisms (new motors, controls, switching gear) that has no visual impact
    - Upgrade/replacement of internal wear points (bushings, rollers, etc.) done substantially in-kind to maintain improve original operational character
    - Structural enhancement, including the installation of additional members to improve bridge capacity, provided work is done is a highly compatible fashion with little or no visual impact
3. Feeling: Defined as "...the quality that a historic property has in evoking the aesthetic or historic sense of a past period of time" (NR Bulletin 16A), feeling as pertains to bridges involves the ability to evoke, on balance, the original bridge design and period of construction. Bridges meeting this minimum threshold retain sufficient connection to their historic feeling to successfully evoke their original construction and character.

4. Association: By definition, any bridge meeting the minimum eligibility requirements and retaining minimum integrity in design, materials and workmanship successfully conveys its original construction and demonstrates integrity of association with the broad themes of transportation and development history. Bridges meeting this standard continue to function as integrated elements of the trans-Willamette transportation system although they may no longer fulfill or be entirely limited to the form of transportation that led to their development.

Bridges that meet all of the minimum eligibility requirements, and additionally retain sufficient integrity as documented here, by definition meet the requirements for registration under Criterion A as defined by the Willamette River Bridges of Portland Multiple Property Submittal.

Criterion C

Bridges eligible under this submittal may — in addition to Criterion A significance for their association with patterns of history — be significant under Criterion C, for their design, innovative or significant use of technology, or as the work of a master engineer.

In order to qualify for registration under Criterion C, in addition to meeting the minimum eligibility and integrity requirements above, an individual bridge must also meet at least three of the following:

1. Design: The bridge must be a significant example of its type, retaining very high integrity in design of the main span(s) to effectively convey the character-defining aspects of its original design and, where appropriate, operation.
2. Use of Materials: The bridge must retain very high integrity in the pertinent materials associated with the significant aspects of its original construction. Modifications, expansions, or additional structural reinforcement, must be in-kind, using the same or highly comparable materials to a great degree and must be installed in a manner and fashion that does not severely alter the key aspects of the original design. Special attention to integrity in the use of materials that are directly related to the significant technology is a key element in meeting this standard.
3. Workmanship: The bridge must retain very high integrity in workmanship, to effectively demonstrate the original construction and design.
4. Technology: The bridge must be an exemplar of a particular bridge technology, method of construction, or include an early use of a particular bridge-construction process. Bridges that are rare or early examples of a particular movable bridge technology, or remain among the earliest surviving example of type, may qualify on that basis, provided they retain a strong, operable connection to that technology. Bridges whose construction included significant technological innovation, design, or process, such as the use of pre-stressed twisted wire rope-strand cables at St. Johns, the early use of a concrete deck on the Burnside, or the monumental heavy lift of the central arch span of the Fremont, may also meet this criteria, provided a demonstrable continuation of that association remains.
5. Work of a Master: To qualify under this criterion the bridge must be the work of a prominent engineer or engineering firm and must represent a significant project within that individual's or firm's body of work. A significant project may be an early or break-through example of a particular design, style, or technology for which the firm was associated or which can be otherwise demonstrated as an exemplary or influential design within the individual's or

firm's career. Additional documentation to justify any particular Willamette River bridge as the work of a master, including the necessary evaluation of significance within the work of that master, is outside the scope of this submittal and will require additional comparative analysis on a case-by-case basis.

For bridges that are considered significant as an example of a particular technology or construction technique, retention of that technology or evidence of that technique in clear and largely unaltered fashion is critical to evaluation of integrity under Criterion C. The intent of these additional standards for evaluation under the Willamette River Highway Bridges MPS is to limit registration to those trans-Willamatte River bridges that, *in addition to their Criterion A significance*, clearly and strongly demonstrate some larger design or technological significance. By meeting three of the above criteria, qualifying bridges either remain substantially as built, with very high integrity with respect to their significant original design and operation, or they have demonstrated significance through bridge technology or association with a master while retaining high integrity in at least one area of design, use of materials, or workmanship to effectively convey that significance.

Criteria Consideration G

In the event that either the Marquam or the Fremont bridges should be evaluated under the Willamette River Highway Bridges MPD prior to having achieved fifty years of age, it appears logical for them to be treated as exempt from Criteria Consideration G, each being a resource appropriately considered within a defined group or district in which the majority of the properties are greater than fifty years of age.[173]

[173] Sherfy & Luce, 1990, as revised:41

Geographic

All potentially eligible resources under this submittal exist within a narrow geographic context defined by the Willamette River channel between River Mile 20 (the Multnomah–Clackamas County boundary) and River Mile 0, the confluence of the Columbia and Willamette rivers. This stretch of river, in the middle of Oregon's most populous city, has been the focus of bridge development stemming from economic, political, and civic forces that are intrinsically linked to the region's historical development. The bridges of the Willamette River, in the Portland, Oregon area, are strongly tied to the history of the city, of region, and the state of Oregon.

