



CITY OF TUKWILA LANDMARKS COMMISSION

6200 Southcenter Blvd
Tukwila, WA 98188

LANDMARK REGISTRATION FORM

PART I: PROPERTY INFORMATION

COMMISSION APPROVED 3/22/2018

1. Name of Property

historic name: BOEING AIRPLANE COMPANY BUILDING

other names/site number: Boeing Building 105; Boeing Red Barn; E.W. Heath Shipyard

2. Location

street address: 9404 East Marginal Way South, Tukwila, WA

parcel no(s): 332404-9019

legal description(s):

3. Classification

Ownership of Property:

- ☒ private
☐ public-local
☐ public-State
☐ public-Federal

Category of Property:

- ☒ building(s)
☐ district
☐ site
☐ structure
☐ object

Name of related multiple property listing:

(Enter "N/A" if property is not part of a multiple property listing.)

N/A

4. Property Owner(s)

name: Museum of Flight Foundation

street: 9404 East Marginal Way South

city: Seattle

state: WA

zip: 98108

5. Form Prepared By

name/title: Flo Lentz (25549 140th Lane SW, Vashon, WA 98070)

& Sarah J. Martin (3901 2nd Avenue NE #202, Seattle, WA 98105)

organization: Contracted consultants on behalf of
the Museum of Flight

date: December 13, 2017

6. Nomination Checklist

- | | |
|--|---|
| <input checked="" type="checkbox"/> Site Map (REQUIRED) | <input checked="" type="checkbox"/> Continuation Sheets |
| <input checked="" type="checkbox"/> Photographs (REQUIRED): <i>please label or caption photographs and include an index</i> | <input type="checkbox"/> Other (please indicate): |
| <input type="checkbox"/> Last Deed of Title: <i>this document can usually be obtained for little or no cost from a title company</i> | |

PART II: PHYSICAL DESCRIPTION

7. Alterations

Check the appropriate box if there have been changes to plan, cladding, windows, interior features or other significant elements. These changes should be described specifically in the narrative section below.

- | | | | | | |
|---|-----------------------------|--|---|--|--|
| <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | Plan (i.e. no additions to footprint, relocation of walls, or roof plan) | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | Interior features (woodwork, finishes, flooring, fixtures) |
| <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | Cladding | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Other elements |
| <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | Windows | | | |

Narrative Description

Use the space below to describe the present and original (if known) physical appearance, condition, architectural characteristics, and the above-noted alterations (use continuation sheet if necessary).

SUMMARY

The Boeing Airplane Company's Building 105, commonly known and herein referred to as the Red Barn, is the centerpiece artifact around which the Museum of Flight developed in the early 1980s. It is located on the 11.44-acre museum campus at 9404 East Marginal Way South in Tukwila, at the southwest edge of the King County International Airport, also known as Boeing Field. The Red Barn was moved here in 1975 from its original site along the Duwamish River, saved from demolition by aviation enthusiasts and flight museum proponents who recognized its significance (see Figures A1 through A3). Since its construction in 1909, this former shipyard building has served maritime, aviation, and educational functions. Its industrial design, form, and materials have allowed for continual change in the use of its space without the loss of its historic character.

THE RED BARN TODAY

The Red Barn is the visual focal point of the Museum of Flight campus (see Figures C1 through C6). This area of south Seattle and north Tukwila is entirely industrial in character. The neighborhood remains an active aviation hub, with Boeing facilities, Raisbeck Aviation High School, and Boeing Field all in close proximity. The Red Barn faces southwest prominently fronting East Marginal Way South. It is mostly free-standing, except for a two-story hyphen connecting the Red Barn's east wall to the 1983 museum building. The connector accesses the museum's main lobby and admissions desk to the east, the Personal Courage Wing to the north, and the Great Gallery to the south.

The early-20th century industrial architecture of the Red Barn contrasts sharply with the soaring glass elements of the surrounding museum. The sturdy wooden, balloon-frame building rests on a concrete foundation and basement constructed in 1980. The grade slopes away from the building, exposing a basement wall that is lined with windows on the north side (see Figure C6). The Red Barn exterior is clad in wood shiplap siding with corner boards and is painted red with white trim. It is believed, from accounts of early-day Boeing workers, that the building was painted red at an early date, if not originally. This siding and trim was applied over the original during the 1980 renovation. Bands of

replacement (1980) multi-light, wood-sash windows mark the first and second stories (see Figures C4, C8). The roof is seamed metal with skylights throughout.

Although the building evolved in form and function over the years, its appearance today is reflective of about 1917. The building includes four sections that developed between 1909 and 1917, noted as sections A, B, C, and D on Figure A4 and described in detail below.

Sections A and B make up the original 1909 building and include a two-story gabled portion (A) with a one-story shed wing (B) along the north wall, together measuring approximately 60' x 140'. The **primary west elevation**, which faced West Front Street at the original site, features the iconic "Boeing Airplane Co.," painted in white above the second-floor windows, a sign that first appeared on the building in 1917 (see Figures B5, C1). A non-historic wood staircase accesses a single-leaf, wood-panel and glass door with a transom above. Painted above is "office," as it appeared in 1917 (see Figures B5, C7). There are two operable double-hung windows centered on the second story of the west facade. Near-continuous bands of fixed single-sash windows line the first and second stories along the long lateral walls, with 15-light sash at the first story and 12-light sash at the second. A small shed-roof dormer occupies the north slope of the roof (see Figures C5, C6).

Only small portions of **section B** are visible on the exterior. The primary west façade and the rear east side of this shed roof section are identical to one another, each with two pairs of nine-light, single-sash windows (see Figure C1). The east one-third of the north elevation includes a continuous band of nine-light, single-sash windows. Below, the concrete basement wall is visible and features a band of six-light, single-sash windows (see Figure C9).

Occupying the northwest portion of the building, **section C** is a one-story gabled structure attached to the north wall of the shed wing (section B), measuring approximately 32' x 56'. Section C was detached from the Red Barn when it was first moved in January 1975 and had been salvaged for reattachment during renovation; however, the salvaged material was ultimately not reused. Instead, this section was reconstructed with new materials in 1980. The northwest portion of section C began as a small (14' x 22') detached office with a rear shed, erected by early 1913. This area is noted on the west façade by a wood-panel door and two double-hung windows, and six single-sash, nine-light windows spaced out along the north wall (see Figure C5). In 1917, the narrow space between the office and main building was filled in to give the west façade its current irregular roofline, a combination of shed and gable forms (see Figure B5). Today, this small in-fill area is noted by a grouping of three multi-light, single-sash windows on the west facade.

Lastly, **section D** is a one-story hipped-roof structure extending perpendicular from the north wall of the two-story building, measuring approximately 52' x 28'. It was constructed between 1909 and 1913 and appears in early photos of the shipyard. The north portion of section D that is integrated with section C was reconstructed during the 1980 renovation. Today, it is seamlessly integrated into the remainder of the building's north wall, with only the fenestration noting its position. A continuous band of single-sash, nine-light windows spans its north wall.

The **interior** of the Red Barn functions as a museum and an artifact, with a largely open and unadorned space reflecting its origins as a manufacturing plant. Visitors enter the building through the first-floor hyphen at the east end (see Figures C10, C11). This interior space within section A is undivided, a single open bay with large openings along the north wall accessing sections B and D. A row of heavy square wood posts, installed in 1916 to support the second-floor structure, bisects the first-floor space (see Figures C13, C14). The second-floor structure is exposed and forms the ceiling of the first floor. The many windows lining the south, east, and west walls provide ample natural light that is supplemented by special accent lighting and industrial pendant light fixtures installed during the 1980 renovation. The interior walls are unfinished, with the structure and backside of the original siding visible. Much of the wood flooring of the first floor was replaced in 1980 because it was covered with asphalt.

There are two partially enclosed, straight-run staircases to the **second floor**, located along the north wall at the northeast and northwest ends of the space (see Figure C15, C17). The second floor is divided into two general spaces – a large open area occupies the east two-thirds and offices and drafting rooms make up the west one-third. These spaces are the result of modifications made in 1916 when a second floor was added. Recreated during the 1980 renovation, the offices and drafting rooms reflect a more finished appearance, with walls of beaded wainscot. Interior wainscot walls are topped by fixed windows and separated by wood-panel doors (see Figures B9, B10, C17, C18). The remaining second-floor walls are unfinished, with the structure and backside of the building's original siding visible. The ceiling is open throughout the second floor, and the roof structure and heavy trusses are visible (see Figures B8, C19). The heavy trusses at the east end are visible in the earliest known photos of the building, though it's difficult to discern any lasting evidence of the tracks that once held the massive swinging doors of the shipyard era (see Figures B1, B3, and C19 through C21). Some of the Red Barn's wood flooring was salvaged and repaired, while some was entirely replaced during the 1980 renovation.

ORIGINAL LOCATION AND BUILDING EVOLUTION (1909-1974)

For a current site plan and a visual representation of the building's change over time, see Figures A4 and A5.

The Red Barn was built as a boat shed on an undeveloped tract of land along the Duwamish River, about five miles south of the river's mouth at Elliott Bay. At that time, the Duwamish was a natural, meandering stream with deep oxbows and continuously changing channels due in part to the effects of tidal currents. G.W. Baist's 1912 *Real Estate Atlas of Seattle* nicely illustrates the winding river just prior to a years-long effort to straighten and deepen the waterway for navigation – an undertaking that opened the door to industrial development and would forever change the character of south Seattle (see Figure A6). In 1906, Joseph R. McLaughlin had platted bottomland on the west bank of the river just north of the community of South Park and across from Georgetown, calling it McLaughlin's Waterfront Addition to the City of Seattle. Realizing the advantages for shipbuilding of such easy river access to Elliott Bay, the shipwright Edward W. Heath in August 1909 purchased Lots 3, 4, 5, and 6 of Block 33. Heath's parcel was situated at the base of a prominent oxbow, fronting the river meander to the north (see Figures A6, A7).

With local and federal permits in hand in October 1909, Heath constructed a substantial boat shed measuring 60' x 140', complete with a 26-foot-wide wharf and a 10-foot-wide launch way. The wood-frame building, composed of a tall 40' x 140' shed with a 20' x 140' lean-to, occupied the entire width of Lot 6 and was partly erected on pilings out over the river. The north, water-side elevation was composed of massive double doors leading to an expansive interior open from the dirt floor all the way to the roof structure (see Figures B1, B3).

Soon afterward, Heath fell into financial difficulty while constructing a custom motor yacht for the lumber baron William E. Boeing. To keep his project on track, Boeing acquired the shipyard from Heath on March 23, 1910, and it continued to function as a shipyard. An inventory of property, dated 1913, suggests that, in the interim, the boatyard had modestly expanded to handle Heath's incoming work. New structures included a hipped-roof wing perpendicular to the boat house (see Figures B1, B2), and an adjacent, free-standing office building (14' x 22') with an adjoining shed (22' x 56'), all on the east side of Lot 7 (Boeing Corporate Archive, Heath to Boeing, Bill of Sale, 1910).

The next round of alterations to the Red Barn came in late 1916 or early 1917, as the building shifted from its maritime origins to aircraft manufacture. Plans drafted in 1916 for Boeing's fledgling Pacific Aero Products Company document the installation of a second floor in the voluminous interior of the boat shed, by this time referred to as "the wood working plant." One-third of the added 5,600 square feet was divided into offices, while the remaining two-thirds was reserved as open manufacturing space (see Figures B8 through B10). The plans included detail drawings of office counters, tongue-and-groove partition walls, lighting, and employee lockers (see Figure A8). Although no elevation drawings survive, the installation of a second floor altered both the north and south elevations, resulting in an appearance much like what one sees today.

The 1917 Sanborn Fire Insurance Company map documents the Red Barn at this stage in its development (see Figure A9), before another important modification – the joining of the free-standing office building and its shed on Lot 7 with the southwest corner of the Red Barn. This change gave the front, street-facing façade its current and familiar irregular roofline. It is this configuration that is depicted in a well-known June 8, 1917, wartime photograph of the Red Barn (see Figure B5).

The young start-up took on its first major government contract in September 1917. This contract jump-started a five-year period of near-continuous expansion at the Oxbow Plant (known as Plant 1 after 1936). By 1922, the footprint of the Red Barn had nearly doubled from the original, with additions to the Lot 7 side (west) and to the water side (north). A new, freestanding office building was built in front of the Red Barn to the south, and an elevated passageway connected the second-floor spaces of the two buildings. At this time, the two-story body of the Red Barn functioned as the Wood Machine Shop Building, with 5,581 square feet on the lower floor for the shop, a bench shop, glue room, and propeller department, and 5,600 square feet on the upper floor for the engineering department, drafting room, and experimental laboratory (see Figures A10, A11, and B6 through B11) (Boeing Corporate Archive, Factory Description, 1921.)

After 1922, growth and development at the plant shifted away entirely from the Red Barn to the surrounding plant. The 1929 Sanborn Fire Insurance Company map shows the Red Barn as it appeared in 1922, but with a greatly expanded campus surrounding it (see Figures A9, A11). Two important additions included an enormous metal shop with stepped, monitor roofs – the largest building ever erected at Plant 1 – and a new administration and engineering building, the only structure from Plant 1 still standing today. At decade's end, the plant occupied about 15.5 acres. With these and other factory improvements, the Red Barn largely functioned as a wood shop through the duration of the interwar years (Boeing Corporate Archive, Report on Manufacturing Plant, 1930; KC Property Record Card, 1937).

The Red Barn's footprint thereafter went unchanged until the mid-1960s. But one important modification made to the interior in 1937 was the removal of the second floor, returning the interior to one large open space. This change was temporary and made to accommodate construction of a full-scale mock-up of the Boeing 307 Stratoliner. By 1942, the floor was re-installed, and the space returned to woodworking and pattern-making. Never again would the Red Barn play such a central role in the planning and production of Boeing's airplanes (MoF, Tech Files, *Modern Mechanix*, 1938; Boeing Corporate Archive, Plant No. 1 [site plan], June 2, 1942).

By the early 1960s, the Red Barn served as a lowly maintenance building and was falling into disrepair. It was briefly buoyed by a 50th anniversary celebration in July 1966 of the Boeing company's founding. The building was repainted to its "original exterior color scheme of barn-red and white trim," (*Seattle Times*, July 10, 1966) (see Figures B14, B15). In her National Register nomination of 1969, author Margaret Corley noted the Red Barn was in use as facilities maintenance shops and a warehouse. She acknowledged there had been "minor modifications in window arrangements" and interior partitions, but emphasized "the basic structure is original and in sound condition."

Corley's assessment was written on the eve of the sale of Plant 1 from the Boeing Company to the Port of Seattle. While completing plans to overhaul the entire site, Port officials briefly leased the Red Barn to the Web Press Company in October 1971. By 1974, the Port was anxious to remove the Red Barn, but agreed to store it elsewhere on their property for up to two more years (*Seattle Times*, Oct 10, 1971, Jan 29, 1975).

RED BARN RELOCATIONS AND RENOVATIONS (1975 to Present)

On January 30, 1975, the Red Barn was rolled 600 feet where it sat on temporary footings for ten more months while preservation advocates brought years of planning for a regional museum of flight to fruition. In preparation for its final move, parts of the building were selectively deconstructed and set aside for reuse. This included the one-story gable addition, labeled section C on Figure A4, which was removed and stored on site, leaving the original 60' x 140' building intact for transport. On December 16, 1975, the Red Barn was barged up the Duwamish River to the southwest edge of Boeing Field. For this dramatic move, the building was braced, hauled to the river, shifted onto a Foss company barge, and delivered two miles upstream to Boeing Field (see Figures B16, B17). It remained there until

November 24, 1980, when it was finally trucked to its present location on the Museum of Flight campus.

