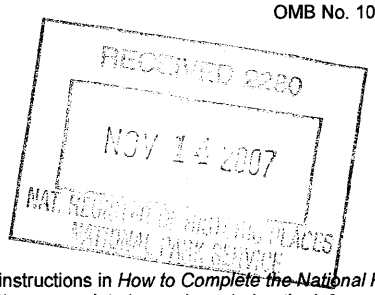
NPS Form 10-900
(Oct. 1990)

OMB No. 1024-0018



1315

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name: Riverside Hangar

other names/site number: 3M Hangars

2. Location

street & number: 690 Bayfield Street, Building 690-01-01 ☐ not for publicationN/A

city or town: Saint Paul ☐ vicinity

state: Minnesota code: MN county: Ramsey code: 123 zip code: 55107

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this ☒nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ☒ meets ☐ does not meet the National Register Criteria. I recommend that this property be considered significant ☐nationally ☒statewide ☐ locally. (☐See continuation sheet for additional comments.)

Britta L. Bloomberg 11/2/07 Britta Bloomberg, Deputy State Historic Preservation Officer

Signature of certifying official Date

Minnesota Historical Society

State or Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. (☐ See continuation sheet for additional comments.)

Signature of certifying official/Title Date

State or Federal agency and bureau

4. National Park Service Certification

I hereby certify that this property is:

☒ entered in the National Register.
☐ See continuation sheet.

☐ determined eligible for the National Register.
☐ See continuation sheet.

☐ determined not eligible for the National Register.

☐ removed from the National Register.

☐ other, (explain): _____

for Carol D. Shull

Signature of the Keeper Date of Action

12.27.07

5. Classification

Ownership of Property
(Check as many boxes as apply)
- ☒ private
- ☒ public-local
- ☐ public-State
- ☐ public-Federal

Category of Property
(Check only one box)
- ☒ building(s)
- ☐ district
- ☐ site
- ☐ structure
- ☐ object

Number of Resources within Property
(Do not include previously listed resources in the count)

Contributing	Noncontributing	
1		buildings
		sites
		structure
		objects
1		Total

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

Number of contributing resources previously listed in the National Register
N/A

6. Function or Use

Historic Functions
(Enter categories from instructions)
DEFENSE (bomber modification center)
TRANSPORTATION / air-related

Current Functions
(Enter categories from instructions)
TRANSPORTATION / air-related

7. Description

Architectural Classification
(Enter categories from instructions)
OTHER / Laminated Wood Arch

Materials
(Enter categories from instructions)
foundation CONCRETE
walls CONCRETE / concrete block
roof ASPHALT; SYNTHETICS / rubber
other

Narrative Description
(Describe the historic and current condition of the property on one or more continuation sheets.)

8. Statement of Significance

Applicable National Register Criteria

(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

- ☐ **A** Property is associated with events that have made a significant contribution to the broad patterns of our history.
- ☐ **B** Property is associated with the lives of persons significant in our past.
- ☒ **C** Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- ☐ **D** Property has yielded, or is likely to yield information important in prehistory or history.

Criteria Considerations

(Mark "x" in all the boxes that apply.)

Property is:

- ☐ **A** owned by a religious institution or used for religious purposes.
- ☐ **B** removed from its original location.
- ☐ **C** a birthplace or a grave.
- ☐ **D** a cemetery.
- ☐ **E** a reconstructed building, object, or structure.
- ☐ **F** a commemorative property.
- ☐ **G** less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance

(Enter categories from instructions)

ENGINEERING

Period of Significance

1942

Significant Dates

1942

Significant Person

(Complete if Criterion B is marked above)

Cultural Affiliation

Architect/Builder

Unit Structures and Rilco, Inc.

Narrative Statement of Significance

(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

Bibliography

(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):

- ☐ 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 Record #_____

Primary location of additional data:

- ☐ State Historic Preservation Office
- ☐ Other State agency
- ☐ Federal agency
- ☐ Local government
- ☐ University
- ☒ Other

Name of repository:
Minnesota Historical Society

10. Geographical Data

Acreage of Property 6.25 acres (aprox.)