The geographic limits of the submittal are focused upon that portion of the Willamette River between River Miles 5.8 and 16.5 (Figure G-1), primarily within the city limits of Portland, and entirely within Multnomah County, Oregon. The nominated property associated with each bridge is limited to the physical elements of the bridge itself between the non-contributing approach spans and including any ground areas (including in-water areas) directly below supporting piers or abutments.

Specific coordinates for the ten Willamette River Bridges of Portland, Oregon are:

Bridge Name	River Mile	Coordinates	UTM*
St. Johns Bridge	5.8	45° 35' 07" N 122° 45' 52" W	10.518490.5047780
Fremont Bridge	11.1	45° 32' 16" N 122° 40' 59" W	10.524860.5042610
Broadway Bridge	11.7	45° 31' 55" N 122° 40' 27" W	10.525550.5041900
Steel Bridge	12.1	45° 31' 39" N 122° 40' 09" W	10.525930.5041420
Burnside Bridge	12.4	45° 31' 39" N 122° 40' 03" W	10.526080.5040915
Morrison Bridge	12.8	45° 31' 04" N 122° 40' 11" W	10.525940.5040330
Hawthorne Bridge	13.1	45° 30' 47" N 122° 40' 14" W	10.525835.5039810
Marquam Bridge	13.5	45° 30' 29" N 122° 40' 09" W	10.525960.5039240
Ross Island Bridge	14.0	45° 30' 04" N 122° 39' 52" W	10.526290.5038480
Sellwood Bridge	16.5	45° 27' 52" N 122° 39' 56" W	10.526220.5034380

* Using 1927 North American datum (NAD27)

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number G Page 1

Willamette River Highway Bridges of Portland, Oregon
Name of Property
Multnomah County, OR
County and State
Willamette River Highway Bridges of Portland, Oregon
Name of multiple listing (if applicable)

Figure G-1. Location of the ten Willamette River Bridges in Portland, Oregon.

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number H Page 1

Willamette River Highway Bridges of Portland, Oregon
Name of Property
Multnomah County, OR
County and State
Willamette River Highway Bridges of Portland, Oregon
Name of multiple listing (if applicable)

Summary of Identification and Evaluation

The multiple property submittal of the Willamette River Bridges of Portland, Oregon, benefits significantly from the well-researched and well-written documentation prepared in connection with the Willamette River Bridges Recording Project, co-sponsored by the Oregon Department of Transportation and the U.S. National Park Service/Historic American Engineering Record during the summer of 1999. These documents, prepared under the general direction of E. Blaine Cliver for HAER, and Kay Van Sickel and Robert W. Hadlow for ODOT, benefitted from field work teams led by Eric DeLony and Richard O'Connor, HAER, and Christine Theodoropoulous, AIA PE, architectural supervisor. Individual narratives, prepared by Judith McGaw, Sharon Wood Wortman and Linda Dodds, provided significant detail on the design, construction history, and technology of the individual bridges and serve as the primary source for much of the narrative in this document. These works include extensive review of bridge contracts, engineer's correspondence, plans, and maintenance records that proved invaluable in understanding the design and construction phase of the bridges. HAER narratives also provided valuable information and considerable research into the project background for each of the Willamette spans. ODOT's Commission and History Center Files and library offered in-house documentation and correspondence related to Portland's bridge construction, maintenance and development.

The review presented here of social, political, and economic history related to the push for bridge construction, as well as the electoral process to provide funding, relied on a mixture of primary and secondary sources. These most notably included E. Kimbark MacColl's several books on Portland's development, along with Jewell Lansing's more recent work on the city's politics. Carl Abbot's work on Portland's planning process detailed the physical development of city during the 20th century and the important role of transportation in creating its character. Exhaustive review of local newspaper reports of the various events, particularly from the *Oregonian*, provided a near-daily documentation of how Portlanders saw the role and value of bridges during the 19th and 20th century. Primary holdings, particularly the Newell Report, held by the Multnomah County Library's Rare Book room provided a wealth of information.

Information on ancillary issues related to the impact and development of trans-Willamette River bridges in Portland, including most notably the establishment, operation and decline of the region's electric trolley system and the impacts to transportation and development during World War II, relied upon extensive files and earlier research prepared for the Portland General Electric Company, the Housing Authority of Portland, and the Bonneville Power Administration. Of particular use was R. R. Robley, *Portland Electric Power Company with its Predecessor and Subsidiary Companies*, a privately printed history of power and transportation utilities in Portland that was published in 1935. Demographic information related to Portland and Multnomah population growth relied upon the bi-annual *Oregon Blue Book*, as published by the Oregon secretary of state.

