National Park Service
U.S. Department of the Interior

Wolf Trap National Park for the Performing Arts
Virginia

Filene Center
HISTORIC STRUCTURE REPORT



100% Draft, August 2017



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HISTORIC STRUCTURE REPORT

The Filene Center

Wolf Trap National Park for the Performing Arts
Vienna, Virginia

August 2017
100% Draft Report

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Chapter 1: Executive Summary

Statement of Purpose and Project Goals

The purpose of this Historic Structure Report (HSR) is to guide the preservation, rehabilitation, and continued maintenance of the Filene Center at Wolf Trap National Park for the Performing Arts. Wolf Trap is the first and only national park dedicated to the performing arts. The park sits on land donated to the United States Government by Catherine Filene Shouse, an accomplished activist, author, and public servant who inherited a love of the arts from her parents and became a fierce advocate for the performing arts during her lifetime. A granddaughter of William Filene, who founded Filene's Department Store, Shouse began purchasing land in the 1930s to form Wolf Trap Farm, which she and her husband, Jouett Shouse, used as a weekend and summer retreat from their main home in Washington, DC. The farm became well known as the site of social and political events hosted by Catherine Filene Shouse and her husband, who had been chair of the Democratic National Committee from 1929-32. In order to protect her farm from development pressure, Shouse donated land to the American Symphony Orchestra League in 1961 for use as its headquarters. In 1966, Shouse donated more land (as well as securing the donation of the ASOL land previously donated) to the National Park Service for the establishment of the nation's first national park for the performing arts. She also donated funds for the construction of an amphitheater on the grounds. Named the Filene Center after her parents, the amphitheater was completed in 1971, designed by the architectural partnership of John MacFadyen and Edward Knowles, who had previously completed a number of performing arts centers. Designed to reflect the rural character of its setting and to provide excellent acoustics, the facility was instantly hailed as a national treasure and hosted the biggest names in classical music, ballet, and other performing arts. Tragically, the Center was plagued by fire, including a major fire while it was under construction in 1971, and a second fire that completely destroyed the venue in April 1982. Strong support from the federal government, entertainers, and the general public enabled

the reconstruction of the theater in 1983-1984, and it reopened in July 1984. Over its lifetime, the Filene Center II has been well-maintained, and a number of issues related to its fast-tracked reconstruction have been addressed and solved. However, many of those systems are reaching the end of their working life, and replacement of systems such as the siding, windows and doors, etc. are anticipated in the near future. Upgrades to maintain the Filene Center's lighting, rigging, and general life safety are also needed. This HSR documents the history and chronology of change to the building in order to understand its evolution and the decision-making processes that led to changes in the past; describes and evaluates existing conditions, including architectural, structural, and building systems; and presents a treatment philosophy and recommendations to ensure that future work preserves the character-defining features of the site and building. The HSR is largely confined to the building itself, with some consideration of the site as it relates to building issues. An assessment of the cultural landscape is not part of this report.

Investigation History and Methodology

The task of preserving a historic site requires a disciplined approach to analyzing historical evidence, documenting physical conditions, and anticipating the future needs of the property. This is accomplished by using a variety of investigative procedures. These include researching primary and secondary sources, performing detailed physical surveys of the structures and site, consulting with specialists in materials and construction methodology, and employing scientific technology.

Historic research was largely limited to materials provided electronically by the National Park Service and the archival collections of Wolf Trap National Park (WOTR). The project historian also viewed WOTR collections held by the National Park Service's Museum Resource Center in Landover, Maryland. Copies of materials were made at that facility and visual materials (photographs) were later scanned and provided to the HSR team. Limited additional research was undertaken to supplement these collections, which are generally comprehensive but not necessarily exhaustive.

The consultant team, including architectural, structural, and building systems, performed an on-site survey on Tuesday, February 8, 2017. Temperatures were in the 60s-70s Fahrenheit that day, with sunny skies. Survey was largely visual, with no destructive testing. Members of the team also made subsequent site visits to continue observations. Photographs were taken and have been used to supplement the narrative where appropriate.

The recommendations in this report are based on documentary evidence and visual observations collected to date. The research process is not concluded with the completion of this report. Rather, it will be supplemented in the future by further information

gathered through additional investigation, and by subsequent documents and information as they are discovered.

Project Team Members

The National Park Service contracted with a team of professionals to complete the HSR. The team consists of:

Alpha Corporation, Dulles, VA, serving as prime consultant and providing structural assessment.

Quinn Evans Architects (QEA), Washington, DC, serving as team leader for the preparation of the HSR, and providing historic documentation, architectural evaluation, and architectural drawings.

Summer Consultants, McLean, Virginia, providing mechanical, electrical, and plumbing services.

Report Organization

The Historic Structure Report is organized as follows:

Chapter 1: Executive Summary
Presents the statement of purpose and project goals, project team members, investigation methodology, report organization, and a summary of findings.

Chapter 2: Administrative Data
Provides background information including locational data, related studies, and cultural resource data.

Chapter 3: Developmental History
Presents and analyzes the site chronology as derived from historical and physical investigations, including site history, summary chronology, preliminary evaluation of significance, list of character-defining features, and historic images.

Chapter 4: Condition and Systems
Presents, analyzes, and evaluates the existing site features and drainage, exterior envelope, interior finishes, structural systems, and mechanical, electrical, and plumbing systems.

Chapter 5: Analysis
Presents the philosophical approach to treatment that guides the treatment recommendations, and provides a code analysis.

Chapter 6: Treatment Recommendations
Presents recommendations for the appropriate treatment and use of the building, including treatment recommendations for the site, exterior envelope, interior finishes, structural systems, and mechanical, electrical, and plumbing systems.

References
Provides a bibliography of sources used in the preparation of this report.

Summary of Findings

Statement of Significance
The Filene Center has not previously been evaluated for historic significance. While this HSR does not provide a formal evaluation of eligibility, a preliminary discussion of potential eligibility is provided in Chapter 3. This discussion concludes that the Filene Center is potentially eligible for the National Register of Historic Places under Criterion A for its significance as a nationally celebrated performing arts venue. It is also potentially eligible under Criterion B for its association with potentially significant person Catherine Filene Shouse, as the place most closely associated with her contributions to American history. Further evaluation is needed to determine the Filene Center's potential eligibility under Criterion C and determine if it meets the conditions for Criteria Consideration G.

Existing Conditions
The Filene Center is generally in very good condition. Structural and other issues related to its construction in 1983-84 have been mostly corrected and the NPS maintains the facility to a high degree of integrity, including periodic upgrades to the theatrical support systems. Some areas exhibit weathering and deterioration related to exposure.

Treatment Recommendations
As the Filene Center is in good overall condition, there are few major architectural or structural issues to address. Most can be taken care of during regular, cyclical maintenance. The National Park Service has hired a consultant to study and prepare drawings and specifications for the replacement of the siding.

Chapter 2: Administrative Data

Locational Data

The Filene Center at Wolf Trap National Park for the Performing Arts is located approximately three miles north of downtown Vienna, Virginia and approximately fifteen miles west of Washington DC. The Filene Center is located on Trap Road, just off the Dulles Access Road/Dulles Toll Road (Hwy 267). It lies south and west of Virginia Route 7. The amphitheater is situated on the east side of Trap Road, in a natural bowl west of Wolftrap Creek which gives the property its name. Event parking for the Filene Center is located northwest of the amphitheater although there is also a small staff parking lot to the east of the stagehouse. The site complex consists of a number of other buildings and structures dedicated to and in support of the performing arts.

Proposed Treatment

The proposed treatment approach for the Filene Center is rehabilitation. There are no major changes anticipated to the function and use of the Filene Center. It is expected to remain as a performing arts facility. Recommendations for the building are generally limited to changes to improve its structural and building systems and maintain its general condition.

Related Studies

There is little published documentation on the Filene Center aside from park publications and contemporary newspaper reports.

There is no document that evaluates the Filene Center's historic significance.

Cultural Resource Data

The Filene Center is not listed in the National Register of Historic Places and has not been formally evaluated for eligibility at this time.

Fairfax County includes the Filene Center on its Inventory of Historic Sites (updated March 2017) but does not indicate any historic designation beyond this listing. The Virginia Cultural Resource Information System (VCRIS) lists Wolf Trap Farm in its database (DHR ID 029-0159) with an associated construction year of 1770. The Filene Center and modern Wolf Trap National Park for the Performing Arts do not appear to be listed in the VCRIS database.

Recommendations for Documentation

The Filene Center and Wolf Trap National Park for the Performing Arts should be evaluated for National Register of Historic Places eligibility through the preparation of a full Determination of Eligibility. Preparation of a Cultural Landscape Report for the entire site is also recommended.

Chapter 3: Developmental History

Introduction

The Filene Center at Wolf Trap National Park for the Performing Arts was constructed in 1983-1984 to replace the original 1971 Center that burned in 1982. The Filene Center was constructed as an outdoor performing arts venue to serve as the centerpiece for what was then called Wolf Trap Farm Park, the first and only national park devoted to the performing arts. Since its 1984 reconstruction, the Filene Center has addressed a number of structural and architectural issues related to its fast-tracked construction and to maintain its reputation as a first-class performing arts facility. In general, the changes made to the Center since 1984 have been complementary to the character of the building.

Historic Background and Context

Catherine Filene Shouse and Wolf Trap Farm

The Filene Center at Wolf Trap National Park for the Performing Arts was the creation of Catherine Filene Shouse, a talented and hard-working woman who was also a strong patron of the arts. Shouse was born in 1896, the daughter of Abraham Lincoln Filene and Therese Weill Filene. Her grandfather was William Filene, who in 1881 founded the Filene's Sons and Co. in Boston, Massachusetts. The flagship Filene's Department Store opened in 1912 in Boston, but the company had a number of stores throughout New England and New York. Catherine's uncle, Edward Filene, opened the bargain annex "Filene's Basement." Catherine's father and uncle inherited the business upon William's death in 1901.[1] In addition to his business interests, Lincoln Filene was a social reformer and patron of the arts; he supported women's suffrage and was part of the group who founded the Boston Symphony Orchestra. Catherine's

1 Filene's Department Store was acquired by the May Department Stores Company, parent of Macy's in 1988 and the stores were converted to Macy's in 2006. Filene's Basement was sold to Syms in 2009; that entity went into bankruptcy in 2011 and the last stores closed in 2011. Filene's Basement remains alive as an online retailer.

mother, Therese Weill, was also a patron of the arts, founding the Boston Music School for Underprivileged Children.

Catherine's early interests lay in vocational education for women. As an undergraduate at Wheaton College in the mid 1910s, she organized the first Intercollegiate Vocational Conference for Women, an event that continued into the 1950s, and founded the college's first Vocational Bureau to assist alumnae in finding employment. Her work at Wheaton earned her a position as the assistant to the chief of the Women's Division of the United States Employment Service of the Department of Labor, and in 1920 she published her original work, *Careers for Women*. Catherine was among the first women appointed to the Executive Committee of the National Democratic Committee, representing Massachusetts, in 1920 when the NDC granted women full voting membership following the passage of the 19th amendment. She also served on the board of directors of the National Democratic Women's Club in the early 1920s. When the Harvard Graduate School of Education opened in 1920, she transferred there from Radcliffe College, and was the first woman to earn a Master of Education degree from the institution, in 1923. She was the first woman to chair the board of the Federal Prison for Women (1926), where she instituted job-training and rehabilitation programs. In 1929, she founded the Institute of Women's Professional Relations to provide opportunities for women with graduate degrees. In her later life, she would accomplish many other firsts and earn a number of honors, including the Presidential Medal of Freedom and Dame Commander of the Order of the British Empire.

Catherine Filene married economist Alvin Dodd in 1921, and they had a daughter, Joan, before they divorced in 1929. The following year, 1930, Catherine Filene Dodd purchased 53 acres of land in rural Fairfax County, Virginia, located along Wolftrap Creek, an area that had been farmed for over 200 years. Wolftrap Creek, a tributary of Difficult Run, had reportedly been named for the numerous wolves that ran wild in the area until trappers were paid bounties to capture them in the 1700s. It was known by that name since at least 1739, when it appeared in a survey by J. M. Warner. During the 18th and 19th centuries, the land at Wolf Trap was frequently exchanged between wealthy families in the Fairfax area, including Bryan Fairfax, the 8th Lord Fairfax of Cameron and longtime friend of George Washington.[2] While the "old manor house" burned during the Civil War, a number of early to mid 19th century buildings remained on the farm when it was purchased by Catherine Filene Dodd, including a "tenant house" circa early 1800s in which the family lived when they first came to the farm and a number of outbuildings. The tenant house was described as "small and very old, painted

2 Stuntz, Connie and Mayo. *This Was Vienna, Virginia: Facts and Photos.* N.p.: n.p., 1987 (via Wikipedia).

white with fine old whitewashed outside chimneys and set off effectively by planting."[3]

Catherine named her farm Wolf Trap Farm after the creek, and she was joined there in 1932 by her second husband, Jouett Shouse. Born in 1879 in Kentucky, Jouett Shouse was also involved in politics, having served as a US Representative from Kentucky in 1915-1919 and as Assistant Secretary of the Treasury in the Woodrow Wilson administration, 1919-1920. Shouse chaired the Democratic National Committee from 1929 until 1932, when differences of opinion with newly elected President Franklin Roosevelt and his New Deal policies led Shouse to resign and form the American Liberty League. Later in life, Jouett Shouse practiced law in Washington DC and retained many of his friendships with leading political figures. He died in Washington, DC in June 1968, at the age of 88, less than a month after ground was broken for the Filene Center.

Although the family used Wolf Trap Farm primarily as a weekend and summer retreat, it was important to the Shouses that it remain a working farm. The family grew crops like corn, wheat, alfalfa and oats, and raised chickens, ducks, turkeys, and milk cows to supply them and their family and friends (they expanded the distribution of their farm products as part of the war effort during World War II). The Shouses also bred Thoroughbred horses and several different dog breeds. The family added a number of buildings to the Wolf Trap Farm including a stable, a hay barn, and a guest house.[4]

While Wolf Trap farm was nominally a retreat, it also served as an alternate social and political gathering space for the family and their Washington connections. Before, during and after World War II, the Shouses frequently held Sunday barbecues and "mint julep parties" on the farm. Sometimes these were simple gatherings, but often they also overlapped with the Shouses' charitable or political activities. In the summer of 1942, the Shouses held a "Have Fun Carnival" to benefit the occupational research and guidance activities of the Institute of Professional Women's Relations (founded by Catherine Shouse). Because many arrived by bus due to wartime shortages of fuel and tires, the Shouses sent hay wagons to bring the guests

3 Georgiana Washington, "Current Notes from Washington," *The Cincinnati Enquirer*, July 8, 1934, 52.

4 Wolf Trap National Park for the Performing Arts, "History," http://www.wolftrap.org/about/history.aspx; Wolf Trap National Park for the Performing Arts, "Founder," http://www.wolftrap.org/about/history/founder.aspx; Wolf Trap National Park for the Performing Arts. *Wolf Trap Interpretive Program Archives*. Wolf Trap National Park for the Performing Arts. Vienna, VA: n.p., n.d; Earl Arnett, "Catherine Filene Shouse Realizes Dreams of Wolf Trap Farm Park," *The Baltimore Sun,* June 26, 1972, 15; Marlene Cimons, "It's Fun to Be First at Things," *The Los Angeles Times*, January 31, 1975, 67-72.

the remainder of the way. In the summer of 1944 the Shouses entertained members of the British delegation to the Dumbarton Oaks Conference, and during World War II the farm often hosted officers on leave, including Generals George C. Marshall and Omar Bradley. By the late 1940s and 1950s, these parties included a staple Kentucky dish, "burgoo," a meat and vegetable stew which Mrs. Shouse cooked outdoors in large stew pots over a fire trench. One of these, held in 1949, honored the new Attorney General, J. Howard McGrath, and guests included Truman administration officials and Supreme Court Chief Justice Fred Vinson.[5]

Music was an important part of these gatherings, whether it involved singing spirituals by candlelight or dances on the dance platform the family had built. Catherine Shouse was already a patron of the arts by the 1930s; she was organizing candlelight concerts in Washington DC to raise money for National Symphony Orchestra musicians in the late 1930s and early 1940s and she was elected to the board of the National Symphony Orchestra Association in 1949, later serving as vice president. By the 1950s and 1960s, she was a well-known arts advocate; she chaired the President's Music Committee's Person-to-Person program from 1957 to 1963 and organized the first International Jazz Festival in 1962.

By 1956, Shouse had acquired additional land around her original farm, expanding her holdings to 168 acres, which still functioned as a working farm.[6] Development from the Washington DC metro area was beginning to encroach, and in 1958 President Dwight Eisenhower designated a site about fifteen miles west of Wolf Trap for the new Dulles International Airport (the completed airport, with its main terminal designed by Eero Saarinen, was dedicated in 1962). Given the development pressures, and the added traffic along the nearby road between Washington and Dulles, Mrs. Shouse was interested in

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5 "Shouse Entertainment," *The Minneapolis Star*, June 28, 1933, 10; *1994 Interview, Catherine Filene Shouse.* Wolf Trap Archives, Wolf Trap National Park for the Performing Arts. Wolf Trap National Park for the Performing Arts, "History," http://www.wolftrap.org/about/history.aspx; Wolf Trap National Park for the Performing Arts, "Founder," http://www.wolftrap.org/about/history/founder.aspx; Wolf Trap National Park for the Performing Arts. *Wolf Trap Interpretive Program Archives*. Wolf Trap National Park for the Performing Arts. Vienna, VA: n.p., n.d; "Hay Wagons are Means of Transportation at Have-Fun Carnival on Wolf Trap Farm," *The Tennessean (*Nashville), June 21, 1942, 41. At a similar event in 1946, President Truman lent his horseshoes for the occasion (*The Courier-Journal* (Louisville, KY), May 19, 1946, 24). Malvina Stephenson, "New Dealer McGrath Feted by Jouett Shouse," *The Start Press* (Muncie, Indiana), October 2, 1949, 23; Fred Othman, "Political Burgoo," *The Pittsburgh Press*, October 19, 1956, 19.

6 Wolf Trap National Park for the Performing Arts, "History," http://www.wolftrap.org/about/history.aspx; Wolf

preserving the character of her rural farm.[7] In 1961, as a way to both ensure the preservation of the farm and support her arts interests, she donated 40 acres of land to the American Symphony Orchestra League to serve as its headquarters and as "an international center for more than 1200 symphony orchestras in the United States and Canada." The plans for the land, to be known as Symphony Hill, included an administration building, library facilities, a small experimental auditorium, a conference center, a "Symphony Inn," and a "Great Hall," all to be designed by architect Edward Durrell Stone. A committee, named the The Friends of the American Symphony Orchestra League, would raise the expected $1 million for the buildings and equipment.[8]

Several years later, Catherine Filene Shouse contacted the National Park Service. She was interested in donating a large portion of her Wolf Trap Farm to create a park dedicated to the performing arts. It is unclear why, after donating land to the American Symphony Orchestra League, she wanted to donate adjoining land to the National Park Service rather than expanding her donation to the ASOL. It is possible that the ASOL did not need the land or did not have the funds or structure to carry out her vision. However, the proposed donation was predicated on the transfer of the land she previously donated to the ASOL to the new park.

Wolf Trap Farm Park and the first Filene Center

In June 1966, Senator A. Willis Robinson, D-Va, introduced a bill in Congress to establish Wolf Trap Farm Park. The Senate Interior Committee and then the full Senate approved the new unit later in June.[9] In July, the House Subcommittee on National Parks and Recreation approved the proposed Wolf Trap Farm Park, but consideration by the full House Interior Committee was delayed by that body's full schedule.[10] After some debate on the House floor, the bill was approved by the full House and on October 15, 1966, President Lyndon Johnson signed Public Law 89-671, establishing Wolf Trap Farm Park as a "park for the performing arts and related educational programs, and for recreational uses in connection therewith."[11] Wolf

7 Wolf Trap National Park General Management Plan, Historical Overview, 1997, 7. Provided by Wolf Trap National Park.

8 "40 Acres Near Capital Donated for Site of World Music Center," *The Philadelphia Enquirer*, June 23, 1961, 29; "Music Group Seeks Funds for Building," *Courier-Post* (Camden, New Jersey), April 30, 1962, 3.

9 "Fairfax Park Act Advanced by Robertson," *The Progress-Index* (Petersburg, Va), June 5, 1966, 17; "Land Donation Wins Approval by Senate Unit," *The Progress-Index* (Petersburg, Va), June 29, 1966, 18. The latter article cited the acreage as 62 acres donated by Mrs. Shouse and 32 by the American Symphony Orchestra League.

10 "Airlines Strike Reminds Tuck of Labor Dispute He Had Faced," *The Danville* (Virginia) *Register*, July 24, 1966, 16.

11 George B. Hartzog, Director, National Park Service, to John Yarem-

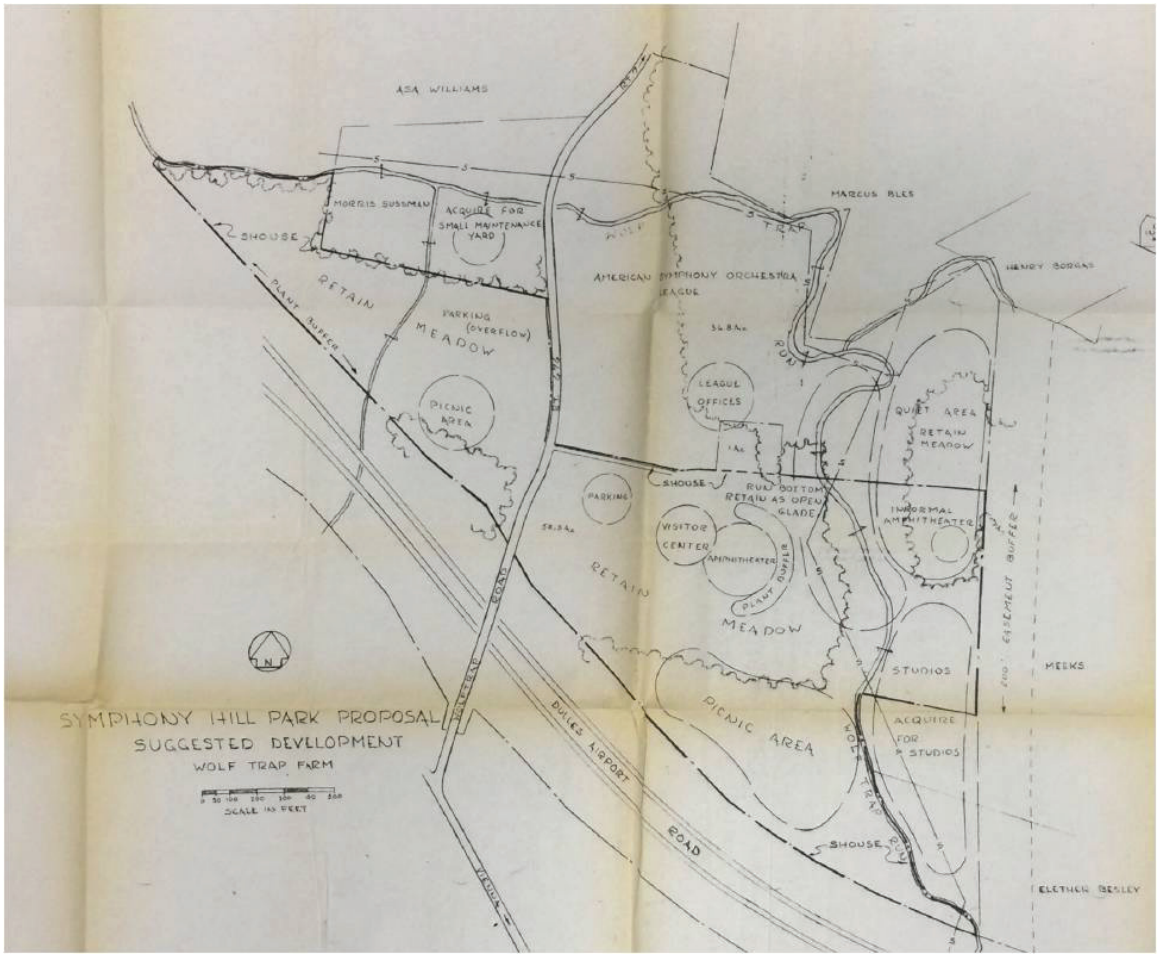


Figure 3-1: Suggested development of "Symphony Hill" at Wolf Trap Farm, dated May 1965, drawing by the National Park Service (source: Museum Resource Center, Filene Center Files, Folder "Acquisition & Disposal of Lands"). At this time, the establishment of Wolf Trap Farm Park was not official, but the existence of drawings by the NPS suggest it was under serious consideration.

Trap Farm Park was a unique and experimental creation, the first and only national park dedicated to the performing arts, although traditional recreation uses were also envisioned for the surrounding rural landscape.

Under the terms of the agreement, Catherine Shouse donated 59 acres of land and the cost of a 3,500 seat amphitheater, estimated to be about $1.75 million, while the American Symphony Orchestra League donated the adjoining 37 acres on Symphony Hill previously transferred to them by Mrs. Shouse (figure 3-1). The park size was limited to not more than 145

chuk, Acting Director of Planning, Fairfax County, VA, letter dated March 23, 1967, in the Museum Resource Center, Filene Center files, "Acquisition and Disposal of Lands." For further details on the legislative process, see Barry Mackintosh, *Wolf Trap Farm Park: An Administrative History* (Washington, DC: National Park Service History Division, 1983), 7-11.