UTM References
(Place additional UTM references on a continuation sheet)

St. Paul, East, Minn.
1967, Revised 1993

NAD 83

	Zone	Easting	Northing
1.	15	495169	4976450
2.			
3.			
4.			

☒ See continuation sheet

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title	Elizabeth A. Gales				
organization	Hess, Roise and Company			date	7-19-2007
street and number	The Foster House, 100 North First Street			telephone	6123381987
city or town	Minneapolis	state	MN	zip code	55401

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A **USGS map** (7.5 or 15 minute series) indicating the property's location.
A **Sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs

Representative **black and white photographs** of the property.

Additional items
(Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of the SHPO or FPO.)

name					
street & number				telephone	
city or town		state		zip code	

The Riverside Hangar, comprising two hangars, a connecting structure, and appendages, is located on the northeast side of the Saint Paul Downtown Airport. The hangars are oriented on a northwest-southeast axis, but historically the long sides of the hangars were known as the north and south facades. The north facades face the Mississippi River and the south facades face the runways on Holman Field. This nomenclature will be used in the following description of the buildings. Each hangar is 168' wide, 600' long, and 50' tall. Large glued-laminated wood arches characterize each hangar's distinctive form. The arches arrived at the site in half sections and were connected at their apex by metal plates that were bolted together. Wood boards running perpendicularly over the tops of the arches act as sub-roofs. The north hangar's roof is clad in asphalt shingles, and the south hangar has a rubber-membrane roof. Both hangars originally had asphalt-shingle roofs. The bases of the arches are connected to poured-concrete buttresses by large metal L-brackets. Concrete blocks form walls between the buttresses. Both hangars have poured concrete floors. The floors may date from 1952 when ground water from a spring flood raised the slabs, or they may be more recent.

On the west and east ends of the south hangar, tall concrete-block door pockets flank aircraft doorways. Telescoping, sliding wood doors are mounted on parallel tracks. Tail doors were centered above. Like the rest of the building's exterior, these openings are covered with steel lap siding, which replaced the hangar's original dark-colored (possibly asphalt) cladding in 1999. The north hangar's openings have been more substantially modified. The sliding doors in the east opening were replaced in the 1990s with metal doors, but the original lower tracks remain. The large opening in the west end has been enclosed and three large garage-door openings installed. Multi-light, opaque Plexiglas panels fill the tail-door openings.

The hangars are parallel to the riverbank and to each other, and are separated by 74'. The concrete-block walls in the south wall of the north hangar and the north wall of the south hangar are approximately 8' tall, and the opposite walls are close to 2' in height. A temporary, wood-frame, plywood-covered structure connects the hangars near their midpoint.

Extending from the west end of the south hangar's south wall is a one-story, flat-roofed, brick addition built in 1959, which holds a passenger lounge. Large plate-glass windows overlook the runway, and doors allow access from the hangar and the exterior. A red 3M sign is mounted on the exterior wall next to the door. A similar sign is mounted on the west buttress wall. Three concrete-block additions to the east of the lounge hold furnace equipment fueled by natural gas. The buildings were originally heated by coal-powered furnaces. Each addition has a shed roof, an exterior door, windows, and a brick chimney. The doorways and window openings, which have segmental-arched brick headers, have been completely or partially enclosed. A shorter shed-roof portion, which held coal, juts off of the west side of the furnace additions. Between two of the additions, a smaller, shed-roof "gable" with an exterior door protrudes from the wall. It is not clear if this gable had a storage purpose or was simply an entrance. Similar additions and

gable have been removed from the north wall of the north hangar. It is unclear when this occurred, but the removal might be linked to the construction of a road a few feet north of the north hangar.

The north hangar is used mainly for automobile parking, but has a small area on the east end for aircraft repair. The south hangar is the prime aircraft storage and maintenance area. The interior of each hangar is primarily open beneath the broad span of the laminated arches. Additional cross-bracing near the ceiling provides stability for the east and west ends. Wood-frame catwalks are suspended below the apex of the arched roof, and are reached from the floor by wood ladders mounted to the walls. The catwalks in the south hangar are in good condition, but the catwalks in the north hangar have not been as well maintained.