General information on bridge development and the engineers who developed them relied upon several excellent volumes among the literally dozens of large-format bridge histories. *Landmark American Bridges* by Eric DeLony, and *Bridges: The Spans of North America* by David Plowden, eloquently document the history of bridge design in the United States and each benefit from their author's passion for the subject. Carl Condit's highly regarded two-volume work, *American Building Art*, traced the development of various bridge technologies during both the 19th and 20th centuries. Ray Bottenberg's *Bridges of Portland*, in the *Images of America Series*, provided a convenient compilation of historic images of Portland's spans.

While all of the above sources, among many others, have added greatly to this document, no single source has proven as useful, no single source has become as dog-eared and post-it noted, and no single work continues to offer a better ready-reference to all things Portland bridge-related than does Sharon Wood Wortman's excellent, exhaustively researched, and eminently readable *The Portland Bridge Book*.

I. Major Bibliographical References

Abbott, Carl. *Portland: Planning, Politics, and Growth in a Twentieth-Century City*. Lincoln, NE and London: University of Nebraska Press, 1983.

Bancroft, Hubert Howe. *History of Oregon (in Two Volumes)*. San Francisco, CA: The History Company Publishers, 1890.

Bolton, Eric. "Portland's Triumphant Arch." *Constructor*, October 1975.

Bottenberg, Ray. *Bridges of Portland*. Charleston, SC: Arcadia Publishing, 2007.

Condit, Carl W. *American Building Art, in Two Volumes*. New York, NY: Oxford University Press, 1960.

DeLony, Eric. *Landmark American Bridges*. New York, NY: American Society of Civil Engineers, 1993.

Downs, Winfield Scott. *Who's Who in Engineering*. New York, NY: Lewis Historical Publishing, 1948.

Gaston, Joseph. *Portland Oregon: Its History and Builders*. Chicago, IL & Portland, OR: The S. J. Clarke Publishing Co., 1911.

Grieser, Arthur H. *PGE: History of the Portland General Electric Company 1889–1981*. Portland, OR: Portland General Electric, 1982.

Hadlow, Robert W. *Elegant Arches, Soaring Spans: C. B. McCullough, Oregon's Master Bridge Builder*. Corvallis, OR: Oregon State University Press, 2001.

Labbe, John T. *Fares, Please! Those Portland Trolley Years*. Caldwell, ID: The Caxton Printers, Ltd., 1980.

Lansing, Jewell. *Portland: People, Politics and Power 1851–2001*. Corvallis, OR: Oregon State University Press, 2003 (Paperback edition, 2005).

Kozer, Sam A. *Oregon Blue Book and Office Directory, 1925–1926*. Salem, OR: State Printing Department, 1925.

Kramer, George. *It Takes More than Bullets: The WWII Homefront in Portland, Oregon*. Prepared for the Housing Authority of Portland. Eugene, OR: Heritage Research Associates, Inc., Report No. 311., August 2007.

Maddux, Percy. *City of the Willamette: The Story of Portland, Oregon*. Portland, OR: Binfords & Mort, 1952.

MacColl, E. Kimbark. *The Shaping of a City: Business and Politics in Portland, Oregon 1885 to 1915*. Portland, OR: The Georgian Press Company, 1976.

McGaw, Judith A. "Hawthorne Bridge," Addendum to Historic American Engineering Record [HAER No. OR-20], prepared under the co-sponsorship of HAER and the Oregon Department of Transportation in cooperation with Multnomah County, 1999a.

"Morrison Bridge," Addendum to Historic American Engineering Record [HAER No. OR-100], prepared under the co-sponsorship of HAER and the Oregon Department of Transportation in cooperation with Multnomah County, 1999b.

"Broadway Bridge," Addendum to Historic American Engineering Record [HAER No. OR-22], prepared under the co-sponsorship of HAER and the Oregon Department of Transportation in cooperation with Multnomah County, 1999c.

Moses, Robert. *Portland Improvement*. New York, NY: Prepared for the City of Portland, November 10, 1943.

Myers, Clay. *Oregon Blue Book and Official Directory*. Salem, OR: State Printing Department, 1971.

National Park Service. National Register Bulletin 15 *How to Apply the National Register Criteria for Evaluation*. Washington, DC: USDOI/National Park Service, 1990; revised 1991, 1995,1997, revised for the Internet 1995, 2001, 2002.