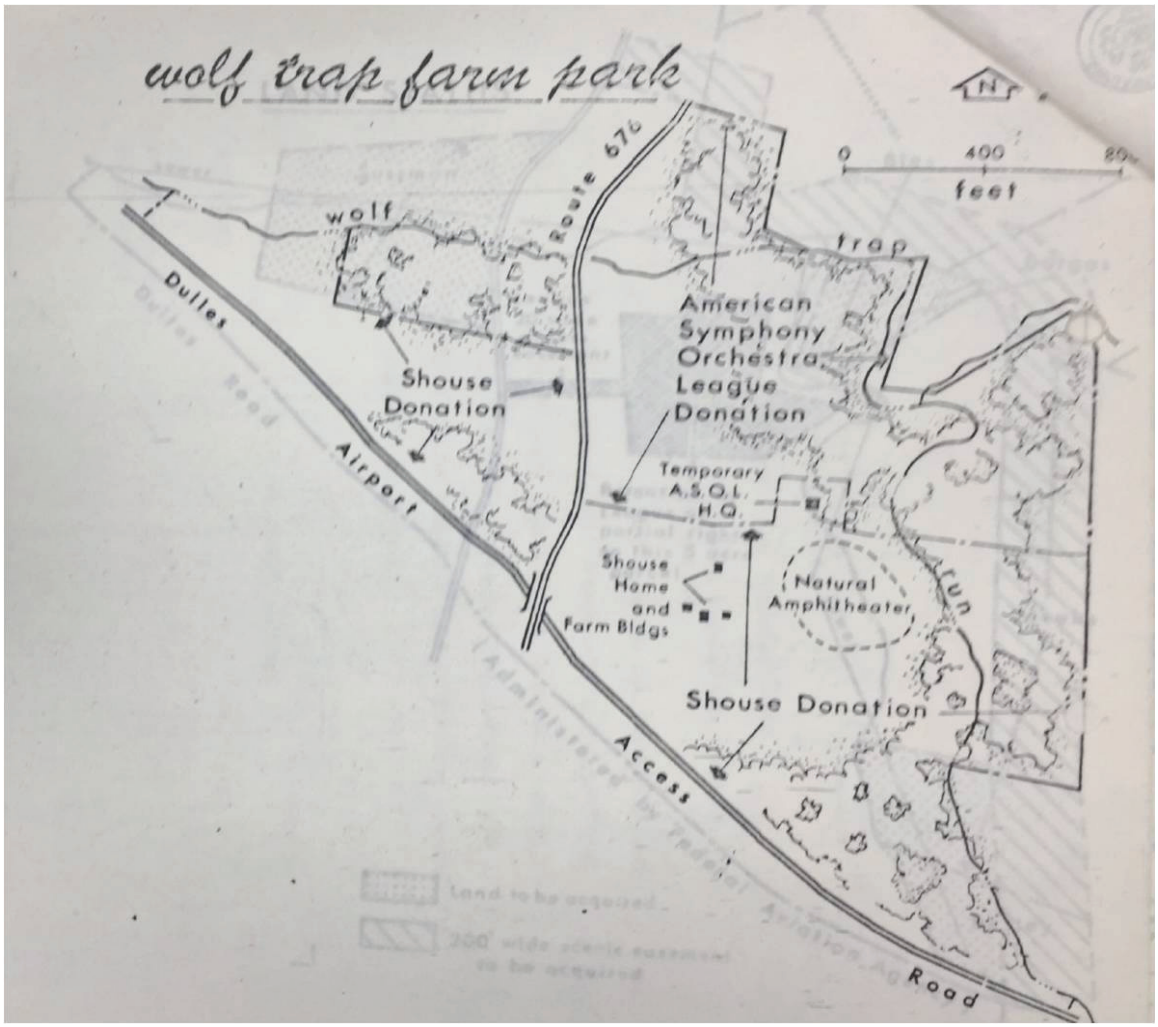


Figure 3-2: Image showing land donated by Catherine Filene Shouse and the American Symphony Orchestra League and the proposed location of the amphitheater (source: attached to a letter from John Yaremchuk, Acting Director of Planning, Fairfax County, VA to Stuart Udall, Secretary of the Interior, dated January 10, 1967, in the Museum Resource Center, Filene Center files, "Acquisition and Disposal of Lands").

acres. The federal government acquired an additional 21 acres of land and 12 acres of scenic easement through donations and purchase at a cost of $71,000. The total acreage of the park was then just over 117 in fee and 12 in easement, a total of about 130 acres.[12] The cost of developing the park was estimated at this time to be about $500,000, to be paid by donated funds. An unusual element of the plan was that the National Park Service would provide a visitor center, parking, picnic areas, and a water system, and be responsible for physical maintenance of the park, while the non-profit Wolf Trap Foundation (founded concurrently with Mrs. Shouse's donation) would run the programs. The transfer of land included the existing buildings,

12 Mackintosh, *Administrative History*, 40-41.



Figure 3-3: Circa late 1960s site aerial (detail), prior to construction (source: Museum Resource Center, Filene Center Files, Folder "Copies of Site Plans and Photos of Wolf Trap Farm (Vintage)").

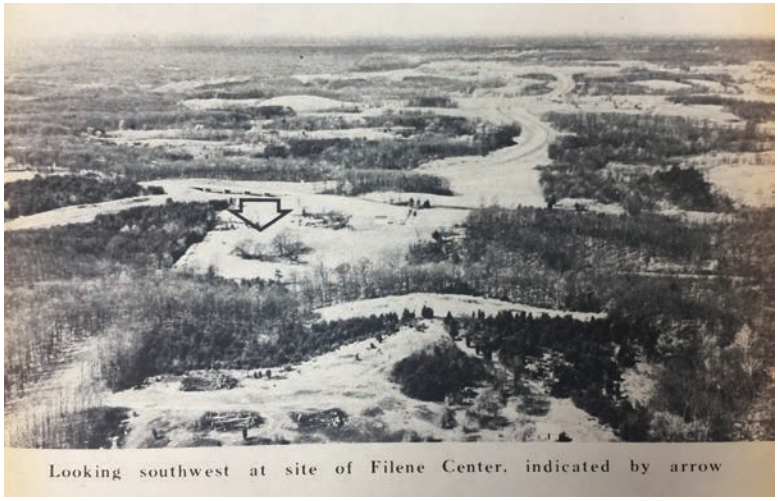


Figure 3-4: Circa late 1960s site oblique view, prior to construction (source: Museum Resource Center, Filene Center Files, Folder "Copies of Site Plans and Photos of Wolf Trap Farm (Vintage)").

including the Shouse home and farm buildings, which appeared from contemporary maps to be on the parcel donated by Shouse (figure 3-2). Most of these have since been removed.

As the centerpiece of the new park, Catherine Shouse envisioned a large amphitheater for public performances. The property contained a natural, grassy bowl that the NPS considered the perfect spot to locate the amphitheater. Mrs. Shouse donated over $2 million for the construction of the amphitheater, which she planned to name the Filene Center after her parents.

The architect chosen to design the Filene Center was the partnership of Edward F. Knowles and John F. MacFadyen of New York City.[13] Knowles, a native of New York City, graduated from the Pratt Institute in Brooklyn with a Bachelor of Architecture degree in 1951 and interned under Abraham Geller, Philip Johnson, Mies van der Rohe, and Edward Larrabee Barnes before going into private practice. Knowles is perhaps best known for his design, with Gerhard Kallmann and Noel McKinnell, of the Brutalist Boston City Hall, which won a design competition in 1962. Prior to designing the Filene Center, he had also completed several other theater commissions, including the LePerc space at the Brooklyn Academy of Music, The Chelsea Theatre in New York and the Newhouse Pavilion at the Manhattan School of Music, also with MacFadyen.[14] MacFadyen, a native of Duluth, MN, earned both undergraduate and graduate degrees in architecture from Princeton University and worked for New York firm Harrison and Abramowitz before opening a private practice. MacFadyen was particularly known for his performing arts centers which, aside from the Filene Center, included the Saratoga Center for the Performing Arts in Saratoga Springs, NY and the Mann Music Center in Philadelphia.[15] The partnership had a strong background in performing arts spaces, with their combined work including the LePerc space at the Brooklyn Academy of Music, the Chelsea Theatre in New York, the Newhouse Pavilion at the Manhattan School of Music, the Saratoga Center for the Performing Arts in Saratoga Springs, NY, and the Mann Music Center in Philadelphia. It was the Saratoga Center that Mrs. Shouse reportedly admired and prompted her to suggest the team for the Filene Center.[16]

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13 Shouse had solicited plans from several (unnamed) local architectural firms and Vermont architect/landscape architect Dan Kiley and NPS director George Hartzog commissioned plans from the Washington Service Center before Shouse ultimately chose MacFadyen and Knowles; Mackintosh, *Administrative History*, 13-14.

14 Muriel Emanuel, ed. *Contemporary Architects* (London, UK: The MacMillan Press, 1980), 431-432.

15 "John MacFadyen, 76, Architect of Performing Arts Center," (obituary) *The New York Times*, February 26, 2000.

16 Mackintosh, *Administrative History*, 14.

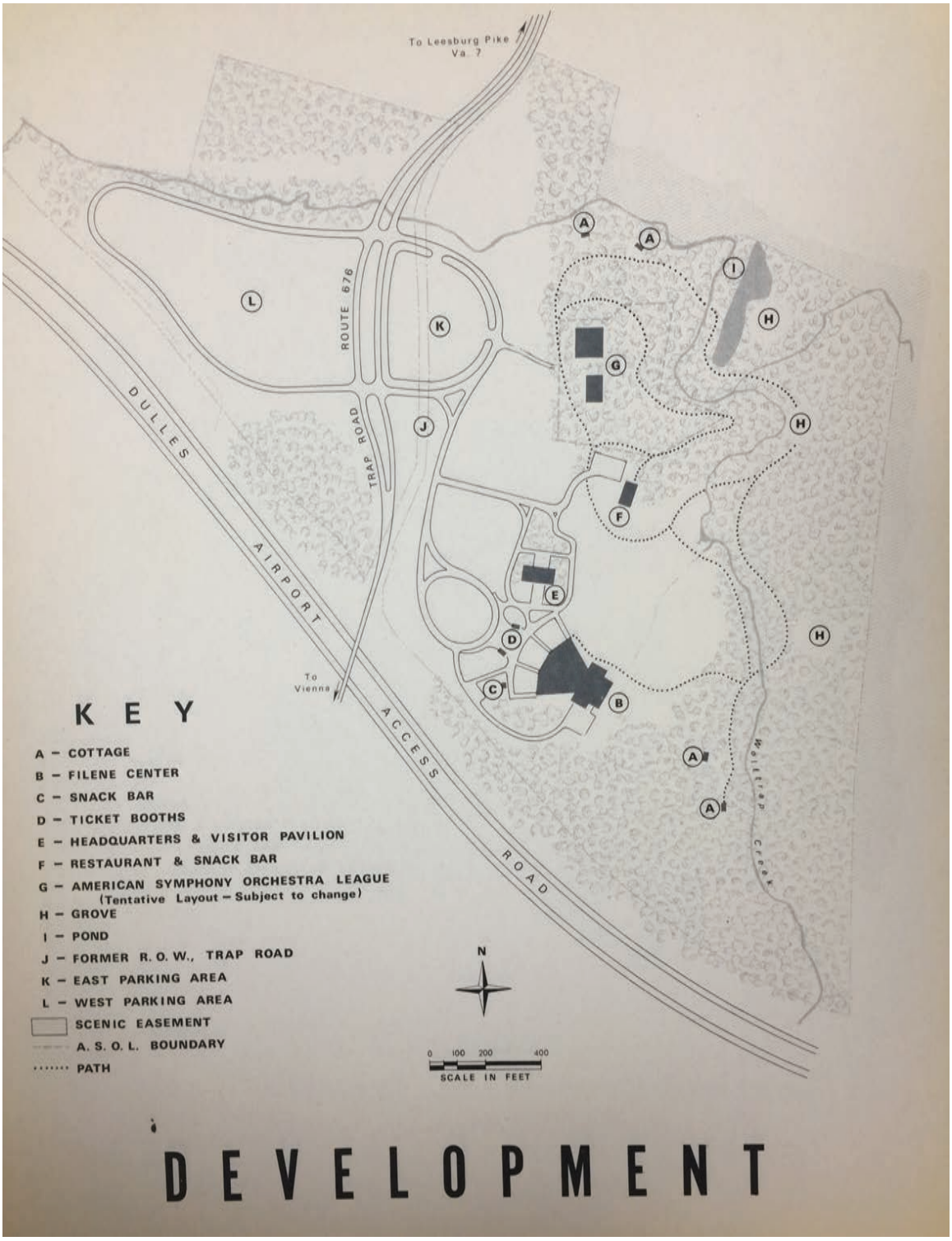


Figure 3-5: Undated development plan, circa late 1960s (?)(source: Museum Resource Center, Filene Center Files, Folder "Copies of Site Plans and Photos of Wolf Trap Farm (Vintage)").

Interestingly, MacFadyen and Knowles rejected the natural amphitheater previously identified by the NPS as the ideal location for the building, instead opting to place it to the south, closer to the highway (figure 3-5). Mrs. Shouse agreed with them, noting that the new location was “down the hill below the old chicken house, which leaves the greater part of the open field from the crest of the hill to Wolf Trap Run open for public use.” The NPS objected to the new location, citing traffic noise, but the architects believed noise could be alleviated through the construction of a buffer wall or berm. Mrs. Shouse, who was paying for a large portion of the facility, carried her wishes on the location.[17]

Despite the disagreement over location, MacFadyen and Knowles’ design for the Filene Center was widely acclaimed. The design was unique, both for its sensitivity to its setting and for the care taken to enhance the audience’s visual and auditory experience (figures 3-6 to 3-10). In keeping with the minimalist architectural approach then still dominant in the profession, the team kept their design basic both to lessen its impact on the surrounding countryside and to provide a clean visual and acoustic quality. The orchestra floor followed the natural slope of the ground and the placement of the structure and stage allowed patrons on the grass beyond to have the same experience as those in seats or boxes. MacFadyen and Knowles harmonized the “disparate parts” of the design by using Oregon red cedar for the structural beams of the roof trusses and as sheathing for

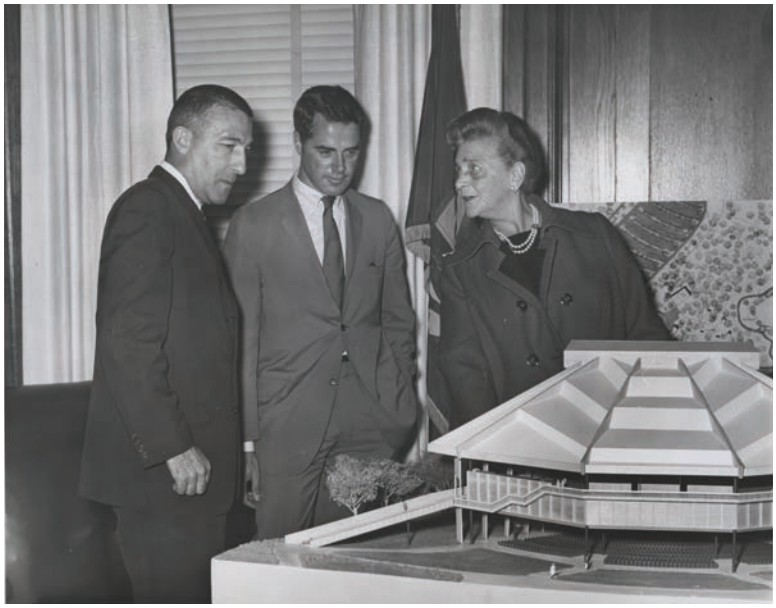


Figure 3-6: Stewart Udall, Secretary of the Interior (left), architect Edward Knowles (center) and Catherine Filene Shouse view a model of the Filene Center, ca. 1968 (source: Museum Resource Center, MRC NCRO S01 B117 Wolf Trap National Park).

17 Mackintosh, *Administrative History,* 14-17.

the steel and concrete structure of the rest of the building. The choice of cedar, which was expected to weather to a silver grey, also complemented the natural site and the acoustical design, which used angled “fins” at the side walls to reflect sound back to the amphitheater while still permitting views to the outside. Other members of the design and construction team included associate Alfredo DeVido, structural engineers Lev Zetlin and Associates, mechanical engineer Peter Flack, acoustical consultant Paul Veneklasen, landscape architects Clarke and Rapuno, and stage consultants Robert Brannigan Associates.



Figure 3-7: Model of the proposed Filene Center, dated May 1969, photo by Louis Checkman (source: Museum Resource Center, NCRO S01 B117 Wolf Trap National Park).

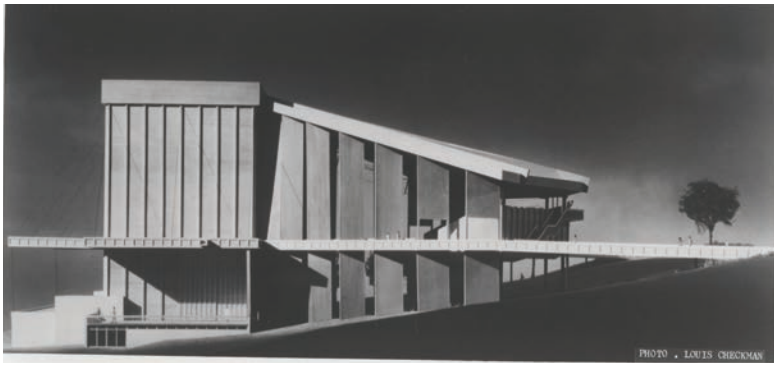


Figure 3-8: Model of the proposed Filene Center, dated May 1969, photo by Louis Checkman (source: Museum Resource Center, NCRO S01 B117 Wolf Trap National Park).

A ground-breaking was held in May 1968, with First Lady “Lady Bird” Johnson holding the shovel.[18] However, this was largely ceremonial, as the construction contract had not yet been awarded. An initial bidding process in the summer of 1969 far exceeded the funds available for construction, and

18 Mrs. Johnson Digs in for Arts Center,” *The Baltimore Sun*, May 23, 1968, 3.



Figure 3-9: Model of the proposed Filene Center, dated May 1969, photo by Louis Checkman (source: Museum Resource Center, NCRO S01 B117 Wolf Trap National Park).

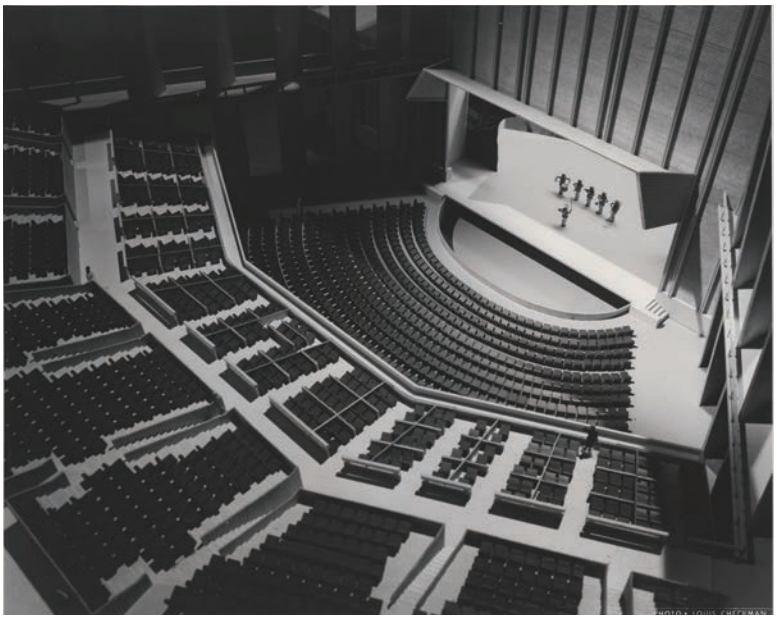


Figure 3-10: Model of the proposed Filene Center, dated May 1969, photo by Louis Checkman (source: Museum Resource Center, NCRO S01 B117 Wolf Trap National Park).

the architects set to cutting “extras” from the contract. These included elimination of glass panels between the acoustical fins and the fire protection system. While the plan was to add the latter in later on a separate contract, this decision would have tragic consequences.[19] Bidding on the revised plans took place in early 1969, with four bids received, ranging from a low bid of $1,983,093 to a high of $2,453,737. The low bid was rejected because the bidder failed to list the subcontractors for structural

19 Mackintosh, *Administrative History*, 23-24.



Figure 3-11: Wolf Trap Farm field prior to Filene Center construction, March 3, 1968 (source: Museum Resource Center, MRC NCRO B117 F1969-71).

steel and building electrical as required in the bid documents. The second lowest bidder, Norair Engineering Corp, Washington DC, was awarded the contract at a cost of $2,207,800.[20] Construction began on July 1, 1969.[21]

On May 27, 1970, the "topping out" ceremony was held, this time with First Lady Patricia Nixon officiating (figure 3-14). Nixon (who had just been appointed honorary chair of the Wolf Trap Foundation) blew a gold whistle to signal the hoisting of a Virginia pine tree onto the roof. The ceremony was based on a German tradition that winds whistling through the branches of a tree will bring good luck. Also present at the ceremony were Dr. Joseph C. Palamountain, president of Skidmore College, Secretary of the Interior Walter J. Hickel, Representative John P. Saylor (R-PA), and Catherine Filene Shouse. Palamountain was on the education committee of the Saratoga Performing Arts Center, which was noted as "somewhat similar" to the Filene Center, and Shouse and her sister, Helen Filene Ladd, were instrumental in the funding of the Therese Filene music building on Skidmore's campus (named for their mother).[22] By

20 Statement and Certificate of Award, National Park Service, dated February 19, 1969, provided by Wolf Trap National Park. The statement noted that the invitation to bid had been circulated to 126 dealers and public notices. Other bidders were E. Jay Smith Construction Co, McLean, VA, Sherman Construction Corp, McLean, VA, and Coe Construction Co, Washington, DC.

21 "Filene Center I Fire, Police Report," report and related correspondence in the Wolf Trap National Park Files at the Museum Resource Center.

22 "Skidmore President Honored," *The Troy Record* (Troy, NY), May



Figure 3-12: Beginning of site work, dated April 1, 1969 (source: Museum Resource Center, MRC NCRO B117 F1969-71).



Figure 3-13: September 11, 1969: A concert by pianist Lorin Hollander took place during the construction of the Filene Center to help fund the Wolf Trap Foundation. It appears that the work at this point encompassed the foundation and utilities (source: Museum Resource Center, NCRO B117 F1969-71).

October of 1970, the fourth beam of the building had been raised into place. Throughout the process, Mrs. Shouse continued her active participation in design decisions. For example, the

27, 1970, 38; "Pat Hoists Tree to Mark Roofing," *The News Journal* (Wilmington, DE), May 28, 1970, 34.



Figure 3-14: Catherine Filene Shouse speaks at the topping out ceremony, with Patricia Nixon in the center, dated May 27, 1970 (source: Museum Resource Center, NCRO B117 F1969-71).

architects advised the contractor to paint the steel black. When Mrs. Shouse objected, the color was changed, at some cost. She similarly requested a number of other design changes, often resulting in change orders that increased construction costs.[23]



Figure 3-15: An unidentified man speaks in front of the Filene Center under construction, dated June 30, 1970 (source: Museum Resource Center, NCRO B116 F002).

On March 13, 1971, as construction was nearing completion, a fire broke out at the construction site, causing $650,000 in damage (figures 3-16 and 3-17). The fire, which was later attributed to arson, started on the ground level near the stage and concentrated in the auditorium and stage area, with damage estimates ranging up to $650,000. Of particular concern were the support beams, which were feared to have been weakened by the fire. Firefighters had a difficult time battling the blaze, which happened during the night, because water plugs had not yet been hooked into the main water lines at the site.[24]

Despite fears that the fire would delay the opening of the center, Mrs. Shouse rallied volunteers and fundraisers to ensure that the damage would be fixed, although the architect and contractors feared that the work quality might suffer as a result. In May, the New York Philharmonic gave a benefit concert at Constitution Hall to assist in repair costs from the fire. Insurance covered the basic damages, but the benefit assisted with overtime costs to

23 Mackintosh, *Administrative History*, 25-28. Aside from the painting, Mackintosh does not specify what these changes were.

24 "Fire Levels Unfinished Performing Arts Center," *The Daily Press* (Newport News, VA), March 14, 1971, 4.



Figure 3-16: Aftermath of the fire, March 13, 1971 (source: Museum Resource Center, NCRO B117F1969-71)



Figure 3-17: Aftermath of the fire, March 13, 1971 (source: Museum Resource Center, NCRO B117F1969-71).

ensure opening the structure without delay due to the fire.[25] The Foundation went forward with plans for the Filene Center's first season. While Wolf Trap would not have a resident orchestra,

25 Undated Filene Center Chronology, ca. 1973, provided by Wolf Trap National Park; Donald Sanders, "Park for the Arts Puts Music in the Vienna (Va.) Woods," *The Baltimore Sun*, June 27, 1971, 75.

the Foundation planned to offer a variety of events during its opening season, from pianist Van Cliburn to the Joffrey Ballet to the New York City Opera and various orchestras. The 33rd National Folk Festival featuring pop, blues, and jazz was scheduled at the Center for August 1971.[26]



Figure 3-18: Mrs. Shouse on the lawn in front of the Filene Center, June 28, 1971 (source: Museum Resource Center: NCRO B117 F1971-75).

In late June newspapers across the country covered the impending opening of the Filene Center. The cost of the facility had risen from the original $2 million donated by Mrs. Shouse to $3 million, with the remainder covered by donations she helped to raise through the Wolf Trap Foundation. Shouse was widely seen as the "patroness" of the endeavor. The amphitheater was described extensively in articles; most noted the construction of Oregon Cedar, which would be allowed to weather with age, and the size, with seats for 3,500 in the pavilion and 3,000 more accommodated on the grass. Other elements mentioned were the side panels, open to the outside, the "seven towering acoustical baffles" on each side, and the 10 story stage house.[27] The stage was noted as half the size of a city, and the curtain was specially woven of handspun mohair in Swaziland from a design by Jack Lenor Larsen, with stripes of orange, brown, and blue – "about the only colorful touch to the structure."[28]

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26 Raymond Ericson, "Va. Cultural Center Nearing Completion," *The Baltimore Sun*, April 11, 1971, 117.

27 The vertical elements designated as "baffles" here go by a number of different names such as fins. "Fins" is the term preferred by the Park staff and is used throughout this document except in direct quotes.

28 Norman Nadel, "New Center Opens," *El Paso Herald-Post*, June

On July 1, 1971 the Filene Center officially opened on schedule with an inaugural concert by the National Symphony Orchestra with pianist Van Cliburn, bass-baritone Norman Triegle, and 200 singers from the Washington area. Guests at the concert included First Lady Patricia Nixon, First Lady Consuelo Gonzales de Velasco of Peru, the Peruvian Ambassador and his wife, Secretary of the Interior Rogers C.B. Morton, and Governor and Mrs. Linwood Holton of Virginia. The evening started with a Marine Band prelude. Following the intermission, Catherine Filene Shouse was awarded a surprise honorary doctor of law degree from American University, and was given a standing ovation. While it rained during the performance, Mrs. Shouse considered this a sign of good luck.[29]

The Filene Center opened to widespread acclaim and garnered a great deal of praise in its first months. Washington area residents flocked to the venue and newspaper critics "praised it for its physical beauty, the excellent acoustics of the auditorium, and for the high quality of entertainment." The venue was also noted as convenient to Dulles Airport. In addition to its new status as a national showcase for the arts, Wolf Trap was also seen as "a place where new talent is developed" through its summer workshops for high school and college students in music, ballet, and theater. Although it regularly attracted top national and international performers, the park was reported as a "place without pretensions where the American Arts are

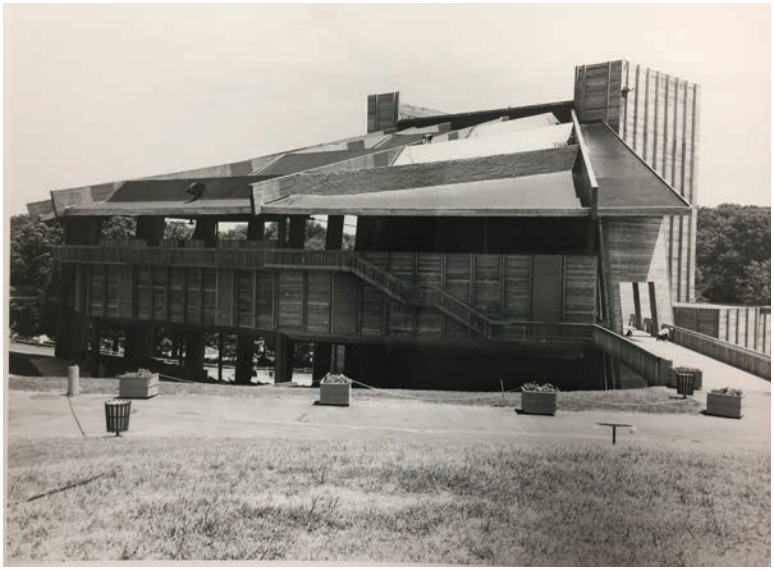


Figure 3-19: The Filene Center, shortly after opening, July 14, 1971 (source: Museum Resource Center: NCRO B117 F1971-75).

19, 1971, 22; Donald Sanders, "Park for the Arts Puts Music in the Vienna (Va.) Woods," *The Baltimore Sun*, June 27, 1971, 75.