Over time, partitions have been erected and removed along the north and south walls as the needs of hangar occupants changed. Today, the north hangar has wood-frame gypsum-board storage closets along most of the north wall. In the south hangar, concrete-block walls create storage areas, workshops, restrooms, offices, and a break room on the south wall.

The mechanical and fire protection systems in the hangars have been updated. Because of the exposed building structure, this work has not been invasive. In both hangars, new sprinkler systems replaced the originals in essentially the same locations. Along the ceiling, plywood ribs that deflect water from the sprinklers have been preserved in each hangar; one runs east-west down the center of each hangar's ceiling, and two others run north-south approximately 200' from the west and east ends of the buildings. A new ventilation system has been installed in the north hangar to vent exhaust fumes from automobiles in the hangar.

The Riverside Hangar, now known as the 3M Hangars, is located at the Saint Paul Downtown Airport. The two hangars that form the complex were built in late 1942 as part of the bomber modification center that operated at the airport during World War II. Glued-laminated arches form the hangars' roofs and walls, and at the time of construction the arches were the widest of their type in the world. Advances in wood construction were stimulated by materials shortages during the war. The Riverside Hangar complex is eligible for the National Register for statewide significance in Engineering under Criterion C, as an excellent example of glued-laminated arch construction in Minnesota.

Saint Paul Downtown Airport is located southeast and across the Mississippi River from downtown Saint Paul. Established in the late 1920s, the airport sits on low-lying land bordering the river. In the early 1930s, the airfield (the runway area) was named for Charles "Speed" Holman, a local pilot who won several national airplane races and nurtured the Twin Cities' early flight culture.[1] Much of the airport's initial development is linked to Northwest Airlines, which was originally incorporated as Northwest Airways in 1926 to secure the official airmail route between the Twin Cities and Chicago. The company rented hangar space at Wold-Chamberlain Field in Minneapolis, and Saint Paul was a stopping point to pick up and deliver mail. In 1927 Saint Paul constructed a new brick-clad, steel-framed hangar at the airport. Northwest tried to rent the hangar for its exclusive use, and was frustrated when the city insisted on keeping it as a public hangar.

When the airline began passenger service between the Twin Cities and Chicago in July 1927, it included Saint Paul as a regular stop. That year the company's Detroit-based owners sold the airline to a group of Twin Cities' businessmen, who shifted the base of operations to Saint Paul. In the fall of 1929, Northwest hired prominent local architect Clarence H. Johnston Sr. to design a hangar with administrative offices at Holman Field. The building was completed in early 1930, and for three decades Holman Field was Northwest's headquarters. Additions were made to the hangar over the next ten years to accommodate the company's rapidly expanding operations. Although the airline eventually limited passenger operations in Saint Paul, the field served as the overhaul center for its fleet.[2]

As Northwest settled into Holman Field, the City of Saint Paul continued efforts to develop the airport. In 1930, a hangar similar to the Northwest structure was constructed for use by the 109th Air Squadron of the Minnesota National Guard. The city began a comprehensive improvement program in 1937 to upgrade the runways and construct a municipally owned administration

[1] For several decades, the airport was known by the airfield's name, Holman Field.
[2] The company was originally known as Northwest Airways but was reincorporated in 1934 as Northwest Airlines. The 1930 hangar/administration building was documented for the Historic American Engineer Record (HAER No. MN-37) by Jeffrey A. Hess in March 1989 prior to its demolition. The HAER report discusses the history of the airline and hangar in detail.

building, designed by city architect Clarence "Cap" Wiggington. The project was completed in July 1940, shortly before the United States entered World War II.[3]

World War II

Civilian use at most airports was restricted in early 1942. Northwest moved its passenger operations to Minneapolis, but maintained a significant presence at Holman Field by becoming the contract-operator of a U.S. Army Bomber Modification Center. A modification center was "an airplane 'tailoring shop' in which standard production aircraft from the factories" were "prepared for a specialized combat function in a particular theater of operation."[4] Saint Paul's facility began service in late February 1942 when several B-25 "Mitchell" bombers arrived for alterations for Great Britain's Royal Air Force as part of the Lend-Lease Act. B-24 "Liberator" bombers, introduced to Holman Field late in May 1942, became the modification center's specialty, although it occasionally worked on other airplane models.[5]