National Register Bulletin 16A *How to Complete the National Register Registration Form*. Washington, DC: USDOI/National Park Service, 1997

National Register Bulletin 16B *How to Complete the National Register Multiple Property Documentation Registration Form*. Washington, DC: USDOI/National Park Service, 1991

Newell, J.P. *Future Bridges Over Portland Harbor*. (Portland, OR: Letter to Dr. Gustav Lindenthal), December 14, 1925 (in Multnomah County Special Collections).

Robley, R.R. *Portland Electric Power Company with its Predecessor and Subsidiary Companies, December 16, 1860 to December 31, 1935*. Portland, OR: Portland Electric Power Company, 1935.

ODOT (Oregon Department of Transportation). *Oregon on the Move: A History of Oregon's Transportation Systems*. Salem, OR: ODOT History Committee, 2009.

ODOT. "Memo on Highway Deck, Willamette River Bridge." ODOT Bridge Files, 1932.

ODOT FILES, cited by File number and date, in text.

Olcott, Ben. *Oregon Blue Book and Official Directory*. Salem, OR: State Printing Department, 1914.

Oregon State Highway Division. "Stadium Freeway," I-405, c1973.

Ostergren, Jack. "Across the Willamette, in Ten Parts." *Oregon Journal*, June–July 1968.

Oregonian. Misc. issues as cited by date in text.

Oregon [Daily] Journal. Misc. issues as cited by date in text.

Parsons, Brinkerhoff, Quade and Douglas. "Alternate Designs for the Fremont Bridge over the Willamette River, Portland Oregon, Interstate Route 405, Federal Aid Project I-405-8 (1) 301", August 1964, through July 1965.

"Mechanical Repairs on the Stone Harbor Bridge," http://www.pbworld.com/news_events/publications/network/issue_47/47_25_nyarkod_mechanicalrepairsstone.asp (visited 26-July-2010).

A Context for Common Historic Bridge Types. NCHRP Project 25-25, Task 15, as prepared for the National Cooperative Highway Research Program/Transportation Research Council, October 2005.

Plowden, David. *Bridges: The Spans of North America*. New York, NY: The Viking Press, 1974.

PRLP. *Outing Trips; Portland, Oregon and Vicinity by Trolley*. Portland, OR: Portland Railway Light and Power Company, 1922.

Randall, Frank Alfred and John D. Randall. *History of the Development of Building Construction in Chicago*. Chicago, IL: University of Illinois Press, 1999.

Sherfy, Marcella and W. Ray Luce. National Register Bulletin 22 *Guidelines for Evaluating and Nominating Properties that Have Achieved Significance within the Last Fifty Years*. Washington, DC: USDOI/National Park Service, wo1990; revised 1996, 1998.

Smith, Dwight A., James B. Norman and Pieter T. Dykman. *Historic Highway Bridges of Oregon*. Portland, OR: Oregon Historical Society Press, Second Ed., Rev., 1989.

Wollner, Craig. *Electrifying Eden: Portland General Electric, 1889–1965*. Portland, OR: Oregon Historical Society Press, 1990.

Wood Wortman, Sharon. "Burnside Bridge," Addendum to Historic American Engineering Record [HAER No. OR-101], prepared under the co-sponsorship of HAER and the Oregon Department of Transportation in cooperation with Multnomah County, July 2000.

(with Ed Wortman, Photography by James Norman). *The Portland Bridge Book, 3rd Ed.* Portland, OR: Urban Adventure Press, 2006.

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES
EVALUATION/RETURN SHEET

REQUESTED ACTION: COVER DOCUMENTATION

MULTIPLE NAME: Willamette River Highway Bridges of Portland Oregon MPS

STATE & COUNTY: OREGON, Multnomah

DATE RECEIVED: 09/28/12 DATE OF PENDING LIST:
DATE OF 16TH DAY: DATE OF 45TH DAY: 11/14/12
DATE OF WEEKLY LIST:

REFERENCE NUMBER: 64501161

REASONS FOR REVIEW:

APPEAL:	N	DATA PROBLEM:	N	LANDSCAPE:	N	LESS THAN 50 YEARS:	N
OTHER:	N	PDIL:	N	PERIOD:	N	PROGRAM UNAPPROVED:	N
REQUEST:	N	SAMPLE:	N	SLR DRAFT:	N	NATIONAL:	N
NEW MPS:	Y						

COMMENT WAIVER: N

✓ ACCEPT ___ RETURN ___ REJECT 11/14/12 DATE

ABSTRACT/SUMMARY COMMENTS:

could use some additional research to est. better state-level context.

RECOM./CRITERIA Cover accepted

REVIEWER [signature] DISCIPLINE Historian

Phone _____ Date 11/14/12

DOCUMENTATION see attached comments Y/N see attached SLR Y/N

If a nomination is returned to the nominating authority, the nomination is no longer under consideration by the National Park Service.