29 "First Ladies Attend Inaugural Park Concert," *The Bee* (Danville, Va), July 2, 1971, 11; "Pat Nixon Attends First Cultural Park Concert, "*The Des Moines Register*, July 2, 1971, 24.

accessible to all of the American people," and had the "potential to bring the people to the arts" rather than "bringing the arts to the people…a subtle but important difference." The center's managers were particularly surprised by the enthusiastic turnout for ballet programs.[30]

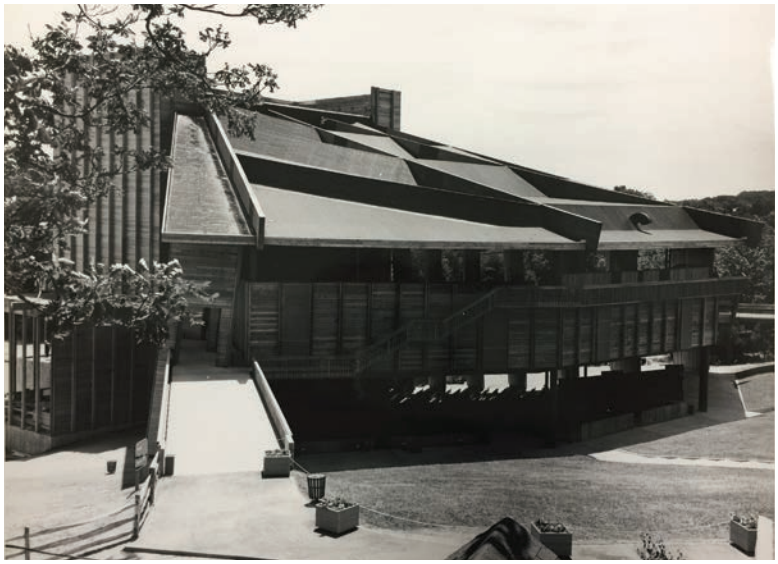


Figure 3-20: The Filene Center shortly after opening, July 14, 1971 (source: Museum Resource Center: NCRO B117 F1971-75).



Figure 3-21: Side view of the Filene Center, ca. 1971. This is outside the official lawn area, where the music could be heard but the stage would not be visible (source: Museum Resource Center: NCRO B117 F1971-75).

30 "First National Park for Performing Arts," *St. Louis Post-Dispatch*, July 18, 1971, 28; Gail Stockholm,"Wolf Trap May Bring People to the Arts," *The Cincinnati Enquirer*, August 1, 1971, 117.



Figure 3-22: View from the booth, ca. 1971 (source: Museum Resource Center: NCRO B116 F001).

Several hundred thousand people attended performances at the Filene Center throughout the 1971 season, and figures in the following ten years hovered around half a million people per season.[31] In addition to its popularity, the facility was also widely praised for its setting, design, acoustics, and general character. In 1972, the project was among the Craftsmanship Award Winners of the Washington Building Congress, including Norair Engineering Associates (Carpentry) and Walter Truland Corporation (Electrical).[32] In November 1975, the *Architectural Record* featured the Filene Center in an article on design for recreation, noting that "giving lighthearted buildings and structures a contextual "fit" can be fun." The article featured structures that "fit into their surroundings (and limitations), and… express exuberance." The section on the Filene Center was headed "A 'bare-bones' pavilion lets the natural landscape help in a musical success,' and focused on how the center integrated with its natural site.

31 One source claimed as many as 380,000 people but official NPS visitation figures for 1971 were 282,200. Official NPS Visitation for Wolf Trap National Park for the Performing Arts, reported at https://irma.nps.gov/Stats/SSRSReports/Park%20Specific%20Reports/Annual%20Park%20Recreation%20Visitation%20(1904%20-%20Last%20Calendar%20Year)?Park=WOTR%22,%22https://irma.nps.gov/Stats/SSRSReports/Park%20Specific%20Reports/Annual%20Park%20Recreation%20Visitation%20(1904%20-%20Last%20Calendar%20Year)?Park=WOTR. The 380,000 figure came from "Wolf Trap Park Seeks Funding," *The Baltimore Sun*, February 22, 1972, 16.

32 http://www.wbcnet.org/craftsmanship-awards/current-and-past-winners/1972-craftsmanship-awards-winners/



Figure 3-23: View up to the booth, ca. 1971 (source: Museum Resource Center: NCRO B117 F1971-75).

> …(T)he architects reduced the structure to a functional minimum to lessen its visual impact on the countryside…little more than basic elements have been built to project sound from the stage in an ideal manner to such a large audience. And with the exception of those thousand seats in the balcony, the audience sits on the natural slope of the ground. This allows half the patrons to sit on the lawn outside the shelter – while maintaining good visual contact with the performance. Even those within the enclosure look directly into the woods on both sides of the stage.
>
> To achieve their goals, the architects, together with acoustical consultant Paul Veneklasen, examined the minimum physical requirements of each building element that would produce the desired characteristics of sound. In keeping with the philosophy of providing only that which is needed, the architectural result is described by Knowles as a profusion of disparate parts. These are united by the single material of red cedar, which is used structurally in the roof (a system utilizing 154-foot-long composite "queen post" trusses) and as sheathing for the steel and concrete construction of the rest of the building. Wood was chosen both for its ability to complement the natural site and its acoustical qualities.[33]

33 "Design for Recreation," *Architectural Record*, November 1975, 117-132. Other structures in the piece included the Castine (Maine) Yacht Club, the park facilities at Cherry Creek Reservoir near Denver, Steppingstone Park, Great Neck, Long Island, Manhattan Square Park in Rochester, New York, the gatehouse at St. Alban's School Tennis Club in Washington, DC, and the tennis pavilion at

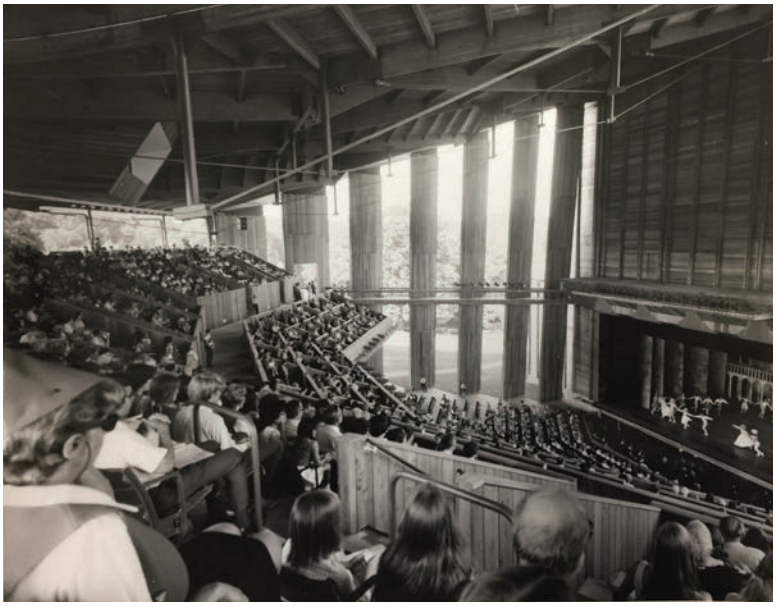


Figure 3-24: Side view from the interior, ca. 1971 (source: Museum Resource Center: NCRO B116 F001).

Nearly ten years after its completion, the design still garnered admiration. In 1980, the book *Contemporary Architects*, edited by Muriel Emanuel, noted that, apart from Boston City Hall, Knowles' commission for the Filene Center had received the most publicity, and that the design "deserves its fame. Sheathed in red cedar for minimal environmental impact and maximum acoustical efficiency, the structure is set in a natural, grassy amphitheatre, so that both those inside the building and those out on its front lawn all sit on the natural slope of the ground with a clear view of the performers." The Filene Center was the image used to illustrate Knowles' work in the book.[34]



Figure 3-25: View from stage, ca. 1971 (source: Museum Resource Center: NCRO B116 F001).

Despite the praise for the Filene Center's design and program, there were still a number of issues to deal with in the years following its opening. Cuts related to funding, the accelerated schedule following the fire, and alleged design flaws resulted in three significant issues. The first was water seepage, particularly into the green room and the dimmer room. The architects blamed the contractors, but the NPS ultimately found the design to be at fault and the two negotiated a compensation agreement at the end of 1972. In 1974 the Overly Manufacturing Company covered the roof with aluminum, but when this did not correct the problems; it was only when the stage house roof was replaced, drains installed, and the open back porches enclosed that the leakage was corrected. The structural analysis conducted to determine the cause of the leakage also revealed that the

Woodhill Country Club, Wayzata, Minnesota.

34 Muriel Emanuel, ed. *Contemporary Architects* (London, UK: The MacMillan Press, 1980), 431-432.



Figure 3-26: Detail of stage/proscenium, ca. 1971 (source: Museum Resource Center: NCRO B116 F001).

balcony seating area was structurally inadequate, and reinforcing cables were added to prevent the king posts from kicking out.[35]

The second significant issue was related to birds. The open-sided auditorium and roof structure invited birds to roost over the seating and in the stage house. Although a number of sound deterrent systems were tested, ultimately the roosting was only partially addressed when the roosting sites were sealed and wires installed on top of the cables the birds were perching on.[36]

The third significant issue was traffic noise. The NPS had objected to the Center's placement so close to the road, but was overruled by the architects and Mrs. Shouse. Indeed, when the Filene Center opened, road noise was an issue. The architects had proposed the construction of an earthen berm to deflect sound, but this was not carried out at the time. Some vegetation was planted, but it did not block much of the sound. The architects also proposed the construction of an administration building between the amphitheater and the road, but this also never came to fruition. At one point, Mrs. Shouse advocated for reducing the speed limit on the highway to 25 miles per hour, but even her considerable political influence could not achieve this. It remained an ongoing issue into the early 1980s, particularly as there were plans for a toll road to be built alongside the airport access road.[37]

35 Mackintosh, *Administrative History*, 28-29; see also Overly Architectural Sheet Metal Division, drawings approved March 1, 1974, provided by Wolf Trap National Park.

36 Mackintosh, *Administrative History*, 30.

37 Mackintosh, *Administrative History,* 30-31. "Temporary" access



Figure 3-27: Detail of boxes, ca. 1971 (source: Museum Resource Center: NCRO B116 F001).

While the Park Service had to deal with construction-related problems, it was also tasked with expanding the facilities to accommodate the crowds being drawn to the venue. The inaugural season had brought in over a quarter of a million visitors and $1 million in gate revenue.[38] To accommodate these numbers and to implement the vision of Wolf Trap Farm Park, the $600,000 budget ceiling originally proposed was grossly inadequate. With the Department of the Interior working through the Office of Management and Budget and Mrs. Shouse working behind the scenes with her political contacts, various budgets were proposed up to over $9.5 million, before Congress passed a new ceiling of nearly $5.5 million in April 1972.[39] The funds would go toward expanding the facilities at Wolf Trap, including light and sound control, weather and fire protection, an orchestra shell, and a projection booth. The Park also wanted to improve parking and sidewalks leading to the center, build an additional amphitheater for simultaneous performances and a visitor center with an auditorium for rehearsals or smaller productions, and expand the concession and picnic facilities. Over the following years, many of these improvements were implemented, including a cottage for composers (1973, burned 1979), a children's Theatre-in-the-Woods (1974, burned 1976 and rebuilt 1977), the Wolf Trapper's Shelter (1977), and a maintenance complex (1980).[40]

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ramps were built linking the Dulles Access Highway to Trap Road just prior to the Filene Center's opening in July 1971. These were open only for a short period of time around scheduled performances and were barricaded at all other times.

38 "Wolf Trap Park Seeks Funding," *The Baltimore Sun*, February 22, 1972, 16.

39 Mackintosh, *Administrative History*, 41-45.

40 Earl Arnett, "Catherine Filene Shouse Realizes Dreams of Wolf



Figure 3-28: Aerial view of the Filene Center, July or August 1971 (source: Museum Resource Center: WOTR RMRC S03 Aerials July or August 1971).

Despite the difficulties experienced in the early years, Wolf Trap was seen as a success by the general public. In 1975, Mrs. Shouse expressed her pleasure at the success of Wolf Trap: "It's far greater than what I had hoped for in such a short period of time…" adding that she did not miss having the land for her personal use because she "loved seeing it used and enjoyed."[41] An article the following year recounting the celebrations held at Wolf Trap for Mrs. Shouse's 80th birthday noted that Wolf Trap Farm Park had been one of the most successful of the country's outdoor theaters.[42] Mrs. Shouse had many ideas for expanding the facilities. Park Service administration and funding could not always accommodate these ideas, and she occasionally took her own initiative. In 1982, she opened a year-round performing arts complex in two 18th century barns on a tract of land she owned about a mile from the main complex at Wolf Trap. The larger German barn housed about 350 people while the smaller English barn was for rehearsals, workshops, and seminars.[43] These are still known as "The Barns at Wolf Trap" but are owned and operated by the Wolf Trap Foundation, and are not part of the national park.

Trap Farm Park," *The Baltimore Sun,* June 26, 1972, 15; Wolf Trap: A New, Unique Institution," *The Progress Bulletin* (Pomona, CA), January 3, 1976, 17; Mackintosh, *Administrative History*, 82-85.

41 Marlene Cimons, "It's Fun to Be First at Things," *The Los Angeles Times*, January 31, 1975, 67-72.

42 "Ford Pays Tribute to Jouett Shouse," *The Santa Cruz Sentinel* (California), June 6, 1976, 6.

43 "Wolf Trap Opens Arts Complex for Winter Use," *The Daily Press* (Newport News, VA), January 6, 1982, 30.



Figure 3-29: Aerial view of the Filene Center, July or August 1971 (source: Museum Resource Center: WOTR RMRC S03 Aerials July or August 1971).

Work continued at the Filene Center in the later 1970s and early 1980s. The balcony reinforcement mentioned above took place in 1977, and a property record in that year noted that work undertaken between 1971 and 1975 included the installation of a light control booth and the previously mentioned aluminum covering of the roof.[44] The year 1977 also saw the addition of gutters and flashing, the raising of several concrete walls to stage level, and the insulation of exterior walls with wood plank. In 1980, overhead doors were installed to cover several ventilation openings, and in 1981 bird proofing was installed and cables at the beams were retensioned.[45] Also in 1981, plans were prepared for replacing the stage flooring. That work began in March 1982, and by early April the floor had been removed, and new wood was on site.[46]

Another project underway in early 1982 was the long-awaited fire protection system. While this had been included in the original design, it was later removed as a cost-cutting measure, with plans to install it under a separate contract. Fires were becoming

44 "Fixed Property Record," National Park Service, last dated September 9, 1977, provided by Wolf Trap National Park.

45 "Filene Center I Fire, Police Report," report and related correspondence in the Wolf Trap National Park Files at the Museum Resource Center. No further information about the location of the overhead doors or the other work was provided.

46 "Filene Center I Fire, Police Report," report and related correspondence in the Wolf Trap National Park Files at the Museum Resource Center.



Figure 3-30: Aerial view of the Filene Center, July or August 1971 (source: Museum Resource Center: WOTR RMRC S03 Aerials July or August 1971).

a common occurrence at Wolf Trap. Following the fire during construction of the Filene Center in March 1971, the Theatre-in-the-Woods was destroyed by fire in 1976 and the Composer's Cottage in 1979. In March 1980, a small fire affected the Filene Center itself. It began on the top back stage left at the 40 foot level, caused by a welding spark igniting the wooden portion of the structure. It damaged a small area of the stage left house wood, with estimated damages of about $5,000. The contractor made restitution.[47]

In January 1977, Wolf Trap Farm Park requested an allocation to install a fire protection system at the Filene Center. The request noted that the Filene Center was a high hazard area due to the large number of people working in the stage house, the number of flammable props and equipment, and the high wattage lighting fixtures in the facility. The facility was also lightly staffed in the winter, so a small fire could turn into a large conflagration before it is caught, as happened during construction. The project was approved for estimating in November of 1977, at an estimated cost of $85,000. The system would consist of an automatic sprinkler system with heads located throughout the stage house, dressing room area, and projection booths. The recommended system was a dry-charged system to prevent freezing; the recommended smoke detection system should be capable of sounding both audible and visual alarms at both the park and the

47 "Filene Center I Fire, Police Report," report and related correspondence in the Wolf Trap National Park Files at the Museum Resource Center.



Figure 3-31: An aerial view of Wolf Trap National Park, ca. 1970s (source: Wolf Trap National Park).

local fire dispatch center.[48] However, the system was not funded until fiscal year 1982, and work had only just begun on the system in early April of 1982.[49]



Figure 3-32: Patrons walk to the Filene Center from the west parking lot, ca. 1970s (source: Museum Resource Center, NCRO B116 F001).

The 1982 Fire and the Second Filene Center

On the evening of April 4, 1982, at about 9:45 pm, NPS staff at the Filene Center discovered a fire in progress at the structure. Although Fairfax County firefighters arrived six minutes after the discovery, the fire was already well underway, fed by high winds that evening. It took several hours for firefighters to bring the blaze under control, and in the interim it had sparked a number of brush fires in the adjoining woods. The destruction was complete (figures 3-33 to 3-35), to the extent that the cause could never be determined, although the origination point was eventually traced to a dimmer room below stage right.[50]

48 Wolf Trap Farm Park, "Development/Study Package Proposal: Fire Protection System for Filene Center," National Park Service, dated January 28, 1977; cost estimate dated November 27, 1977, provided by Wolf Trap National Park.

49 Mackintosh, *Administrative History*, 87.

50 "Amphitheater Destroyed by Fire at Wolf Trap Park," *Muncie Evening Press* (Indiana), April 5, 1982, 6; "Officials Say Rebuilding Wolf Trap Depends on Donations from Public," *The Town Talk* (Alexandria, Louisiana), April 6, 1982, 15; "Filene Center I Fire, Police Report," report and related correspondence in the Wolf Trap National Park Files at the Museum Resource Center.



Figure 3-33: Aftermath of the fire, April 5, 1982 (source: Museum Resource Center NCRO B117 F1982-3).



Figure 3-34: Aftermath of the fire, April 5, 1982 (source: Museum Resource Center NCRO B117 F1982-3).

The federal government did not have insurance on the Filene Center, and while the loss was estimated at $6 million, reconstructing the amphitheater was eventually estimated at over $17 million. Catherine Filene Shouse, much as she had after the 1971 fire, immediately vowed to rebuild, and the day after the fire she met with Wolf Trap Foundation staff to discuss the construction of a temporary structure to house the 1982 season events and to authorize a nation-wide fundraising drive. At the time, the cost to rebuild was not known, but the Foundation board president, Robert Gray, noted that construction



Figure 3-35: Aftermath of the fire, April 5, 1982 (source: Museum Resource Center NCRO B117 F1982-3).

costs had risen considerably since the original construction 11 years previously.[51]

The outpouring of support in the aftermath of the fire was nationwide, with support ranging from President Reagan and former Presidents Richard Nixon and Jimmy Carter down to numerous individuals. President Reagan appointed a Presidential Task Force to launch plans to rebuild the Center. Donations ranged from larger corporations to bake sales from individual loyal patrons down to school children who taped pennies and nickels to support letters written in crayon. The United States Postal Service issued a commemorative stamp honoring the Filene Center and gave the fundraising campaign its own zip code to speed the donations. Internationally-famous artists such as Bob Hope and Elizabeth Taylor donated their time and talents for benefit performances.[52]

In May 1982 a fundraiser was held on WETA-TV, one of Washington, DC's public television stations, to benefit the rebuilding fund. The station needed to secure a special waiver as Federal Communication Commission rules prohibited televising auctions or telethons benefitting organizations other than the station itself. While there was some debate on the precedent set in granting the waiver, it was eventually granted; the commissioner championing the waiver called Wolf Trap "one of

51 Michael Wise, "The Show Will Go On at Wolf Trap," *The Anniston Star* (Alabama), April 6, 1982, 21.

52 "The People's Park for the Performing Arts," history of the fire and rebuilding efforts provided by Wolf Trap National Park.

a kind" and "a national cultural treasure" and argued that since its programming was carried on the station, the fundraiser would benefit the station.[53]

An unusual example of aid occurred for Wolf Trap in April 1982; of the 17 companies bidding for the contract to demolish the structure, the Wrecking Corp of America offered to not only do the work for free, but to pledge $1,001 to help rebuild the theater. National Park Service contract administrator Helen Staten expressed her shock at the offer, noting that "I've never seen anything like this…this is the first time in my experience where a contractor is actually paying the government to get work."[54]



Figure 3-36: The Filene Center site after demolition, July 1, 1982 (source: Museum Resource Center: NCRO B117 F1982-3).

Despite fundraisers and donations, the bulk of the money to reconstruct the Filene Center would have to come from the federal government. In May 1982 the Interior Department announced a plan for a cost-sharing arrangement where the federal government would pay half the $17 million cost of rebuilding, with private donations funding the balance. The cost-sharing plan would potentially speed up construction, which would not take place until 1985 at the earliest if done entirely by the Park Service. There were some suggestions to take the opportunity to move the amphitheater further from the highway or use a different design, but that would add more time to the project. Mrs. Shouse had preferred an 80-20 arrangement, but

53 "FCC Approves Wolf Trap Telethon," *The Daily Press* (Newport News, VA), April 23, 1982.

54 "Demolition Firm Pays to Land Wolf Trap Job," *The Lansing State Journal* (Michigan), April 27, 1982, 4.

the 50-50 one was most likely to get approval. By the end of May, the Foundation had already raised nearly $1 million.[55]

In June, the season at Wolf Trap opened as scheduled in a temporary structure built by Spring Instant Structures in the Meadows area. Plans were to rebuild the center "along the original lines" with "minor refinements" in the backstage and technical areas and with fireproofing and smoke detection. An article noted that the original Filene Center was "(t)echnically…one of the most advanced amphitheaters in the world, capable of hanging 109 set units at one time," and boasting "acoustical fins stretching back through the audience that made it possible for visitors to watch the stars in the sky while they watched the stars onstage."[56]

By late July, the bill to fund reconstruction of the Filene Center was under consideration by the House Interior subcommittee. Opera star Beverly Sills testified to the subcommittee, calling Wolf Trap "one of the greatest festivals this country has ever produced" and that the site at Wolf Trap Farm Park "worked so beautifully." The chair of the subcommittee noted that the federal government bore some responsibility because of its failure to provide insurance for the structure. The proposal called for the government to provide $9 million in federal grants and a matching $9 million loan to be repaid by the Wolf Trap Foundation in five years, a plan that was supported by the Reagan administration. The proposed legislation would include authorization to insure the replacement structure.[57] The House Interior Committee approved the bill to fund the reconstruction of the Filene Center in September. In addition to the already stated provisions, the bill required the state of Virginia to protect Wolf Trap from air and noise pollution before the state was granted a right-of-way to build a toll road to either side of the existing Dulles Access Road to Dulles International Airport.[58] President Ronald Reagan signed the final bill into law in October 1982.[59]

With funding secured, the plans for reconstruction could move forward. Fairfax, Virginia, architects Dewberry and Davis were engaged to design the second Filene Center, with original architect John MacFadyen serving as a consultant. The

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55 William Kronholm, "Cost Sharing Plan Sought for Wolf Trap," *The News Journal* (Wilmington, DE), May 12, 1962, 52; "Announcement of Rebuilding of Wolf Trap Said Premature," *The Clarion Ledger* (Jackson, MS), May 31, 1982, 19.

56 "Building Anew from the Ashes," *The Philadelphia Inquirer*, June 13, 1982, 143; Anne Marie Welsh, "Wolf Trap is On its Way Back, Thanks to an Outpouring of Help," *The Baltimore Sun*, June 13, 1982, 69.

57 "Opera Star Hails Wolf Trap Aid," *The Daily News* (Newport News, VA), July 30, 1982, 38.

58 "Aid for Wolf Trap Authorized," *Daily Press* (Newport News, VA), September 16, 1982, 59.

59 "Construction Begins at Wolf Trap," *Daily Press* (Newport News, VA), December 15, 1982, 3.

rebuilding program was ambitious. The goal was to reopen in time for the 1984 summer season, and most of the decisions taken were based on schedule. Dewberry and Davis were awarded the contract in large part because they promised to meet the tight 12-week design deadline by using an early version of computer aided design (CAD), which they noted was 80 times faster than hand sketching.[60] The construction process was overseen by the Wolf Trap Foundation, as it was believed that construction would be considerably delayed (by a year or more) if the federal government was the contracting officer.

At the same time, the NPS and the Foundation took the opportunity to make a number of improvements to the original design. The new theater would have the "same basic look" as the original center, with a larger backstage space, "the latest" in sound and light technology, fire protection in the form of an automatic sprinkler system and fire-retardant siding, and accessibility modifications. The new design added 200 seats for a total of 3,700 under the roof as well as the 3000 on the lawn. Other changes included the substitution of Douglas fir for the original cedar, for its durability and because it could be treated with fire retardant, and steel beams instead of timber beams to eliminate the need for free-standing cables that attracted pigeons to the original Filene Center.[61]

Wolf Trap's House Manager recommended implementing accessibility accommodations in the new Filene Center. These included removing a section of seats from the Orchestra Seating House Right to accommodate patrons in wheelchairs, altering boxes on the transverse aisle to accommodate wheelchairs, creating a connecting ramp for the Rear Orchestra Right area, and creating accessible toilet rooms on the house right side of the theater. The House Manager also recommended installation of a listening system for hearing-impaired patrons, and expressed a wish that the Filene Center "become a model example of assembly space accessibility."[62]

Additional improvements were made to the stage floor, which had been undergoing replacement at the time of the fire. The original floor had been a "basket-weave" floor almost entirely of wood, while the new floor was set on a substructure of steel beams, followed by a concrete floor with neoprene pads resting on the concrete. The deck was then set on a wooden grid of 2x4s with a

60 "Computers Have Designs on Cutting Cost, Time," *The Morning News* (Wilmington, DE), December 19, 1983, 30.

61 "Construction Begins at Wolf Trap," *Daily Press* (Newport News, VA), December 15, 1982, 3; "Wolf Trap Wants to Raise $29 million," *The Daily News* (Newport News, VA), February 28, 1984, 3.

62 Pat Saaveedra, House Manager, memorandum to Chief, Division of Interpretation and Visitor Services, Wolf Trap Farm Park, dated November 29, 1982, in the Wolf Trap National Park files at the Museum Resource Center.

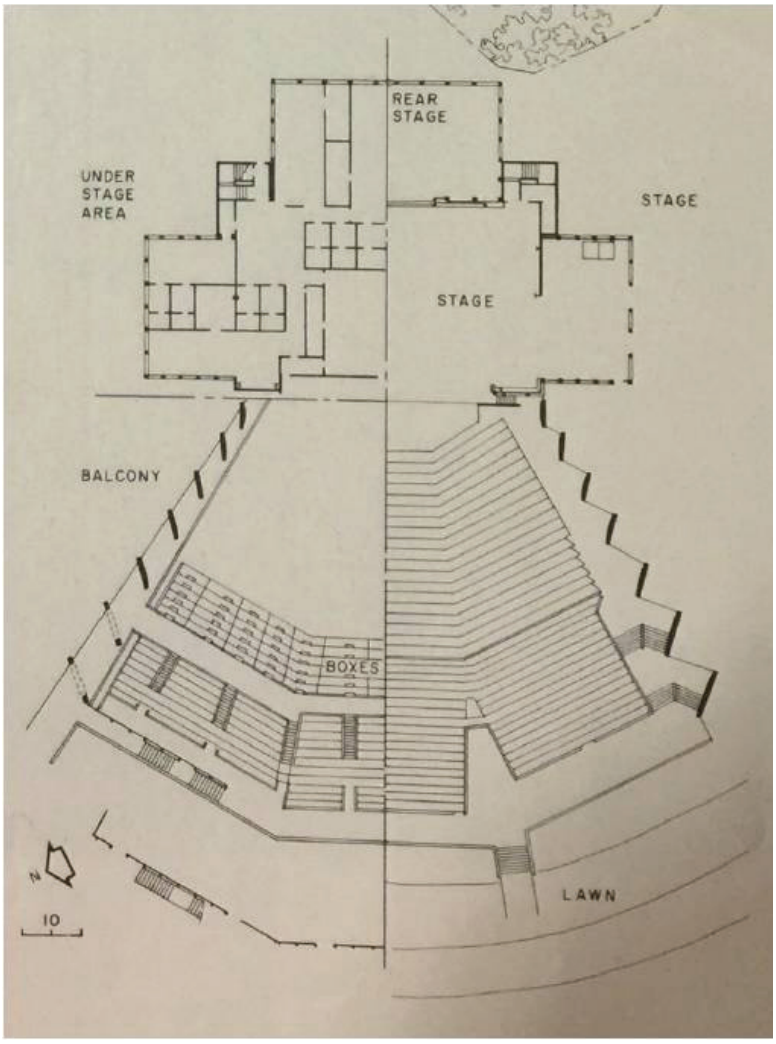


Figure 3-37: Composite plan of the original (1971) Filene Center (source: "Design for Recreation," Architectural Record*, November 1975, 124).*

2-inch thick dance floor of Douglas fir nailed to the sleepers. Both the original and new floor were "sprung" floors, which were better for dancers. Sprung floors have more "give" or flex, and absorb the shock of dancing better for a softer feel, reduced chance of injury, and an enhanced performance. A 1984 publication entitled *Space for Dance: An Architectural Design Guide* by Leslie Armstrong and Roger Morgan noted that open-air theaters often posed a number of problems for dance programs, particularly the variable temperature of the stage floor. The first Filene Center was "unusually successful" for dance and anticipated that the new floor would continue that condition.[63]

63 Leslie Armstrong and Roger Morgan, *Space for Dance: An Architectural Design Guide* (Publishing Center for Cultural Resources, 1984), 132-137.