Seattle-based architect Ibsen Nelsen, who joined the team in 1975 to oversee the multi-phased, multi-year Museum of Flight project, managed the relocation and rehabilitation of the Red Barn. Nelsen detailed the condition of the building as it sat on shorings in a 1977 progress report. At that time, a layer of asphalt covered some of the extant first floor, and some sub-flooring was dry rotted. Almost all of the early wood-sash windows were damaged by neglect and dry rot. The interior had accumulated layers of nailed-on miscellaneous lumber, conduit, and piping. The one-story sections lacked flooring and some walls, and the building overall had no insulation, a major concern given the intent to convert the building to museum use.

Phase One of the project involved renovating the Red Barn and installing it on a permanent foundation. Nelsen's Phase One-A specifications, dated August 14, 1980, included the following work: site drainage and grading; **excavation of a basement** and backfill; piling; pouring **concrete basement and foundation**; building drainage; and positioning the building on the foundation. Associated renovation included: demolishing and removing items to be replaced down to the basic structure; providing structural reinforcement; **reconstructing appurtenant structures**; installing **new framing systems**, thermal and acoustic **insulation**, and **new exterior siding, wood trim, windows, and doors**; removing the old roofing down to the original sheathing, installing roof insulation, plywood, and **new metal roofing, gutters, downspouts, and skylights**; laying **new wood flooring** where needed, **repairing some wood floors**, and finishing floors; **sandblasting and artificial aging** of new interior wood; painting; and roughing-in various mechanical and plumbing connections (MoF Corporate Archive, Ibsen Nelsen & Associates, Specifications for Phase 1a, 1980).

Phase One-B was to complete work to the Red Barn and to construct a new, visually distinct facility that attached to the rear (east) wall via a hyphen connector. The new facility would serve as the museum entrance and shop. Nelsen's Phase One-B specifications related to the Red Barn, dated May 15, 1981, included **installing additional floor and roof structure and sprinklers** and **completing mechanical and electrical work**. Final work to finish out the basement occurred between May and July 1983. The Red Barn exterior was repainted red with white trim in August 1983, in advance of the museum's official opening in September (MoF Corporate Archive, Ibsen Nelsen & Associates, Specifications for Phase 1b, 1981).

The work resulted in a first-floor interior left open with an industrial appearance that included exposed wall and ceiling structures. The space flowed seamlessly into the one-story wings, which exhibited a similar character. The second-floor interior included the rebuilt office spaces (based on 1916-1918 drawings and photographs – see Figures B9 and B10) at the front (west) end and an open bay occupying the east two-thirds of space. As a result of the 1980-1983 rehabilitation, the Red Barn's original wood siding was left intact to be visible on the interior. On the exterior, new sheathing plywood and insulation was installed under the new wood siding and trim, made to exactly match the original. The new wood-sash windows were made with insulating glass to match the originals. Importantly, all of this work underscores the importance the owner and architect placed on the need for a museum-quality, climate controlled interior, something expressed in the early planning stages.

McCann Construction Company of Renton served as general contractor for the rehabilitation of the Red Barn, but many contracting firms contributed to the project, including Puget Sound Roofing Co., Colbeck & Co. (sandblasting), and A.C. Wright & Sons (painting).

The Red Barn was repainted once again in 1991. A more comprehensive exterior repainting and renovation followed in 1998, funded in part by King County's Cultural Facilities Program. Work included the replacement of rotted windows and fascia boards; the replacement of roughly 200 window pane units; refurbishment/replacement of skylight flashings; scraping, power washing, prepping, caulking, and painting the exterior siding and trim; digging up and relocating underground landscape sprinklers; and the installation of fire alarms, smoke detectors, and moisture sensors. Among those involved were Baugh Construction Co. (general contractor), Long Painting, and General Storefronts (window replacements). Long Painting returned to power wash, clean, and repaint the Red Barn exterior in 2015.

PART III: HISTORICAL / ARCHITECTURAL SIGNIFICANCE

8. Evaluation Criteria

Historical Data (if known)

Designation Criteria:

- ☒ A1 Property is associated with events that have made a significant contribution to the broad patterns of national, state, or local history.
- ☐ A2 Property is associated with the lives of persons significant in national, state, or local history.
- ☐ A3 Property embodies the distinctive characteristics of a type, period, style, or method of design or construction or represents a significant and distinguishable entity whose components lack individual distinction.
- ☐ A4 Property has yielded, or is likely to yield, information important in prehistory or history.
- ☐ A5 Property is an outstanding work of a designer or builder who has made a substantial contribution to the art.

Criteria Considerations:

Property is

- ☐ a cemetery, birthplace, or grave or property owned by a religious institution/used for religious purposes
- ☒ moved from its original location
- ☐ a reconstructed historic building
- ☐ a commemorative property
- ☐ less than 40 years old or achieving significance within the last 40 years

Date(s) of Construction: 1909	Other Date(s) of Significance: 1975, 1980	
Architect: Ibsen Nelsen (rehabilitation)	Builder:	Engineer:

Statement of Significance

Describe in detail the chronological history of the property and how it meets the landmark designation criteria. Please provide a summary in the first paragraph (use continuation sheets if necessary). If using a Multiple Property Nomination that is already on record, or another historical context narrative, please reference it by name and source.

SUMMARY

The Boeing Airplane Company's Building 105, more commonly known and herein referred to as the Red Barn, is primarily recognized for its direct association with early 20th century aircraft manufacture in King County, Washington. But the significance of this industrial shed encompasses broader themes; namely, the waning years of wooden shipbuilding on the West Coast and the emergence of the national historic preservation movement within Washington State.

The Red Barn meets City of Tukwila Landmark criterion A1, through its *association with events that have made a significant contribution to the broad patterns of local, state or national history*, in the following ways:

- Built in 1909 as a shipyard boat shed and launch ways by accomplished Pacific Northwest shipwright Edward W. Heath. Turned out the yacht *Taconite* and the steamer *Polar Bear*, two renowned vessels of their day. Remains a rare remnant of the age of wooden ships, and is last known artifact associated with Heath.
- Appropriated for aircraft manufacture by William E. Boeing in 1916. Became nucleus of Boeing Airplane Company's first factory, later called Plant 1. Housed the manufacture of Model-C series floatplanes for U.S. Navy, the company's first major contract. Modified for functional reasons, but still readable as Boeing's oldest surviving structure.
- Targeted for preservation by Pacific Northwest aviation buffs as early as 1966, at outset of the national historic preservation movement. Informally protected and relocated for 17 years prior to final rescue. Rehabilitated and adaptively re-used as focal point of a regional aviation museum by an early public-private partnership. Still the primary historic artifact of nationally-acclaimed Museum of Flight, 25 years later.

MARITIME ERA (1909-1916)

A Shipwright Moves West

The market for wooden ships was declining when Edward W. Heath began his shipbuilding career in Michigan in the 1880s. Metal hulled vessels, powered by steam, already dominated the East Coast and the Great Lakes. Throughout the 1890s, a comparative shortage of railroad connections and roads made the Pacific coast a last bastion of the wooden ship industry (Spitzer 1998, 3).

Like many traditional shipwrights, Heath was a consummate craftsman and a stubborn perfectionist. He struggled throughout his career to stay within the constraints of time and budget on any given job. These two factors – an old-fashioned work ethic rooted in a declining industry – dogged him for his entire life and typified the late stages of wooden shipbuilding everywhere (Spitzer 1998, 3-4).

Heath was born in 1863 into a prosperous shipbuilding family with ties to New Bedford, Massachusetts. Raised on the shores of Lake Michigan, Heath entered the trade at the age of 23. He soon established his own shipyard in his hometown of Benton Harbor, Michigan. From 1889 to 1899, Heath designed and constructed tugboat hulls, and advertised as a “General Ship Builder” for barges, yachts, and “upper cabin steamers.” His yard was small and typical of the period, with an inventory of several small buildings, a lumber kiln, a bandsaw, and a collection of tools. During this period, Heath honed his craft and established a solid reputation for strong wooden vessels of the highest quality (Spitzer 1998, 4).

In 1899, his business foundered. Still young and open to opportunity, Heath relocated to the Pacific Northwest. Here wooden boatbuilding remained viable, because mosquito fleet steamers, lumber schooners, and fishing boats were still in demand. He was first hired by Moran shipyards in Seattle, where he built the 210-foot military transport *Seward*. Moving on to Everett, he designed the passenger steamer *Majestic*, and the barkentine *Aurora* in the waning days of merchant sail. Finally in

1903, Heath was able to establish a yard of his own on the Puyallup River in Tacoma.

Heath was perhaps at his most prolific here in the last golden days of the industry. His 160-foot ferry *West Seattle* was acclaimed as one of the largest and best on the West Coast. Two of his best known vessels launched from Tacoma were the wooden steamers *Jefferson* and *Clallam*. Although the *Jefferson* served a long and useful life, the *Clallam* sank in a storm in January, 1904 on a regular run to Victoria, B.C., and 50 people perished. The seaworthiness of the vessel faced a serious legal challenge. In the end, Heath's high standards proved unimpeachable, but the tragedy was another serious blow to the perceived safety of wooden boats (Spitzer 1998, 4-7).

Heath's Yard on the Duwamish

In 1909, Heath pulled up stakes and started over once again in Seattle, where he pursued a site on the west bank of the Duwamish River. At that time, the Duwamish retained its natural course with flat flood plains, ripe for development. The site Heath chose was tucked at the base of a large oxbow five miles (as the crow flies) upriver from Elliott Bay. On August 31, 1909, Heath entered into a real estate contract for Lots 3, 4, 5, and 6 in Block 33 of Joseph R. McLaughlin's Waterfront Addition to the City of Seattle (see Figure A6) (MoF Tech Files, original contract referenced within Heath to Boeing, Assignment of Real Estate Contract, Mar 23, 1910).

Because the Duwamish River was under jurisdiction of the War Department as a navigable stream, Heath was required to get a federal permit to build his wharf and launchways. On September 29, 1909, he submitted a formal letter of application to the Seattle office of the Corps of Engineers, with plans in triplicate, showing his planned development on Lot 6. He noted that his pile drivers were ready at the site, and sought permission to proceed while the permit was pending, promising to remove any element of it that wasn't ultimately approved. Approval from the Corps was issued on October 31, 1909 (Boeing Corporate Archives, Heath to Corp of Engineers, Application to Construct Wharf and Launch Ways in Duwamish River, Sept 29, 1909).

But in the interim, Heath proceeded to build. In an article about property purchases in the Duwamish Valley, the *Seattle Daily Times* reported:

Notable among these is the purchase of E.W. Heath of Tacoma, of a large frontage along the Duwamish River at Oxbow, for a shipyard. Mr. Heath is actively at work putting up his building now, and will soon have his yard in operation at this point (*Seattle Sunday Times*, "South End Property...", Oct 10, 1909, 9)

The referenced building (now the Red Barn) was a large boat shed with a lateral lean-to, opening toward the river's meander to the north. Massive double doorways led to the ways and the wharf. Inside, the shed was open to the rafters except for a small, enclosed office with a wood stove and rolltop desk. The work area was naturally lit by two continuous bands of multi-paned sash. The floor was dirt. Photographs of the yard in full operation over the next five years, during construction of Heath's most ambitious projects, show some incremental additions made to one side of the shed (see Figures B1, B2).

Heath's first major contract in the Red Barn was with William E. Boeing, a wealthy young timber baron,

boating enthusiast, and airplane aficionado. Boeing undoubtedly knew Heath by reputation and, appreciating master craftsmanship, sought out Heath to build a fast, ocean-going motor yacht. Once launched, the 96-foot *Taconite* gained fame up and down the West Coast as one of the finest, largest, and most technologically advanced private yachts of its day (Spitzer 1987).

As work on the *Taconite* got underway early in 1910, Heath's financial difficulties surfaced. He may have owed money to those who constructed his shipyard, and perhaps had already fallen behind on his payments for the property. Boeing, reportedly concerned over the impact this could have on his yacht project, took over Heath's real estate contract in March of that year, for \$10 and other valuable considerations (MoF Tech Files, Heath to Boeing, Assignment of Real Estate Contract, Mar 23, 1910). On the same day, Boeing acquired outright all improvements on the site, and all of Heath's lumber, office furniture, equipment and tools, right down to 140 pounds of 9-inch galvanized boat spikes (Boeing Corporate Archives, Heath to Boeing, Bill of Sale, Mar 23, 1910). Presumably, for all of this, Boeing relieved Heath of his outstanding debts. In May 1911, Boeing was granted a warranty deed to the underlying property itself (MoF Tech Files, Heath to Boeing, Warranty Deed, May 15, 1911). He would remain in ownership of the yard, essentially subsidizing Heath's rent-free shipyard operation there, for the next five years.

The second major product of Heath's shipyard during this period was the 82-foot trading schooner *Polar Bear*, begun after the launch of Boeing's yacht (see Figure B3). The sturdy little vessel was designed for adventure whaling in Arctic waters, with hull strength designed to cut through arctic ice. Although she carried sails, *Polar Bear* was primarily motor-driven, another example of the changing times. The vessel was renowned in Northwest waters, in part because of her first owner Captain Louis L. Lane, himself a larger-than-life waterfront character of the "wooden ships and iron men" era (Spitzer 1998, 7-9).

From Shipyard to Airplane Factory

Heath's unofficial silent partner William Boeing, in the meantime, was experimenting with airplanes on Lake Union in Seattle. As a fledgling business took shape in a seaplane hangar at the foot of Roanoke Street, Boeing soon found he had use for that industrial site on the Duwamish River. Beginning in 1916, Boeing started to stage some pontoon fabrication for his first float-planes at Heath's shipyard. He and his associates referred to it as "Heath's" and later the "Oxbow," in contrast to the hangar on Lake Union. E.W. Heath's name remained painted on the building for a time, but the role of the Red Barn shifted permanently into airplane manufacture in 1916 (Spitzer 1987).

For a time that year, Boeing kept Heath on at the yard to oversee the wood shop, building pontoons, wing ribs, and hundreds of light-weight wooden parts. But the shipwright could not successfully make that transition. To him, the light-weight materials, the construction standards, and the final product held no appeal. By the late summer of 1916, he packed up his tools and moved on to Portland, reportedly on good terms with Boeing. For a few more years, with the final burst of demand for wooden ships as a back-up to steel during World War One, Heath found ample work in larger shipyards on the West Coast. But he never again was master of his own yard (Spitzer 1998, 11-12).

As historian Paul Spitzer wrote:

For Heath, wood was emblematic of hand craft, personal toughness, dedication, aesthetics, and the very salt of the sea. To favor wood put excellence above efficiency....His ideals were his undoing. He missed reward in the 20th century because he aimed for success in the 19th....Wood lost its battle with steel; the sea ceded half its territory to the sky; and perfection laid down its arms before proficiency. The shipwright Edward Heath was one of many ruined in the unceasing assault of the new upon the old (Spitzer 1998, 14).

From 1916 on, the Red Barn entered a new phase of its industrial history and was repeatedly subjected to practical alterations and several relocations. But the essential physical form of Heath's boat shed remains discernable even today. This building is the only known surviving artifact associated with the master shipbuilder Edward Heath and with his remarkable contribution to the art of wooden shipbuilding in the Pacific Northwest (Howe, email to Lentz, Oct 20, 2017).