Oregon
John A. Kitzhaber, MD, Governor

Parks and Recreation Department
State Historic Preservation Office
725 Summer St NE, Ste C
Salem, OR 97301-1266
(503) 986-0671
Fax (503) 986-0793
www.oregonheritage.org

September 20, 2012

Ms. Carol Shull
National Register of Historic Places
USDOI National Park Service - Cultural Resources
1201 "Eye" Street NW, 8th Floor
Washington, D.C. 20005

Re: National Register Nominations

Dear Ms. Shull:

At the recommendation of the Oregon State Advisory Committee on Historic Preservation, I hereby nominate the following historic properties to the National Register of Historic Places:

BROADWAY BRIDGE
1100 NW NAITO PKWY
PORTLAND, MULTNOMAH COUNTY

BURNSIDE BRIDGE
W BURNSIDE ST
PORTLAND, MULTNOMAH COUNTY

HAWTHORNE BRIDGE
1200 SW HARBOR DR
PORTLAND, MULTNOMAH COUNTY

MORRISON BRIDGE
520 SW NAITO PKWY
PORTLAND, MULTNOMAH COUNTY

These four bridges are being nominated under the auspices of the Willamette River Highway Bridges of Portland, Oregon Multiple Property Document, also enclosed here.

Also attached is an amendment to the National Register Nomination for the Dr. K. A. J. and Cora Mackenzie House (NRIS # 96000625).

MACKENZIE, DR. K. A. J. AND CORA, HOUSE
615 NW 20TH AVENUE
PORTLAND, MULTNOMAH COUNTY

We appreciate your consideration of these nominations. If questions arise, please contact Diana Painter, Architectural Historian, National Register and Survey Program, at (503) 986-0668.

Sincerely,

Roger Roper
Deputy State Historic Preservation Office

Encl.

The Pacific Northwest

An Interpretive History

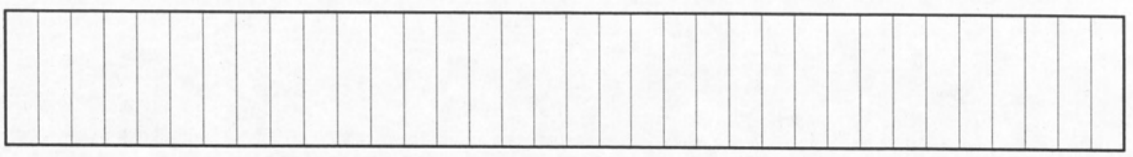
*

CARLOS A. SCHWANTES

*

UNIVERSITY OF NEBRASKA PRESS
LINCOLN AND LONDON

1989



territory's most populous town, but by 1890 that title belonged to Seattle, which had grown by an impressive 1,000 percent to more than 42,000 residents. Still more spectacular was Spokane's 6,000 percent increase. Portland's 164 percent increase seemed almost leisurely by comparison.

THE BIG FOUR CITIES PLUS BOISE

Portland was the city that gravity built. It enjoyed the natural advantage of a location that enabled it to dominate the commerce of both the Willamette and Columbia rivers. Situated on the west bank of the Willamette twelve miles upriver from its junction with the Columbia, Portland dates from 1843. In its early years it had several rivals, the most formidable being Oregon City and its growing complex of mills at the falls of the Willamette. But Portland possessed a superior deepwater anchorage, an advantage that proved decisive after 1848 in securing trade between the Willamette Valley and California's goldfields. Its wharves were piled with cargoes of lumber, wheat, fruit, and other farm products leaving the Pacific Northwest for distant markets.

Portland recorded a population of eight hundred in 1850 and was incorporated the following year. Several other milestones marked the community's progress toward metropolitan status. Ladd and Tilton became the Northwest's first bank in 1859 and a financial bulwark of the Oregon country. Five years later, William S. Ladd and Henry W. Corbett opened a telegraph line to California, and on March 5, 1864, the *Oregonian* printed a special edition of news from the East that was only twenty hours old.

The growing trade with the booming gold camps of the upper Columbia region brought Portland prosperity. During the Clearwater rush of 1862, more than ten thousand people traveled to and from the mines in Portland-based riverboats; that number grew to thirty-six thousand in 1864. Freight on the river increased also. New wharves had to be built to handle the traffic. Portland's role as hub of a steamboat monopoly and, later, of Henry Villard's railroad empire further enhanced the city's status. Gold and wheat had made Portland rich and smug by the late 1870s, a place untroubled by booms or depressions, unhurried, and not a little complacent in its role as the region's premier metropolis.

But Portland was not a city wholly devoted to material pursuits. In the 1860s it could boast of several churches, a library, a music store, and several newspapers. After a fire in 1873 leveled thirty blocks, substantial brick and stone structures replaced its original wooden buildings. Cities of the Pacific

Northwest had a mindless way of imitating their eastern counterparts by platting a monotonous grid of streets without regard for aesthetics or terrain. Despite this, Portland became a city noted for its physical dignity and charm, as well as its God-fearing respectability.