The 109th Squadron's hangar was appropriated for the modification center, but for the first ten months, most of the airplanes were serviced outside under tarps. A machine shop and barracks were constructed east of the airport's administration building. Sometime in 1942 the army decided to construct new hangars, freeing up space in the 109th Squadron's hangar for special projects, including the assembly and installation of radar equipment in the airplanes. New hangars would also enable modification work to proceed regardless of the weather. Excavation for the footings of a large hangar was begun close to the banks of the Mississippi River in September. A second, identical hangar was started not long afterward. The first hangar was completed by December 7, 1942, and both hangars were occupied by January 1943. Each measured 168' wide by 600' long and was "capable of housing 13 of the big ships at once."[6] A two-story, flat-roofed building between the hangars held "offices, shops where parts were made and repaired, rest lounges and, on [the] second floor, a modern cafeteria capable of serving 2,500 workers each day." The complex was known as the Riverside Hangar. Eventually, a row of nose hangars and a maintenance shop were erected south of the 109th's hangar to complete the modification center.[7]

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[3] The Holman Field Administration Building was listed in the National Register of Historic Places in 1991. Ibid.
[4] A. B. Horner Jr., "The AAF Representative Says," *Field and Hangar* 2 (June 1945): 2.
[5] Francis J. Geng (Saint Paul Downtown Airport Director, 1927-1961), interview by Anne M. Holey, June 12, 1965, transcript available in Air Museum of Minnesota Collection, Minnesota Historical Society (MHS), Saint Paul; Northwest Airlines, Inc., "St. Paul Bomber Modification Center," booklet on Northwest Airlines's war efforts, n.p., Box 19, Corporate Records, MHS.
[6] "About the Mod Center," *Field and Hangar* 2 (June 1945): 11.
[7] The nose hangars, maintenance shop, and barracks are not extant. The original 109th Squadron hangar has been replaced with a newer structure. "St. Paul Bomber Modification Center," n.p.; "Center Closes with Brilliant Record," *Field and Hangar* 2 (September 1945): 4-5; "B-24s Tailored to Fight," *Field and Hangar* 2 (June 1945): 9.

Glued-Laminated Timber

The three hangars built at Holman Field during the 1920s and 1930s had steel structural members. Rationing of steel and other critical materials during the war, however, forced architects and engineers to look for other alternatives. The designers of the Riverside Hangar chose glued-laminated arches for the structure. The decision was likely based on several factors.

Glued-laminated timber was known for its lightness and strength. The technology for the glued-laminated timber technology used on the Riverside Hangar came to the United States from Germany. In 1901, Otto Karl Friedrich Hetzer, in Weimar, patented a system of laminating very thin pieces of wood together using a waterproof adhesive, casein, which was derived from milk. The system for creating laminated arches was straightforward. Wood boards, preferably from coniferous trees, were kiln dried and planed smooth before lamination. The boards were then spread with glue and the layers clamped together against a curved steel form. The boards forming the outer layers of the arch were usually full-length pieces. Inner layers were shorter boards that were set end to end. Glued-laminated beams and arches were tied together with hinges to produce members of the necessary lengths.[8]

Hetzer's laminating system was known as Hetzerbauweise (Hetzer building method). The system was so popular that the Hetzer name was applied to any laminated wood timbers using water-resistant glue, regardless of the manufacturer or the size and form of the timber. Commonly used in Germany, Switzerland, and the Scandinavian nations, the systems were economical to manufacture and were lighter than steel and iron construction. They also held up well under corrosive conditions, which made them popular for train sheds where coal smoke shortened the life-span of metal structures.[9]