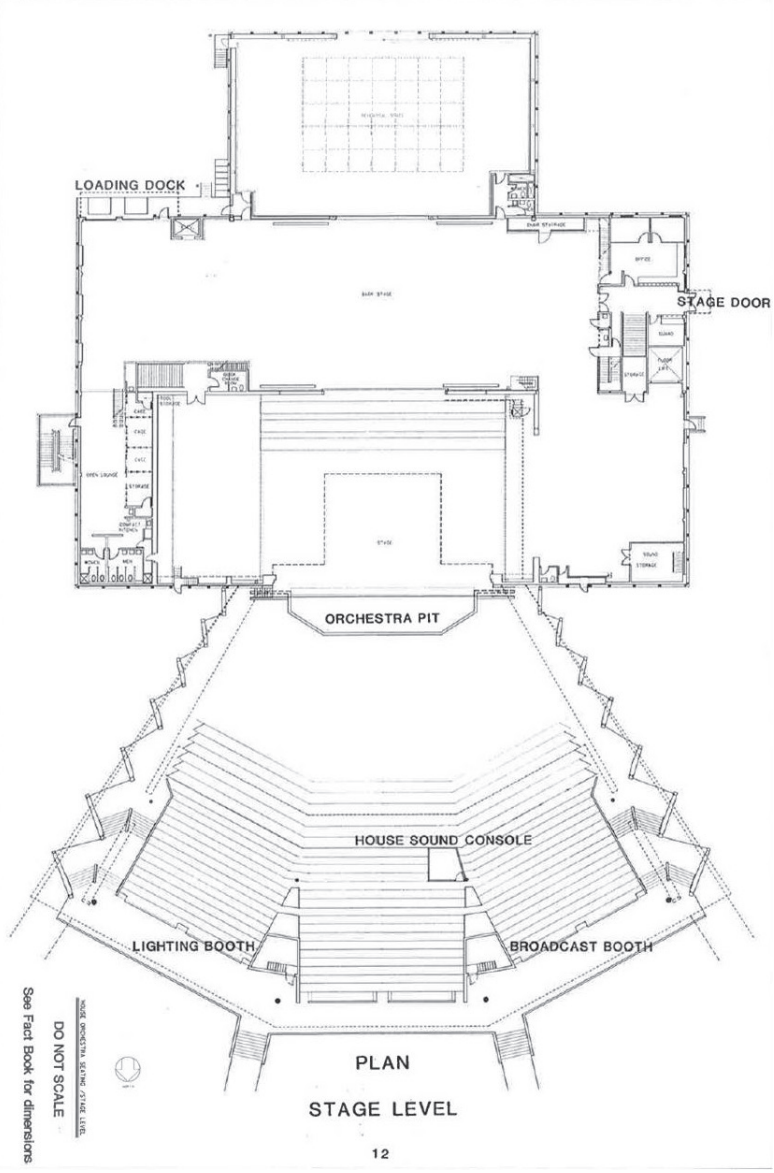


Figure 3-38: Stage level plan of the second Filene Center (1984) (source: Wolf Trap Farm Park Fact Book, May 1988, 12).

Construction on the replacement Filene Center began in December 1983, with completion expected in time for the 1984 season. Filene Center II did indeed open on July 30, 1984, with a sold-out inaugural performance by Placido Domingo, soprano Rosario Andrade, and the National Symphony Orchestra. Another improvement implemented at this time was a large wall, built to block noise from the adjacent Dulles Toll Road, which was built in 1984 to either side of the Dulles Access Road.[64]

64 Stephen Cera, "Opera Opens New Pavilion at Wolf Trap," *The Baltimore Sun*, August 1, 1984, 37. The Access Highway remained free.

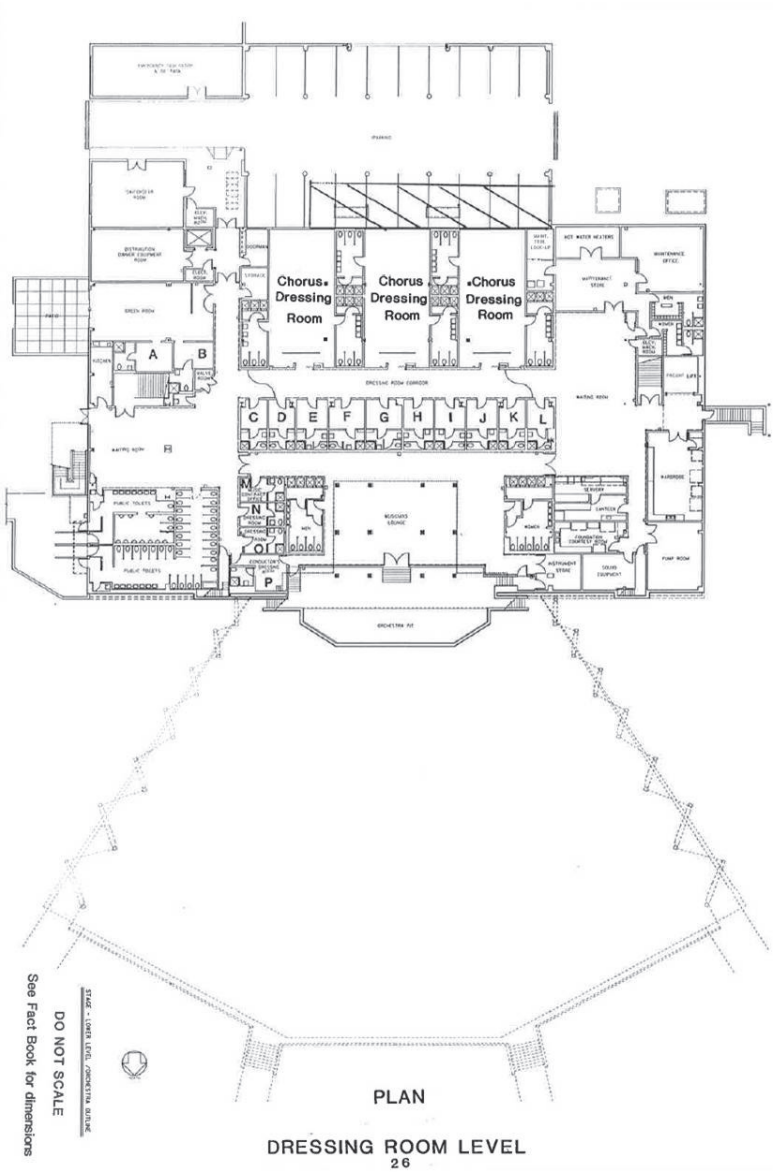


Figure 3-39: Dressing room level plan of the second Filene Center (1984) (source: Wolf Trap Farm Park Fact Book, May 1988, 12).

However, the fast-tracked design and construction process resulted in a number of mistakes being made in the design and materials, and it took a number of years (and lawsuits) for the National Park Service to correct the results of these mistakes. One major issue developed barely six months after the opening, when an eight-foot long crack was discovered in one of the steel queen beams in January 1985. Within days, a giant crane was on site to stabilize the roof while engineers studied the problem.[65] Chicago structural engineer Charles Guedelhoefer of Raths,

65 "Crack Found at Wolf Trap," *The Daily Press* (Newport News, VA), January 25, 1985, 3; "Wolf Trap Roof Beam Stabilized," *The Fort Lauderdale News* (Florida), January 26, 1985, 12.

Raths, and Johnson supervised repairs to the crack, which he attributed to a combination of sub-zero temperatures, high winds, a welding flaw, and the poor quality of the steel that left the girder brittle rather than flexible. An NPS report expressed concern that the accelerated pace of construction may have resulted in design flaws and poor workmanship. The crack caused the roof to visibly sag and a hydraulic jack was used to boost it back to its original height. Workers also tested, inspected, and upgraded welds throughout the structure. Repairs cost $1.5 million and were partially covered by the insurance company and partially by the subcontractors who did the original work. These included architects Dewberry and Davis; Globe Iron Construction, who fabricated the beam, Materials Testing Laboratories, which tested the welds, steel supplier Bethlehem Steel, and chief contractor G&C Construction of Vienna, VA. The queen beam was repaired by that May, in time for the opening of the summer season on June 11.[66]

Structural repairs recommenced in the winter of 1985-86, in the off season. These repairs included installation of high-strength tension rods at the bottom of the four main girders to reduce the loads on the girder bottom flange corner welds, resupporting the secondary box girder connections, strengthening the cross-bracing below the plate girder at the proscenium wall, epoxy injection of slab cracks induced by the beam fracture and subsequent structural movement, installation of ramp handrails, and miscellaneous building repairs. The NPS recommended additional non-destructive testing following repairs to ensure the soundness of the structure.[67]

As a result of the problems, the Wolf Trap Foundation filed a $3 million lawsuit against the architects, Dewberry and Davis, and general contractor, G&C Construction, in January 1986. The contractor maintained that they merely installed the beam received from the manufacturer and built to the architect's specifications, and had earlier filed a suit against the Foundation and architects asking the court to determine who was responsible. The Foundation's suit alleged that Dewberry and Davis specified the wrong alloy and accepted girders with small cracks in the weld, and that they "exaggerated its expertise," failed to perform "necessary and customary" calculations of stresses on the roof, failed to detect errors in the general contractor's shop drawings, and did not conduct regular site inspections. Other problems cited in the suit included inaccessible valves in the center's fire protection system and inadequate access to safety components; improper moisture

66 "Theater Beam Fixed at Cost of $1.5 million," *The Los Angeles Times*, May 27, 1985, 64; Lee Hockstader, "Filene Center Repair Gets No Guarantee," *The Washington Post*, May 24, 1985.

67 "Briefing Paper – Status Report – January 6, 1986," files in Museum Resource Center Wolf Trap National Park files.



Figure 3-40: The Filene Center, by Carol Highsmith. This photograph is dated 1980, but is clearly the rebuilt Filene Center, so it must date after 1984 (source: Library of Congress).

controls in the design, leading to leaks in the stage house, rehearsal hall, and garage; and a cracked backstage floor.[68]

In April, more deficiencies were noted in the fire protection systems, a particularly troubling development given the facility's history. These included a high rate of false alarms, the ineffectiveness of the high-ceiling area pre-action sprinkler heads (their height from the floor level would likely delay actuation and effectiveness); and the reliance on the actions of a guard to activate the water discharge system on the acoustic fins (related to the issue of false alarms). Indeed, a minor fire occurred in the duct heating system of one of the chorus dressing rooms in November 1986, but was fortunately extinguished with a hand-held extinguisher and did not cause undue damage.[69]

By late 1986, the branch chief of the Falls Church Office of the Denver Service Center noted that the "lists of problems and loose ends have shrunk to a small, manageable group," but that final acceptance could not occur while the series of lawsuits was ongoing.[70] Nevertheless, the Park Service continued

68 Grant Wills, "Wolf Trap Sues its Builders," *The Fairfax Journal*, January 1986 (copy in "Fractured Queen Beam" folder in Museum Resource Center's Wolf Trap National Park files).

69 Deputy Director, Wolf Trap Farm Park, memorandum to file, undated, copy in Museum Resource Center's Wolf Trap National Park files.

70 Branch Chief, Falls Church Office, DSC-EAF, undated memorandum to Regional Director, National Capital Region, in Museum



Figure 3-41: The Filene Center, by Carol Highsmith. This photograph is dated 1980, but is clearly the rebuilt Filene Center, so it must date after 1984 (source: Library of Congress).

to find issues over the next several years. In 1991, a study commissioned by the NPS noted that the nails used to attach the wood siding boards to the framing system were not appropriate. Maitland and Kuntz Architects recommended renailing using 8d stainless steel ring shanked nails with blunt tips, and that hand-nailing was necessary to avoid splitting the wood. The architects also recommended re-treating the siding for fire retardancy at the same time.[71]

The following year, 1992, another study evaluated ongoing leaking issues at the orchestra copper roof system. It concluded that the copper roof was "not designed or installed in a manner consistent with good roofing practice for long term maintenance performance." The copper roof was substituted during construction for the pre-formed aluminum roofing system originally specified, and the details of the installed system were not in accordance with recommended standard practice. The principal causes of the leaks were the flashings at the box beam gutters, which were of insufficient height to accommodate the gutter conditions, coping details which prevented the natural flow of drainage down the beam, and the placement and design of the roof expansion joints. In general the roof could be repaired

Resource Center Wolf Trap National Park files. The resolution of the lawsuit was not included among the documents used for this report.

71 Maitland and Kuntz Architects, "Survey Report for Filene Center II Flashing and Sealant Repairs and Siding Securement," June 4, 1991, in Museum Resource Center Wolf Trap National Park files.



Figure 3-42: The Filene Center, by Carol Highsmith. This photograph is dated 1980, but is clearly the rebuilt Filene Center, so it must date after 1984 (source: Library of Congress).

and most of the design and components would need to be replaced.[72] The copper roof repairs were completed in 1993.[73]

On December 14, 1994, Catherine Filene Shouse died in Naples, Florida (where her daughter lived), aged 98. Shouse had remained an active supporter of Wolf Trap and the Filene Center to the end of her life. She was deeply involved in the entire rebuilding process in 1983-1984, and continued her interest in the Filene Center until her death.

Since the mid 1990s, most work done on the Filene Center has been routine maintenance and replacement or upgrading of systems, all designed to maintain its status as a first class performance venue. The HVAC system was replaced in 1998-1999. Although specifications for replacement of the siding were issued in 1999, the re-siding never took place, although it has been re-nailed as recommended in 1991. In 2002, modifications were made to loading gallery, the last of the structural issues related to the grid, and the original stage floor was moved to the rehearsal hall, and a new stage floor installed. In the same year, Wolf Trap Farm Park was renamed “Wolf Trap National Park for the Performing Arts.[74]

72 Maitland and Kuntz Architects, “Wolf Trap Filene Center Copper Roof Repairs,” August 14, 1992, in Museum Resource Center Wolf Trap National Park files.

73 Wolf Trap timeline, dated 2016, provided by Wolf Trap National Park.

74 Wolf Trap timeline, dated 2016, provided by Wolf Trap National Park; Specifications for Siding and Siding Fasteners, unattributed letter to Joseph Joyce, Bell Atlantic Mobile, dated February 18, 1999, provided by Wolf Trap National Park; National Park Service, As-Built Drawings, “Loading Gallery Modifications,” dated April 2002,

In 2004, new sprinkler lines were installed at the ceiling of the orchestra, and the following year the fire alarm system was upgraded.[75]

The flooring and seating in the orchestra area were replaced in 2010, after damage to the concrete had been documented in 2007. The major earthquake that struck the Washington DC area in April 2011 caused only minor damage at the Filene Center, confined to a crack in the column in the drive-through area underneath the building, and cracking of the concrete on the exterior near the loading dock.[76] In the fall of 2011, the queen beams were inspected and found to be in good condition with isolated surface corrosion. The Dywdiag bars installed to provide additional support were in good condition, and it was noted that routine maintenance would continue to protect the system.[77] In 2012, the previous copper roof had reached the end of its useful life and it was replaced in several phases.[78] In 2014, the siding was checked for fire susceptibility, and in 2015-16 the box tier, loge flooring, stairs, and ramps were refinished.[79]

In July 2011, an article reviewing Wolf Trap's 40th anniversary noted both continuity and change for the facility. The venue still appealed to "middlebrow" entertainment, with Wolf Trap as a family oriented place where "people should feel comfortable." It continued to offer a variety of entertainment throughout the year, although ballet and opera were less popular and there were fewer "big name" performers who could reliably draw a sell-out crowd. More popular programs included non-classical events like

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provided by Wolf Trap National Park; Wolf Trap timeline, dated 2016, provided by Wolf Trap National Park; "An Act To Rename Wolf Trap Farm Park as 'Wolf Trap National Park for the Performing Arts,' and for other purposes," Public Law 107-219, 107th Congress, approved August 21, 2002. https://www.congress.gov/bill/107th-congress/house-bill/2440/text?overview=closed.

75 Photos taken by Thomas Fields, Architect, 2004-2005; copy provided by Wolf Trap National Park; Wolf Trap timeline, dated 2016, provided by Wolf Trap National Park.

76 National Park Service, Construction Drawings, "Replace Filene Center Flooring and Seating," dated July 16, 2010, provided by Wolf Trap National Park; Wolf Trap timeline, dated 2016, provided by Wolf Trap National Park; Wolf Trap timeline, dated 2016, provided by Wolf Trap National Park.

77 Wiss Janney Elstner Associates, memorandum report to Steve Hay, National Park Service, dated December 9, 2011, provided by Wolf Trap National Park.

78 Gauthier, Alvardo Associates, Construction Drawings, "Reroof Filene Center," dated April 2011, provided by Wolf Trap National Park; Wolf Trap timeline, dated 2016, provided by Wolf Trap National Park.

79 Wolf Trap timeline, dated 2016, provided by Wolf Trap National Park; National Park Service, Construction Drawings, "Refinish Filene Center Box Tier and Loge Flooring, Stairs, and Ramps," dated December 4, 2015, provided by Wolf Trap National Park.

"Disney in Concert".[80] As it approaches its 50th year, Wolf Trap National Park for the Performing Arts, and the Filene Center, remains one of the nation's premiere performing arts venues.

80 Anne Midgette, "Wolf Trap at 40: The Mission Remains. What That Means Has Changed," *The Washington Post*, July 29, 2011.

Summary Chronology

1700s-1800s Land around Wolftrap Creek, a tributary of Difficult Run, is frequently exchanged between wealthy families in the Fairfax area, including Bryan Fairfax, the 8th Lord Fairfax of Cameron and longtime friend of George Washington. The creek is named for the wolves that reportedly ran wild in the area and were trapped for bounties. The land later known as Wolf Trap Farm included an old manor house that burned during the Civil War, an early 1800s tenant house and a number of outbuildings.

1930 Catherine Filene Dodd purchases 53 acres of land on the Wolftrap Run in Vienna, Virginia as a weekend retreat and working farm. The family later builds a stable, hay barn, guest house, and dance platform.

1931 Catherine Filene Dodd marries Jouett Shouse. Catherine and Jouett Shouse hold large social gatherings at Wolf Trap Farm. Before World War II, these include a series of popular Sunday afternoon “mint julep” parties and barbecues.

1941-45 During World War II the farm produces additional food for local consumption. In the summer of 1944, the Shouses informally entertain some of the British delegation on the eve of the Dumbarton Oaks Conference, at which the formation of the United Nations was discussed. Wolf Trap also hosts a number of American officers on leave during the war, including Generals George C. Marshall and Omar Bradley.

1940s-1950s Following World War II, Wolf Trap Farm continues as a second home and social/political gathering space for the Shouses with guests including President Harry Truman, Attorney General, J. Howard McGrath, a number of other Truman administration officials, and Supreme Court Chief Justice Fred Vinson. The Shouses’ had a standard party dish, Kentucky “burgoo” a meat and vegetable stew coooked outdoors in large stew pots set in a fire trench on the lawn, supplemented by ham, salad, and other fare. These “burgoo” political events continue into the 1950s.

1956 By this time, Catherine Filene Shouse’s Wolf Trap Farm had increased to 168 acres; it is still a working farm.

1961 Catherine Filene Shouse donates 40 acres of Wolf Trap Farm to the American Symphony Orchestra League to serve as its headquarters and as "an international center for more than 1200 symphony orchestras in the United States and Canada."

1964 Mrs. Shouse first offers a portion of her property to the federal government through the National Park Service, to be dedicated as a park for the performing arts.

1966 After several months of debate in Congress, President Lyndon Johnson approves Public Law 89-671, establishing Wolf Trap Farm Park as a "park for the performing arts and related educational programs, and for recreational uses in connection therewith." The park is to be not more than 145 acres and includes the donations of Mrs. Shouse and the American Symphony Orchestra League as well as land purchased in fee or as a scenic easement. Mrs. Shouse also donates $2 million towards the cost of building an outdoor amphitheater.

1968 First Lady "Lady Bird" Johnson, wife of President Lyndon B. Johnson, breaks ground on the "beautiful Virginia hillside" that will be the site of the 3,500 seat amphitheater donated by Catherine Filene Shouse. The amphitheater is now being called the Filene Center, named for Mrs. Shouse's parents. The architects chosen to design the Filene Center are Edward F. Knowles and John F. MacFadyen of New York City.

Jouett Shouse dies in Washington, D.C. at the age of 88.

1969 Norair Engineering Corp, Washington DC, is awarded the construction contract at a cost of $2,207,800. Construction of the Filene Center begins on July 1.

1970 First Lady Patricia Nixon participates in the "topping out" ceremony at the Filene Center.

1971 One month before its anticipated completion, in March, the Filene Center is heavily damaged by a fire later attributed to arson. Mrs. Shouse organizes a fundraising effort to cover costs so that the Center can open on schedule.

The Filene Center officially opens on July 1 with an inaugural concert by the National Symphony Orchestra with pianist Van Cliburn, bass-baritone Norman Triegle, and 200 singers from the Washington area. Guests at the concert include First Lady Patricia Nixon, First Lady Consuelo Gonzales de Velasco of Peru, the Peruvian Ambassador and his wife, Secretary of the Interior Rogers C.B. Morton, and Governor and Mrs. Linwood Holton of Virginia.

The new amphitheater garners praise by attendees and architectural and performing arts critics. Several hundred thousand guests attend concerts and other events during the inaugural season.

1972 The Interior Department requests additional funding to further develop the facilities at Wolf Trap.

1974 The amphitheater roof is covered with aluminum to address ongoing water infiltration issues.

1975 The Filene Center is featured in the *Architectural Record* in an article on design for recreation.

1976 A fire of undetermined origin destroys the Theatre-in-the-Woods at Wolf Trap.

1977 Wolf Trap Farm Park requests an allocation for installation of a fire protection system at the Filene Center. This was cut out of the original construction to reduce costs. The allocation was not budgeted until the 1982 fiscal year.

The balcony is reinforced with cables to prevent the king posts from kicking out.

1979 A fire of undetermined origin destroys the Composer's Cottage at Wolf Trap, estimated cost, $70,000. There is some suggestion of arson.

1980 A small fire begins on the top back stage left at the 40 foot level, caused by a welding spark igniting the wooden portion of the structure. It damaged a small area of the stage left house wood, with estimated damages of about $5,000; the contractor made restitution.

1981 Work at Filene includes cable retensioning of beams and bird proofing.

Plans are prepared for the replacement of the stage flooring. The plans are approved in January 1982 and work begins in early 1982.

1982 The “Barns at Wolf Trap” are opened as a year-round performing space on land owned and operated by the Wolf Trap Foundation.

On April 4, the Filene Center is completely destroyed by a massive fire fed by high winds. The cause is never determined. The fire protection system was in the process of being installed, but not operational, and the building was not insured.

Plans are immediately made to house the 1982 season in a temporary building while fundraising begins for replacing the Filene Center.

By October, President Ronald Reagan has signed a bill authorizing reconstruction of the Filene Center. Under a cost-sharing arrangement, the federal government will pay half of the estimated $17 million cost, and provide a loan to the Wolf Trap Foundation to be paid back via donations. In order to speed the reconstruction, the Wolf Trap Foundation oversees the reconstruction process.

Although the new Filene Center is to be designed to have the “same basic look” and be in the same location, a number of improvements are planned for the new building, including accessibility modifications, a larger backstage, up to date sound and light technology, and a full fire protection system. Douglas Fir is substituted for the original cedar to provide better durability and because it can be treated with fire retardant; steel beams are substitute for the original timber beams. Virginia architecture firm Dewberry and Davis, with original architect John MacFadyen serving as a consultant, is chosen for the redesign, in part because they are using an early form of computer aided design which will speed up the design process.

1984 The rebuilt Filene Center opens on July 30 with a sold-out inaugural performance by Placido Domingo, soprano Rosario Andrade, and the National Symphony Orchestra. At this time, a giant wall has also been constructed to block noise from the adjacent Dulles Toll Road, which was built in 1984 to either side of the existing Dulles Access Highway.

1985 An 8-foot long crack is discovered in one of the steel queen beams supporting the ceiling of the Filene Center. Within days, a giant crane is on site to stabilize the roof, and repair is complete in time for the opening of the season. The crack is attributed to a combination of sub-zero temperatures, high winds, a welding flaw, and the poor quality of the steel that left the girder brittle rather than flexible. An NPS report expresses concern that the accelerated pace of construction may have resulted in design flaws and poor workmanship.

1986 Additional structural repairs are carried out at the Filene Center. The Wolf Trap Foundation files a $3 million lawsuit against the architects, Dewberry and Davis, and general contractor G&C Construction for the numerous design and construction flaws discovered after project completion. Repairs are still ongoing at the end of the year.

In November, a minor fire occurs in the duct heating system of one of the chorus dressing rooms.

1991 The siding is renailed to replace the original nails which were evaluated as not appropriate.

1992 A study commissioned by the National Park Service evaluates ongoing leaking issues at the orchestra copper roof system. It concludes that the copper roof “is not designed or installed in a manner consistent with good roofing practice for long term maintenance performance.” The copper roof was substituted during construction for the pre-formed aluminum roofing system originally specified. The details of the installed system are not in accordance with recommended standard practice and are causing leaks.

1993 Copper roof repairs are completed.

1994 December 14: Catherine Filene Shouse dies in Naples Florida, aged 98.

1998-99 HVAC replacement.

1999 Specifications are prepared for residing the Filene Center, but the work is not carried out.

A cell phone antenna chase is built on the east side of the Fly Tower by Bell Atlantic using siding to match the existing.

2002 Modifications are made to the loading gallery. This is the last of the structural issues related to the grid.

The original stage floor is moved to the rehearsal space and a new stage floor installed.

Wolf Trap Farm Park is renamed “Wolf Trap National Park for the Performing Arts.”

2004 New sprinkler lines are installed at the ceiling of the orchestra.

2005 The fire alarm system is upgraded.

2010 Flooring and seating at the orchestra are replaced. Damage to the concrete had been documented in 2007.

2011 In April, a major earthquake strikes the Washington, DC area. Damage at the Filene Center is confined to a crack in the column in the drive-through area underneath the building, and cracking of the concrete on the exterior near the loading dock.

2012 The copper roof is also replaced in several phases, approximately 20 years after the previous reroofing.

2014 The siding is checked for fire susceptibility.

2016 The box tier and loge flooring, stairs, and ramps are refinished.

Significance of the Filene Center

The Filene Center has never been formally evaluated for listing in the National Register of Historic Places (NRHP). Listing in the National Register requires that properties be determined significant in one of four categories, or Criteria, and that they retain integrity to their period of significance. Additionally, certain classes of properties, such as cemeteries, birthplaces, moved buildings, etc. are typically not eligible for listing unless they meet special requirements in these categories (Criteria Considerations). This includes properties whose construction dates to or that have achieved significance within the past fifty years (Criteria Consideration G).