AVIATION ERA (1916-1970)

Boeing as a Start-Up

Having moved to Seattle in 1903 and made a second fortune in timber, William E. Boeing took up flying at the age of 34. He decided to learn to fly after barnstorming as a passenger over Lake Washington in the summer of 1915. Heading south to Santa Ana, California, and took lessons at a flying school operated by the Martin Aircraft Company. Boeing was hooked, and because he was financially able, bought a \$10,000 Martin TA seaplane and had it shipped to Seattle in October, where he assembled it on the shores of the lake near Madison Park (MoF Tech Files, Searles, 1986, 42). Boeing wasn't happy with the plane's rather obsolete single pontoon or even with its updated replacement, so he set about re-designing the pontoon, and then created a copy of it, all as part of the experimentation phase of his fledgling business (Spitzer 2004, 141).

In the meanwhile, Boeing met and formed an informal partnership with a naval officer and M.I.T. engineer stationed in Seattle. Commander George Conrad Westervelt was as interested as Boeing in creating a better version of a seaplane. With Westervelt as his engineer, Boeing purchased some piano wire, spruce lumber, and linen fabric, and hired some carpenters (MoF Tech Files, Huber, 1946, 4). At Heath's shipyard on Oxbow in today's Red Barn, pontoons and wings were built for the first Boeing & Westervelt (B&W) seaplane, dubbed the *Bluebill*. The fuselage was built at the Lake Union hangar (MoF Tech Files, Morrow, 1966, 43). After assembly, the B&W was launched in late June 1916, and made 82 successful test flights by the end of that year.

The second B&W, the *Mallard*, was a copy and followed shortly thereafter. It was fabricated more completely in the Red Barn (Little to Lentz, verbal communication, Aug 24, 2017). For at least a year, Boeing sought to interest the U.S. Navy in the two B&Ws as trainers. Ultimately, the Navy rejected the planes, but Boeing sold them in 1918 to the New Zealand Flying School in Auckland for \$3,750 each (MoF Tech Files, Searles, 42-45).

The now celebrated B&W models, the first of Boeing's aircraft and the first to be substantially built in

the Red Barn, were an improvement over the Martin TA in several ways. Two 16-foot streamlined floats replaced the heavy, boxy, single pontoon of the Martin. Most significantly, the B&Ws were lighter than the Martin. With its all wood-framed fuselage, fabric-covered wings, and wire bracing, the B&W boasted an empty weight of only 2,100 pounds (MoF Tech Files, Searles, 42).

After the launch of the first B&W model, Boeing determined the time was right to formalize his private enterprise. On July 15, 1916, he formed the Pacific Aero Products Company, incorporating it with the State of Washington at a capitalization of \$100,000. Officers included W.E. Boeing as president, Edgar N. Gott (Boeing's cousin) as vice-president, and engineer James C. Foley as secretary and manager (MoF Tech Files, Pacific Aero Products Company, Original Organization and Description of Plant, Oct 13, 1916).

To follow up, Boeing sold his aircraft, buildings, and equipment to the company, including:
...all of the personal property and equipment contained and situated in the shipbuilding plant at Oxbow, King County, Washington, situated on Lots 3,4,5,6, & 7, Block 33, J.R. McLaughlin's Addition to Seattle, and also all of the personal property and equipment contained and situated in the hangar and machine shop at Lake Union of Block 52 Lake Union Shore Lands in the City of Seattle (MoF Tech Files, Boeing to Pacific Aero Products, Bill of Sale, Aug 31, 1916).

At the end of summer 1916, the economy was booming in the lead-up to American entry into World War One. Boeing supported U.S. participation in the war and believed strongly in the future of flight in the military. Because he was enjoying steady profits from his timber interests, he was able to prepare for expansion even before his airplane company had any large contracts or sales (Spitzer 2004, 7). His facility at Oxbow was poised for growth:

The Company proposes, in the event of receiving sufficient work to warrant the additional space, of putting on a second floor on the wood working plant, which will double the floor space at this plant and will give this plant ample capacity for 100 men working one shift (see Figure A8) (MoF Tech Files, Pacific Aero Products Company, Original Organization and Description of Plant, Oct 13, 1916)

Throughout the fall, Boeing put in place an organizational structure, employed a local work-force that doubled in size from six to 12, and hired a white-collar staff of five or six, including Wong Tsoo, a young Chinese aeronautical engineer fresh out of M.I.T. After Edward Heath departed from the wood shop, Boeing brought in George and Richard Pocock, English craftsman of racing shell fame, to run the pontoon department at Oxbow. There they built light-weight wooden floats for seaplanes, a product line Boeing considered promising (Spitzer 2004, 146).

Most importantly, work was already underway in the Red Barn on a new aircraft, the Model C seaplane. The new, all-Boeing design was the work of James Foley, a mechanical engineer who essentially had replaced Westervelt. The design was further perfected by Wong Tsoo during his 10-month stint at Boeing. A test flight of the C-4 over Lake Washington, in November 1916, brought mixed results, but successful refinements were made and tested with the C-5 and C-6, into the following year (Spitzer 2012, 87-90).

Sometime in the winter of 1917, it appears that most company operations shifted out to the Oxbow site. Foley and Wong, who had worked out of Boeing's timber company headquarters in downtown Seattle's Hoge Building, set up office in the Red Barn to be next to the workers building airplanes. America entered World War One on April 6, 1917. A month later, Pacific Aero Products renamed itself the Boeing Airplane Company. According to historian Paul Spitzer, this reflected the company's realization that aircraft production itself - rather than research, experimentation, or niche products like pontoons - was key to profitability in both in the short and long term (see Figure B4) (Spitzer 2012, 91).

The Plant 1 Era

A familiar historic image, dated June 8, 1917, shows the Red Barn's southeast-facing facade, with "Boeing Airplane Co." painted in the gable. Military officers on patrol indicate a factory on a wartime footing (see Figure B5). Behind the doors of the 140' by 60' building was a growing beehive of activity. A recently installed second floor housed painting, doping, varnishing and storage; the lower floor contained an expansive open space for manufacture and assembly, a large lumber storage shed and tool room, and a pier 30' by 100' on the Duwamish River (MoF Tech Files, Pacific Aero Products Company, Description of Plant, 1916).

In April 1917, the young company got its first big break when the United States Navy authorized a no-bid contract for 50 Boeing Model C training planes. In part, the military was seeking to establish aircraft firms on the West Coast, and to have a back-up for the Curtiss Company's corner on the seaplane market (MoF Tech Files, Owers 2009, 73). The contract was worth an astounding \$600,000. This wartime order would jump-start the company's future, and trigger a burst of industrial development at the old Oxbow site (Spitzer 2004, 147).

As it moved into full-scale production mode in 1918, a rapid re-organization of the work flow took place inside the Red Barn. Constructing 50 planes, instead of two at a time, required efficiencies, although not yet in the highly mechanized, assembly line mode. Job shop production was instead messy and dynamic. Airplanes were built in batches of 12 or so at a time, so that every type of assembly was happening all at once, everywhere on the factory floor. (Spitzer 2012, 91). Some of the best, most illustrative photographs of work within the building – including the drafting room, propeller fabrication area, wing framing, and office work - date from the C series construction period (see Figures B7, B8, B9).

According to historian Paul Spitzer, it was the Model-C series that elevated the fledgling company to a national force in the emerging field of airplane manufacture, largely because of the many rapid, internal company upgrades this job demanded.

Volume production made necessary the introduction of industrial systems such as drawing standards and operating procedures. Marketing to the military, government relations, repetitive manufacturing processes, division of labor, departmental organization with individual supervisors, quality control, and written work rules were first implemented on the Model C (Spitzer 2012, 93-94).

Since Model C work was largely executed in the Red Barn, this lends added significance to the building. In late 1918, a military official declared the Boeing Airplane Company the best-run plant on the West Coast.

In addition to the Model C series (including William Boeing's own private order for C-700), the company took on a \$116,000 licensed production contract for 50 Curtiss HS-2L flying boats in June 1918. With a steady flow of work, the number of employees quickly ballooned to 337. To meet the demands of wartime production, new structures began to sprout up all around the Red Barn, roughly between late 1917 through 1918. *The factory was known simply in those days as the Boeing factory, or the plant at Oxbow, but is hereafter referred to as Plant 1, a name it gained in 1936 when the company built a second large facility (Plant 2) in advance of World War Two.*

One of the first new structures was a galvanized sheet steel building to house brazing, enameling, and wire making, thereby removing the worst fire hazards from the Red Barn (MoF Tech Files, Boeing Airplane Company, Organization Scheme, 1917). A new detached, wood-framed office building, facing away from the river toward the bridge to Georgetown, created a formal orientation of the plant to the southeast. Just off-site, a barracks for Army guards assigned to guard the plant was built. After the War it became a cafe for Boeing workers. A tar-paper shed put up east of the Red Barn quickly became a new clay tile assembly building, recognizable in photos and on site plans for its open courtyard and a distinctive stepped parapet. This building alone doubled the available floor space of the factory (see Figure B6).

Like all industrial operations, the company experienced a slump after the Armistice. William Boeing was shrewd enough to seek out other opportunities to keep his company alive. In 1919, the business took on a licensed production contract for "sea sleds," a new type of fast watercraft made by the Sea Sled Co. of Boston. Basically a hydroplane, the sea sled had an inverted V bottom, and was good in heavy weed growth along shorelines and in open, rough waters. Sales were not good until Prohibition was implemented in Washington State, after which the boats were snapped up, allegedly by rum-runners (*Seattle Times*, "Boeing at home...", Aug 30, 1920; advertisement for Sea Sled, in *Country Life*, May 1920).

Another survival strategy during the downturn was that Boeing's highly skilled wood shop was able to turn out carpentry projects – at first a series of hat racks, telephone booths, umbrella stands and library tables. By the summer of 1919, an English-born Boeing inspector designed a line of Boeing bedroom furniture. Production continued into 1921, with several hundred sets produced and sold (MoF Tech Files, "Notice to Employees of the Boeing Airplane Company Only," Dec 1921). Much of this immediate post-War wood construction took place inside the Red Barn.

In the 1920s, aircraft production reached unprecedented levels. The Boeing Airplane Company had made a name for itself with military contracts, but now, a market emerged for commercial air mail transport and passenger travel. At Plant 1, production boomed in the 1920s and '30s with contracts for the following projects:

- de Havilland DH-4M – modernization of the Army fleet, replacing wood structure with steel
- PW-9s - for the U.S. Army, the company's first fighter planes
- Model 40 - the company's first successful commercial plane, a mainstay of Boeing's own air mail company
- Model 80- the first purpose-built passenger airliner, used for Boeing Air Transport service, first

to introduce stewardesses.

- F4B/P-12 – very successful aircraft fighter of the 1930s
- Monomail – single-engined, five passenger and cargo
- B-9 – advanced, twin-engine, all-metal bomber
- P-26 Peashooter – all-metal monoplane fighter
- 247 – a twin-engined, all-metal transport, 60 sold to United Airlines for coast-to-coast routes
- Model 299 – prototype of the B-17 Flying Fortress
- XB-15 – large bomber prototype, assembled at new Plant 2
- 314 Clipper – largest Pan American flying boat, wings fabricated at new Plant 2

(Nelson, Timothy, 2016, 31; MoF Tech Files, Rummel 1934, 16).

Plant 1 experienced another growth spurt. Sanborn maps and a variety of site maps in the Boeing Co. Archives show major additions in the 1920s. By the end of 1921, a second "final assembly" plant, 39,200 square feet in size, with a sawtoothed roof replaced the wartime "old assembly" plant. The new one fronted the river on the opposite, west side of the Red Barn from its predecessor (See Figure B11). Even more massive was the 1929 metal shop with its stepped, monitor roofs shedding light to the interior spaces. This shop is labeled variously on site maps for sheet metal, bench work, brazing and welding, body work, and machine shop work. The metal shop remained the largest building ever built at Plant 1, covering a large percentage of the developed site. That same year, a sturdy reinforced concrete building with brick veneer was put up at the southeastern-most corner of Boeing property. This was the new administration and engineering building (see Figures A10, A11). It is the only surviving building from Plant 1 that remains standing today.

During the interwar years, the Red Barn remained an important, though certainly less central, component within a sea of rapid expansion at Plant 1. Site maps from the late 1910s show the building still housing wood shops, lumber storage, machine shop, plating shop, and fittings room. But, by the late 1920s, the building was primarily a wood shop. All assembly, machine and metal work had been removed to much larger facilities. Planing, lumber storage, paint storage, and "spar building" were depicted as interior uses on a 1929 Sanborn Insurance map. The King County Assessor's property record card from 1937 labels it simply as Building No. 5, Wood Shop (see Figures A11, A13, B12).

The Plant 2 Era

Expansion of the industry and of the sheer size of aircraft eventually led to seriously cramped quarters at the old Oxbow factory. There was simply no room for fighter plane and huge floating boat production. Another problem with Plant 1 was that airplanes had to be completely disassembled, trucked or barged to test flight locations, and then reassembled. By the late 1920s, an adjacent airport was sorely needed (Nelson, Timothy, 2016, 35, 44).

In 1936, a brand new Boeing production facility (Plant 2) was built a mile or so farther upstream, at the north end of King County's regional airport (opened in 1928, named Boeing Field in honor of William Boeing). Over the years, and especially during World War Two, the company doubled, tripled, and quadrupled the original floor area of this massive factory. Famously, the sawtoothed rooftop of this sprawling complex was camouflaged by a fake residential neighborhood during the War (Nelson, Timothy, 2016, 44, 49).

If Plant 1 was where the Boeing Airplane Company advanced from a start-up to a world-famous manufacturer of aircraft, Plant 2 earned fame as a symbol of America's wartime strength. Major aircraft built at Plant 2 from the mid-1930s through the 1960s include:

- XB-15 – final assembly of a large bomber prototype
- 307 Stratoliner – first airliner with pressurized cabins
- B-17 Flying Fortress – almost 7,000 produced here 1941-1945; one rolled out every 90 minutes at peak rate
- XB-29, YB-29 Superfortress prototypes – three planes, with some fabrication at Plant 1
- B-29 subassemblies – final assembly in Renton
- B-50 – advanced postwar version of the B-29
- 377 Stratocruiser – advanced post war airliner
- XB-14 Stratojet – two prototypes of first swept-wing jet
- B-52 Stratofortress – prototypes and early production
- 737 – prototype and initial airframe

(Nelson, Timothy, 2016, 44).

During these decades, Plant 1 remained active in the production of essential parts and subassemblies. A Plant 1 site map dated 1942 shows a continuing tradition of wood shop functions such as planing, turning, gluing, and pattern making taking place in the building. From the mid-1940s to 1969, the company's jet engine and small gas turbine business was located here. By 1963, Building 1.05 is labeled on a company site plan as a Maintenance Building. Later, in 1970, when Plant 1 was sold to the Port of Seattle, oral tradition has it the old Red Barn was storing light bulbs and electrical supplies (see Figures B13, B14) (Boeing Corporate Archive, Plot Plan, Plant 1, revised Aug 15, 1963; Little to Lentz, verbal communication, Aug 2017).