A former employee of the Hetzer firm, Max Hanisch Sr., is credited with bringing the Hetzer technology to the United States. Hanisch was a registered architect and civil engineer who started his own firm in Germany shortly before World War I. The company did not survive the disruption and economic failure caused by the war, and Hanisch immigrated to the United States in 1923 with plans of setting up a new glued-laminated timber business. He found that there was not an American market for glued-laminated timber because the technology was not understood. He settled in Racine, Wisconsin, and began an architectural practice. In 1934, Hanisch proposed to use glued-laminated timber arches for a school gymnasium in Peshtigo, Wisconsin. No company in the United States manufactured glued-laminated timber at the time, so he formed a corporation, Unit Structures, in partnership with Thompson Brothers Boat Manufacturing Company based in Peshtigo, Wisconsin. The Thompson family provided woodworking skills and

[8] Andreas Jordahl Rhude, "Structural Glued Laminated Timber: History and Early Development in the United States," *APT Bulletin* 29 (1998): 11-12; T. R. C. Wilson, *The Glued Laminated Wooden Arch*, Technical Bulletin, No. 691 (Washington, D.C.: United States Department of Agriculture, 1939), 88.
[9] Rhude, 11-12; Wilson, 87-88.

an established factory. Hanisch and his two sons brought engineering expertise to the partnership. Unit Structures was the first and most successful company to produce glued-laminated timber in the country through World War II. Hanisch licensed the glued-laminated technology to companies in California, Illinois, Minnesota, Oregon, and Washington.[10]

In the beginning, though, the company had to prove that the innovative building material was strong and stable. The design of the Peshtigo gymnasium was challenged by the Wisconsin Industrial Commission, which oversaw and approved all public building plans. Intrigued by the technology, the U.S. Forest Products Laboratory built a model structure at its facility in Madison, Wisconsin, and tested it for over a year. The arches passed with high scores and the Peshtigo gymnasium was completed. The Forest Products Laboratory's interest in glued-laminated timber continued to grow. The lab developed designs for glued-laminated arches and conducted extensive tests that improved glues, manufacturing methods, and design analysis. Advocates for glued-laminated construction cited its strength, economy, and diverse uses: "Structurally the member can be tailor-made to fit the particular job to be done, i.e., the structural designer can specify the most economical shape and construction for carrying the load."[11] The glued-laminated arch design principles determined by the laboratory "enabled architects and engineers to design arches of greatly varied size and shape to support —with no obstruction to floor and overhead space—many vital structures, such as hangars, drill halls, and garages." Aircraft hangars, like the Riverside Hangar, were some of the largest examples of glued-laminated arch construction exclusive of any additional supporting structure. Northwest Airlines used glued-laminated arches for two hangars in Fargo and Grand Forks, North Dakota, in the late 1930s. The Fargo hangar set a world record for its 152'-wide span. The 168'-wide arches in the Riverside Hangar set a new world record at the time of the complex's construction.[12]

Holman Field's hangars featured single glued-laminated members arching across the entire span. Unit Structures and its Minnesota-licensee, Rilco, in Albert Lea, produced the 120 arches needed for both hangars. The 168'-wide span was sufficient for its important task of housing the largest of four B-24 modification centers in the country. Following an assembly line process, the planes were moved within the hangars from station to station, where small teams repeated specialized

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[10] Rhude, 12-16.

[11] Ibid., 13; Frank J. Hanrahan, "Glued-Laminated Lumber Construction," *Mechanical Engineering* 65 (December 1943): 907-909.

[12] At this time, it is not known if there are any other large-scale glued-laminated arch structures in Minnesota. The hangar at Grand Forks is extant. It was moved to a new airport site in 1964. The hangar at Fargo was damaged beyond repair in a windstorm in July 1999. The hangar was documented by the North Dakota State Historic Preservation Office. Rick Audette, Operations Manager, Grand Forks International Airport, Grand Forks, N.D., telephone conversation with Elizabeth A. Gales, June 4, 2007; Shawn Dobberstein, Executive Director, Hector International Airport, Fargo, N.D., telephone conversation with Elizabeth A. Gales, June 4, 2007; Rhude, 13, 16; Hanrahan, 907-909; Carlile P. Winslow, "Wood Goes to War," *Southern Lumberman* 165 (December 15, 1942): 144.