As the egalitarianism of frontier days gave way to a more structured society, Portland developed an aristocracy dominated by the Ladds, Corbetts, Failings, and other first families. Yet even in that self-proclaimed enclave of New England on the Willamette, society's villas, chateaus, and castles were forced to coexist with the 30 houses of prostitution and 110 saloons recorded in the 1880 census. A bridge spanned the Willamette River by 1890, and electric streetcars clanged down city streets that reached away from both banks of the river. Three years later, one of the first electric interurban lines in the United States connected Portland to neighboring Oregon City. Electric railways contributed to the growth of numerous satellite communities in Portland's orbit and thus initiated what a later generation would label suburbia and urban sprawl.

Tacoma, which during the 1870s seemed likely to emerge as Portland's main rival, had its beginnings in 1852 around a small sawmill built on the south shore of Commencement Bay at the southern end of Puget Sound. The original settlement became Old Tacoma when in 1873 the Northern Pacific selected a site three miles east for its terminus and platted a new Tacoma on the lowlands. The town grew rapidly as factories and wharves fringed the shore and building commenced on the tideflats. Dozens of steam- and sailing ships carried wheat, coal, and lumber from Tacoma's docks to distant markets.

The epithet City of Destiny seemed entirely appropriate when in 1888 Tacoma became the site of the world's largest lumber mill. A host of other sawmills and wood products factories soon followed, but the great depression of the 1890s hit Tacoma especially hard and shattered its dream. By 1900 the city's fate was clearly not to become the dominant metropolis on Puget Sound, though it might legitimately claim to be the lumber capital of America. Destiny, so it seemed, favored Tacoma's archrival to the north.

The growth of Seattle lagged dramatically behind that of Portland and remained barely ahead of Tacoma's until the 1890s. The first settlement inside the present urban boundary of Seattle was at Alki Point in 1851, but this proved such a poor location that settlers moved across Elliott Bay the following year to the foot of what is now Yesler Way. In 1853 the first steam-powered sawmill on Puget Sound formed the nucleus around which modern Seattle took shape.

WINNING THE BATTLE FOR PRODUCTION

Even before the United States formally declared war on the Axis nations of Japan, Germany, and Italy in December 1941, the Pacific Northwest experienced the impact of increased production for defense and for aid to friendly nations already at war. The surprise Japanese attack at Pearl Harbor rapidly accelerated that trend. Industries large and small produced ships, barges, aircraft, lumber and various kinds of wood products, metals, food, machinery, clothing, munitions, and armaments. Seattle alone secured war contracts totaling $5.6 billion, ranking it among the nation's top three cities in per capita war orders.

The region's two best-known war industries were the Kaiser shipyards in the Portland-Vancouver area and the Boeing airplane company. Boeing had large assembly plants in Seattle and Renton and several smaller subassembly and parts factories located throughout the Pacific Northwest. Before war broke out in Europe in September 1939, it employed about four thousand people and produced military planes for the Army Air Corps and a limited number of commercial aircraft.

One of Boeing's models from the 1930s was the B-17 or Flying Fortress, which Britain's Royal Air Force purchased to strike at the Germans. By mid-1941 nearly ten thousand people worked for Boeing, a number that jumped to twenty thousand in September, and to thirty thousand when the United States officially entered the war a few months later. At the peak of B-17 production, Boeing's Seattle plant rolled out sixteen B-17s every twenty-four hours.

A larger and longer-range Boeing plane, the B-29 Super Fortress, became operational in 1943. On each of its assembly lines in Renton, Boeing was capable of building a B-29 bomber in five days. By mid-1945 six new planes rolled out of the plant each day, for a wartime total of 1,119 B-29s, in addition to nearly 4,000 B-17s produced in the Seattle plant. At its peak of production in 1944, Boeing employed nearly fifty thousand people in the Seattle area and amassed total sales of more than $600 million, an impressive sum considering that in 1939 the value of all Seattle manufacturing totaled only $70 million.

Vital to the success of the aircraft industry were the region's five new aluminum reduction plants—the first of which Alcoa opened near Vancouver in 1940—and Bonneville and Grand Coulee dams, which supplied the cheap power necessary to convert alumina (aluminum oxide) into ingots of aluminum. Congress provided the Bonneville Power Administration

85. The arsenal of democracy: producing B-17s at a Boeing plant in Seattle. Courtesy Library of Congress: LC-15760-LC US262–59739.

more than $2 billion to increase the generating capacity of the dams sixfold between 1941 and 1945. Most of the electricity went to the aluminum reduction plants.