Despite its lowly final role for the company, the Red Barn was never completely forgotten, either by Boeing employees or aviation historians. On the 50th anniversary of Boeing, there were many festivities, one of most exciting being fabrication of an operating replica of Boeing's first aircraft, the B&W. In another meaningful tribute, the aging boat-shed-turned-airplane-factory was given a coat of fresh red paint, and a historic plaque mounted on its exterior (see Figure B15). This may have been the first outward sign that Boeing employees and enthusiasts of aviation history were keeping watch on the historic building.

The Red Barn's significance to the history of aviation and to the birth and early growth of the Boeing Airplane Company cannot be overstated. Its significance is more than symbolic. It was in fact the space in which the company's first big contract was executed – the Boeing Model-C series. Not only was it this contract that first brought the company into profitability, it also forced the essential efficiencies that made the company a worldwide contender in high volume aircraft manufacture. At the close of World War One, Boeing was one of only three out of 31 companies operating during the war to have survived (Spitzer 2012, 94). Most intensely used from 1916 to 1936, the Red Barn embodies the first astounding 20 years of the Boeing Airplane Company's history.

Museum of Flight Era

Harl Brackin and the Pacific Northwest Aviation Historical Foundation

In 1962, a Boeing executive revealed to a history-minded employee, 39-year-old Harl V. Brackin, Jr., that the company had plans to update Plant 1. Under that scheme, the Red Barn would likely be demolished. Brackin began work at Boeing in 1942 as a wind-tunnel engineer, but soon became the company's first corporate historian. In Brackin's own words, "This was all that this dreamer-author needed to go off and running for the next thirteen years, scheming, sketching and pushing in a low-profile and dogged fashion," (MoF Corporate Archives, Brackin 1975, "Museum Musings" reprint). More than any individual at Boeing, Brackin understood that the venerable old Red Barn had to be preserved, and he is today widely credited with accomplishing that.

Even then, Brackin had a big vision for some sort of regional air park or aviation museum. From 1962 to 1964, the company authorized him to take some exploratory trips around the country to study successful museums. In doing so, he concluded that the best museums were operated by tax-exempt non-profits, supported by industry, but not company owned (Brackin 1975, "Museum Musings" reprint).

Brackin took action toward that end in 1965, when he founded a dynamic organization called the Pacific Northwest Aviation Historical Foundation (PNAHF). The group was incorporated in September, 1965, in Renton, Washington, with 12 well-connected commercial aviation leaders, bankers, and public relations men as trustees. Their mission was research and publication on aviation history, acquisition and restoration of aircraft, and establishment of a regional aeronautical museum. Although he remained in his role as corporate historian, Brackin would spend the rest of his life nurturing, pushing, and leading the PNAHF on to success (*Seattle Post-Intelligencer (PI)*, "Air Museum: Plans Are Big," Oct 22, 1965).

The PNAHF started collecting aircraft right away; in fact, within the first year, they had acquired a 1929 Boeing Model 80A and a 1933 Model 247D. The organization also vetted incoming proposals for aviation museums, including concepts for Renton Airport, Lake Sammamish State Park, Cedar Hills, and Marymoor Park in Redmond. PNAHF's activities consistently garnered good media coverage. For instance, they participated actively in Boeing's 50th anniversary in 1966 (Brackin 1975, "Museum Musings" reprint).

In May 1968, the PNAHF opened a seasonal Museum of Flight in Building 50 at the Seattle Center. The building had only recently housed a covered area for the Seattle World's Fair amusement park. It offered an expansive, 10,000 square-foot space for exhibits, displays, and five full-sized aircraft. Until 1973, the museum operated only in the summer. It remained remarkably popular and notably solvent, allowing for the continued collection of large-scale artifacts and restoration work. (MoF, Corporate Archives, Proposal: PNW Aerospace Historical Data Center..., 1972).

Early Efforts to Preserve the Red Barn

Brackin's concern for the Red Barn remained at the forefront of his thinking and planning. In mid-1969, the building was nominated for listing in the National Register of Historic Places, only three years after

passage of the National Historic Preservation Act, creation of the National Register, and the launching of the national preservation movement. The Red Barn nomination was part of an initial call by the recently-established Washington State Office of Archaeology and Historic Preservation (OAHP) for county historical societies to identify and submit their most significant historic properties. Nominations from King County included Boeing's Building 105 (the Red Barn), along with Pioneer Square, the Pike Place Market, the Schooner Wawona, and Pioneer Hall.

It is unclear whether Brackin instigated the nomination himself, but he supported it from the outset. He recognized the protective effect National Register listing could have for such a high profile property. And, he understood that there were federal matching funds available at that time for National Register sites. Formal listing at the federal level took until the summer of 1971 (Corley, National Register nomination form, 1969).

In 1970, during a climate of declining business, Boeing sought to divest itself of the outdated Plant 1. The entire site was sold that year to the Port of Seattle for \$2,959,000 for development as a tug and barge terminal (*Seattle Times*, "Port Studies Boeing Offer...", July 18, 1970; "Boeing Plant No. 1...", Oct 16, 1970). By then, awareness of the Red Barn's historical value had risen, so the real estate transaction included an understanding that efforts to preserve it would continue. Early in 1971, the Boeing Management Association's newly formed Gold Card Chapter of retirees met with Port officials and PNAHF representatives to discuss possible ways of moving the building off Port property to potential museum sites. There was agreement that the PNAHF should be the non-profit partner in this effort (MoF, Corporate Archives, Proposal: PNW Aerospace Historical Data Center..., 1972).

The search for a viable air park site continued through the early 1970s, led in large measure by Harl Brackin and the PNAHF. Some locations considered were Sand Point and various parcels of land along and off East Marginal Way. Late in 1973, the Port notified interested parties that the Red Barn needed to be moved off its property by mid-1974. Its development of Terminal 115 would involve filling in the turning basin and substantial grade changes. Something had to be done, quickly.

A potential five-acre donation of Boeing land in South Park on the west side of the river gained considerable traction that year. Several critical steps were completed. The widowed Mrs. W.E. Boeing and her son William E. Boeing, Jr. contributed \$1 million to the effort (MoF Corporate Archives, Brackin to Mrs. Boeing, Nov 23, 1974). Brackin confirmed with OAHP that the building's National Register status would remain intact, despite the move (MoF Corporate Archives, Brackin to Hansen, Mar 11, 1974). Cost estimates were secured, and volunteers lined up to do some necessary de-construction work prior to the move. The Port formally authorized donation of the building to the PNAHF. Brackin sent a formal response:

On behalf of the general membership and the Board of Trustees of the PNAHF, it is with pleasure that our organization does accept your donation of the Boeing factory, Building 105. We also appreciate the Port's generous offered contribution toward the preparation of the building and transportation from Terminal 115 to the new site [in] South Park.

(MoF Corporate Archives, Brackin to Opheim, Oct 8, 1974).

At the last minute, however, in November 1974, the Boeing company withdrew its support for the

South Park site. Instead, Boeing treasurer and PNAHF officer J.B.L. (Jack) Pierce promised to facilitate finding, securing, and fund-raising for an even more appropriate site, with easier public access from the I-5 freeway. The day after Christmas, Pierce wrote to Jean DeSpain, director of King County Public Works, asking directly for consideration of a site at King County International Airport, or Boeing Field (MoF Corporate Archives, Pierce to DeSpain, Dec 26, 1974). For the first time, King County came to the table as a partner, and this inspired confidence in all parties.

The Port of Seattle consented to the use of its property for up to two more years, but to make way for their continued development at the terminal, they lifted and rolled the Red Barn 600 feet to a corner of the site (*Seattle Times*, "Moved but not...", Jan 31, 1975). There it sat on shorings through 1975, allowing for closer inspections of its structural condition. PNAHF hired the architectural firm of Ibsen Nelsen to begin schematic design and a model for the proposed museum complex. Volunteers began to selectively remove recent additions and more modern materials inserted in the building over time.

Meanwhile, serious negotiations proceeded on nailing down the many complex pieces of the project. In June 1975, the PNAHF announced plans for a \$4 million aviation museum and park at the southwest corner of Boeing Field. The 11-acre site would include the Red Barn, a new 60,000 square foot aircraft display and restoration facility, a model control tower, and a green space with benches and a play area. The County already owned two and one-half acres. The rest was in private hands and would need to be acquired. By July, County Executive John Spellman, public works and airport management all agreed to proceed with a bond-funded "West Side Development Plan" for the airport – a plan that included, at long last, an aviation museum. Now, with the Red Barn as its focal point, the project began to be called for several years the Red Barn Air Park (*Seattle Times*, "Museum at Boeing Field...", June 1, 1975; "Aviation Park...", Sept 22, 1975).

The Museum of Flight at Boeing Field

A new era for the Red Barn began at the end of 1975. On December 16, the old factory with its original shed wing was braced, jacked up, set on wheels, and rolled to the river's edge. From there it was loaded onto a Foss Company barge and floated two miles south, passing under the First Avenue South bascule bridge, all the way to Boeing Field (see Figure B16). The event attracted quite a bit of photo coverage in the news. The final cost of the move was \$32,000 (*Seattle Post-Intelligencer*, "The Old Red Barn...", Dec 16, 1975; *The Oregonian*, "Boeing Barn Reborn...", Aug 22, 1983).

Once moved off Port property, the building was considered safe from demolition. It stood on County-owned land off East Marginal Way, in close proximity to its final destination at the south end of the airport (see Figure B17). The architects Ibsen Nelsen moved into full swing, preparing a plethora of promotional materials and refined schematics. Beginning in September 1976, they began work on as-builts and preliminary restoration drawings, overall site planning, program development, coordination with King County, and visits to comparable museums around the country (MoF Corporate Archives, Nelsen to Pheasant, Aug 30, 1976).

No public opposition emerged when the County issued a draft EIS for the entire West Side Development Plan the following year. In the fall, the King County Council voted to issue \$1.2 million in revenue bonds to cover land purchases and airport improvements. Other funding was quickly lined up

for the larger project, including a \$1 million grant from the U.S. Department of Transportation. A newspaper article late in the year noted that the County was poised to purchase 15 acres, three of which would be leased to the PNAHF for a museum of aviation (*Seattle Times*, "The Red Barn Air Park," Nov 28, 1976).

With funding in hand, King County set about buying private land from nine property owners in 1977. Here the project got bogged down when certain property owners held out. County officials finally sought Executive backing to proceed with a settlement before going to court, pointing out that the airport was losing revenue and fund-raising for the museum was losing momentum. Final acquisition of all the necessary project parcels dragged on until March 1979 (MoF Corporate Archives, Smith to Guenther, Sept 15, 1978; *Seattle Times*, "Boeing Field Project...", Mar 4, 1979).

Several project milestones occurred in 1977. In February, Ibsen Nelsen submitted a progress report on the Red Barn, spelling out the preservation approach the firm would take:

It is intended that the building when completed will be restored authentically, except for natural aging, to its original condition. All materials and workmanship will be first class. The intention is to minimize operating and maintenance costs and to restore the building to its condition in the early years of its use (MoF Corporate Archives, The Red Barn Restoration Progress Report, 1977, 1).

The National Register nomination was updated by David Hansen at OAHP in July, effectively justifying the building's move. OAHP feedback on the project design, however, was not entirely positive. Hansen, and initially Acting State Historic Preservation Officer Jeanne Welch, believed that too much original fabric was being replaced, and that the old building was essentially being encased in a replica of itself to meet climate control goals. Project proponents made a trip to Washington, D.C., in the fall, to confer with the National Park Service in a meeting facilitated by Senator Warren Magnuson's office. Ultimately, the project moved forward as designed (Washington State OAHP, Red Barn Correspondence, 1970s).

Unexpectedly, lead project proponent and dedicated aviation historian Harl Brackin passed away in October 1977, at the age of 54. By this time, the museum project had gathered enough momentum that, despite the shock and loss, the team was able to push on. Soon afterward, Howard Lovering was hired as executive director of the PNAHF as its first full-time, paid employee.

By 1979, the project name had evolved from the Red Barn Air Park to the Pacific Museum of Flight. Perhaps this was owing to the excitement generated by Ibsen Nelsen's design for the Great Gallery, a soaring glass exhibition hall for aircraft proposed for a second phase of museum development. *Seattle Times* real estate editor Polly Lane called it "an imaginative mix of old, new" and noted that the design, "a daring space-framed structure of steel and glass, jutting out from the rehabilitated 1910-era former factory of the Boeing Co. - undoubtedly will attract international acclaim for its graceful simplicity and its high visibility," (*Seattle Times*, "An imaginative mix...", Dec 9, 1979).

Finally, in 1980, everything came together. The Boeing Company donated \$1 million to the museum effort in honor of retired Boeing chairman William Allen. This gift allowed construction to begin. PNAHF issued a call for contractor qualifications for Phase One, restoration of the Red Barn. The contract was

ultimately awarded to McCann Construction of Renton (*Seattle Daily Journal of Commerce*, "Flight museum Phase 1...", July 3, 1980). A ground-breaking ceremony was held in late summer, and workers rolled the old Red Barn onto its newly completed, permanent concrete foundation just three months later. Work then proceeded at a rapid pace. By October 1981, the Red Barn's shell was essentially complete. Construction on the connecting museum lobby continued through 1982.

Some 18 years of intense dedication and concerted effort all came to fruition on September 1, 1983 when, with great fan-fare, the Museum of Flight opened its doors to the public. Harl Brackin's widow Emma Brackin and William Boeing, Jr. cut the ribbon. Governor John Spellman and King County Executive Randy Revelle were in attendance.

Since its opening in 1983, the Museum of Flight has grown steadily and exponentially. The following new buildings and facilities have gone up over the past 35 years:

- Great Gallery - 1987
- Archives & Library - 2002
- Personal Courage Wing - 2003
- Space Gallery - 2012
- Aviation Pavilion - 2016

From 1983 to 1987, the Red Barn served as the sole display area of the Museum of Flight, featuring exhibits conceptualized by Seattle's prolific industrial designer Gideon Kramer, and executed by Promotion Products, Inc. of Portland, Oregon. Initially, these exhibits focused on a general review of the birth of flight through the 1930s, with a roughly 30% focus on the Boeing story. A meticulous scale model of Plant 1, based on a 1918 map prepared by Boeing draftswoman Helen Holcombe, was salvaged from the site, and incorporated as part of the exhibit from day one (Nelson, Peder, Museum of Flight 50th Anniversary PowerPoint script; Gideon Kramer papers; Boeing Corporate Archive, Plot Plan of Boeing Airplane Co., 1918, H. Holcombe)

Early Red Barn exhibits were updated in 2005, and most recently in 2016, for the 100th anniversary of The Boeing Company. The Red Barn continues to tell the story of early aviation, with an appropriate emphasis on the early use of the Red Barn itself. The current exhibits cover, among other topics, the Boeing Model C, the straightening of the Duwamish channel, women in aviation, and the interesting, little known story of Wong Tsoo, one of Boeing's earliest engineers (Nelson, Peder, email to Lentz, Oct 4, 2017).

The Red Barn was without doubt one of the earliest, most visible historic preservation projects in King County. Ultimately, the building was saved from the threat of its own obsolescence by caring Boeing employees, public officials, and the PNAHF (now the Museum of Flight Foundation). Led by the dreamer Harl Brackin, these partners envisioned it as the heart and soul of an aviation museum of national caliber. By acquiring and preserving the Red Barn first, the building became a symbol and an icon for the entire project. Its comprehensive adaptive re-use, questioned by some at the time as over-restoration, in retrospect has proven a practical approach given the maintenance demands placed on the facility each year by thousands of visitors. Even today, it serves as the nucleus of The Museum of Flight, and remains arguably its most important artifact.