tasks. Wherever one shift left off, the men and women on the next shift took over. The Saint Paul center had an excellent production record and was chosen as the prototype for special programs. From November 1943 to May 1945, it was the only location outfitting B-24s with radar-guided bombing equipment as part of a program known as H2X. This equipment enabled the military to conduct day- and nighttime bombing runs with greater accuracy. The H2X-B-24s were used by the Fifteenth Air Force in Italy and the Eighth Air Force in England for bombing raids in advance of Allied ground troop movements. Special camera-outfitted B-24s from Saint Paul performed valuable reconnaissance in both the European and Pacific Theaters. The type of modification completed at the center was kept secret until the center was awarded the Army and Navy "E" Award for excellent production records in November 1944 after the Allies had invaded Europe. Even then, press releases for the award ceremony only hinted at the facility's work; details were not revealed until after the war. The center continued to exceed its production quota, and in May 1945 received the "E" award for the second time. By the end of the war, the center had modified 3,286 airplanes, mostly B-24s. In early September 1945, with the nation turning to postwar pursuits, the military began phasing out the center's operations, cutting its 3,500-person workforce to 1,500.[13]

The army was obligated under its lease to "restore the field to its pre-war condition" before returning the airport to local jurisdiction. Surplus equipment was to be liquidated. Because the Riverside Hangar complex was considered surplus property, it could only remain on the site with the approval of the Metropolitan Airports Commission (MAC), created by the state legislature in 1943 to control all airports in the Twin Cities region. MAC director Robert Aldrich appeared to have little fondness for the hangars, particularly given their heating and maintenance costs. Erected as temporary structures, they were basically un-insulated wood shells. They could, however, shelter aircraft, and that utilitarian purpose saved them after the MAC took over control of the airport in the summer of 1946 with plans to develop it as the "major special services airfield" in the Twin Cities region. Wold-Chamberlain Field (now Minneapolis-Saint Paul International Airport) would serve as the major passenger terminal.[14]

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[13] The final count of modified airplanes included 165 B-25s, 1,633 B-24 Liberator bombers, 120 camera ships, 34 aerial tankers, 46 weather reconnaissance airplanes, 1,119 radar ships, 155 low altitude bombers, one Australian airplane, and 13 anti-submarine bombers. Rhude, 16; Horner, "The AAF Representative Says," 2; "Mod Center Gets Top Production Award," *Field and Hangar* 2 (November 1944): 1; "New Bomber Modification Line to Start," *Saint Paul Pioneer Press*, April 15, 1945; "2,000 to Lose Jobs at NWA Plant Here," *Saint Paul Pioneer Press*, August 25, 1945; "Center Closes with Brilliant Record," 6-7; "Second 'E' Award Presented Today," *Field and Hangar* 2 (June 1945): 11; "Airport Bomber Modification Center to be Unveiled, with E Award, Friday," *Saint Paul Dispatch*, November 23, 1944.

[14] "Big Hangars' Maintenance Here Costly," *Saint Paul Pioneer Press*, September 12, 1945; Walter E. Quigley, "Million Dollar White Elephant Created at St. Paul Airport by Peace," *Saint Paul Pioneer Press*, September 9, 1945; "U.S. Grants MAC Right of Entry to Holman Field," *Saint Paul Pioneer Press*, March 9, 1946.

The return of civilian control of the airport signaled the return of Northwest Airlines to the arched hangars. Northwest used the Riverside Hangar complex as its overhaul base. Metal-sided additions were erected on the west and east ends of the north hangar, and the interior was converted to a machine shop. The south hangar's large doorways and spacious interior were preserved and the hangar was used year-round for aircraft maintenance. When the Mississippi River flooded the airport in April 1952, however, the disruption and cleanup expense prompted Northwest to consider other options. A few years later, it decided to centralize its operations in Minneapolis, leaving Holman Field in 1959 to occupy a new complex of buildings at Wold-Chamberlain Field. The following year, the 3M Corporation's aviation department leased the south hangar. Part of the north hangar was leased by the 109th Squadron and the other part by a fixed-base operator. In the 1990s, 3M began to expand its aviation department, purchasing the south hangar in 1997. The company leased the north hangar from the MAC in 1999. 3M made alterations to both buildings, including the demolition of the two-story office and workshop section between the hangars.[15]