In the production of aluminum goods, the Pacific Northwest supplied little more than electricity and reduction facilities. Aluminum originated in the tropics as bauxite ore, and after being refined in the Columbia Valley, it was shipped across North America to be fabricated into semifinished products. Another reminder of the region's continuing status as an economic colony was the fact that, of all the major components in a B-29, Boeing itself fabricated only the spar chord (a support assembly in the wing). Wing tips were manufactured in Cleveland, landing gear in Milwaukee, engine housings in Detroit, and engines in a Dodge factory in Chicago. Puget Sound businesses handled no more than 5 percent of Boeing's subcontracted work.

Even more spectacular than Boeing's accomplishments were those of the

three Kaiser shipyards in the Portland-Vancouver area. With the aid of federal subsidies, the aggressive and blunt-spoken industrialist Henry J. Kaiser became the world's foremost shipbuilder. For a time nearly one hundred thousand people worked in the Kaiser yards, which displaced Pacific Telephone and Telegraph as Portland's biggest employer. Between mid-1941, when his first yard opened on the banks of the Willamette River, and August 1945, Kaiser constructed about fifty "baby flattop" aircraft carriers and several hundred Liberty ships. The shipyards used fast and simplified methods of welding and steel produced in Kaiser plants in Utah and California.

In mid-1942, a Kaiser yard could build a ship in seventy-two days, half the national average. By the war's end, one of Kaiser's Oregon yards launched a ship in a mere five days. The Kaiser facilities in Vancouver and Portland built more vessels than were constructed anywhere else in the United States and compiled a productivity record unmatched among shipyards.

Other shipyards in the Portland-Vancouver area employed from a few hundred to several thousand workers. Subassembly plants for ships and airplanes, and industries manufacturing wartime chemical, aluminum, steel, and other products were also located in Portland. Elsewhere, smaller plants like the Pacific Car and Foundry Company in Renton converted from making logging trucks to Sherman tanks. Eighty-eight ship- and boatyards in Washington—including the navy's big facility at Bremerton—employed a total of 150,000 workers in 1944.

FEATURES OF WARTIME LIFE

War industries and military installations wrought profound population changes in the Pacific Northwest. In the state of Washington were located more than fifty relatively large army and navy bases, with the greatest concentration of military personnel being in the Fort Lewis–Camp Murray–McChord Field area south of Tacoma. The population growth that accompanied the establishment of military bases nearly overwhelmed small communities like Ephrata, Soap Lake, Moses Lake, and Oak Harbor.

In Portland, where Kaiser shipyards employed nearly 70 percent of the city's labor force, job seekers arrived from ranches in Idaho and Montana—even from as far away as New York City—by special Kaiser trains. Five such trains left New York City on a single weekend in late 1942 carrying five thousand workers. Kaiser charged a fare of $75 to be deducted from subsequent paychecks.

The region's population shifts were phenomenal. Between 1940 and 1944, Seattle increased from 368,302 to approximately 530,000 people (650,000 in the greater metropolitan area); Tacoma from 109,408 to 140,000; and Bremerton from 15,134 to 48,000. Portland gained 160,000 new residents, a figure that did not include another 100,000 people in the industrial suburbs of Troutdale, Oregon City, Vanport, and Vancouver. Oregon's population growth during the 1940s nearly equaled its increase for the entire nineteenth century.

Although many war workers came from outside the Pacific Northwest, residents of the region made up the largest percentage of the work force. As a consequence, urban growth represented mainly a redistribution of population within the region. The exodus of people to the boom areas and into the armed forces resulted in stationary or declining populations in agricultural areas east of the Cascades. Except for Camp Farragut and a large naval ordnance plant in Pocatello, Idaho contributed mainly the traditional products of its mines, forests, and fields to the war effort. The state actually lost 15,000 residents between 1940 and 1945. During that same time, the states of Oregon and Washington gained 194,000 and 533,000 new residents respectively.

Seattle doubled its number of manufacturing employees between 1940 and 1942. Nearly half the people initially hired in its war plants were men under twenty-five. The rapid influx of young males without strong community ties was common to all the major cities of the region. Typically, they came from small towns or rural areas where, if previously employed, they had been working in one of the region's principal extractive industries—forestry, mining, and fishing. About 10 percent had formerly worked on farms. In addition to the lure of high pay offered by war industries, such jobs were exempt from the draft, at least in the early part of the war.