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Section A – Maps and Site Plans

Figure A1. The Boeing Red Barn was originally located along the Duwamish River (upper left circle) on the Duwamish Peninsula. It is now located on the Museum of Flight campus (lower circle) in Tukwila. King County iMap, 2017.

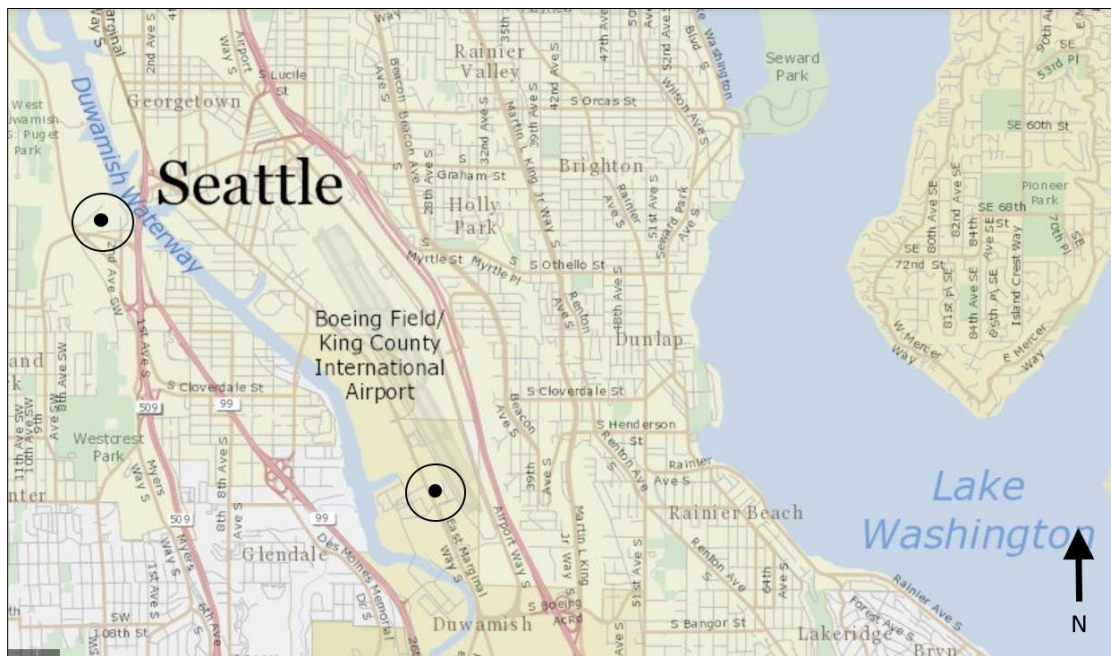


Figure A2. Former Boeing Plant 1 location in West Seattle. The circle indicates the original location of the Red Barn. Lat/Long: 47.54219 -122.33887. King County iMap, Aerial 2015.

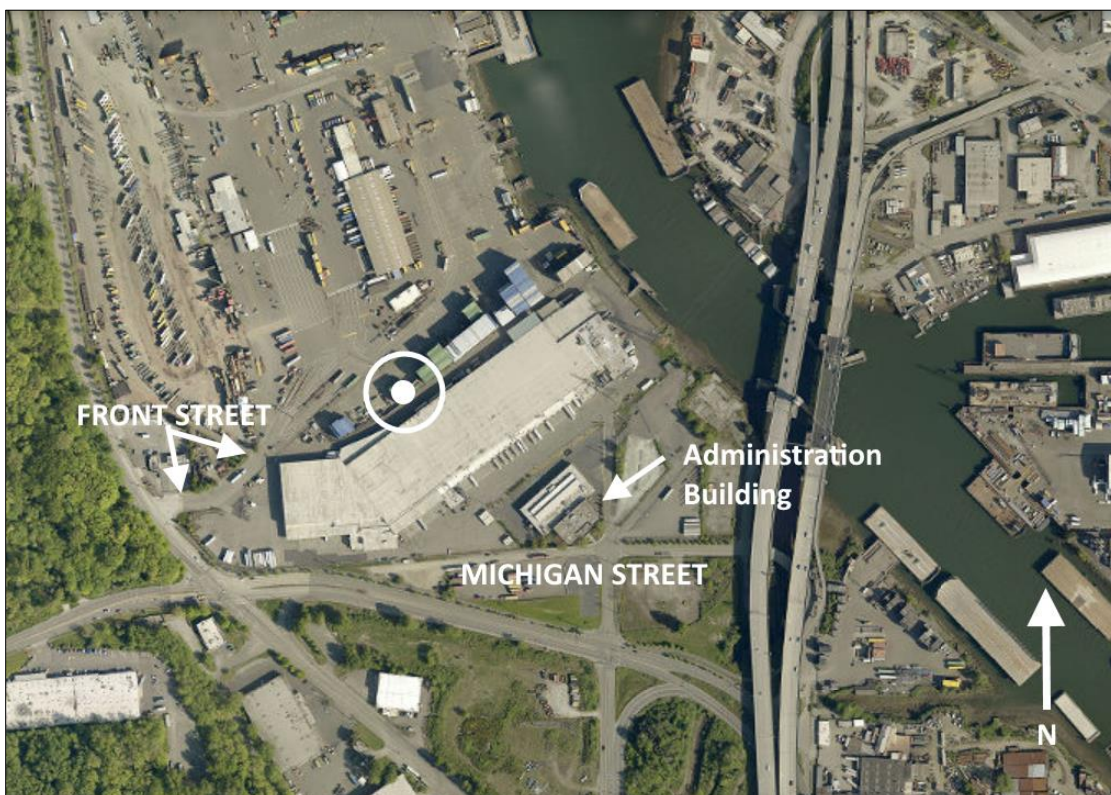


Figure A3. The Museum of Flight campus. Lat/Long: 47.51844 -122.29724. King County iMap, Aerial 2015.

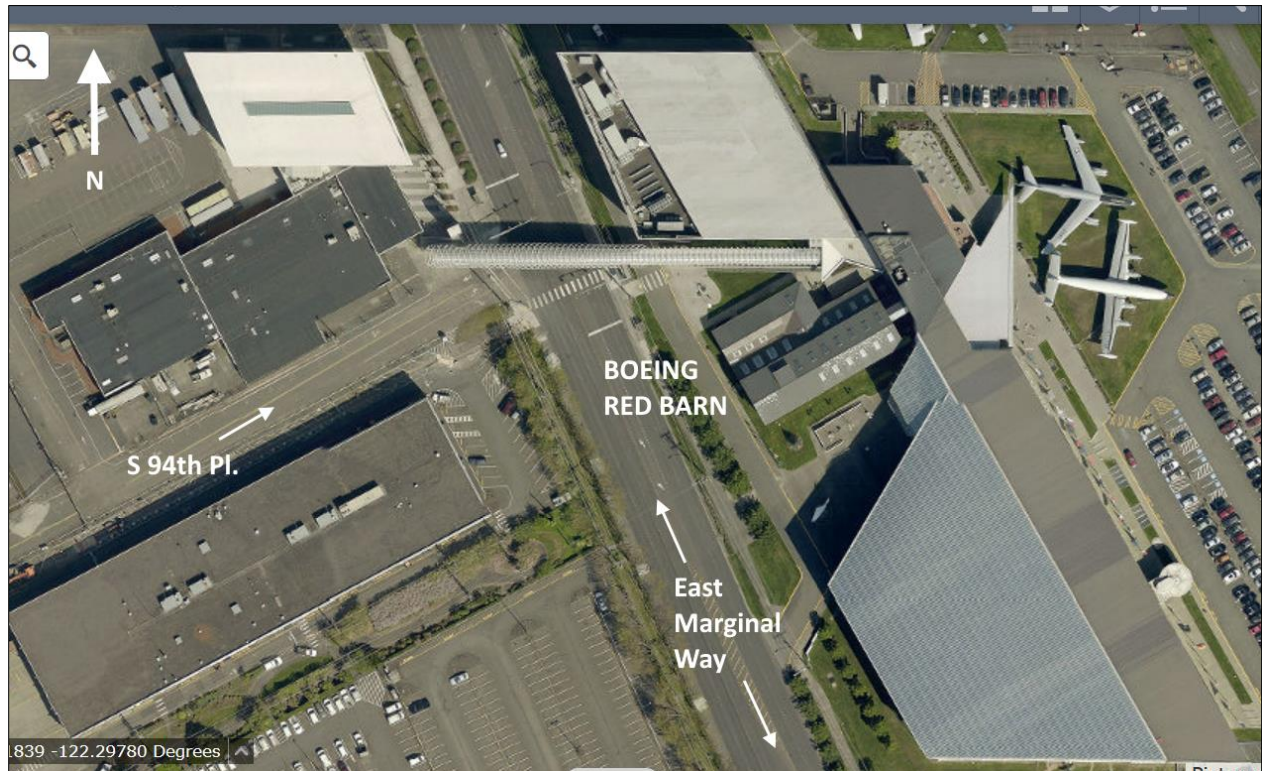


Figure A4. Red Barn. Section A is the main two-story gable structure. Section B is a one-story shed roof wing. Section C is a one-story gable wing. Section D is an intersecting, one-story gable wing. King County iMap, Aerial 2015.

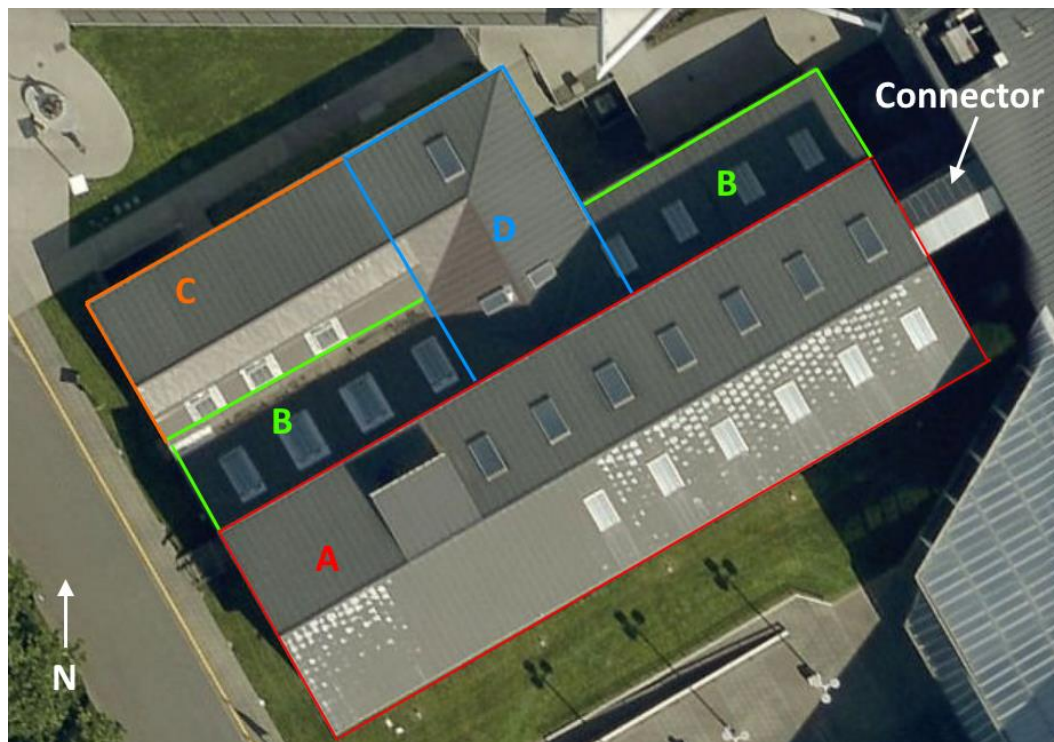


Figure A5: Red Barn development and change over time (not to scale).

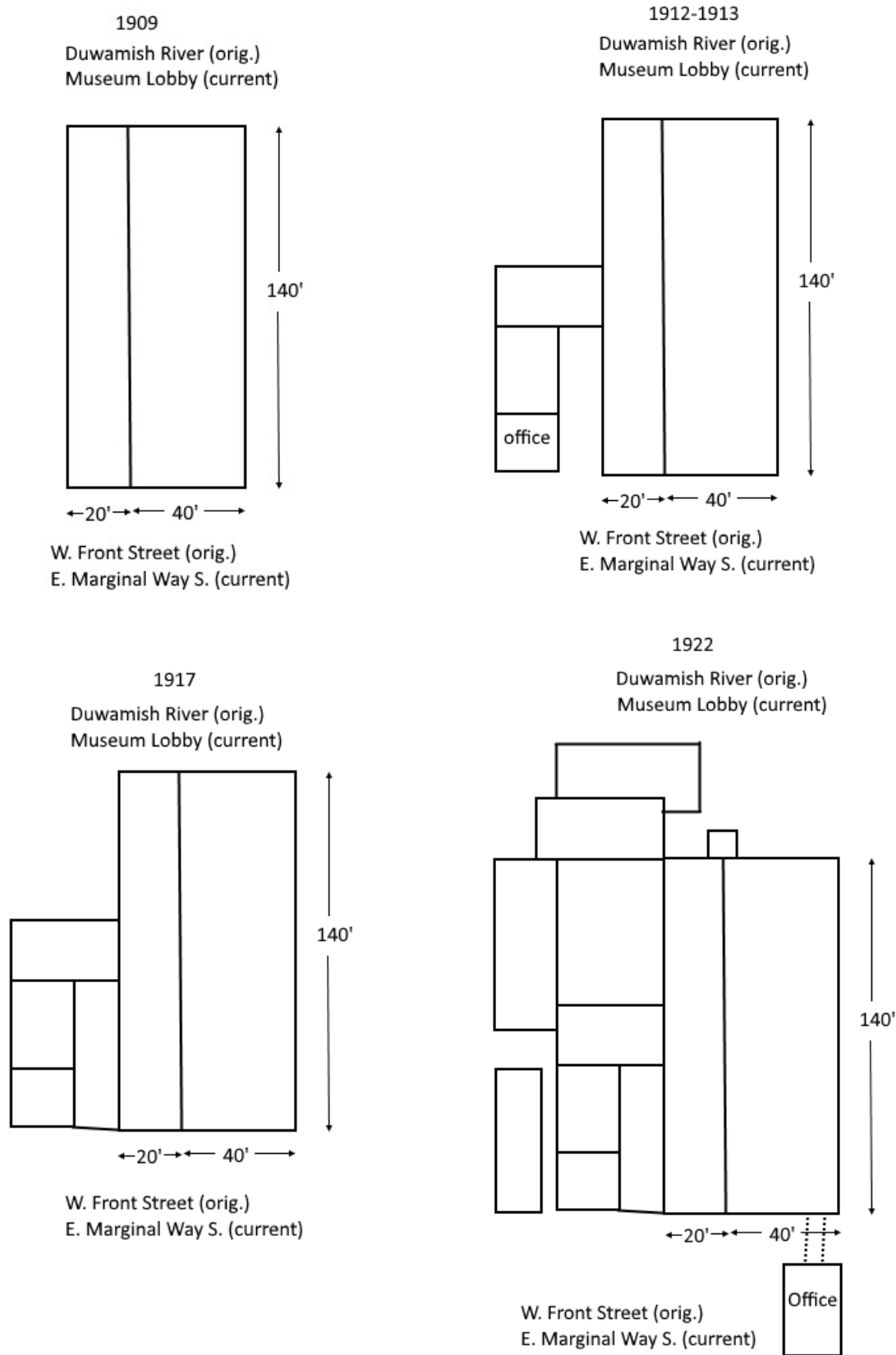


Figure A6. Baist Real Estate Atlas of Seattle, 1912. Partial index image (top), partial Plate 33 image (bottom). The top map shows the winding Duwamish River prior to straightening. The dotted-line arrows points to the E.W. Heath shipyard building in McLaughlin's Waterfront Addition to the City of Seattle.