Conclusion

Hangars are utilitarian, and utilitarian properties are typically adapted over time to respond to new needs. Failing that, they decay or are demolished. Changes to utilitarian structures are made pragmatically, often with the most economical materials available and rarely with consideration of the Secretary of the Interior's Standards for Rehabilitation. Even given an allowance for their utilitarian nature, however, the changes made to the Riverside Hangar complex are substantial from the perspective of its association with the World War II modification center. These alterations include the removal of the two-story section between the hangars; the installation of steel lap siding on both hangars; the removal of the furnace additions on the north hangar; the removal or covering of the tail doors on the south hangar; the installation of a rubber-membrane roof on the south hangar; and the addition of a passenger lounge on the south hangar. The integrity of the World War II setting was also adversely affected by the removal of the public hangar, the Northwest Airlines Hangar and Administration Building, and the 109th Squadron's original hangar. Hence, although the complex appears to meet Criterion A, it does not maintain sufficient integrity to merit listing on the National Register under the criterion.

The hangars as individual buildings, on the other hand, maintain sufficient historic integrity as unique examples of glued-laminated arch construction in Minnesota to be eligible for listing in the National Register for Engineering under Criterion C. During World War II, steel was classified as a critical material and was hard to obtain, even for military-related facilities on the home front. Designers were challenged to adapt other materials where steel was normally used. Prior to the war, overhead steel trusses were increasingly called on to provide the broad,

[15] Francis J. Geng interview; Northwest Airlines, Inc., photo album of 1952 flood, Boxes 15 and 53, Corporate Records, MHS; Joe Tschokke (Materials Control Supervisor 3M Aviation), in discussion with Elizabeth A. Gales, July 20, 2005.

unobstructed space required for hangars as the size of aircraft grew in the first half of the twentieth century. Other materials could not be substituted for steel in the same truss configurations, but some materials could be used in other forms to meet the need. Thin concrete shells, for example, were adopted for substantial military aircraft hangars at Ellsworth, North Dakota, and Limestone, Maine. A series of arches made from glued-laminated timber also served the purpose. The latter technology was selected for the hangars at Holman Field, which represent a creative response during a period of crisis, using materials that were traditionally associated with the region. The Holman Field hangars are unique in Minnesota in terms of their type and scale, hence claiming statewide significance.

Published Sources

"About the Mod Center." *Field and Hangar* 2 (June 1945): 11.

"Airport Bomber Modification Center to be Unveiled, with E Award, Friday." *Saint Paul Dispatch*, November 23, 1944.

"B-24s Tailored to Fight." *Field and Hangar* 2 (June 1945): 4-10.

"Big Hangars' Maintenance Here Costly." *Saint Paul Pioneer Press*, September 12, 1945.

"Center Closes with Brilliant Record." *Field and Hangar* 2 (September 1945): 1, 4-7.

Hanrahan, Frank J. "Glued-Laminated Lumber Construction." *Mechanical Engineering* 65 (December 1943): 905-913.

Horner, A. B., Jr. "The AAF Representative Says." *Field and Hangar* 2 (June 1945): 2, and 2 (August 1945): 2.

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Verbal Boundary Description: The boundary extends easterly from the northwest corner of the north hangar 496.85 feet to the northeast corner of the north hangar then southerly 351.9 feet to the southeast corner of the south hangar then westerly 498.03 feet to the southwest corner of the south hangar then northerly 352.13 feet to the starting point.