This HSR provides a preliminary discussion of potential eligibility based on research to date in order to guide a recommended approach to treatment for the building. This evaluation does not rise to the level of a full Determination of Eligibility (DOE) or National Register of Historic Places nomination. The initial assessment provided here suggests that further evaluation, including a formal Determination of Eligibility, is necessary to fully understand the Filene Center's potential eligibility.

This evaluation is confined to the Filene Center building. A full DOE or NRHP nomination should include the entire Wolf Trap National Park for the Performing Arts. Under Criterion A, other elements of the park may contribute to the overall significance of the park as a performing arts venue and a place for education in the arts, another critical element of the site's history. Under Criterion B, the landscape and remnants of historic buildings may contribute to the park's significance in connection with Catherine Filene Shouse's life and accomplishments.

This evaluation only assesses the Filene Center's eligibility under Criteria A, B, and C for the current (1984) Filene Center (II). It does not determine if the Filene Center II meets the requirements of Criteria Consideration G. Discussion of the Filene Center's period of significance and eligibility are complicated by its construction history. Had the original Filene Center (1971) still been in place, a good case could be made that it is so close to the 50 year mark (46 years since completion) that it does not need to address Criteria Consideration G. However, the loss of the original Filene Center and its rebuilding in 1984 means that the application of Criteria Consideration G must be included when assessing the Filene Center's significance under the National Register criteria for evaluation. The current assessment is considered a starting point to facilitate further research but is by no means a full determination.

Potential Period of Significance

The recommended period of significance for the Filene Center II building is 1971 to 1984. The earlier date of 1971 is included as portions of the building's original foundation, basement, and orchestra floor were retained after the demolition following the

1982 fire and incorporated into the new building. The end of the period of significance is 1984, the completion of the rebuilding and the reopening of the venue. While the building did continue its significant associations under Criteria A and B after that time, it had achieved its essential significance at that time, and no significant developments occurred after that time.

Criterion A

The Filene Center is potentially eligible under Register Criterion A (properties that are associated with events that have made a significant contribution to the broad patterns of our history), at the national level. The Filene Center is the most visually and culturally representative element of Wolf Trap National Park, the first, and only, National Park dedicated to the performing arts, a unique status among the nation's national parks. From its opening day in 1971, the Filene Center was considered a nationally significant performance venue and attracted the internationally-famous entertainers and artists of the day. Its audience ranged from ordinary families up to the nation's political and social leaders; Presidents, First Ladies, and representatives of the executive, legislative, and judicial branches regularly attended performances here. The Filene Center was unusual in attracting such a mix of the powerful and the humble, all of whom were welcome and felt comfortable.

Criterion B

The Filene Center is potentially eligible under National Register Criterion B (properties that are associated with the lives of significant persons in our past) at the national level, as the place most closely associated with a significant person, Catherine Filene Shouse. Mrs. Shouse was an accomplished activist, author, and public servant from her college days until her death. She achieved many firsts as a woman and made a significant contribution to American history, not only for her patronage of the arts and donation of Wolf Trap, but for her political and vocational work. Mrs. Shouse was honored during her lifetime with thirteen honorary doctorates from prominent American academic institutions. She received the Presidential Medal of Freedom and was named a Dame Commander of the Order of the British Empire. Wolf Trap, both as a farm and a National Park, is the place most closely associated with Catherine Filene Shouse. Her association continued through the construction of the second Filene Center, while she was in her 80s, and indeed she played a significant role in promoting and fundraising for the rebuilding.

Criterion C

Making a case for significance under Criterion C (properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual

distinction) is more problematic. Certainly the original design of MacFadyen and Knowles was highly significant. It compared favorably to other outdoor performing arts venues from the modern era, even larger venues like the Merriweather Post Pavilion in Columbia, MD (1967, Gehry, Walsh and O'Malley) or MacFadyen's earlier design of the Saratoga Performing Arts Center in Saratoga Springs, NY (1966), which, while at a larger scale, employed similar design motifs, from the angled acoustic fins to the folded plate roof. The architects' skillful insertion of the amphitheater into the natural site, their minimalist approach to design, focusing on acoustical and visual performance, and the use of Oregon cedar to tie together the disparate elements, are all arguments in favor of the original design's significance. Were that building to remain, it would likely meet the criteria for listing under Criterion C.

However, the loss of the original structure, and its reconstruction in a slightly different format, complicates the case for significance under Criterion C. One possible approach is to argue that the Filene Center II is a "reconstruction" of the Filene Center I. However, it is clear that, while the second Filene Center is certainly meant to closely resemble the original, it is by no means a close enough copy to meet National Park Service definitions of a reconstruction. While the decisions made at the time, such as expansion of the backstage area, addition of the rehearsal hall, taller fly tower, higher proscenium opening, the replacement of the original Oregon cedar with Douglas Fir, the use of copper on the roof, and the installation of steel queen beams rather than the laminated trusses of the original, were all understandable improvements in the context of the opportunities presented during the rebuilding process, they do represent significant alterations to the original design such that it cannot be reasonably argued that the Filene Center II is a faithful reconstruction of the original.

Indeed, the difference not only in details but in design between the two buildings was acknowledged in 1984, when Benjamin Forgey wrote in the *Washington Post* that "(t)he difference between Boggs' (lead designer for Dewberry and Davis' replacement design) concern with image and metaphor and the forthright functionalism of the original design reflects a shift in architectural theory and practice between the late 1960s and the early 1980s. His awareness that the original building in fact had a very strong image, and that to recreate it while accommodating new needs was the central architectural task, served him well: the result of the sensitive design is a weightier, more sculptural, more impressive building."[81] While this opinion suggests that Boggs' design reflects the essential emotional character of the first Filene Center, it also points to a not insignificant shift in the

81 Benjamin Forgey, "Beauty from the Filene's Ashes," The Washington Post, July 28, 1984

building's architectural character, from what would now be called the Modernism of MacFadyen and Knowles' late 1960s design to the influence of Post-Modernism in the 1980s.

A final consideration is whether the Filene Center II meets National Register Criteria C for its design as executed by Dewberry and Davis. The building clearly is not an original design by Dewberry and Davis, which would disqualify it under Criterion C. However, a case could be made that it does represent the design of MacFadyen and Knowles with later modifications by Boggs/Dewberry and Davis, particularly because MacFadyen was a consulting architect on the rebuilding. The 1984 replacement building does retain sufficient similarities in design, materials, feeling, and association to reflect the 1971 building. Further evaluation is needed to determine if the building could be potentially eligible under National Register Criteria C, at a minimum state level and possibly national level.

Character-Defining Features

Site/Landscape
- Rolling hills within the National Park boundaries and the surrounding area.
- Open spaces around the Filene Center with few trees or large shrubs resulting in the Center being highly visible from the south and west
- Large areas of open lawn including the lawn seating area to the northwest of the auditorium.
- Heavily wooded areas to the east and north of the building.
- Amphitheater sited in a natural declivity.

Location/Siting
- Natural sloping landscape, accommodating the siting of the amphitheater and taking advantage of the natural grade change
- Gently sloping area from the ticket booths to the lower parking area.
- Sloped lawn seating area with walkways angled along the lines of the main roof beams.
- Rural setting of the outbuildings to the north of the Filene Center.
- Two box office and concessions buildings located at an angle to each other and separated forming the entry gates.
- Circular drive in front of the box office buildings.

Exterior

Massing
- Triangular form of the auditorium seating area and roof above.
- Contrast of vertical elements (tall fly tower, vertical fins, and vertical siding battens) with angled elements (cascading roof, main and balcony seating areas).
- Evenly spaced fin walls angled and spaced apart and open to the air on all sides.
- Fly tower that serves as the visual center of the building and anchors the composition.
- Open rear and sides of the auditorium seating area.
- Double pitched roofs over the side stage areas and the rehearsal space
- Auditorium roof cascading down from the fly tower

Texture and Materials
- Copper roof over the auditorium.
- Douglas Fir wood siding and vertical battens.
- Natural wood sheathing at the auditorium balcony, both below for the soffit for the orchestra seating, and for the box and loge seating, at the auditorium ceiling, and of the technical booths
- Concrete walkways and flooring in the auditorium.
- A very limited palette of materials from copper to natural wood walls and ceiling surfaces and light gray concrete.

- A very limited palette of colors from medium brown to light gray.

Doors
- Glass paneled public doors.

Windows
- Small square casement windows in the office area.

Interior
- Limited public interior spaces, with all services accessed from the exterior including the public restrooms.
- Plaster walls on the interior spaces.
- Theater organization on the interior with the stage, side stages, rear stage and the rehearsal hall all immediately adjacent and accessible to each other.
- Flexible layout permitting three shows to be in production at one time (the main stage for rehearsal and performance, the scene dock for assembly and shell storage, and the rehearsal hall for rehearsal and performance).
- General dressing room level layout with principals and chorus dressing rooms together.
- Parking garage concealed under the rehearsal hall.
- Orchestra lounge direct access to the orchestra pit at the basement level.

Chapter 4: Conditions and Systems

Introduction

Theater Nomenclature
Theater terms that may be unfamiliar to a lay reader are defined in the text when they are first used. A few key definitions are also included here:

"Stage right" and "stage left" indicate the point of view of a performer standing on the stage facing the audience. "House right" and "house left," are their mirror images that describe the same directions, but from the opposite side—as if an audience member is looking toward the stage.

Information regarding theater terminology is from "Glossary of Theater & Stage Rigging Terms" prepared by Stagecraft Industries, www.stagecraftindustries.com/siteglossary.php

Dimensions and other statistical information regarding the Filene Center in this report are from the "Filene Center Fact Book 2017, Wolf Trap National Park for the Performing Arts, January 18, 2017," prepared by the National Park Service.

Assessment Criteria
The following condition assessment criteria are used to describe the condition of architectural elements:

Excellent is defined as elements that perform their original function and require no renewal or repair.

Good is defined as elements that perform their original function and require only limited repair or renewal. Generally, this would be applied to new or recently installed materials.

Fair is defined as elements with only minor or limited areas of failure. Elements may require some repair or corrective action.

Poor is defined as elements that only marginally function as originally intended. Deterioration or loss is more significant and significant repair work, partial replacement, or full replacement is required.

Site Context

The Wolf Trap National Park for the Performing Arts is a 130.28 acre park near the Dulles Toll Road/Dulles Access Highway and the Leesburg Pike in Vienna, Virginia (figure 4-1).[1] The National Park Service (NPS) manages the park and provides interpretive and educational programs, and maintains the technical equipment and backstage facilities that support the performances at the park. The Wolf Trap Foundation for the Performing Arts, a private not-for-profit corporation, is responsible for the artistic programs, ticketing, public relations and marketing.



Figure 4-1: Aerial view of Wolf Trap National Park for the Performing Arts (source: Google Earth 2017).

There are two primary venues at the park, the 7,028-seat Filene Center and the 600-seat Children's Theatre-in-the-Woods.

The Filene Center is just north and east of the Dulles Toll Road while the Theatre-in-the-Woods is to the north of the Filene Center (figure 4-2). Both theaters are set in a rural setting on the former Catherine Filene Shouse property.

The National Park is located on rolling hills, with the Filene Center sited near the center of the park. The Filene Center is located within a natural bowl or depression roughly between the original buildings of the Wolf Trap Farm to the west, and Wolftrap Creek to the east. The land slopes down from west to east towards Wolftrap Creek. The Filene Center takes advantage of the steeper slopes between the box office and stage to facilitate raked seating on the lawn and auditorium seating areas. From there, the site slopes more gently, but still with a notable grade change from the stage level down past the loading dock and on to the lower parking lot (figure 4-3)

1 Approximately 118 acres are owned by the federal government and an additional approximately 13 acres are held in scenic easement.

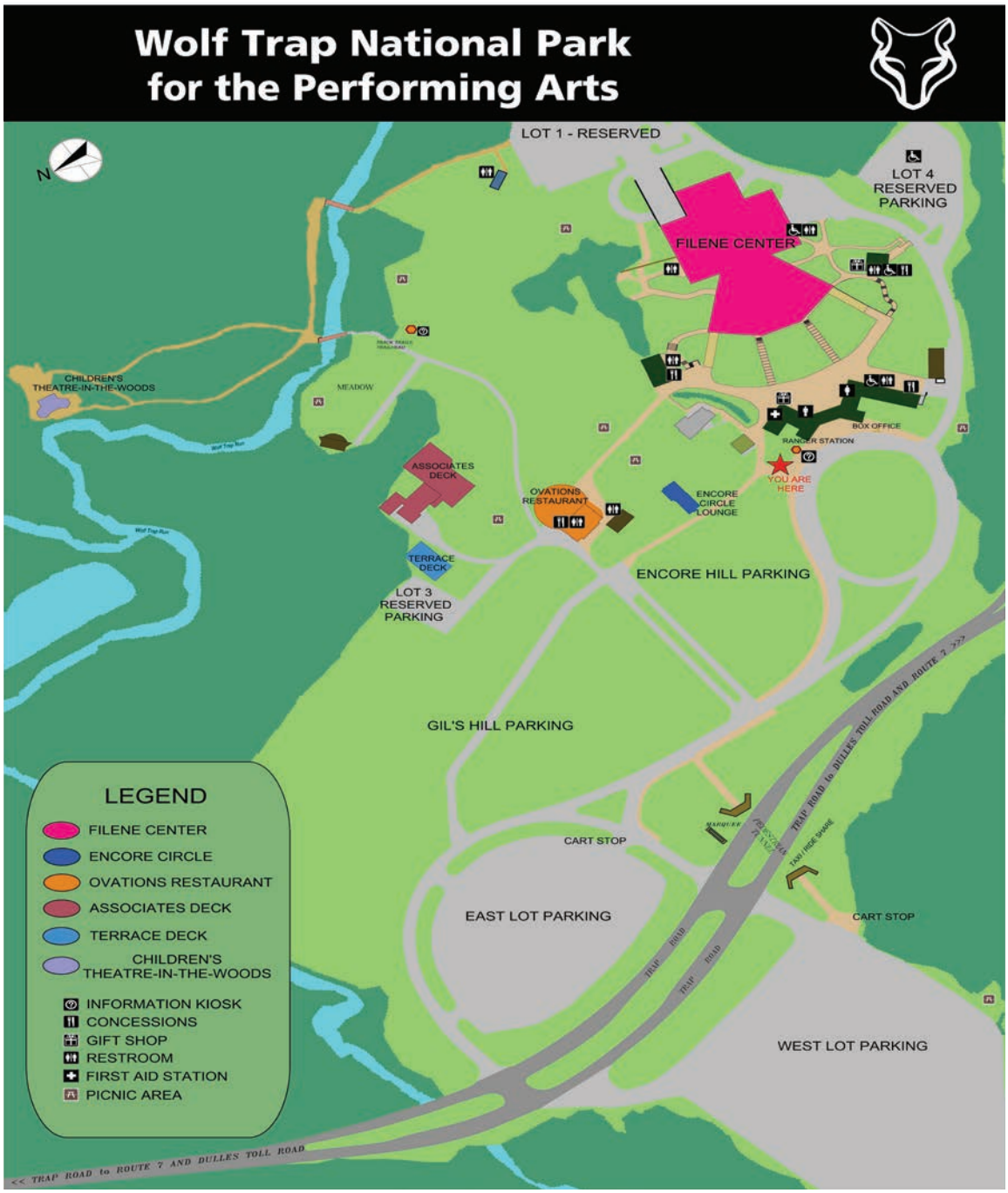


Figure 4-2: Site map of Wolf Trap National Park for the Performing Arts (source: National Park Service, 2017).

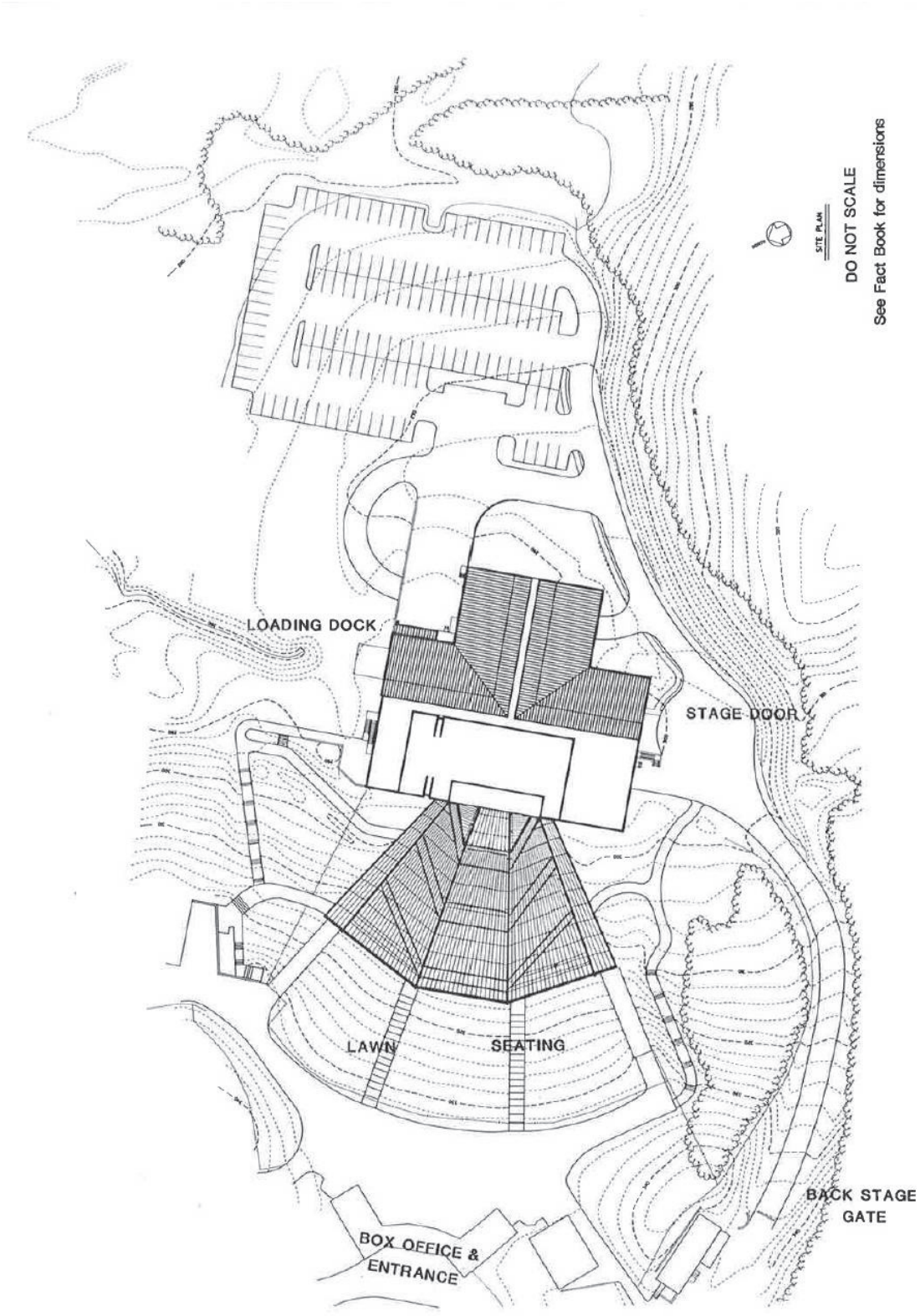


Figure 4-3: Filene Center site plan with contour lines show slope to east (source: Wolf Trap Farm Park Fact Book, 1988).

Accessibility

The walkways from the visitor parking lots to the Filene Center and into the auditorium appear to meet ADA and ABAAS requirements (figure 4-4). The steepest slope is from the lawn seating area down to the stage entrance. Existing handicapped parking at the lower parking lot, Lot 4, provides for more direct access into the lower level orchestra seating area for patrons with mobility issues.

The primary public restrooms are located on the east side or House Left of the lower level of the building. Access to them is via a long ramp from the middle of the east side of the auditorium.

There is a single stall accessible restroom at stage left near the proscenium. There are two accessible restrooms at the concession stand at the south gate entrance adjacent to Lot 4.



Figure 4-4: Accessible walkways at south side of the auditorium (source: Quinn Evans Architects, February 2017).

Exterior Envelope

NOTE: The Filene Center's original drawings and most subsequent drawings have used "plan north." While the stage actually faces northwest, this direction is designated as "plan north." This document provides actual orientations in the text, but the HSR drawings are oriented to plan north to match the historic drawings.

General Description

The Filene Center is generally aligned from northwest to southeast. A large circular asphalt drive is centered on the axis of the amphitheater to the northwest. The drive provides drop



Figure 4-5: Box office and concessions buildings looking northwest from fly tower roof, with circular drive beyond (source: Quinn Evans Architects, February 2017).

off for passengers. Between the circular drive and the lawn seating area are two large single-story box office and concession buildings set on an asphalt plaza (figure 4-5). These are set facing each other and angled approximately 45 degrees toward each other. They are separated by about forty feet.

The Filene Center is a large open-air performing arts complex that houses 3,780 people in seats under a large roof structure that is open on three sides (figure 4-6). An additional 88 people can be accommodated in the orchestra pit area when it is not in use. In addition to the formal seating, the auditorium opens to a gently sloping grass outdoor seating area that also holds approximately 3,160 people for a total of 7,028 people.

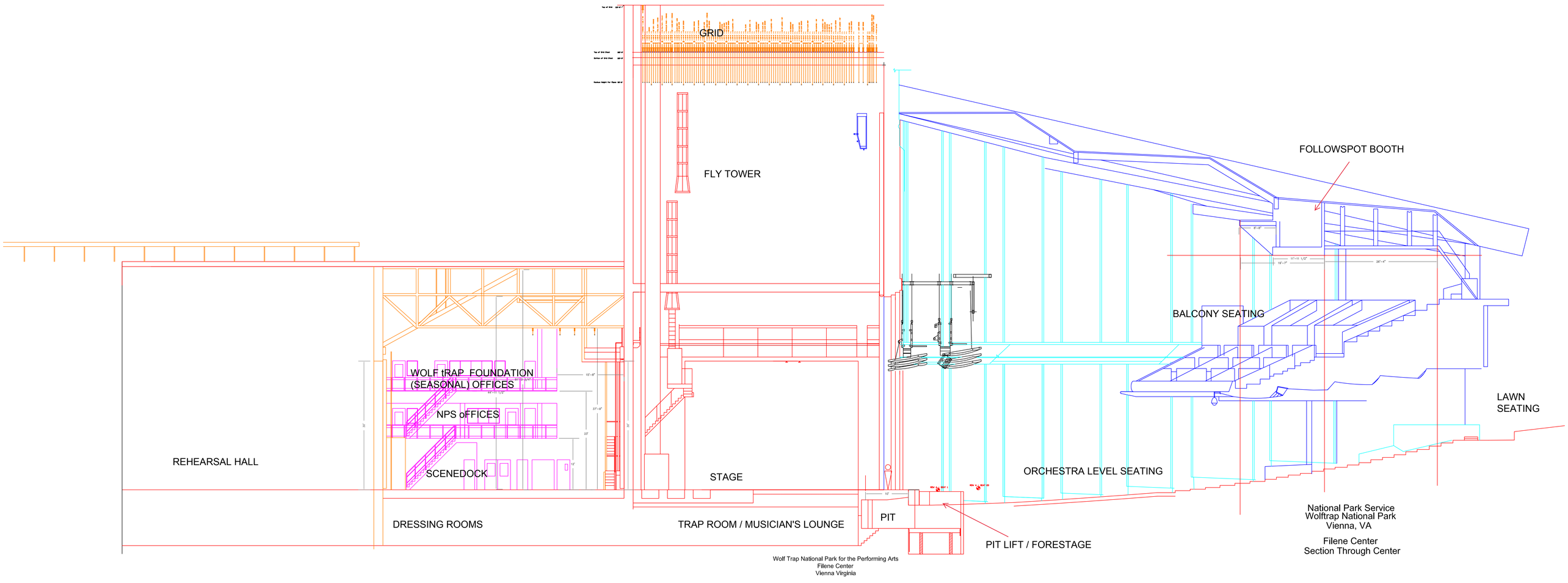
Overall Form

The Filene Center consists of four major elements that are interconnected. From northwest to southeast, the lawn seating area slopes down to a large covered seating area with fixed seats. The main stage house faces the auditorium seating. It is over 100 feet high and covers the main stage as well as side stage areas. Behind the main stage are several other stage and rehearsal areas (see labelled section, overleaf)

The Filene Center steps down a hill with the box office at the highest point and the parking garage at the lowest point. The lowest level of the center is 13 feet below stage area which is 34 feet below the plaza level.

Lawn Seating

The main entry to the Filene Center is from the northwest through a covered gate between the box office and concessions buildings.



Wolf Trap National Park for the Performing Arts
Filene Center
Vienna Virginia

National Park Service
Wolftrap National Park
Vienna, VA

Filene Center
Section Through Center



Figure 4-6: Oblique aerial from the north (source: Boggs and Partners, no date).



Figure 4-7: Lawn seating areas and steps, looking northeast (source: Quinn Evans Architects, February 2017).

Directly beyond the box office to the southeast is the large lawn seating area that is divided into three roughly equal rectangles (figure 4-7). These taper towards the auditorium and are separated by broad concrete steps that lead to the auditorium from the asphalt plaza above. The lawn seating drops approximately seventeen feet from the asphalt plaza near the box office to the last row of the auditorium seating at the stage level.



Figure 4-8: Exterior overall looking northeast (source: Boggs and Partners, no date).



Figure 4-9: Auditorium detail, northwest wall looking south (source: Quinn Evans Architects, February 2017)

Elevations

Northwest Elevation (Plan North): (Sheet A-11)
The northwest elevation is the primary view for visitors to the Filene Center. The broad lawn seating slopes down to the orchestra seating in the auditorium with the large roof above (figure 4-9 and 4-10). Beyond is the large fly tower. It is an impressive and unique view of this unusual facility.

Northeast Elevation (Plan East): (Sheet A-9)
The northeast elevation is broken into four major elements. To the northwest is the large auditorium roof with seating below. The seven large vertical fins span from the ground to the lower edge of the roof.[2] To the east of the auditorium is the large stage right and open lounge area with the fly tower beyond. To the left, or southeast, are the back stage area and the rehearsal hall with its pitched metal roof. All of the walls on this elevation are covered with wood siding and vertical wood battens. There are very few openings in any of the walls. One exterior stair leads from the stage level up to the mezzanine storage area above the open lounge.

Southwest Elevation (Plan West): (Sheet A-10)
The southwest elevation is similar to the northeast elevation with the elements reversed from north to south. There are more openings in this elevation with windows for the office area and several doors into the stage level (figure 4-11). This elevation also is completely covered in wood siding with vertical battens.

2 The vertical elements designated as "fins" here go by a number of different names such as baffles. "Fins" is the term preferred by the Park staff.



Figure 4-10: Auditorium portion of the southwest elevation (source: Quinn Evans Architects, February 2017).



Figure 4-11: Fly tower/stage door/office portion of the southwest elevation (source: Quinn Evans Architects, February 2017).

Southeast Elevation (Plan South): (Sheet A-12)
The southeast, or rear elevation of the building, is covered with wood siding with vertical battens. Six office windows are located on the southwest end of this elevation and two large rolling doors are located at the northeast end of the façade.

Numerous cellular arrays are located at the exterior top of the fly tower on the southeast elevation (figure 4-12). Several ancillary sheds behind the Filene Center support the arrays. They are not owned or maintained by the NPS.