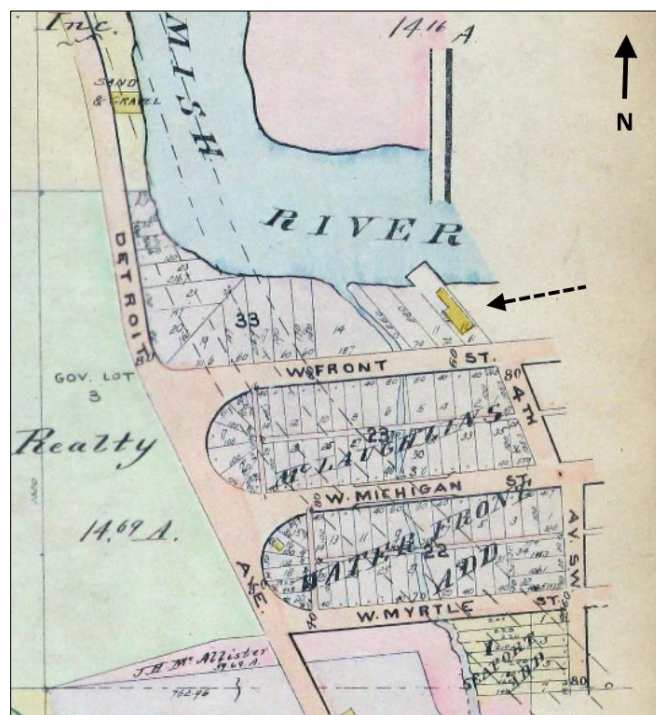
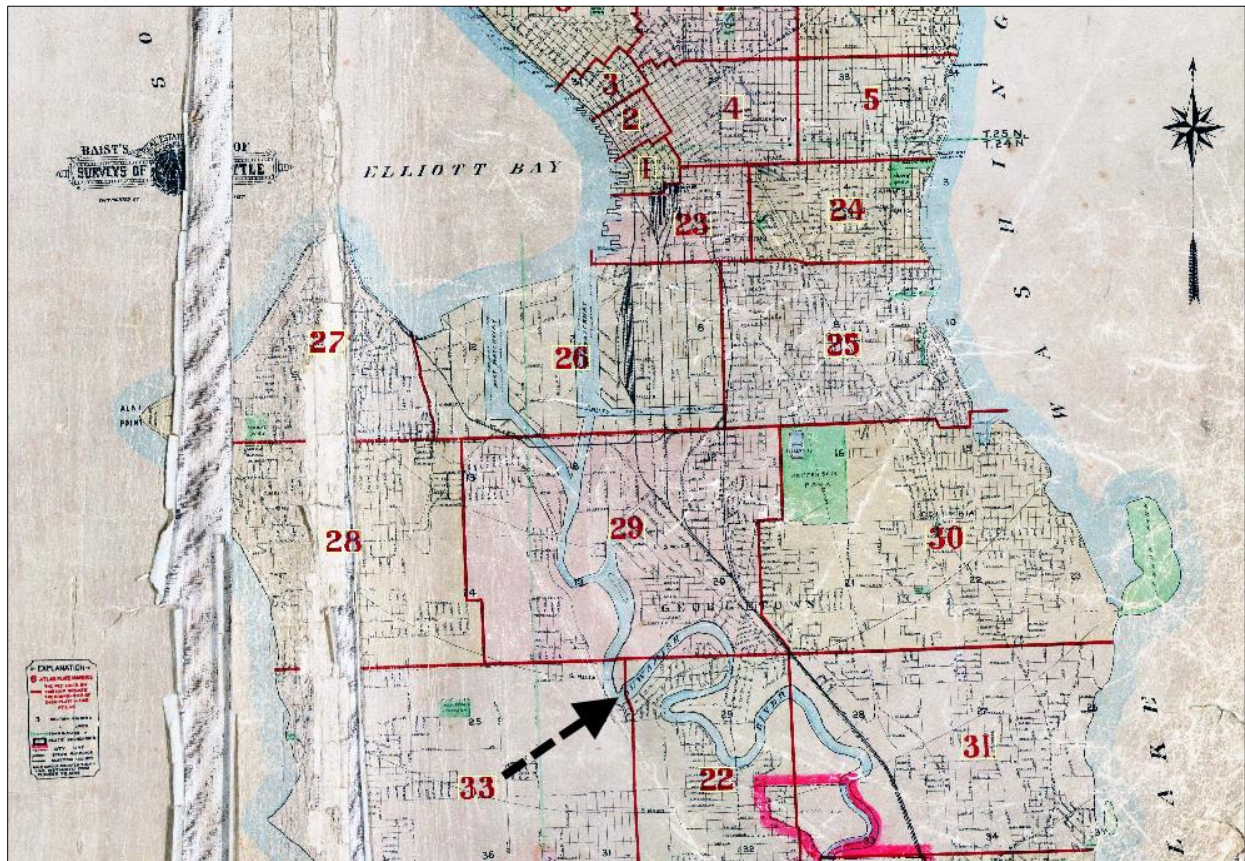


Figure A7. Map of Duwamish Waterway from mid-Harbor Island to S. 112th St., 1915 (partial & close-up).
Seattle Municipal Archives, Item No. 1466.

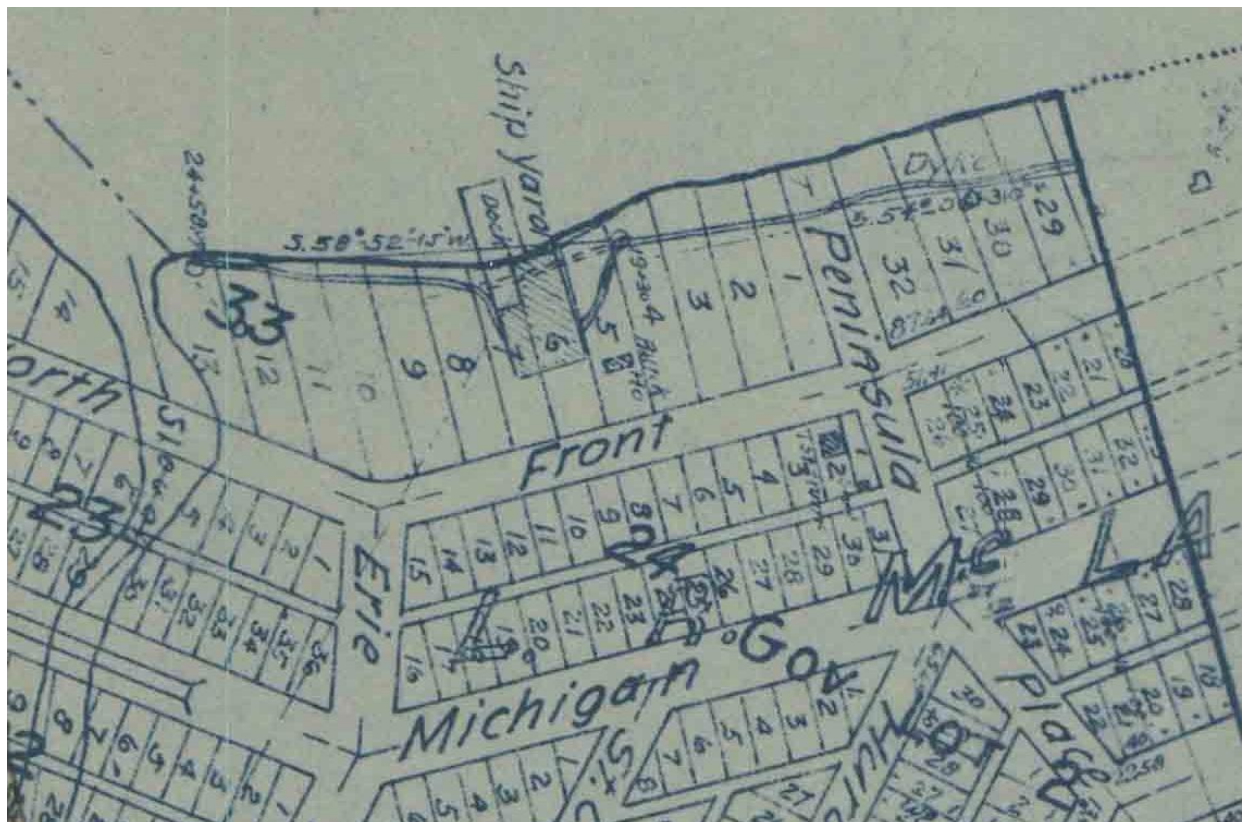


Figure A8. Pacific Aero Products Company, Alteration to Oxbow Plant, 1916. This drawing illustrates plans for a new second floor. Museum of Flight, Corporate Archives Collection.

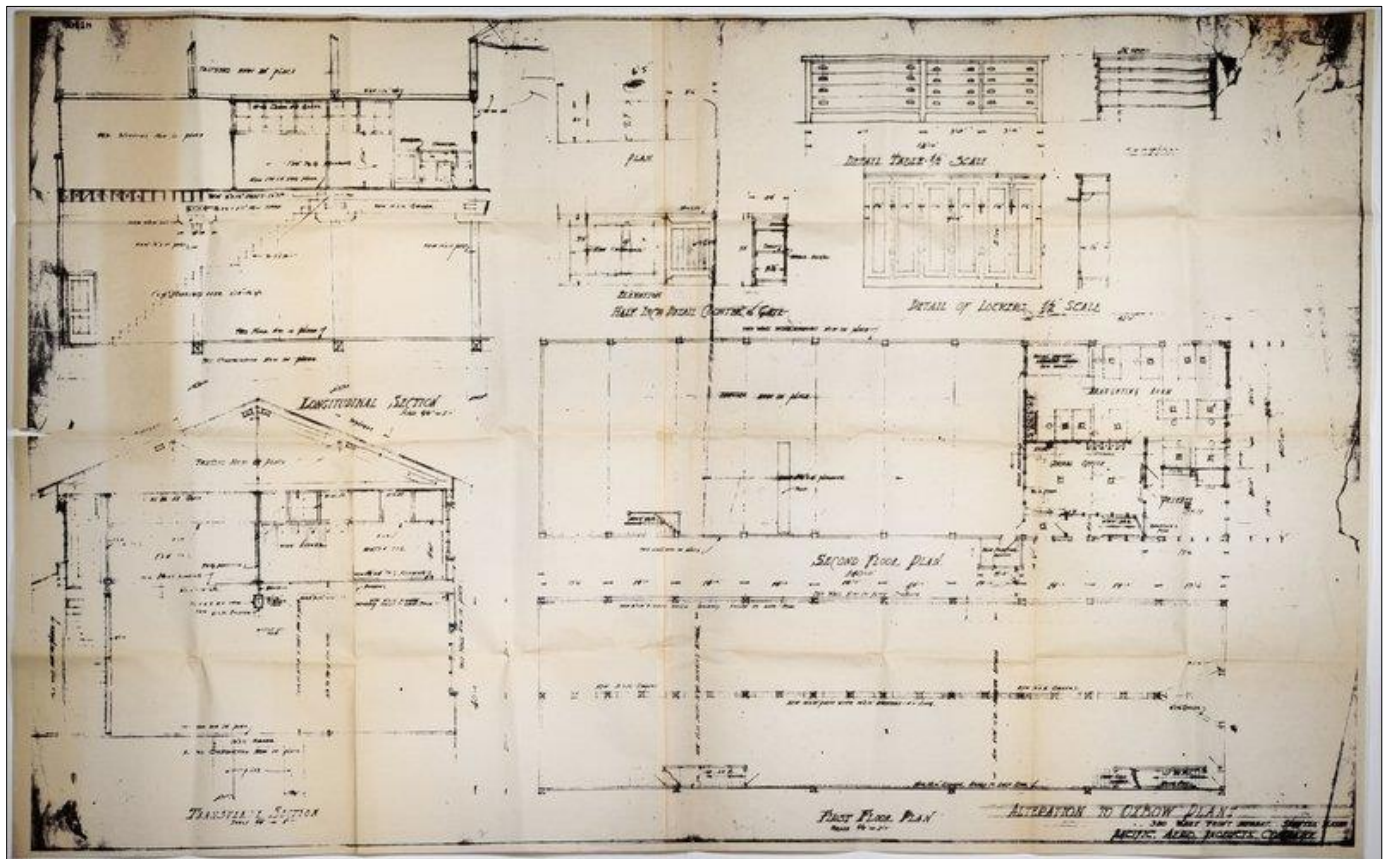


Figure A9. Sanborn Fire Insurance Company Map, Seattle, WA – Vol. 3, 1917, Sheet 332.