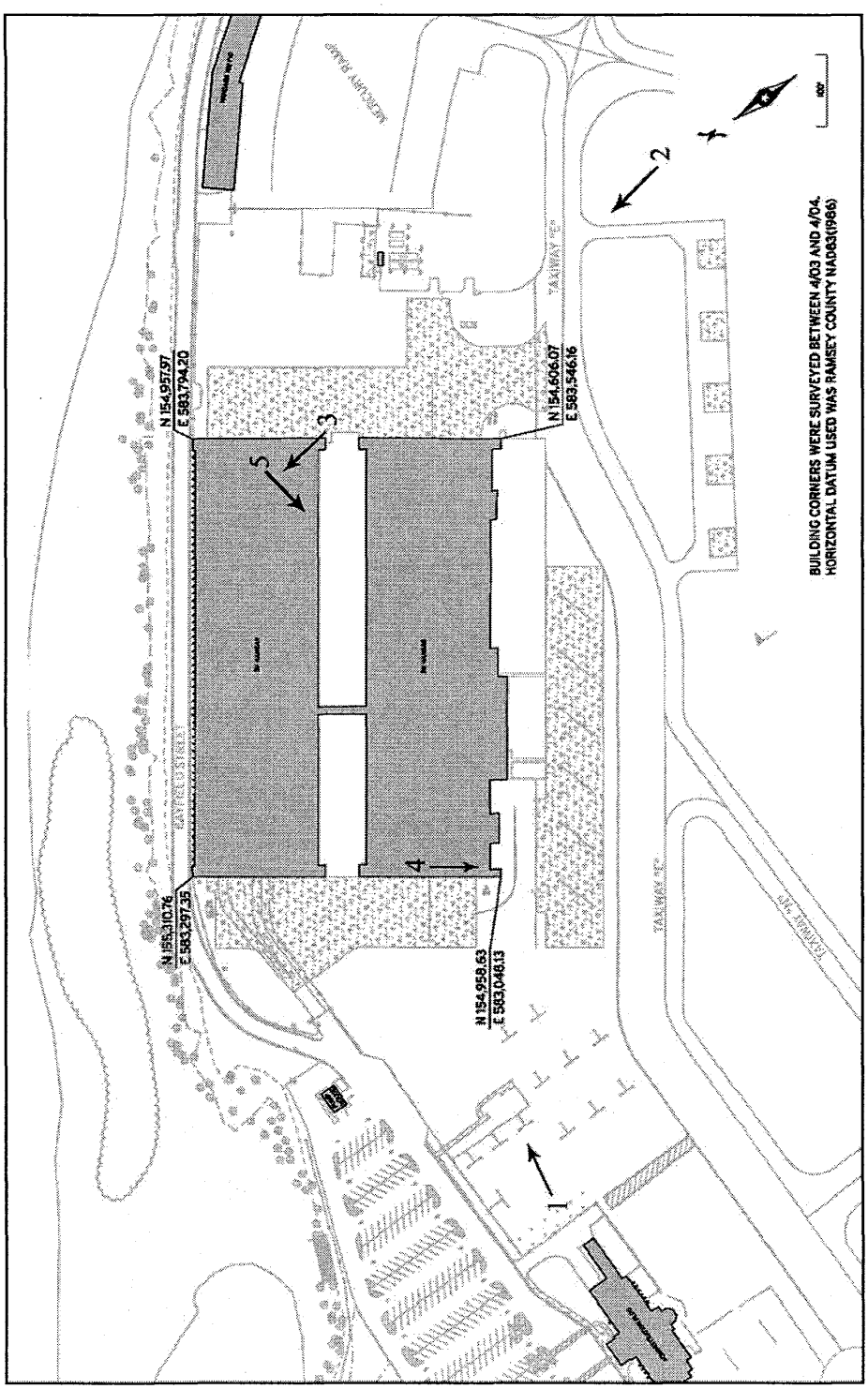
Boundary Justification: The boundary contains the two hangars and the enclosed link that connects the buildings.

Index to Photographs

Photographer: Elizabeth A. Gales
Date: May 14, 2007

Negatives: Hess, Roise and Company, Minneapolis

1. North facade. View to southeast.
2. South and west facades. View to north.
3. Interior of north hangar. View to north.
4. Hangar arches and ceiling. View to southwest.
5. Detail of arch and buttress. View to west.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E 583,546.16
N 155,310.76
E 583,297.35
N 154,958.63
E 583,046.13
BUILDING CORNERS WERE SURVEYED BETWEEN 4/03 AND 4/04.
HORIZONTAL DATUM USED WAS RAMSEY COUNTY NAD83(1986)
1
2
3
4
5
TAXIWAY 'C'
TAXIWAY 'E'