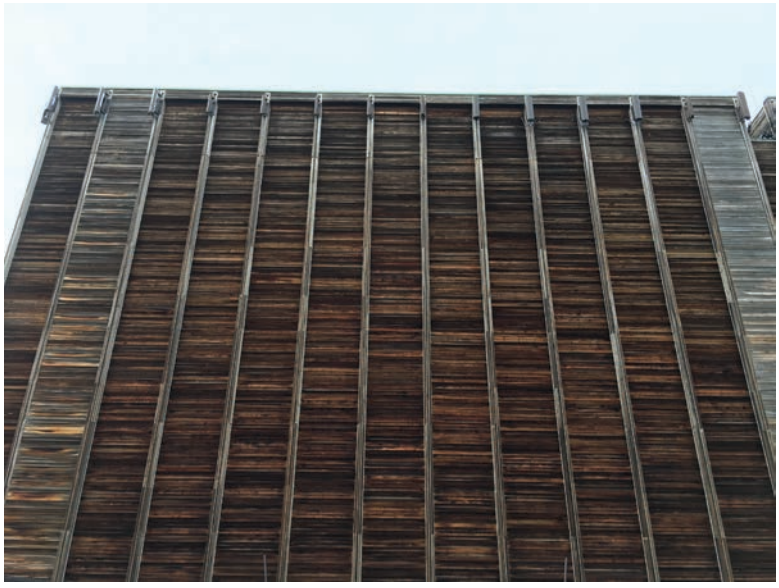


Figure 4-12: Upper fly tower wall with cellular arrays, looking northwest (source: Quinn Evans Architects, February 2017).



Figure 4-13: Fin details on southwest wall (source: Quinn Evans Architects, February 2017).

Beyond the lower rehearsal hall and back stage areas is the large fly tower.

Auditorium Fins

The tall auditorium fins on the left and right sides of the auditorium seating are surfaced with horizontal wood siding on the exterior and with vertical wood siding facing the interior. The vertical siding on the interior fin walls is in fair to very good condition.



Figure 4-14: Exterior wall, typical condition (northeast elevation looking southeast) (source: Quinn Evans Architects, February 2017).

The fins are discolored from the concrete walkways up to about four feet (figure 4-13). This appears to be due to water splashing up on the fins and from patrons rubbing against the walls.

The fin surfaces facing to the exterior have horizontal siding that is the same as that on the fly tower and stage exterior walls. The siding here is in poor condition.

Exterior Walls

The exterior walls of the fly tower, stage left, stage right and the rehearsal hall have the same horizontal siding as the fin walls



Figure 4-15: Exterior siding detail (source: Quinn Evans Architects, February 2017)

(figure 4-14). The exterior siding on all of these exterior surfaces is in poor condition with many boards that are loose, cupped and in some cases split. Numerous efforts have been made over time to secure the siding to the substructure with screws and nails (figure 4-15). Initially the siding was pressure treated with fire proofing chemicals but over time these have washed off leaving a faint discoloration.

At approximately every eight feet horizontally, on all of the exterior walls having wood siding, vertical battens run the full height of each wall. These are constructed of three vertical boards with wooden pegs at the joints of each batten.

At the top of these walls, eight or nine horizontal boards placed above each other are located in front of the vertical battens or between them and serve as a cornice to the wall.

Roofs and Drainage

The Filene Center has five distinct roofs (see figure 4-6 for overall view).

The Auditorium Roof and Drainage (Sheet A-8)
The auditorium seating is covered by a large cascading roof made up of three similar triangles joined together (figure 4-16). The center portion is a horizontal equilateral triangle with a base that is 68 feet wide. This base faces the lawn seating area. To the left of the central triangle is another horizontal right-angle triangle with its base also facing the lawn seating area and the 90 degree angle located to the east. The base of this triangle is also 68 feet long. To the right of the central triangle is another horizontal right-angle triangle with its base 68 feet long facing the lawn seating area. The 90 degree angle faces to the west. These interconnected triangles form the roof of the auditorium.



Figure 4-16: Auditorium roof, looking northwest (source: Quinn Evans Architects, February 2017).

The auditorium roof is pitched upwards as the roof extends to the fly tower. The combined triangle does not come to a point but where it is approximately 102 feet wide it terminates into the fly tower northwest wall.

The roof rises 33 feet to connect into the fly tower.

The roof drains from the fly tower to a perimeter gutter at the northwest edge of the roof and six roof drains spaced along the northwest edge of the roof carry runoff to a storm drainage system.

The auditorium roof is supported by four large concrete columns at the rear of the auditorium. The columns are located at the base connecting points of the three triangles that make up the roof.

Four smaller concrete columns are located at the triangle's third points at the front of the balcony.

Seven large acoustic panels that extend from the ground to the roof are located along the perimeter of both the northeast and southwest auditorium.

The auditorium roof was replaced in 2012 with a new copper roof and appears to be in excellent condition.

Fly Tower Roof and Drainage

The fly tower is the central element around which the other roofs connect. The fly tower roof is 112 feet above the stage level and a 12 foot parapet wall rises above the actual roof. The roof is a built-up flat roof with six catch basin drains aligned at the center axis of the roof running northeast/southwest (figure 4-17).

A separate roof at the north side of the fly tower is exposed to the auditorium roof and has its own pair of roof drains.

The upper fly tower roof is a built-up roof and also is in excellent condition. The roof drains are clear and free from debris. The inside surface of the parapet walls are covered with asphalt shingles in good condition. The flashing and lightning arresters are also in excellent condition.

Stage Left Roof and Drainage

The stage left roof is 35 feet above the stage level and is a flat built-up roof connected to the fly tower on the northeast (figure 4-18). This roof has three equally spaced catch basins at the center axis of the roof running northwest to southeast. This roof is in good condition.



Figure 4-17: Fly tower roof, looking northeast (source: Quinn Evans Architects, February 2017).



Figure 4-18: Stage left roof, looking southeast (source: Quinn Evans Architects, February 2017).



Figure 4-19: Stage right roof, looking northwest (source: Quinn Evans Architects, February 2017)

Stage Right Roof and Drainage

This roof is narrower than the stage left roof and is a flat built-up roof connected into the fly tower on the northeast (figure 4-19). It has two catch basins providing drainage from the center of the roof. This roof is in good condition.

Back Stage and Rehearsal Hall Roofs and Drainage

This area has a complex series of roofs.

A flat roof approximately eight feet wide extends from the stage left roof to the stage right roof. From the stage right roof it extends for approximately 16 feet and then gently rises up approximately 10 feet to the center line of the auditorium. From



Figure 4-20: Walkway and clerestory windows between rehearsal hall roofs, looking northwest (source: Quinn Evans Architects, February 2017).

this point continuing on to the west, the roof slopes downward to meet the stage left roof at the corner of the fly tower.

Two pitched roofs cover the rehearsal hall. From the northeast one roof extends to the southwest rising up approximately 28 feet and then becoming a flat roof for about 20 feet. A similar roof extends from the southwest rising up 28 feet as it angles northeast. It also extends for another 20 feet to a flat roof. A ten foot gap between these two roofs forms a walkway that is six feet below them. This horizontal roof extends from the southeast end of the building to the fly tower. To either side of this roof are clerestory windows into the rehearsal hall (figure 4-20)

A similar pair of roofs extends from the northeast over stage right to the southwest and from the southwest to the northeast over stage left.

The two roofs connect at valleys.

Along the low points of the pitched roofs are gutters that connect to four downspouts on each of these roofs.

All roofs are in good condition.

Entrance Systems

The main entrance into the auditorium area is through the lawn seating area. There are no doors here.

Access into the back of house areas is through the stage door and stairs from the loading dock and a stair on the northeast side of the building to stage right.



Figure 4-21: Loading dock on southeast elevation, looking northeast (source: Quinn Evans Architects, February 2017)

There are several large rolling doors on the southwest and southeast elevations. These provide access to the stage level (figure 4-21).

At the dressing room level, doors from the parking garage lead into the building,

Open air access from the southwest and northeast leads to the parking garage.

The doors are in fair to poor condition.

Windows
There are very few windows in the Filene Center. All of these are in the offices on the southwest and southeast façades. All of the windows are casement windows.

The windows are in fair to poor condition.

Additions
The basic form of the Filene Center has not changed since construction of the new center after the original building burned. There have not been any major additions to the building itself. Numerous changes have been made to the equipment and functional elements of the back of house area including the various theatrical systems.

Interior Architecture and Finishes

General
The architectural finishes of the Filene Center vary depending on the location and use of the spaces that make up the center. Public areas such as the auditorium seating area have the richest palette of materials and finishes, while support spaces such as the dressing rooms and staff work areas have more utilitarian finishes. The interior elements and finishes are generally in good condition, unless otherwise noted below.

Auditorium (Sheet A-2)

Auditorium Main Level
The auditorium has two groups of seating covered by a large roof and open to the sides and rear (figures 4-22 and 4-23). The auditorium seating faces the stage and the large fly tower. The main floor level of the auditorium steps down from the lawn area to the front of the stage. Above this is a balcony, with box and loge seating that spans the full width of the auditorium at the rear of the theater.



Figure 4-22: Auditorium main level seating, looking south (source: Quinn Evans Architects, February 2017).



Figure 4-23: Auditorium main level seating, looking north; control booths on left (source: Quinn Evans Architects, February 2017).

To the rear of the main auditorium seating is a broad walkway that spans the width of the auditorium and separates the lawn seating from the auditorium seating.

The main auditorium level seating is arranged as a mixture of continental seating (a seating arrangement with access aisles only at the ends of each row of seats) in the first 20 rows and standard seating on the remainder of the floor with five interior aisles in addition to the end aisles.



Figure 4-24: Main level and balcony seating, looking west (source: Quinn Evans Architects, February 2017).

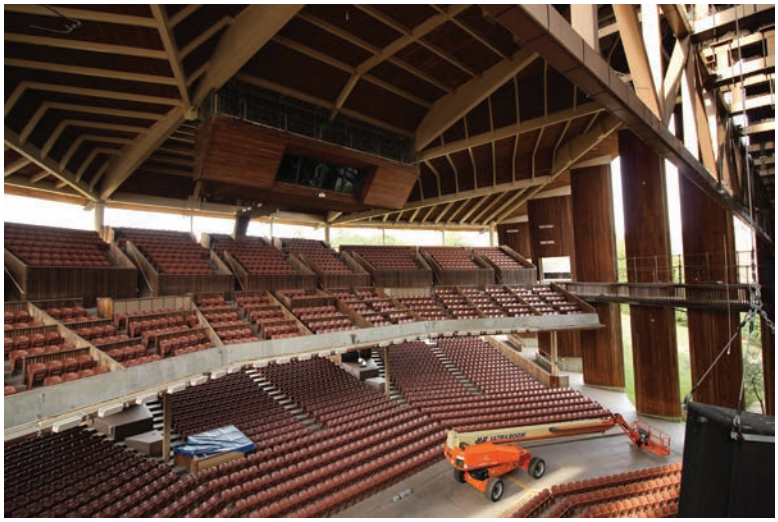


Figure 4-25: Main level and balcony seating, including follow spot booth, looking north (source: Quinn Evans Architects, February 2017).

Auditorium Balcony Level (Sheet A-7)
At the rear of the main auditorium seating, a balcony extends the full width of the auditorium (figures 4-24 and 4-25). The ceiling at the underside of the balcony is scalloped to provide better acoustics in this area (figure 4-23).

A broad walkway leads across the seating from side to side with box seats below the walkway and individual seating on the loge above. The loge has eleven rows of seats in the center and eight to each side. At the top of the seating is a cross aisle at the rear of the seating area. This cross aisle has two series of stairs leading to the plaza level at either side.

The auditorium walls, stage front wall, ceiling, follow spot booth, and under balcony area are all finished with wood siding that is in good to poor condition. Some of the boards in the ceiling have lost their finish and others appear heavily weathered. Many need to be refinished and some will need to be replaced.

The concrete floor is generally in very good condition with only a few small cracks.

The balcony and loge area have wood siding for dividers and the walls are in fair to poor condition with a very weathered finish.

House Seating

The seating in the auditorium may be configured in a number of different ways resulting in a variety of seating capacity alternatives (figure 4-26). Generally speaking, the front orchestra holds 1,401 seats and the rear orchestra can hold 1,236 for a maximum seating capacity of 2,637.

Box seating in the balcony can hold 442 and the loge seating in the balcony can hold 701 for a total of 1,143 seats maximum.

The house total seating is 3,780 and the lawn total seating is 3,160 for a total seating of 6,940.

When used, the orchestra pit can hold 88 seats, bringing the total capacity to 7,028.

Control Booths

The auditorium has a number of booths located in the auditorium seating area that are used to change aspects of a performance during the performance. At the rear of the main auditorium level are the lighting control booth on house left and broadcast booth on house right (figure 4-23). Between the broadcast booth and the stage is the facility's house sound booth and road front of house console area.

The follow spot light booth is above the balcony seating in the center (figure 4-25)

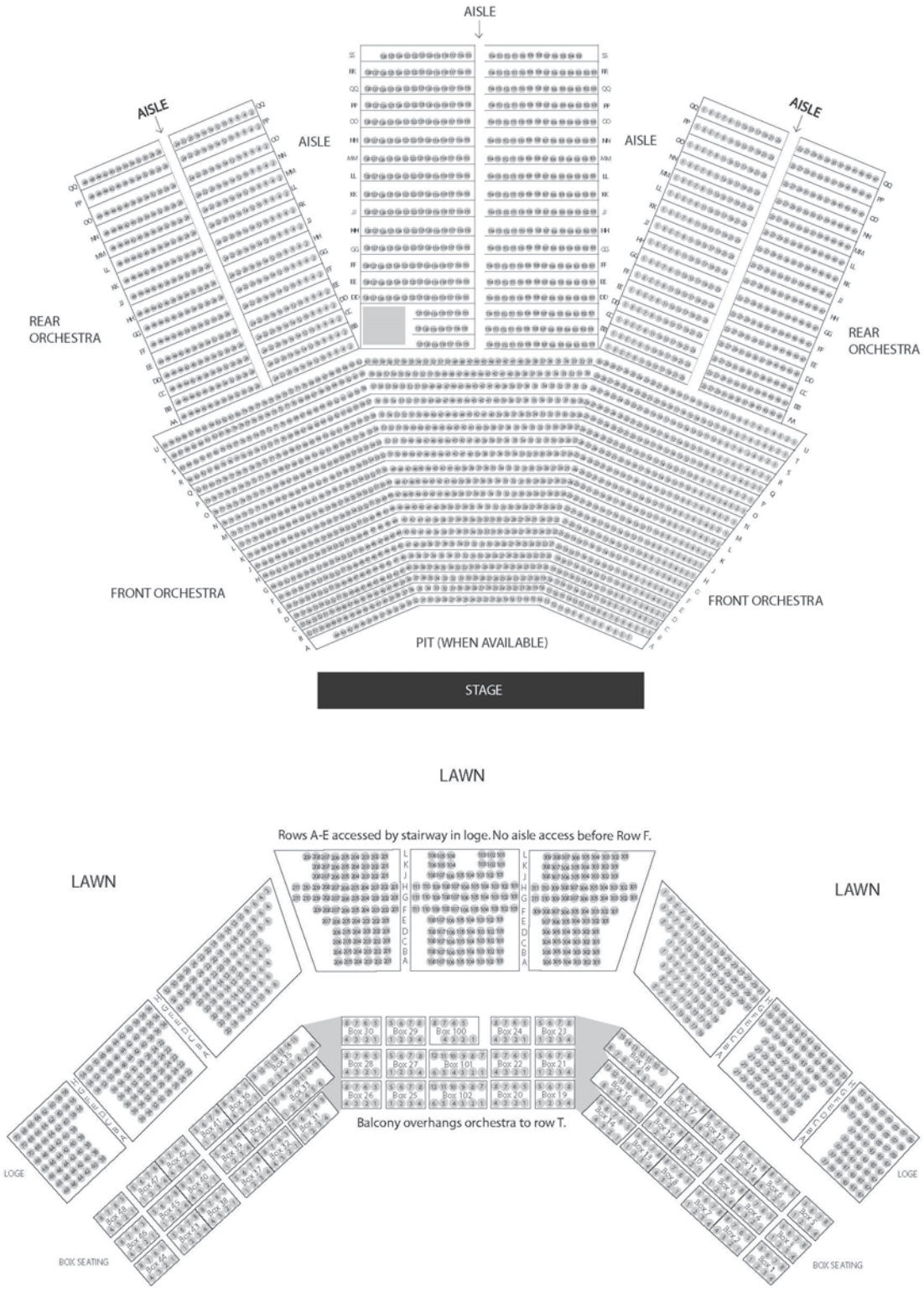


Figure 4-26: Filene Center seating plans, main level (top), balcony level (bottom) (source: Filene Center Fact Book 2017)



Figure 4-27: Forestage grid and proscenium, looking southeast (source: Quinn Evans Architects, February 2017).

Stage

The stage level includes the stage itself and the various backstage areas (figure 4-28). The stage is generally very well maintained and its elements are in good condition unless otherwise noted below.

Stage Information

All of the elements that make up the back-of-house area in this theater are as large as almost any in the United States. The center has a large stage and associated with it a large back stage and adjacent rehearsal hall. The side stages are also quite large. This arrangement of spaces allows the center to produce very large shows and to have one show in performance with two more in rehearsal or ready to present. The back-of-house statistics shown below demonstrate this quite well.

Areas

Stage	6,815 sq ft.
Stage Left Storage	1,176 sq ft.
Upstage Scene Dock	8,864 sq ft.
Rehearsal Hall	5,452 sq ft.
Total	22,304 sq ft.

Stage Floor

The stage is built of tongue and groove edge-grain Douglas fir, two inches by six inches nominal dimension painted black. The entire floor is suspended on flexible elastomeric membrane isolation pads (figure 4-29).

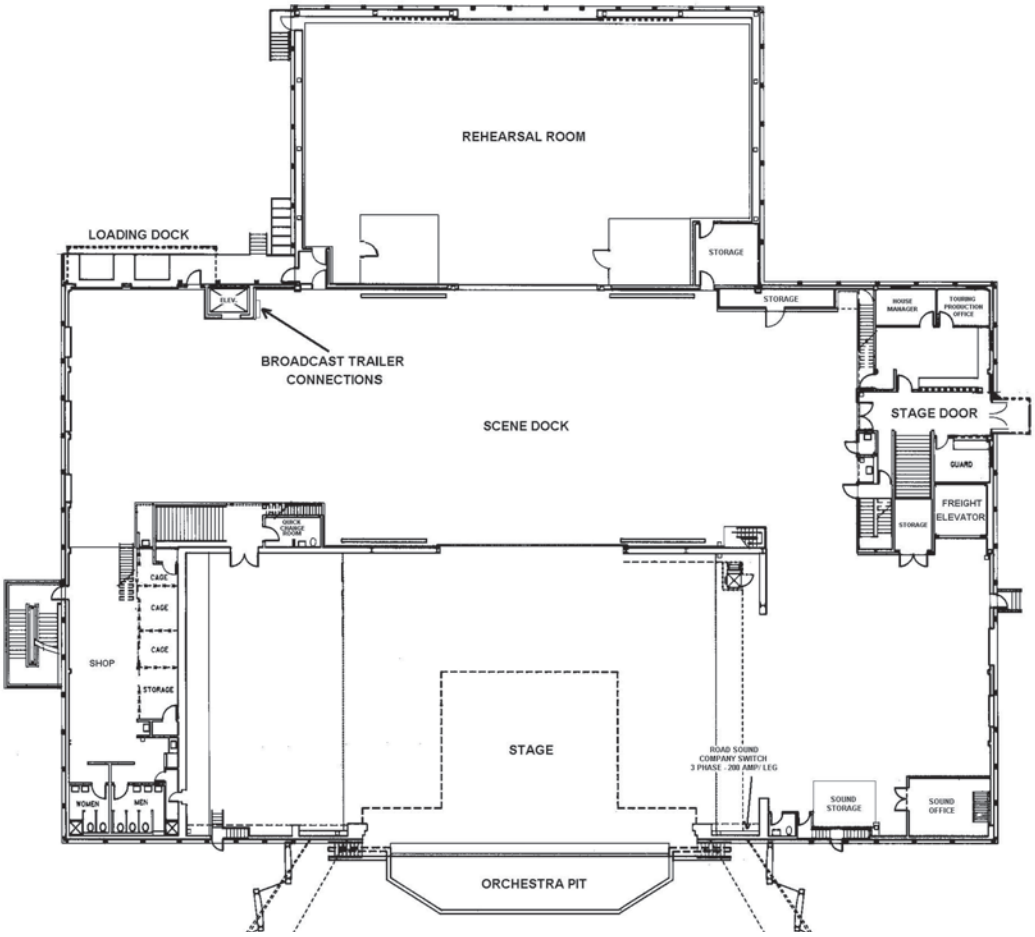


Figure 4-28: Stage level (source: Filene Center Fact Book 2017)

The distance from the stage left archway to the lock rail (a structural railing designed to support rope locks in a way that allows them to be easily operated – it holds out of balance loads from the rigging system held by rope locks and also serves as a safety railing for operators and other personnel) is116 feet six inches. From the upstage wall to the plaster line (an imaginary reference line on the stage that indicates where the rear face of the proscenium arch is located.) is 58 feet six inches. The total wall to wall distance is 123 feet six inches.

The dance floor is sprung (see Chapter 3 for a discussion of sprung floors) and is 63 feet wide by 46 feet deep. It is stained black and covered with black linoleum.

The distance between center stage and the stage right lock wall is 67 feet and from center stage to stage left inside wall is 49 feet 6 inches.



Figure 4-29: Main stage floor and orchestra shell walls, looking northeast (source: Quinn Evans Architects, February 2017).

The battens (bars, usually made from steel pipe, from which scenery, lights and curtains are hung) are 80 feet in length with a vertical travel length of 92 feet ten inches.

The distance between the curtain and the last line set (a system consisting of one or more lift lines and related components operating together to lift, lower, or suspend a load) is 54 feet six inches.

The Filene Center has a very tall stage fly loft (the space between the roof and the performance area that is not visible to the audience). The stage grid (or gridiron) is an open floor, usually made from light steel channels and grating, that is located near the roof steel. It provides mounting locations for rigging equipment and access to that equipment for inspection and maintenance. The grid is 100 feet 9 inches above the stage floor (see Sheet A-4).

Orchestra Shell

The orchestra shell (an enclosure on stage, consisting of walls and a ceiling that reflects sound into the auditorium, usually decorative in nature) opening is 70 feet wide (figure 4-29)

From the plaster line the shell is 35 feet deep.

The proscenium is the opening that divides the audience from the stage. It is 70 feet wide by 45 feet tall (figure 4-30).

The rear wall of the stage has two large sliding doors that open to the back stage area for moving sets and props. The opening is 40 feet 6 inches feet wide by 30 feet high.



Figure 4-30: View of proscenium opening stage right with speaker array, looking northeast (source: Quinn Evans Architects, February 2017).



Figure 4-31: Back stage, looking northeast (source: Quinn Evans Architects, February 2017).



Figure 4-32: Back stage, looking southwest (source: Quinn Evans Architects, February 2017).

Back Stage

The back stage (the stage area that is located beyond the sight of the audience. It is usually behind curtains and other masking devices) extends nearly the full width of the Filene Center tower. It is roughly 172 feet wide and 56 feet deep (figures 4-31 and 4-32).

At the southwest corner of stage left is the sound storage cage.

Stage Right

Stage right extends from the front wall of the fly tower to the rear wall of the stage (figure 4-33). The stage right area contains a number of controls for the theater including the stage manager's

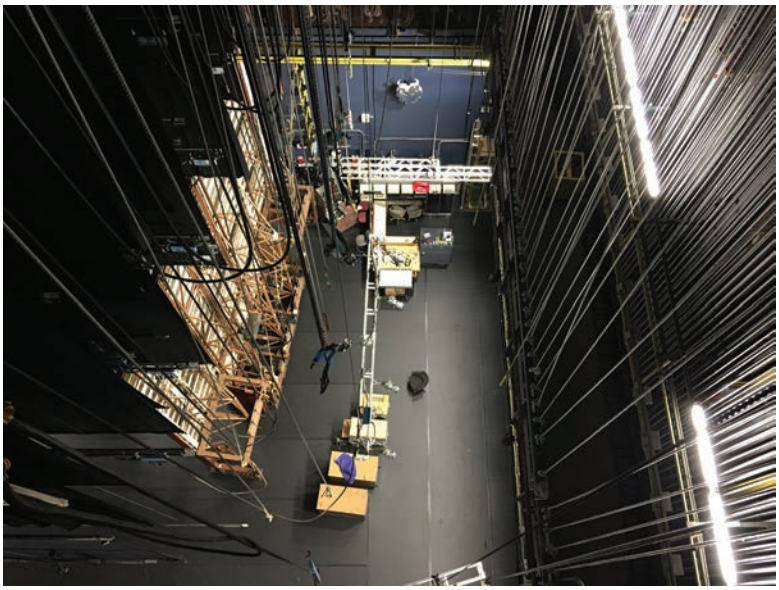


Figure 4-33: Stage right, as seen from the grid above, with orchestra shell wall to the left and rigging to the right (source: Quinn Evans Architects, February 2017).

controls, curtain and winch controls, the counterweight lock rail and orchestra pit lift controls. To the right of stage right is the stage lounge.

A stair leads up to the crew mezzanine. This area is directly above the crew lounge and consists of both men's and women's rooms, each with a lounge.

Stage Left
Stage left extends from the front of the fly tower to a line that extends the rear wall of the stage to the west. Behind stage left is the stage door area.

Rehearsal Hall
The rehearsal hall is directly behind (southeast of) the back stage area and is 95 feet eight inches wide by 57 feet deep (figure 4-34). The two large sliding doors that lead from the back stage storage area to the rehearsal hall are each 15 feet wide by 30 feet tall. The opening is 30 by 30 feet. The rehearsal hall and the back stage storage area are separated by a sound rated wall. Due to cost issues during the rebuilding of the Filene Center, this area is unfinished. It was originally intended to have insulated walls and operable windows at the clerestory.

Orchestra Pit
The orchestra pit (a depressed area between the stage and audience seating area where musicians sit, so the audience can hear the music and see the performance over the heads of the musicians) is recessed under the forestage lip and is



Figure 4-34: Rehearsal hall, looking southeast (source: Quinn Evans Architects, February 2017).

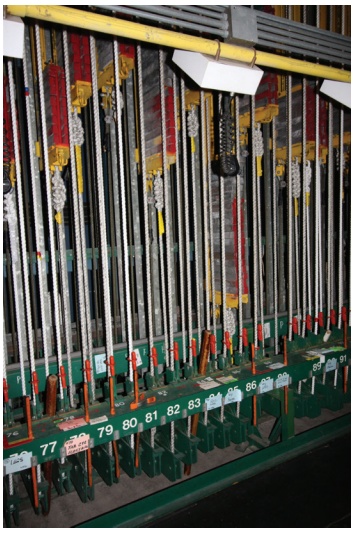


Figure 4-35: Rigging at stage right, detail (source: Quinn Evans Architects, February 2017).

approximately 67 feet wide by 24 feet deep. It has the capacity for 100 musicians at approximately 14 square feet per musician.

The stage apron is a hydraulic lift that lowers the apron to create additional seating at the orchestra level or may be lowered further to the orchestra pit level.

Curtains

The black velour drop curtain (a curtain that is painted or constructed in a manner that makes it a part of the scenic environment) and the scrims (a curtain made from a semi-transparent material that looks solid when lit from the audience side and becomes almost invisible when back lit) are 80 feet wide by 45 feet high. These curtains are raised and lowered.

The main house curtain (a curtain, sometimes designed for a specific show, that is opened to signal the beginning of a performance. The front curtain is often used for this purpose), is 50 feet high by 80 feet wide and is made of two overlapping pieces. This curtain opens from side to side.

Rigging

There are 104 line sets (a system consisting of one or more lift lines and related components operating together to lift, lower, or suspend a load – light, curtains, scenery, etc.) (figure 4-35). They are on six inch centers using hand lines (a line, usually of rope, that is pulled by hand to lift or control the movement of a load).

Stage Door

At the southeast corner of the back stage is a series of storage areas, two small restrooms and the stage door which consists of two sets of overhead rolling double doors leading to the exterior. The hall between the two sets of doors has a stair leading down



Figure 4-36: Fly grid looking southwest (source: Quinn Evans Architects, February 2017).

to the dressing rooms. To the east of the hall is an office with two adjacent storage rooms.