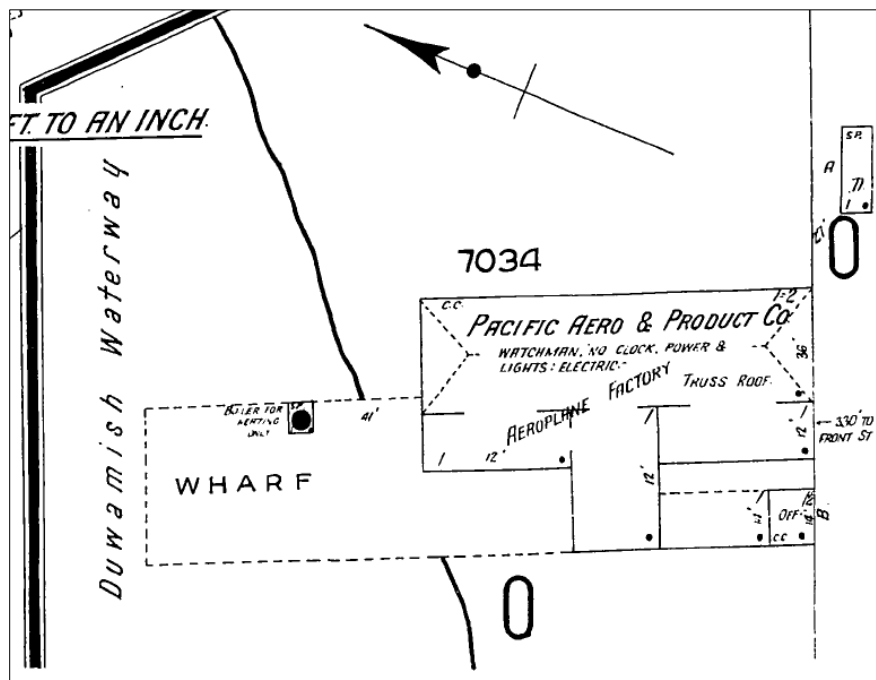
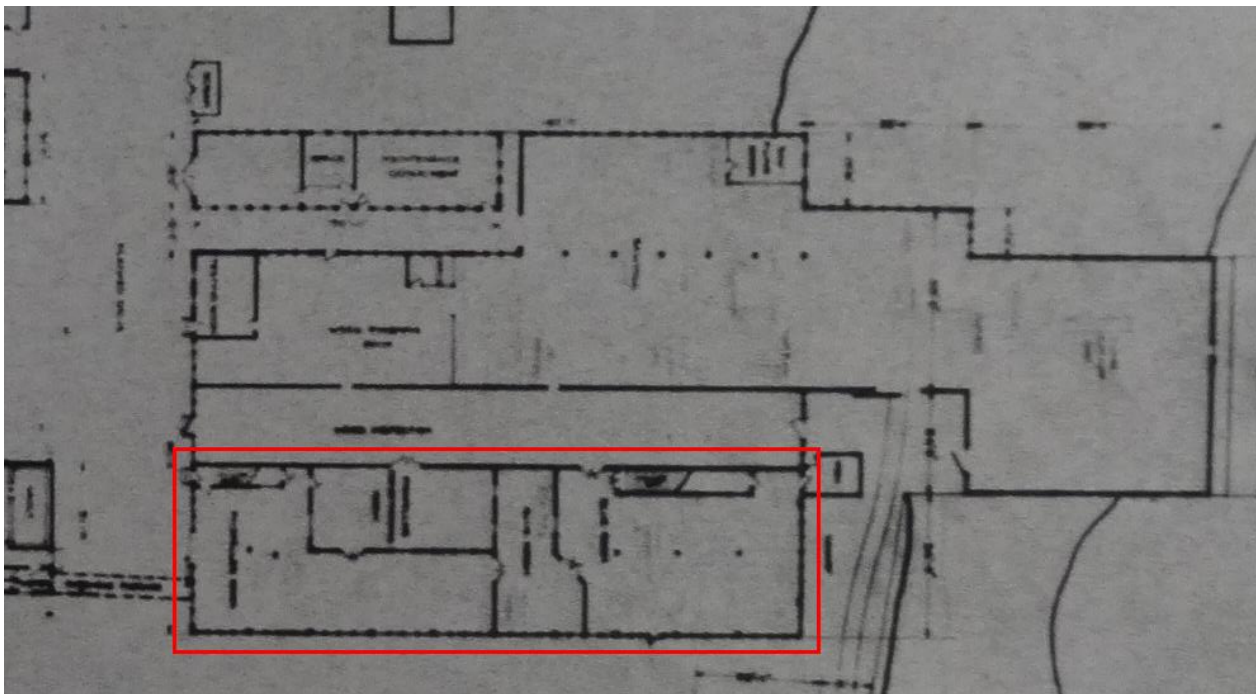
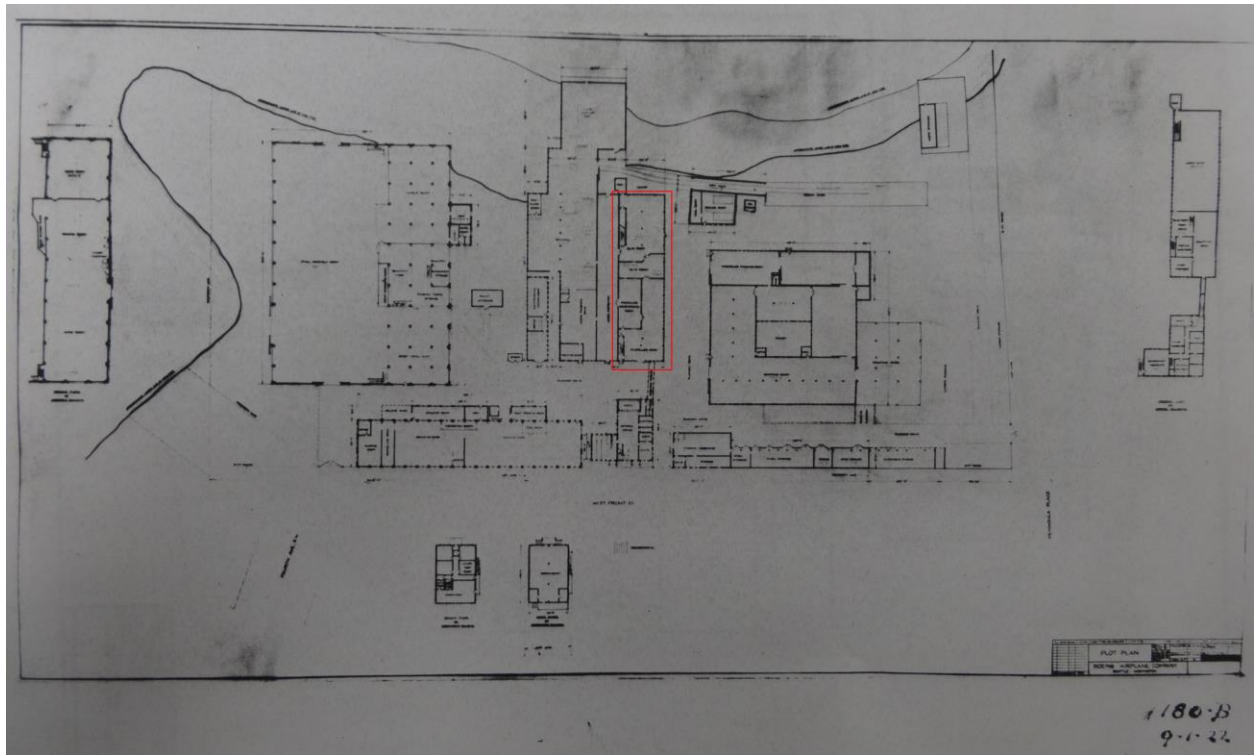


Figure A10. The Boeing Airplane Company. Plot Plan. September 1, 1922. The Boeing Co., Corporate Archive. Red box denotes two-story portion of the Red Barn. Although the text is difficult to discern, the plan illustrates the plant's tremendous growth between 1918 and 1922. A close-up footprint of the Red Barn is below.



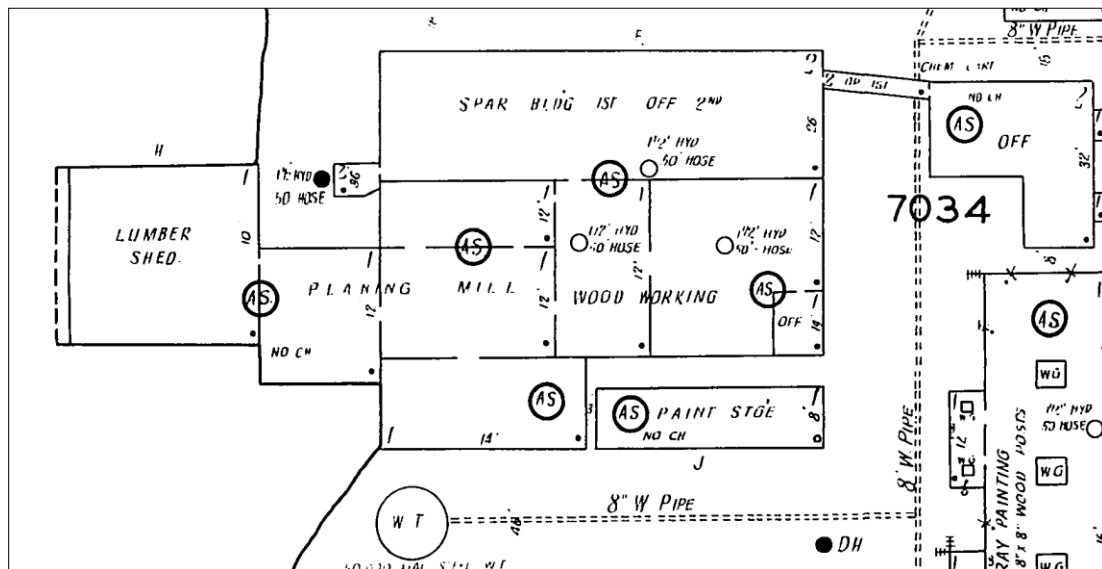


Figure A12. Map of the First Avenue S. Bascule Bridge, built 1931, with Boeing Plant 1, undated [1930s]. Boeing Co. Archive 140434B.

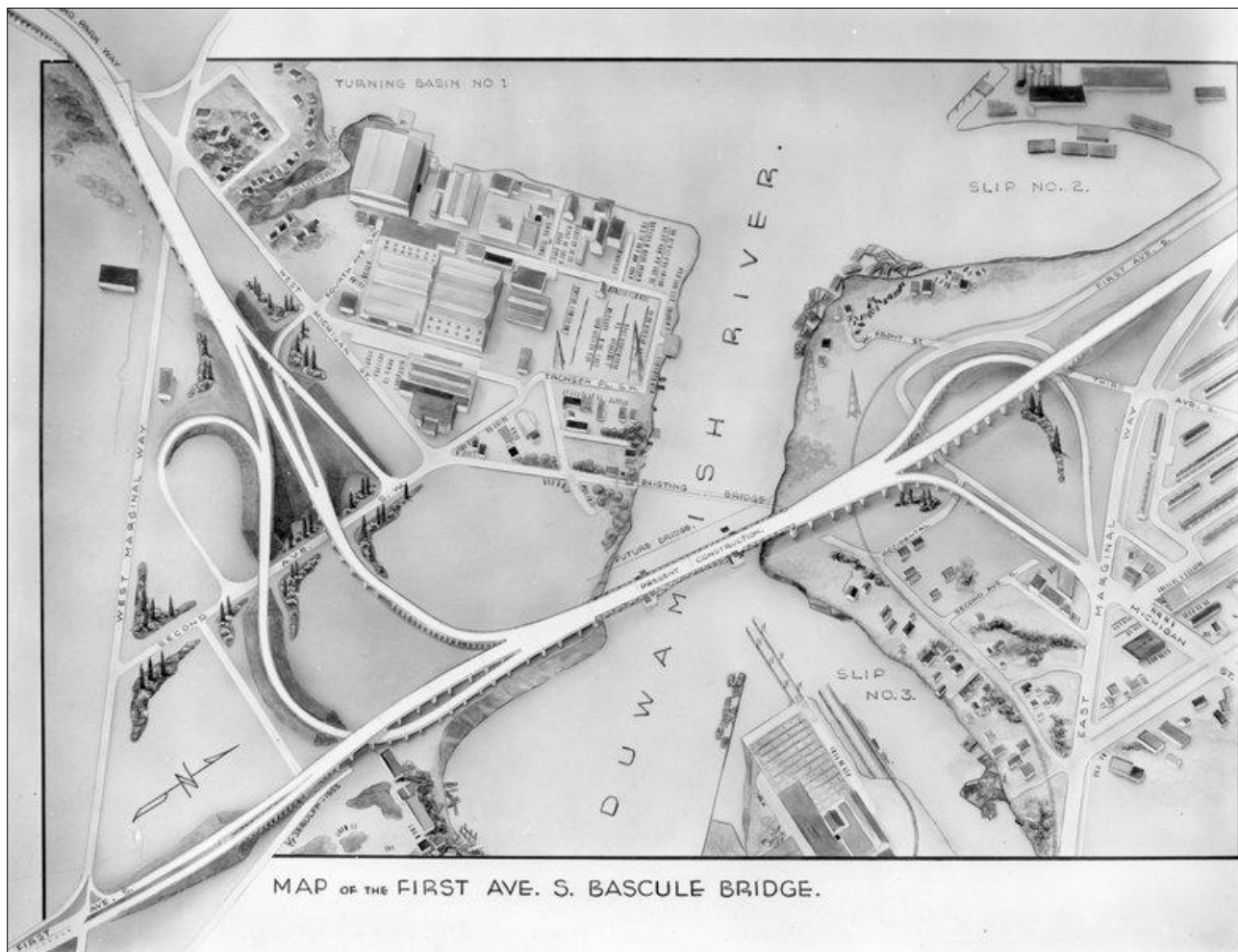
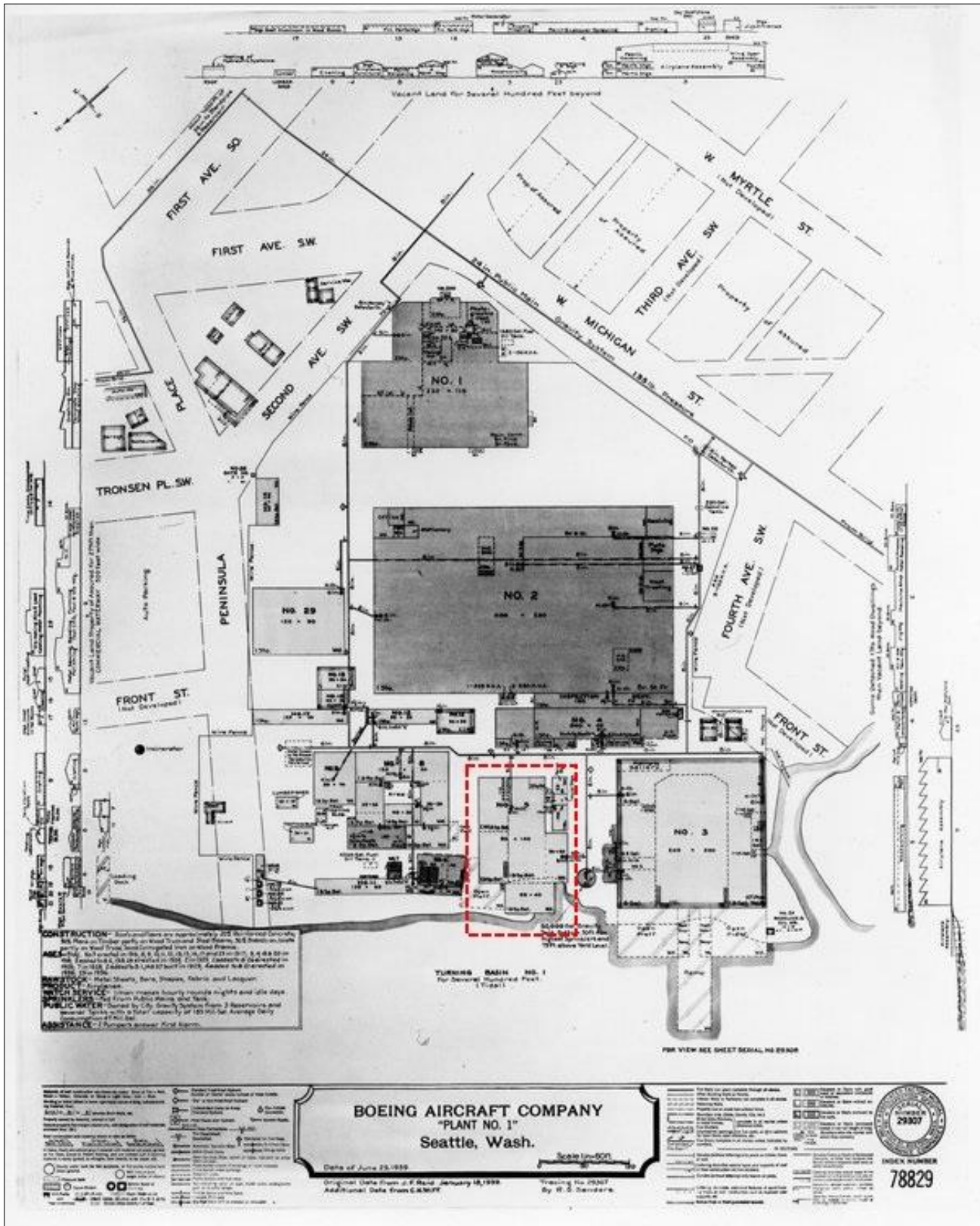


Figure A13. Boeing Aircraft Co., Plant No. 1. June 24, 1939. Boeing Co. Archive A120022.
The red box denotes the Red Barn.