Married men among the newcomers faced the problem of finding suitable housing for their families or leaving them behind—as Kaiser advised his imported East Coast workers to do. In the late summer of 1941 when the large influx of new residents began, the vacancy rate for housing in Seattle, Tacoma, and Everett dropped to 1 or 2 percent, and rents rose accordingly. Nearly one-third of all Seattle dwellings renting for less than $50 a month suddenly commanded higher rents, a far greater proportion of increases than occurred in any other large city in the United States. That was one reason why inflation in Seattle exceeded that in any comparable city, climbing 74 percent from 1939 to 1947.

Wartime Seattle and Portland also confronted some of the nation's worst

housing problems. To alleviate the shortages, shortcuts were taken, few of them satisfactory. Many existing dwellings were hastily divided into apartments; trailer camps were established; obsolete and condemned houses were patched up; and chicken coops, sheds, lodge halls, empty service stations, and offices were converted into dwellings. Even tents were used. People lived in the back seats of cars or took turns sleeping around the clock in "hot beds." The result was overcrowded and substandard facilities—houses without adequate sanitary arrangements—that created considerable dissatisfaction among war workers. In an attempt to relieve the shortage, federally financed housing projects were hastily constructed, such as the Hudson House Dormitory in Vancouver, which accommodated six thousand men in single and double rooms.

The most spectacular effort to address the housing problem was a completely new working-class town built in a lowland area adjacent to the Columbia River just north of Portland. Called Kaiserville and then Vanport, it became one of the world's largest housing projects. In mid-1942, Henry J. Kaiser's son, Edgar, signed a contract with the United States Maritime Commission to build a six thousand–unit project. Five thousand construction workers (including two hundred women who pushed wheelbarrows and wielded shovels) literally slapped Vanport together. Units were built on wooden block foundations and had thin fiberboard walls. Vanport received its first tenants in December and increased almost overnight to thirty-five thousand residents, making it the second-largest community in Oregon.

Housing was only one of many wartime shortages. More physicians, dentists, and hospital facilities were desperately needed in communities experiencing exceptional growth. Many people feared that crowded conditions, substandard housing, inadequate and overloaded sewage and garbage disposal systems, vermin and rodents, and communicable diseases—especially syphilis and gonorrhea—menaced public health. Even so, health care throughout the Pacific Northwest was probably better than in many parts of wartime America, thanks in part to Henry J. Kaiser's establishment of the Northern Permanente Foundation to furnish medical and hospital care to his shipyard workers and their families.

An ordeal often as bad as finding housing or adequate medical care was getting to and from work. On some Seattle streets the traffic flow nearly doubled by late 1941, and when gasoline and tire rationing restricted automobile use in mid-1942, streetcars and buses labored under crushing passenger loads. Everyday shopping posed the challenge of standing in long check-out lines or doing without. The daily discomforts endured by shift

workers may have been responsible for the unusually high absentee rates in places like Portland and Vancouver. The annual rate of labor turnover reached 150 percent in 1943. It became so great at Boeing that observers described the company as a "giant turnstile."

The shortage of labor created jobs for all seekers. The number of lines in the "help wanted" section of the *Seattle Times* jumped from 28,631 during the first nine months of 1940 to 225,515 during the same period in 1943. Employers paid good wages and competed with one another for workers. They used newspapers, billboards, radio, and movies to attract help: "Older Men and Women, We Have a Place for You . . ."; or "Contribute to Victory by Doing Your Share on the Home Front . . ."; or "New and Higher Wage Scale."

At the peak of wartime production, some 46 percent of Boeing's nearly fifty thousand employees were women. In the spring of 1942 approximately 80 percent of the local trainees for aircraft-manufacturing jobs were women, many of them wives of military personnel. At the Puget Sound Navy Yard, employment of women in production jobs increased from virtually none in 1941 to 21 percent of the yard's thirty thousand employees in mid-1943. In all the important industrial facilities of the Puget Sound area combined, women formed about one-fourth of the work force. Housewives without any work experience or educational qualifications beyond a few years in grade school earned $200 to $250 a month at Boeing, at the shipyards, or as bus drivers. Day-care centers for the first time became a significant feature of urban life. Although women performed many jobs traditionally done by men, they rarely received the same pay. Their entry into the work force, moreover, was regarded as a temporary wartime expedient by most men—and by many women, too.

Not every woman, of course, became Rosie the Riveter. Those who remained at home contributed to the war effort by raising victory gardens; preparing meals that took into account shortages of meat, sugar, vegetables, and other staples of the American diet; saving tin cans, shortening, and other items for salvage drives; and often raising a family while a husband was away at war.

Organized labor experienced a great influx of new members during the war, but life in the burgeoning union ranks was not harmonious. Industrial workers who had been recruited from rural regions and small towns often regarded unions with apathy or even antagonism and resented paying any dues. The addition of women and blacks to the industrial work force further disrupted several unions. Tensions arose when blacks in the aircraft and shipbuilding industries applied for union membership. At Boeing, the union