Staff Work Areas

To the west side of the back stage a stair leads up to offices above the stage door. On the second level are three offices, a file room and a men's and women's restroom. The stair continues on to a third level where there are three offices and a men's and women's restroom (Sheets A-3 and A-5). The staff work areas generally have concrete floors and drywall walls.

Back Stage Stairs

Two sets of stairs lead from the stage area to the dressing room floor below. A third exterior set of stairs is a fire escape stairs that connects crew areas to stage lounge and then to ground level outside. To the south, a broad stair leads from the stage door down to the canteen lounge. To the north, another broad stair leads down to the SR lounge. An exterior stair on the northeast side of the fly tower leads down to the SR lounge and up to storage on the northeast side of the fly tower.

A set of stairs leads from the northeast side of the stage door in the back stage going up to two floors of offices.

Two sets of steep stairs lead up to the fly grid from behind the stage rear wall (figures 4-36 and 4-37). One set leads to the fly grid. One set changes to a caged ladder halfway to tie off level and continues as a caged ladder to the fly grid.

The forestage grid is located above the proscenium (figure 4-27). This grid spans across the stage from one side to the other.



Figure 4-37: Walkway at stage right with grid above to the left, looking northwest (source: Quinn Evans Architects, February 2017).

Elevators
An accessible elevator is located near the loading dock at stage right. It serves the lower level dressing room area providing access to the stage level.

A large freight elevator from the lower level to the stage level is located at stage left.

A large portion of the orchestra pit operates as a lift traveling from the pit level to the stage level and the other levels in between. The pit elevator is 57 feet wide and 12 feet 3 inches deep.

Scenery Load In
Two loading doors are located on the north end of the back stage rear wall. They are each 9 feet five inches wide by 10 feet 9 inches tall. They lead out to the loading dock (figure 4-38).

Open Lounge
To the northeast of stage right is a work area that includes cages for equipment storage and two restrooms at the north end of the lounge.



Figure 4-38: Scenery load-in doors at loading dock, looking southeast (source: Quinn Evans Architects, February 2017).

Dressing Room Level (Sheet A-9)

The dressing room level is directly below the stage, back stage, and the rehearsal hall (figure 4-39). The dressing room areas are typically finished with gypsum board walls, vinyl baseboards, carpeted floors and acoustic tile ceilings with recessed light fixtures. The structural walls are of painted concrete block.

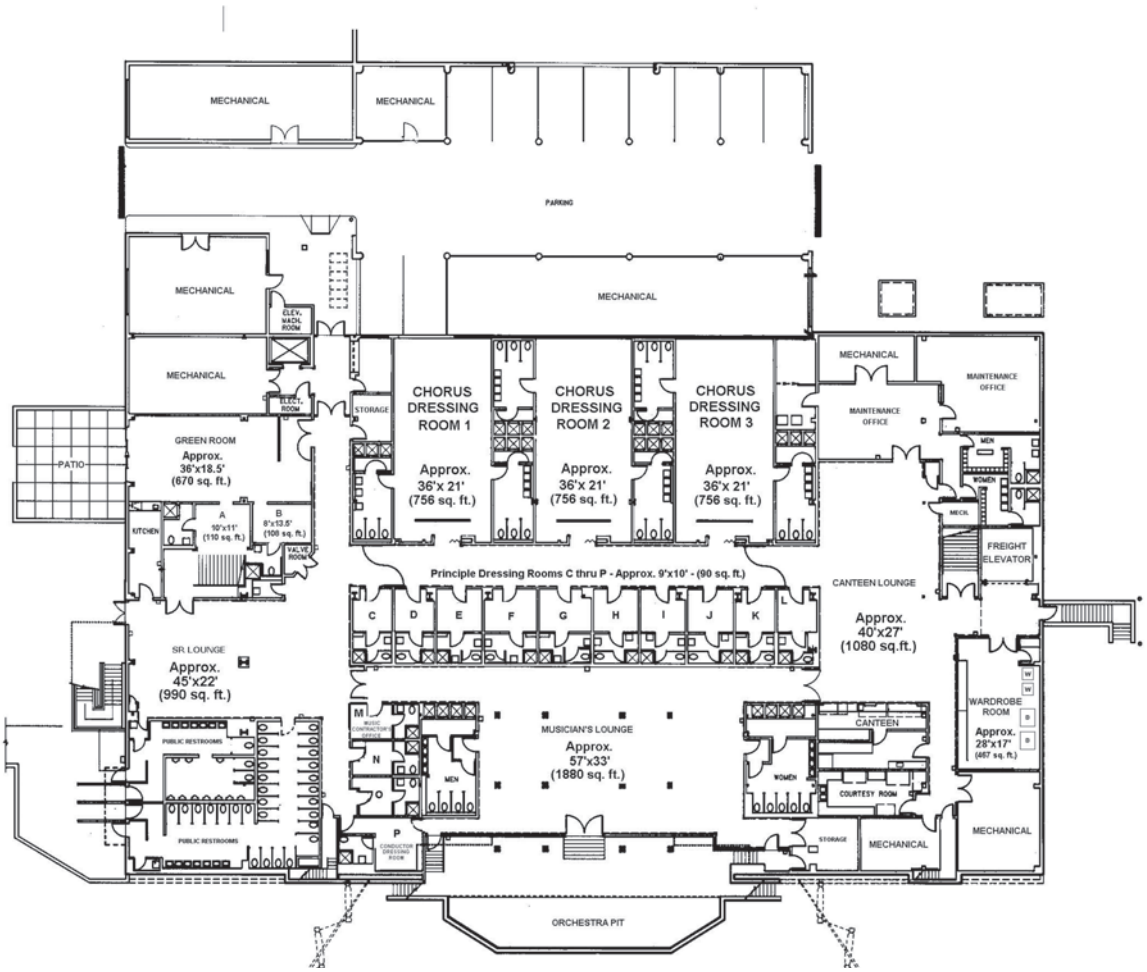


Figure 4-39: Dressing room level (source: Filene Center Fact Book 2017)

The equipment and storage areas have concrete floors.

The elements and finishes of the dressing room level are generally in good condition, unless otherwise noted below.

Dressing Room Stairs

The dressing room level is primarily accessed at four locations. A stair leading up to the stage level is located near the northeast side of the fly tower from the SR lounge and another near the southwest side of the tower from the canteen lounge that goes up to the stage door. A third access point is to the southeast where a double set of double doors lead out to the small parking garage. To the southwest of the canteen lounge a door leads out to a stair that goes up to grade.

Directly below the stage, the orchestra pit extends 67 feet across the center of the stage. A central stair leads down from the



Figure 4-40: Musician's lounge, looking west toward orchestra pit doors (center) (source: Quinn Evans Architects, February 2017).

rear of the pit to the musician's lounge (figure 4-40). There are additional stairs at either end of the pit.

Northeast of the musician's lounge is a large men's room.

Northeast of the men's room are three principal dressing rooms. The conductor's dressing room is adjacent to the orchestra pit, with stairs to the stage level immediately adjacent. Each of these dressing rooms has a toilet, shower, sink, a dressing table with mirrors and movable lights, and a locker. These dressing rooms are designed for one person occupancy.



Figure 4-41: Canteen lounge with door to stage at right, looking south (source: Quinn Evans Architects, February 2017).



Figure 4-42: Chorus and principal dressing room corridor, looking southwest (source: Quinn Evans Architects, February 2017).

To the northeast of the dressing rooms are two very large men's and women's restrooms for the public. These are accessed from the exterior of the building on the northeast side of the fly tower.

To the southwest of the musician's lounge is a large women's room.

To the southwest of this restroom is a large canteen and commissary room with storage and mechanical rooms beyond (figure 4-41).

At the southwest corner of the dressing room level are a series of storage rooms for instruments, sound equipment and wardrobe. The building pump room is located at the southwest corner of the building.

To the east of the musician's lounge is a corridor that extends from the SR lounge to the canteen lounge (figure 4-42). On one side of this corridor are ten individual principal dressing rooms. Each of these dressing rooms has a toilet, shower, sink, a dressing table with mirrors and movable lights, and a locker. Each of these dressing rooms has space for four people. These dressing rooms face into the dressing room corridor that also extends from the SR lounge to the canteen lounge.

East of the dressing room corridor are three large chorus dressing rooms, each with a restroom for men and for women (figure 4-43). Each of the restrooms has three toilets, three showers, three sinks, long dressing tables with mirrors and movable lights, and lockers. Each of these dressing rooms has space for approximately 50 people.



Figure 4-43: Typical chorus dressing room, looking north (source: Quinn Evans Architects, February 2017).

To the southwest of the canteen lounge is a small kitchen, the stair to the stage level and a valve room.

A corridor runs southeast from the public restrooms through the SR lounge room to the parking garage on the outside of the building. The corridor has two sets of double doors.

On the northeast side of the corridor is the green room with two restrooms (figure 4-44). The green room also has access to an outside patio area.

On the southwest side of the corridor is a storage room and the doorman's office immediately adjacent to the exterior door.



Figure 4-44: Green room looking east (source: Quinn Evans Architects, February 2017).

A freight elevator is adjacent to the green room with an electrical closet, mechanical equipment, and distribution and dimmer equipment. The freight elevator goes up to the loading dock.

To the west of the canteen lounge is the freight lift that serves the stage left area of the back stage.

Behind the freight elevator are two restrooms and mechanical equipment.

Directly to the southeast of the canteen lounge is a wardrobe room with washers and dryers for costumes.

At the southeast corner of the dressing room level is the maintenance office, adjacent to the wardrobe room.

Parking at Dressing Room Level

To the southeast of the fly tower, the dressing room level extends below the rehearsal hall. It is open to the air at the sides and has a small parking lot with spaces for ten cars although several are blocked off (figure 4-45). At the northeast end of this area is the switchgear room and the emergency generator and oil tank. This area is generally in good condition.



Figure 4-45: Dressing room level parking garage, looking southwest (source: Quinn Evans Architects, February 2017).

Structural Systems

Survey Methods
Site inspections were performed by senior structural engineers from Alpha Corporation, Mr. Timothy Walton, PE, and Mr. Mostafa Fahimi, PE, in conjunction with NPS personnel and other A/E team members, during the period January 24th-March 15th, 2017. No destructive tests were conducted. Inspections were limited to accessible areas. Inspections of the roof framing in the house seating area were performed using a man-lift. Inspections of other areas were performed from the ground, the roof, and available catwalks.

In the house, structural inspection of the shear walls, column baseplates, columns and hidden steel connections were not possible as they were hidden from view.

Structural Systems
Few structural drawings are available for the facility. Information described herein is based on available drawings, photographs, and inspections. A description of the construction and existing material condition of various areas and structural systems in the Filene Center are described below. Figure 4-46 shows the configuration and nomenclature for the roof beams in the house seating area. Figure 4-47 shows the stage and backstage area with the locations of several of the inspection observations.

Roof Framing of House Seating Area
Construction
After the 1982 fire, the roof framing was rebuilt using steel girders and beams. The roof framing system supports the roof deck which is formed of 1 5/8” thick tongue-and groove wooden planks. The wooden deck is covered by a roofing system. The current roof framing system is shown in figure 4-46. The facility reopened in July 1984. Both girders and beams are closed rectangular sections. The main girders are built-up steel sections that are supported by steel columns. On the north and south sides of the house seating area are a set of seven wing walls. The wing walls are elongated shear frames between a pair of steel columns. The wing walls are encased in decorative wood. The wing walls provide lateral stability for the roof system in the house area.

In January 1985, a crack was observed in the bottom flange for the G1 (north) girder, allowing it to sag. The G1 girders are the largest in the structure. They are rectangular built-up box sections, 16-inches wide and approximately seven feet high, with three-inch thick flanges. Scaffolding was erected to shore up the sagging girder. A root cause analysis of the failure determined that the crack was caused by a combination of a weld defect propagating from a backing bar for a flange weld, plus use of a weld metal with low toughness. Compounding these causes was the fact that the weather when the crack was noted was particularly cold, which lowered the fracture toughness of the

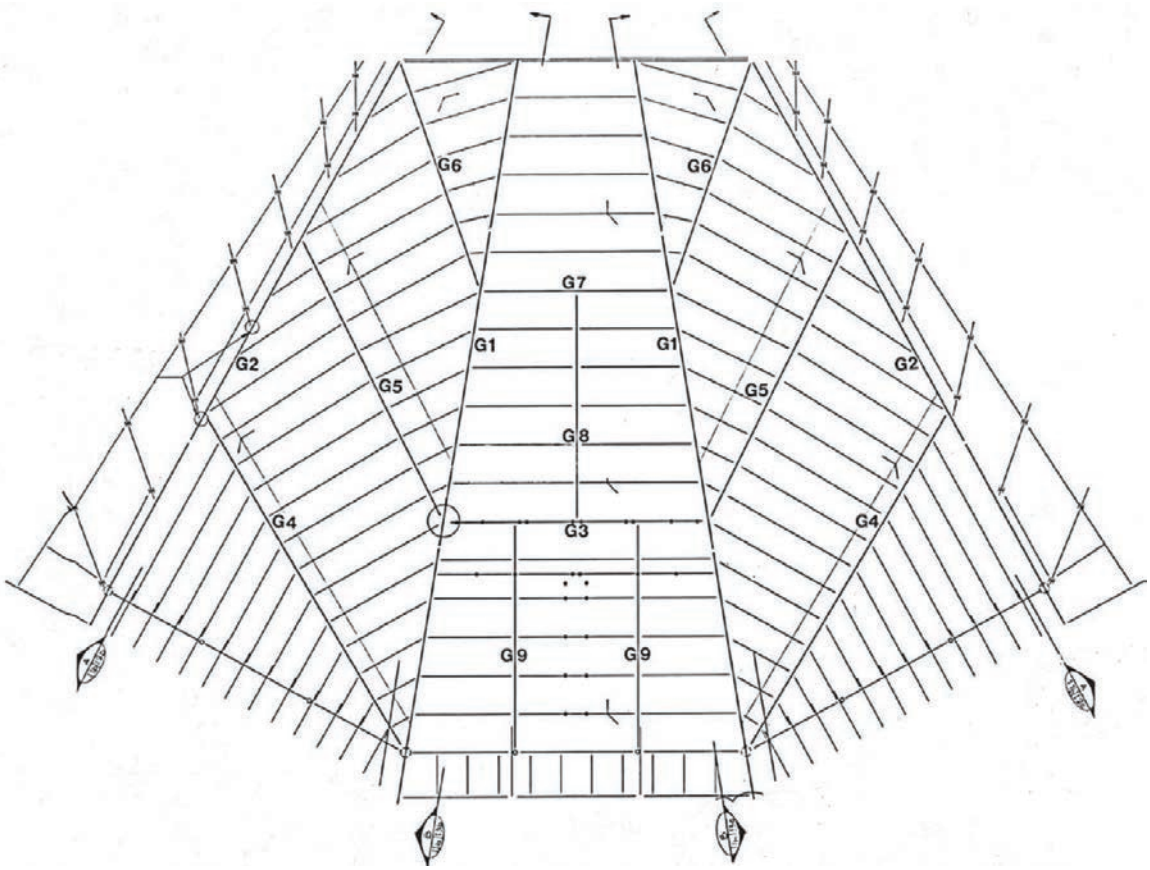


Figure 4-46: Roof framing system for the house seating area (source: 1984 as-built drawings, Wolf Trap National Park for the Performing Arts)

weld metal below its already low value. Corrective actions performed in 1986 included installing post-stressed Dywidag bars on the G1 and G2 girders. Six 1¼" diameter Dywidag bars were installed on each of the G1 girders, and three 1¼" Dywidag bars were installed on each of the G2 girders. The Dywidag bars are made from all-thread ASTM A722 high-strength prestressing steel, with a minimum ultimate strength of 150 ksi. The Dywidag bars were installed below the bottom flange of the G1 girders, and steel sheet metal was formed around them so that the assembly resembles an integral deep beam. The three Dywidag bars were installed above the bottom flange inside the G2 girders. The Dywidag bars are supported at regular intervals so that they do not sag. Both the G1 and G2 girders are primarily simply-supported long-span members, with positive moment near mid-span placing the lower flange of the girder in tension. Post-tensioning the Dywidag bars, which are below the neutral axis of the girders, places a net compression on the girders plus negative moment. Both of these factors reduce tensile stress in the bottom flanges of the girders. An inspection of the Dywidag bars was performed in late 2011 by opening available access covers permitting inspection of the bars. The 2011 inspection indicated the Dywidag bars were in good condition. In a few

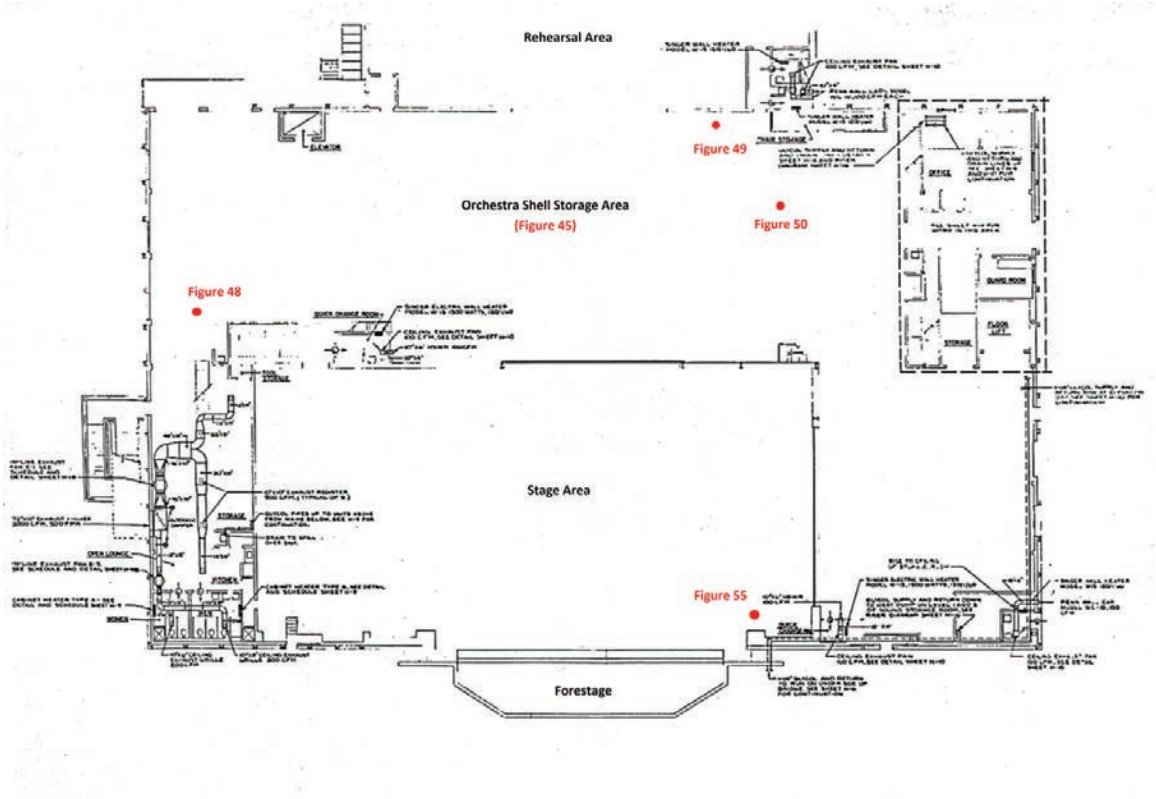


Figure 4-47: Stage area and backstage area showing locations of observations

locations, the waxy coating that protected the Dywidag bars from corrosion was missing, permitting some surface corrosion to occur, but the amount of corrosion was not a structural concern at the time of the inspection. Inspection of the Dywidag bars in the G1 and G2 girders was not included in this inspection as the area could not be accessed.

Existing Conditions

Overall, it appears that little degradation has occurred to the roof framing structure since it was installed in 1984. Some corrosion has occurred, as indicated, but observed corrosion has not affected the structural capacity of the framing system. Other conditions have been observed which likely have been present since construction. In some cases, these conditions should be corrected, even though the structure has endured for over 33 years.



Figure 4-48: Location shows lower section of G1 (south) queen girder. Line drawn in ink represents web to lower flange weld. Note the depression near the end of the ruler; which is not considered structurally significant. Also shown in the photograph is the sheet metal which covers the Dywidag bars installed below the beam flanges in the G1 beams. Note: As shown, the lower flange of the G1 queen beams is three inches thick. At the top of the photo are angle sections which form part of the connection to the roof deck. Because of changes in the roof deck slope, most of the G1 girder lies above the deck in this location (source: Alpha Corporation, March 2017)



Figure 4-49: Member shows collected debris which is assumed to be sealant material to bird-proof the openings. The debris and/or sealant is not considered to be structurally significant (source: Alpha Corporation, March 2017).



Figure 4-50: Polyurethane foam was installed to prevent rain water from seeping through the roof and down the steel structure. The foam stopped the seepage, but did not resolve the real issue. The roofing or trim needs to be repaired to prevent the water seepage, otherwise the foam can trap water between the wood and roofing material creating additional problems (source: Alpha Corporation, March 2017).



Figure 4-51: The angle bracket that is bolted to the beam does not appear to be connected to the continuous G2 girder. There is obviously some connection, as it has not failed, but the connection cannot be determined (source: Alpha Corporation, March 2017).



Figure 4-52: Intersection of G1 (south) and G4 (south) girders. Seat supporting the G4 girder is bent and somewhat corroded. Condition is considered acceptable since bolted connection supports the girder (source: Alpha Corporation, March 2017).



Figure 4-53: A small hole occurs in the framing adjacent to G1 (north) girder. The hole is part of a bracket and does not pose a structural issue. There is minor corrosion on the beam adjacent to the bracket (source: Alpha Corporation, March 2017).



Figure 4-54: There are two bolts missing in the connection. This was an installation problem that was corrected by welding the bracket to the beam. This is a typical repair for misaligned bolts, and is considered satisfactory (source: Alpha Corporation, March 2017).



Figure 4-55: Four holes in the girder have been filled with weld metal. Four bolts at right are installed in the leftmost holes in the beam bolt pattern. The left four bolts have been installed in the seat, but they do not pass through the beam. Only four bolts are effective in the connection, and the seat bearing area is minimal (source: Alpha Corporation, March 2017).



Figure 4-56: Two out of four bolts are missing in this connection. This occurred during erection. The bracket was not welded to the beam, and while the connection has been in place for 33 years, it is not clear whether the condition meets code requirements (source: Alpha Corporation, March 2017).

There are many locations where minor surface corrosion exists on roof framing beams. Although the framing system is protected somewhat by the roof, the Filene Center structure is open to the elements year-round, and thus regularly exposed to high humidity conditions. The corrosion indicates that the members need repainting to prevent additional corrosion, but in all cases observed the degree of corrosion does not indicate significant section loss. Figures 4-57 through 4-61 show examples of surface corrosion.



Figure 4-57: Beam and seat show signs of minor surface corrosion (source: Alpha Corporation, March 2017).



Figure 4-58: Beam and seat show signs of minor surface corrosion (source: Alpha Corporation, March 2017).



Figure 4-59: Member shows collected debris. Since this is a protected area, the debris may have been collected by a nesting bird. The debris is not structurally-significant, but the debris may encourage bird nesting and promote corrosion of structural framing (source: Alpha Corporation, March 2017).



Figure 4-60: Beam to girder connection shows signs of minor corrosion (source: Alpha Corporation, March 2017).



Figure 4-61: Beam-to-girder connection shows signs of corrosion. Seat for girder is of unique design and may have been a retrofit (source: Alpha Corporation, March 2017).

Stage Catwalk

Construction

The stage catwalk is supported by a long space frame that spans across the proscenium. The frame is supported by the wing walls, and employs both welded and bolted connections. The catwalk is suspended from the space frame by threaded rods.

Existing Conditions

The catwalk and space frame are in generally good condition; however, several of the hanger rods and nuts that support the catwalk and other equipment have corrosion. The members of the space frame also show some signs of corrosion, but not to the same degree as the hanger rods. The level of corrosion is currently not a structural concern, but since the facility is partially open to the weather, steel surfaces should be protected by proper coatings to prevent further section loss.

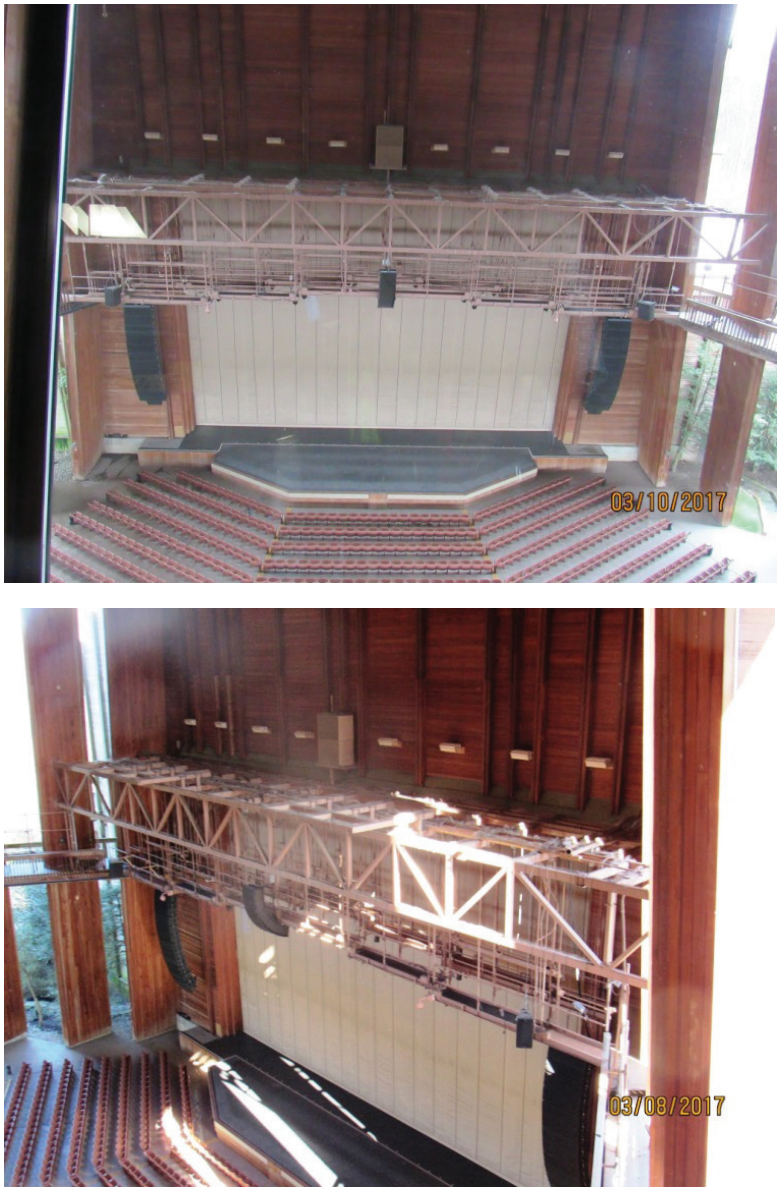


Figure 4-62: Overall construction of the stage catwalk (source: Alpha Corporation, March 2017).



Figure 4-63: The space frame superstructure that supports the catwalk spans across the stage, supported by wing walls. The catwalk itself hangs from threaded rods attached to the superstructure. Deterrents have been attached to the superstructure to discourage birds from roosting on the structure (source: Alpha Corporation, March 2017).



Figure 4-64: Many of the threaded rods that are suspended from the superstructure are corroded. The degree of corrosion currently present is not an immediate concern; however, this condition will need to be addressed before section loss occurs (source: Alpha Corporation, March 2017).



Figure 4-65: Corroded tie rods. The degree of corrosion currently present is not an immediate concern; however, this condition will need to be addressed before section loss occurs (source: Alpha Corporation, March 2017).