Section B – Historic Photographs

Figure B1. Men working on wooden spars for the *Polar Bear* in front of shipyard-era Red Barn, pre-1916.
Museum of Flight Archive, PM3465, Evert E. Soldin Collection.



Figure B2. Shipyard-era Red Barn with masted ship in foreground, pre-1916.
Museum of Flight Archive, PM3466, Evert E. Soldin Collection.



Figure B3. *Polar Bear* frame under construction inside Red Barn, pre-1916.
Museum of Flight Archive, PM3468, Evert E. Soldin Collection.

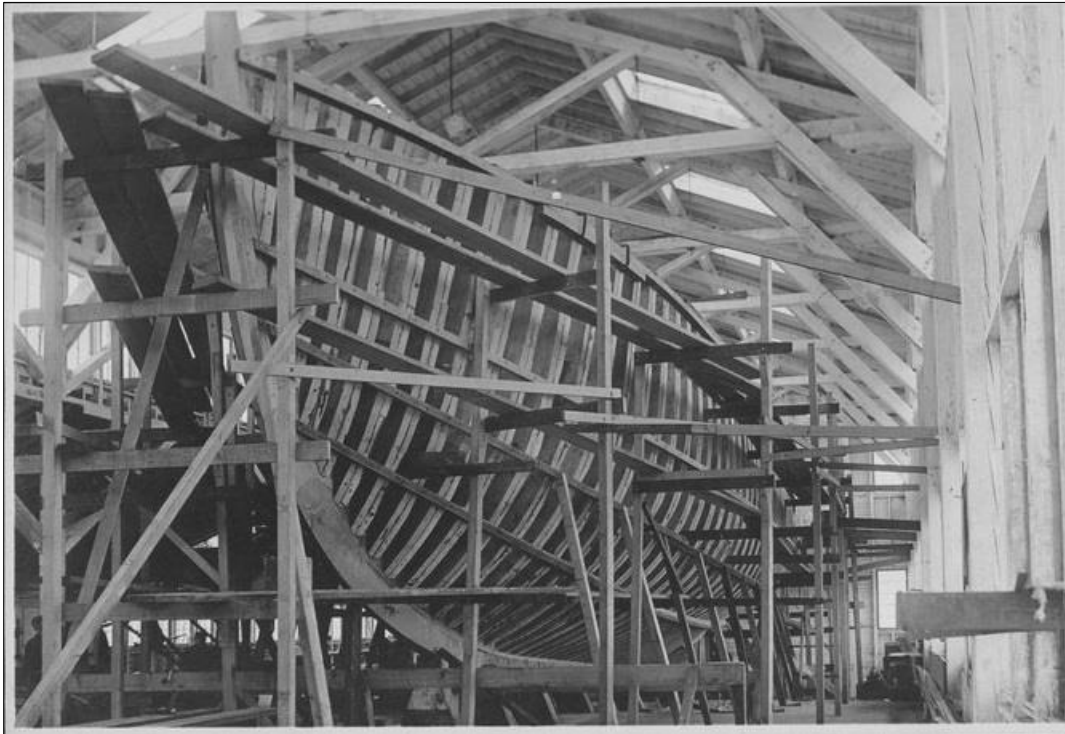


Figure B4. Red Barn, view east, just prior to plant expansion, 1917. Boeing Co. Archive, P57.



Figure B5. Red Barn, June 8, 1917, during World War One. Boeing Co. Archive P28.



Figure B6. Red Barn, view southeast, January 2, 1918. This photograph is taken as the plant is expanding to handle the contract for 50 Model C seaplanes. Boeing Co. Archive, P42.



Figure B7. Red Barn, first-floor interior, May 23, 1918. Boeing Co. Archive, P85.



Figure B8. Red Barn, second-floor interior, ca. 1918. Boeing Co. Archive, P15.



Figure B9. Red Barn, second-floor interior, 1918. Pictured is the Boeing Engineering Department working on the contract with the Navy to produce 50 Model C seaplanes. Boeing Co. Archive, P16.



Figure B10. Red Barn, second-floor interior, September 25, 1922. Boeing Co. Archive, 207-B.



Figure B11. Bird's Eye View of Plant, undated [c. 1922]. Boeing Co. Archive, P214.

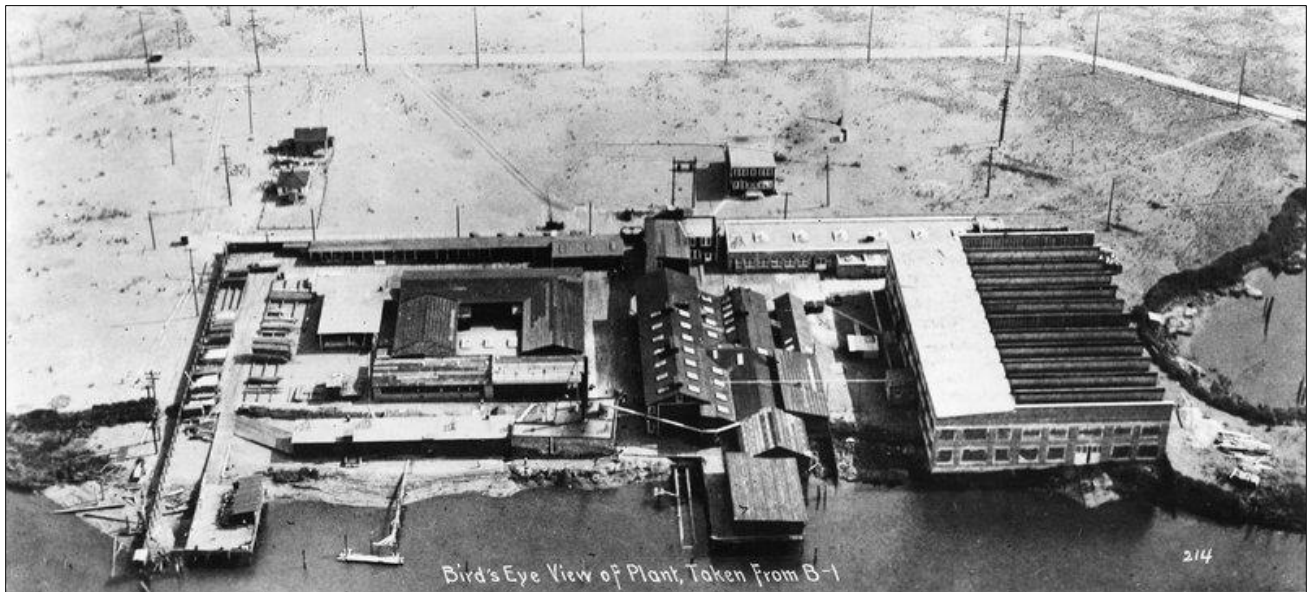


Figure B12. Red Barn, Property Record Card, King County Assessor, 1937. Washington State Archives, Puget Sound Branch, Bellevue, Washington.



Figure B13. Aerial photograph of Plant 1, undated [late 1930s or early 1940s]. Boeing Co. Archive, A11352.



Figure B14. Aerial photograph of Red Barn, 1966. Boeing Co. Archive, 6A42214-3.



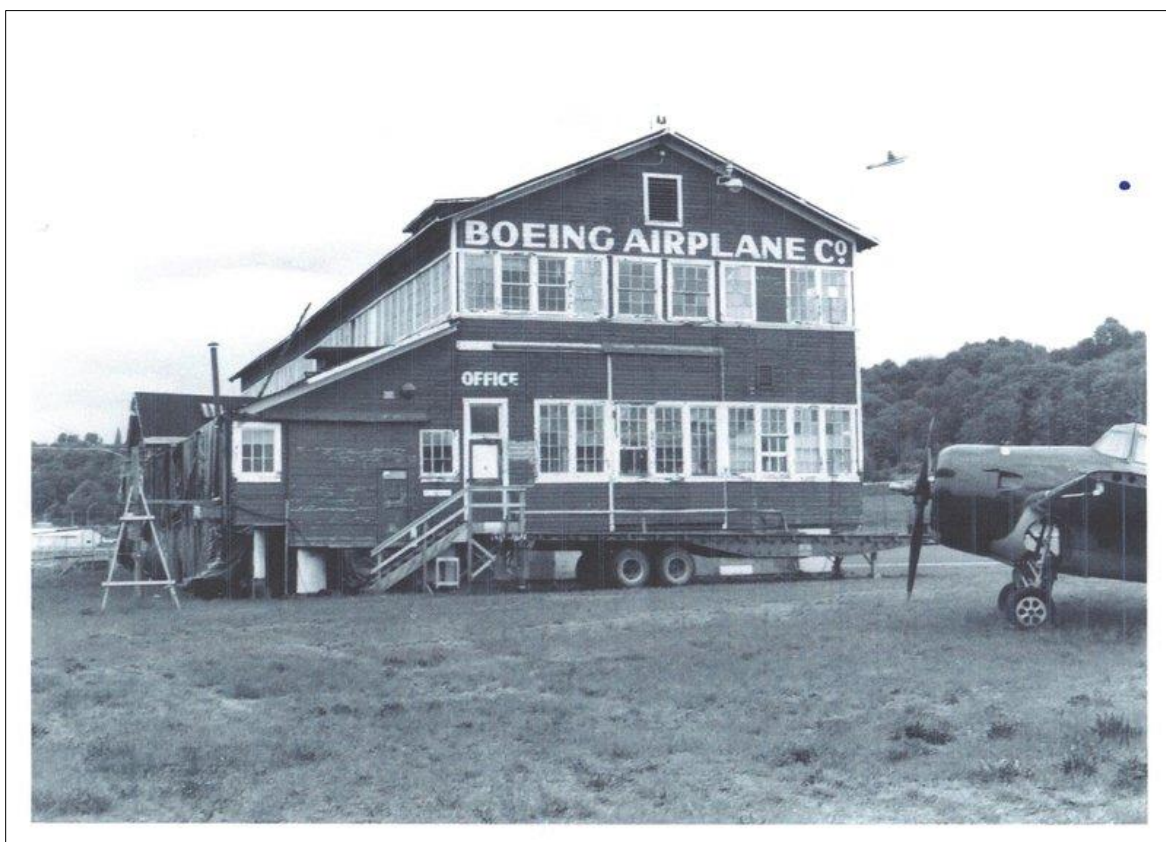
Figure B15. Red Barn, 50th anniversary event, July 1966. Boeing Co. Archive, 2A233504.



Figure B16. Red Barn, barging up the Duwamish Waterway, Dec. 16, 1975. Museum of Flight Archive PM3616.



Figure B17. Red Barn at temporary location at Boeing Field, 1977. David Hansen, NRHP nomination.



Section C – Current Photographs (Taken by Sarah J. Martin, August 24, 2017)

Figure C1. Red Barn, primary (west) façade, camera facing NE.



Figure C2. Red Barn, primary (west) and south elevations, camera facing NNE.



Figure C3. Red Barn, primary (west) and south elevations, camera facing N.



Figure C4. Red Barn, south elevation, camera facing W.



Figure C5. Red Barn, primary (west) and north elevations, camera facing SE.



Figure C6. Red Barn, primary (west) and north elevations, camera facing S.



Figure C7. Red Barn, historic office entrance, primary (west) façade, camera facing NE.



Figure C8. Red Barn, typical window, south elevation, camera facing N.



Figure C9. Red Barn, east end of building, showing connector and basement, camera facing S.



Figure C10. Red Barn, east wall of building connecting to museum lobby, camera facing N.



Figure C11. First-floor interior, double-door entrance, with the connector hall and museum store in background.



Figure C12. First-floor interior, southeast corner.



Figure C13. First-floor interior, with the south wall of windows at left.



Figure C14. First-floor interior, with the enclosed staircase at center.



Figure C15. First-floor interior, with the historic entrance at left, the hallway into the lean-to wing at center, and the enclosed staircase at right.



Figure C16. Interior of the lean-to wing.

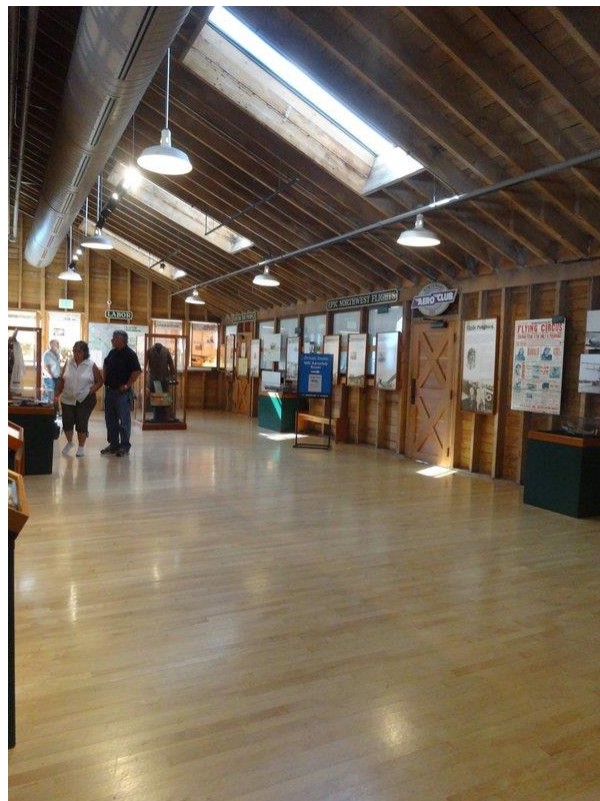


Figure C17. Second-floor interior, drafting room and office.



Figure C18. Second-floor interior, office at northwest corner.



Figure C19. Second-floor interior.



Figure C20. Second-floor interior, structure at southeast corner.



Figure C21. Second-floor interior, showing the former location of boathouse double doors.



PART IV: MAJOR BIBLIOGRAPHICAL REFERENCES

9. Previous Documentation

Use the space below to cite the books, articles, and other sources used in preparing this form (use continuation sheet if necessary).

Previous documentation on file:

- ☒ included in King County Historic Resource Inventory
- ☐ previously designated a Tukwila Landmark
- ☐ previously designated a Community Landmark
- ☒ listed in Washington State Register of Historic Places
- ☐ preliminary determination of individual listing
- ☐ (36 CFR 67) has been requested
- ☒ previously listed in the National Register
- ☐ previously determined eligible by the National Register
- ☐ designated a National Historic Landmark
- ☐ recorded by Historic American Buildings, Survey #:
- ☐ recorded by Historic American Engineering, Rec. #:

Primary location of additional data:

- ☒ State Historic Preservation Office
- ☐ Other State agency
- ☐ Federal agency
- ☒ King County Historic Preservation Program
- ☐ Local government
- ☐ University
- ☒ Other (specify repository)
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Boeing Airplane Co. Building, Exterior. June 8, 1917. P28.
Boeing Airplane Co. Building, Engineering Department. September 25, 1922. P16.
Boeing Airplane Co. Building, Drafting Office. September 25, 1922. 207-B.
Boeing Airplane Co. Building, Pontoon Department. May 23, 1918. P85.
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- Shipyard-era Red Barn with masted ship in foreground, pre-1916. PM3466.
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"Boeing at Home Either in Air or on Water," August 30, 1970.

"Boeing Plant No. 1: a ghost in the fog," October 16, 1970.

"Web Press Moves to Plant 1 Building," October 10, 1971.

"The Past: Preserving for the Future," April 30, 1972.

"Boeing's Old Plant 1 – the lights are on again," December 17, 1972.

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