Figure 4-66: Minor corrosion on catwalk support truss members. The existing coating appears to be a typical primer coating and is not suitable for an exterior environment (source: Alpha Corporation, March 2017).

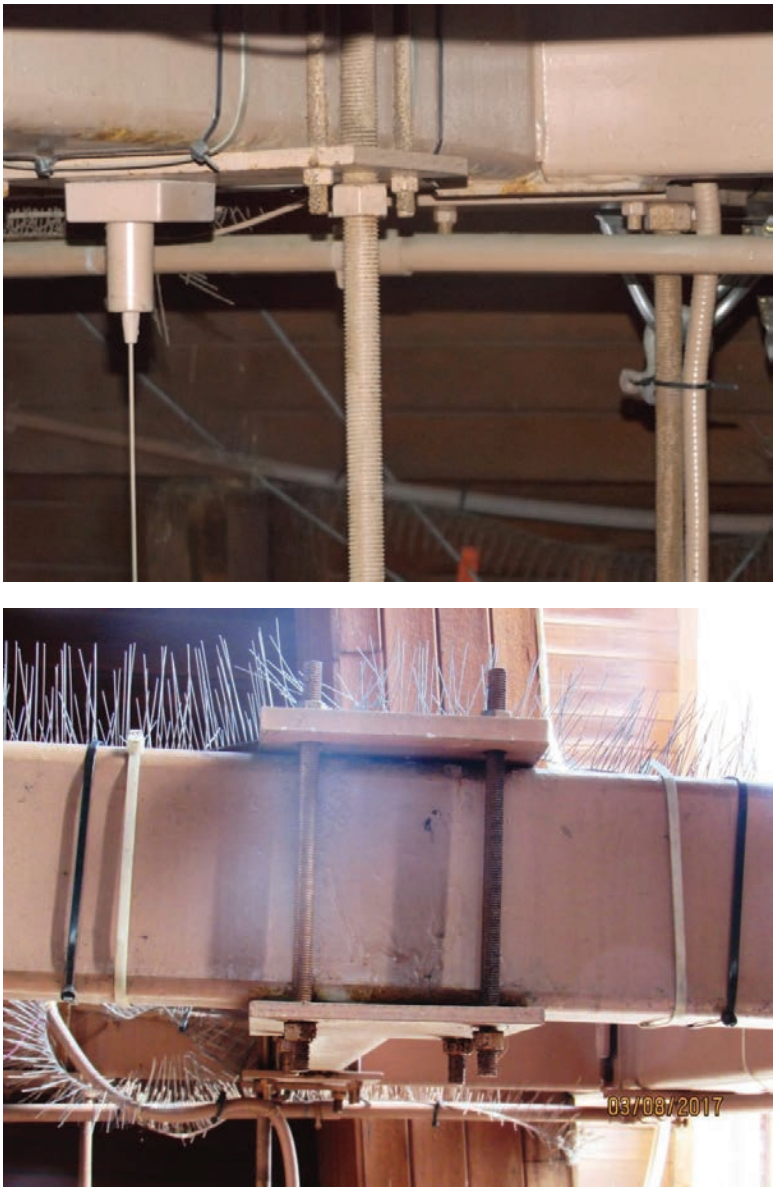


Figure 4-67: Some cross-members of the space frame are bolted with plates that clamp lateral beams. The reason for this design is not clear. It is possible the members were installed after the original construction, or the connection needed to allow the position of certain members to be adjusted. Some of the nuts on the hanger rods are not secured against frame plates. Many bolts were added to the structure as equipment was installed in the theater. Since construction was completed, welding was not permitted (source: Alpha Corporation, March 2017).

Loge Structure

Construction

The loge structure is an elevated seating area supported by columns and a combination of steel girders. A concrete deck supports the seating area.

Existing Conditions

Most of the loge structure is in good condition. There are some areas showing minor corrosion, but there is no significant section loss at this time. There are several areas where fireproofing has fallen away from the structural steel members.

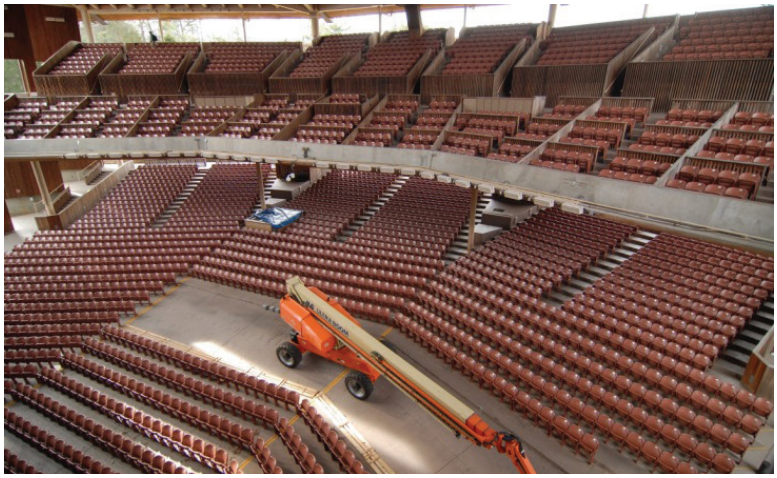


Figure 4-68: The loge structure is elevated above the main house seating. The loge structure is supported by front and rear columns; some of which are visible in the photograph (source: Alpha Corporation, March 2017).



Figure 4-69: The fireproofing used to protect some of the structural members supporting the loge is delaminating from the support beams (source: Alpha Corporation, March 2017).



Figure 4-70: Fireproofing is delaminating from structural members in certain areas (source: Alpha Corporation, March 2017).



Figure 4-71: Additional locations beneath the loge where fireproofing is peeling from structural members (source: Alpha Corporation, March 2017).



Figure 4-72: Support structure beneath loge that is missing fireproofing material (source: Alpha Corporation, March 2017).



Figure 4-73: Upper photo shows girder and piping beneath loge section where fireproofing is missing from steel components. Lower photo shows loge column that is missing fireproofing (source: Alpha Corporation, March 2017).

Follow Spot Booth

Construction
The follow spot booth hangs from the roof framing structure in front of and above the loge seating area. Primary structural members for the follow spot booth are structural steel and not generally visible. Portions of the booth use steel deck plate, and the outside is covered in wood planks.

Existing Conditions
Overall, the structural condition of the follow spot booth is good, however, the steel decks and access stair are corroded and in need of maintenance. An opening in the main girder that supports the follow spot booth permitted inspection of the interior of the girder, which is showing signs of corrosion.



Figure 4-74: Front view of the follow spot booth (source: Alpha Corporation, March 2017).



Figure 4-75: Side view of follow spot booth shows steel catwalk access from the rear of the booth (source: Alpha Corporation, March 2017).



Figure 4-76: Access stair to catwalk behind follow spot booth shows minor surface corrosion (source: Alpha Corporation, March 2017).



Figure 4-77: Access catwalk deck and railings show surface corrosion (source: Alpha Corporation, March 2017).





Figure 4-78: The G3 girder has an open access hole permitting a camera to be passed inside to photograph the interior. As seen in the lower photograph, the interior of the G3 beam shows signs of corrosion. The degree of corrosion does not currently reduce the strength of the structure (source: Alpha Corporation, March 2017).



Figure 4-79: Stairway access to follow spot booth. Note that there are no bars or fencing below the top bar to prevent objects from falling down the staircase. This is a potential safety concern (source: Alpha Corporation, March 2017).

House Area Floor

Construction

The house area floor, including associated stairways, consists of concrete slab-on-grade construction. The amount of reinforcement is not known.

Existing Conditions

The condition of the house area floor is generally good, but there are a few cracks and spalls which will promote further concrete degradation if not repaired. This slab was part of the original Filene Center construction and the cracks have been caused by water pressure from below.



Figure 4-80: Concrete crack in area adjacent to stairway. Crack is in the interface between concrete pours, and does not currently pose any structural concern. However, since the facility is exposed to the elements, freeze-thaw cycles will cause additional degradation if not repaired (source: Alpha Corporation, March 2017).



Figure 4-81: Crack in house stairway tread. Cause is not clear. The crack will increase in length and width if not repaired (source: Alpha Corporation, March 2017).



Figure 4-82: Additional cracks in house stairs. Additional cracking or spalling leading to a pedestrian hazard will occur if the cracks are not repaired (source: Alpha Corporation, March 2017).



Figure 4-83: Cracks in house stair. The stair appears to be placed over an existing joint. This crack will lead to further damage and a pedestrian hazard if not repaired (source: Alpha Corporation, March 2017).





Figure 4-84: Additional cracks are located in walkways. Further spalling of the concrete will occur if repairs are not implemented (source: Alpha Corporation, March 2017).



Figure 4-85: The cause of the crack near the control joint is not clear. Additional cracking or spalling will occur if repairs are not made (source: Alpha Corporation, March 2017).



Figure 4-86: Large crack at left may have been caused by settlement. If not repaired, the crack will lead to additional cracking and spalling, and a pedestrian hazard (source: Alpha Corporation, March 2017).

Rehearsal Hall

Construction

The rehearsal hall is located in the center rear of the facility, and is constructed with steel columns and a combination of steel and timber roof beams.

Existing Conditions

The condition of the rehearsal hall structure is generally good. There are several roof beam connections that are missing bolts. Unlike the stage and main seating area of the hall, the rehearsal hall is insulated and not open to the environment. This protection reduces humidity and corrosion of structural members.



Figure 4-87: General construction of the rehearsal hall. Note steel columns and timber roof beams (source: Alpha Corporation, March 2017).



Figure 4-88: Connection between column and roof beam appears to be missing a bolt. Minor corrosion on column and clip is not an issue (source: Alpha Corporation, March 2017).



Figure 4-89: The connection appears to hang from the girder, and is not connected by lag screws or bolts (source: Alpha Corporation, March 2017).



Figure 4-90: Three out of four spikes are installed on the beam hanger (source: Alpha Corporation, March 2017).

Orchestra Shell Ceiling Storage Area Roof

Construction

The orchestra shell ceiling is constructed of a welded-steel space frame structure with a combination of bolted and welded connections.

Existing Conditions

The overall condition of the orchestra shell roof is good. There is little corrosion or other degradation. There are several connections in the roof frame where bolt-holes are present, but the connections were welded instead of bolted. The weld capacity exceeds the capacity of the bolts; therefore, the connections are acceptable and in good condition.



Figure 4-91: The orchestra shell ceiling storage area is covered by a steel frame trusses that support the roof (source: Alpha Corporation, March 2017).



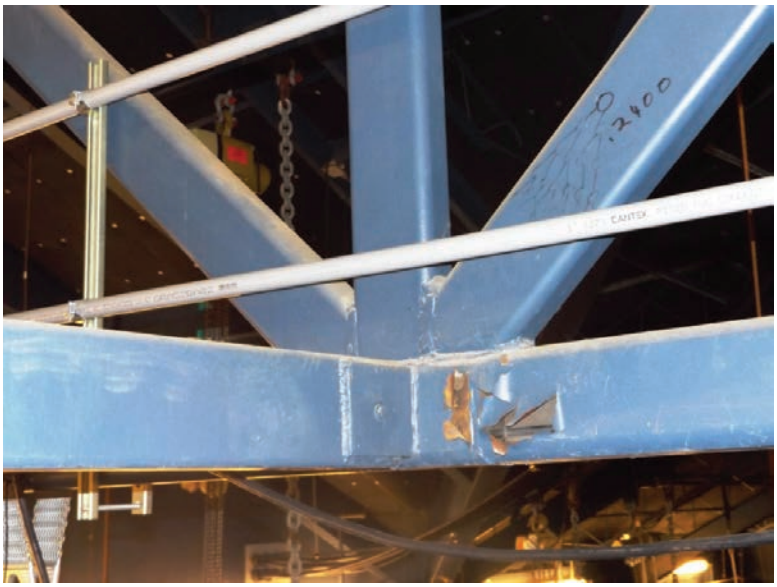


Figure 4-92: Paint is peeling from some of the orchestra shell ceiling storage roof framing members. Accelerated corrosion will occur if the bare metal surfaces are not repainted (source: Alpha Corporation, March 2017).



Figure 4-93: Several brackets in the roof frame structure appear to have been designed for bolted connections, but ultimately were welded in place (source: Alpha Corporation, March 2017).



Figure 4-94: Additional connections that were originally designed to be bolted. Welds are not visible to secure the roof truss in the upper photograph. The equipment available for this inspection did not allow for a closer examination of the structure. The staining of the roof members indicates roof leaks at some point in time (source: Alpha Corporation, March 2017).



Figure 4-95: Bolts are missing from the beam flange. The top flange appears to be attached to the column structure by a small weld, this weld is asymmetrical, and no welds are visible on the web of the beam (source: Alpha Corporation, March 2017).



Figure 4-96: As indicated by the photo, a steel member has been removed from this location. The web of the roof beam appears distorted at this location. It is possible that the distortion was the result of an overload at this location. While it is likely that the member is still capable of sustaining normal loads, it is not clear whether the member meets current code requirements (source: Alpha Corporation, March 2017).

Stage Wing Left

Construction

The roof of the stage wing left is a concrete deck supported by open steel trusses and steel columns.

Existing Condition

The general condition of the stage wing left structural members is very good. It was noted that it appears that stage equipment has been suspended from relatively lightweight roof joists. No damage to the roof joists was observed. Most joists are not designed for heavy loads that occur between panel points. Where hangers are installed between panel points braces should be considered.



Figure 4-97: Stage wing left overhead and roof structure (source: Alpha Corporation, March 2017).



Figure 4-98: Upper section of block and tackle is suspended from a lightweight roof joist. While it appears that load ratings are indicated on the block, it is not clear that the roof joist is capable of sustaining heavy concentrated loads (source: Alpha Corporation, March 2017).

Stage Roof and Ceiling

Construction

The roof above the stage, scene storage, and lounge areas to either side of the stage is very high and flat, in order to enable curtains and scenery to be lifted out of audience sight behind the proscenium. The roof is supported by steel beams and steel columns. Diagonal beams provide lateral support in the north-south direction.

Existing Conditions

The condition of the steel structure above the main stage is generally good. There are a few areas where paint has peeled and members are showing some corrosion, but the degree of corrosion at present is relatively minor. Access to this area was limited for the visual inspection.



Figure 4-99: Main stage roof structure – general view (source: Alpha Corporation, March 2017).

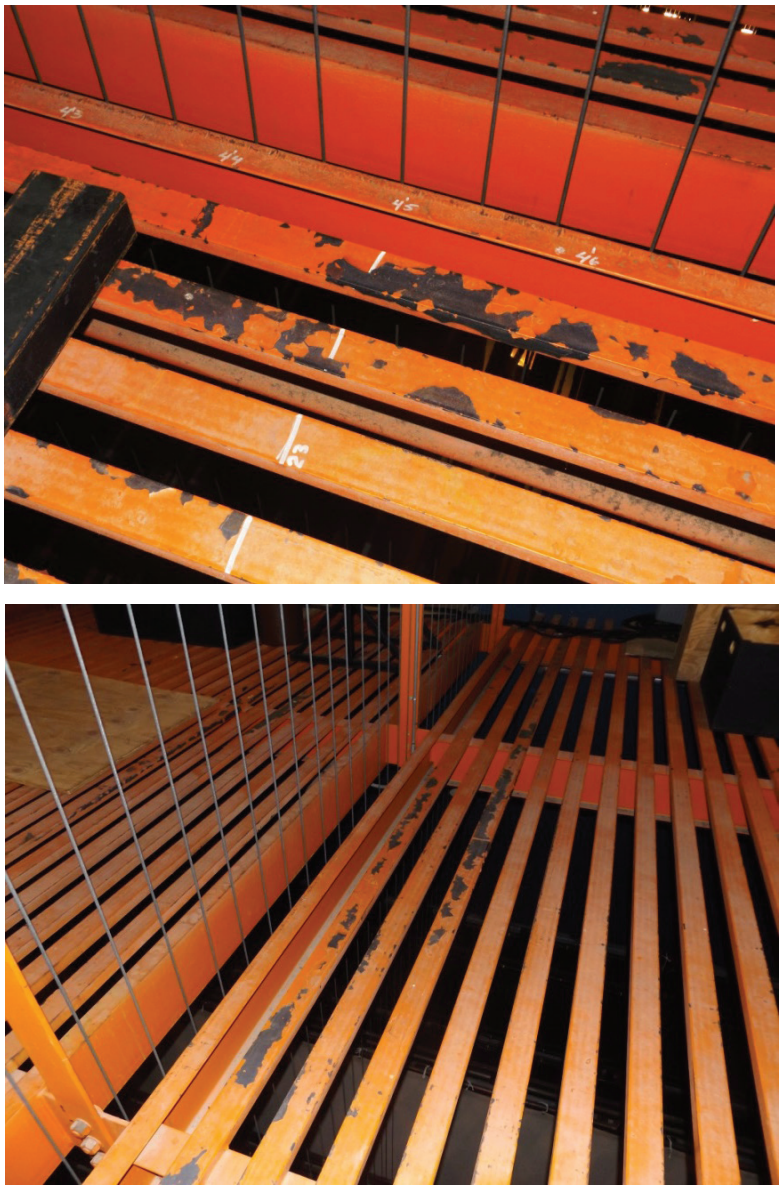


Figure 4-100: Structure above stage is missing paint in places. Accelerated corrosion will occur if bare metal surfaces are not repainted (source: Alpha Corporation, March 2017).

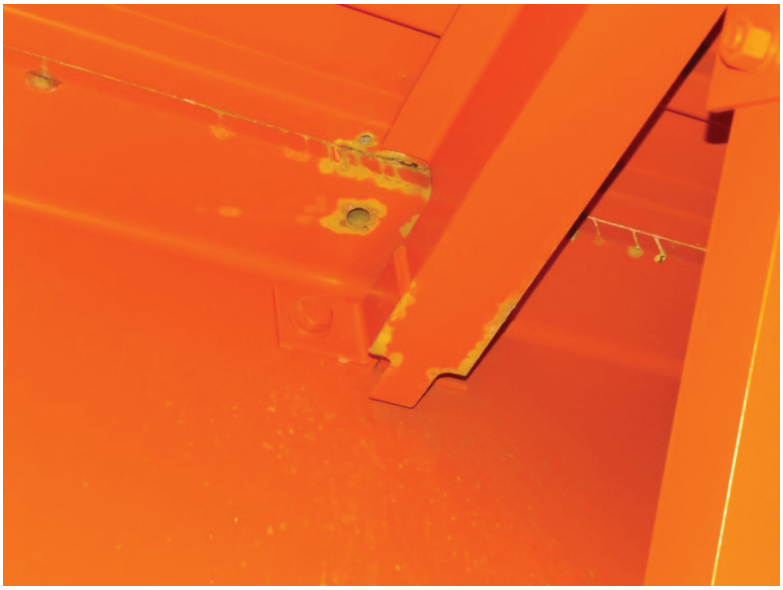


Figure 4-101: bolt is intended to secure a bracket that supports the upper portion of the roof joist (source: Alpha Corporation, March 2017).

Rear Space Roof Structure

Construction

The roof covering the back-stage, offices, and rehearsal space is sloped, and formed of open steel joists mounted at the roof angle. It is significantly lower than the flat roof above the stage area.



Figure 4-102: The sloped roof in the foreground covers the rehearsal hall (at left) and portions of the back-stage area (ahead). The high flat roof area in the background covers the stage itself, and stage-left and stage-right areas (source: Alpha Corporation, March 2017).

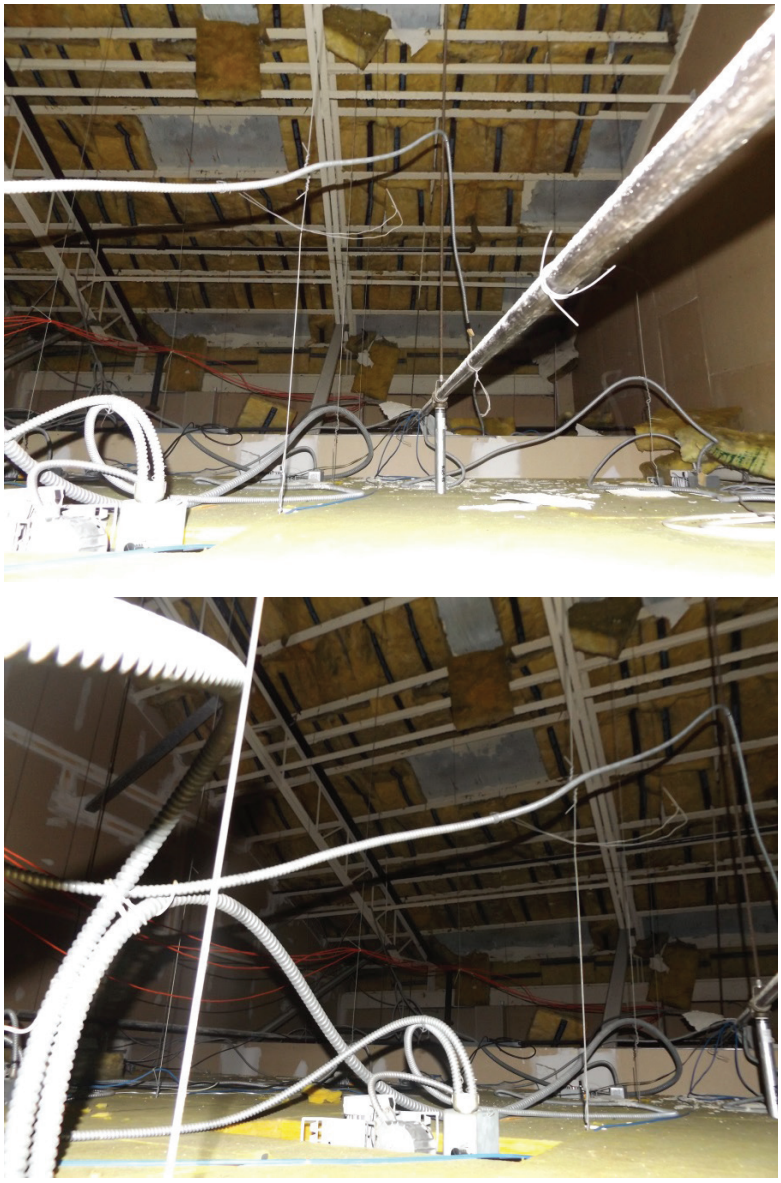


Figure 4-103: The photos above show that the roof structure consists of widely-spaced open steel joists with steel angles serving as cross-members supporting a sloped roof. Although some of the insulation is deteriorated, this is not a structural concern. The roof members appear to be in good condition (source: Alpha Corporation, March 2017).

Existing Condition

The condition of the structural components for the rear roof is generally very good. There are some areas where fireproofing has detached from steel members.



Figure 4-104: Fireproofing has separated from structural steel members (source: Alpha Corporation, March 2017).

Interior First Floor, Basement and Office Area

Construction

The first floor of the Filene Center is at stage level. The floor consists of a metal deck with a concrete slab supported by steel beams and columns. Fireproofing is installed on steel components in most areas. Mechanical and electrical equipment support and attachments to steel using hangers is typical for this type of construction.

The office areas are framed with non-load bearing light gauge metal studs. The walls are braced to the steel structure or metal slab on deck to provide proper lateral support. The floors are slab on metal deck supported by steel beams and columns.

The basement slab is a concrete slab on grade. Foundations for the columns are buried beneath the slab. No drawings were provided of the foundations; however, typical concrete foundation construction is expected with footings installed eight to twelve inches beneath the slab.



Figure 4-105: The photo shows the typical construction in the office area. Similar construction is used at the lower level. The only exception being masonry was used in lieu of light gauge framing. The masonry extended to the metal deck in most cases (source: Alpha Corporation, March 2017).

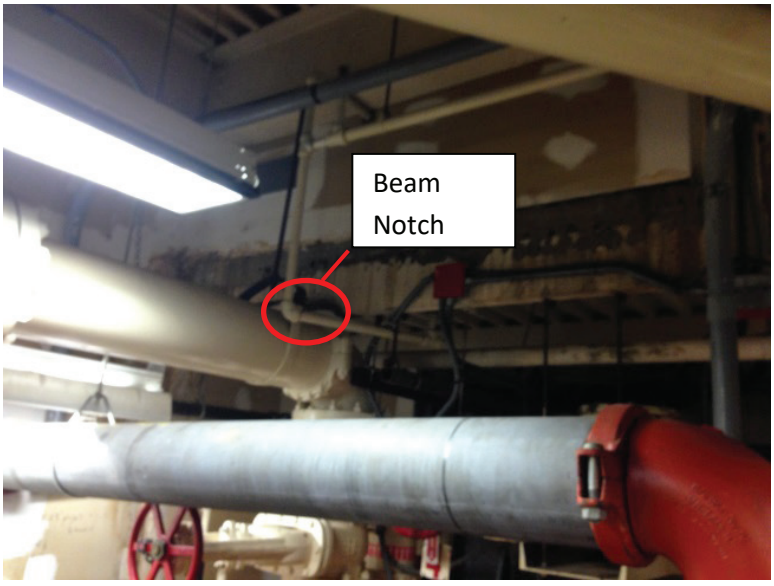


Figure 4-106: The photo above shows a notch cut in an existing beam which shows signs of corrosion. The notch was cut to allow for the installation of the large water main. The beam supports a floor above. This is the mechanical room on the lower level, so moisture levels are higher than normal for an interior space. Standing water was seen in the mechanical room. In addition to the above, fireproofing is missing from some structural members (source: Alpha Corporation, March 2017).



Figure 4-107: New steel installed beneath the stage. Based on conversations with staff, this was added to reinforce the stage floor. The plastic vapor barrier above prevents visual inspection of the stage floor from below. The steel did not appear to have fire proofing installed. Unprotected wood framing was noted in this area as well. Fire codes were not reviewed to determine the necessity of fire proofing in this area (source: Alpha Corporation, March 2017).



Figure 4-108: The picture above was taken in the green room. The sheetrock surrounding the steel tube column terminates just above the drop ceiling. Fire codes were not reviewed to determine the necessity of fire proofing in this area (source: Alpha Corporation, March 2017).



Figure 4-109: This is a typical condition in the lower level. Fireproofing has delaminated or was removed when equipment was installed directly to the steel framing (source: Alpha Corporation, March 2017).

Exterior Structures and Parking Garage

Construction

The lower level and parking garage consists of reinforced concrete retaining walls and foundations. Slabs in the lower level are slabs on grade. The interior framing consists of metal deck with concrete slab supported by steel beams and columns. The amount and type of reinforcing is not available. The concrete wall extends up to the stage elevation. The parking garage is partially beneath the rehearsal hall and the loading dock area. Beneath the rehearsal hall, the ceiling consists of a metal deck with concrete slab supported by steel beams and concrete columns. Beneath the loading dock and below grade the ceiling consists of reinforced concrete slab and beams. The exterior of the parking garage consists of reinforced concrete walls and beams.

Existing Conditions

Most of the outdoor areas are in generally good condition. There are many areas where algae or moss has grown on concrete and wood surfaces. Some concrete structures have minor cracks and spalls. There are exterior steel structures that show signs of corrosion.



Figure 4-110: A crack is present in the concrete near the entrance to the parking garage (source: Alpha Corporation, March 2017).



Figure 4-112: A concrete crack is present in the rear of the Filene Center adjacent to the air conditioning equipment (source: Alpha Corporation, March 2017).



Figure 4-111: Spalls reduce or eliminate concrete cover for steel reinforcement. Reinforcement corrosion due to lack of adequate cover causes rapid deterioration of reinforced concrete structures (source: Alpha Corporation, March 2017).





Figure 4-113: A significant crack in the concrete vertical wall to the right of the loading dock. The cause of this crack could not be determined by visual inspection. Additional testing is necessary to determine the extent of the crack and the proper repair (source: Alpha Corporation, March 2017).



Figure 4-114: This crack is in the concrete wall adjacent to the loading dock. If unrepaired, it will lead to more-significant future damage (source: Alpha Corporation, March 2017).

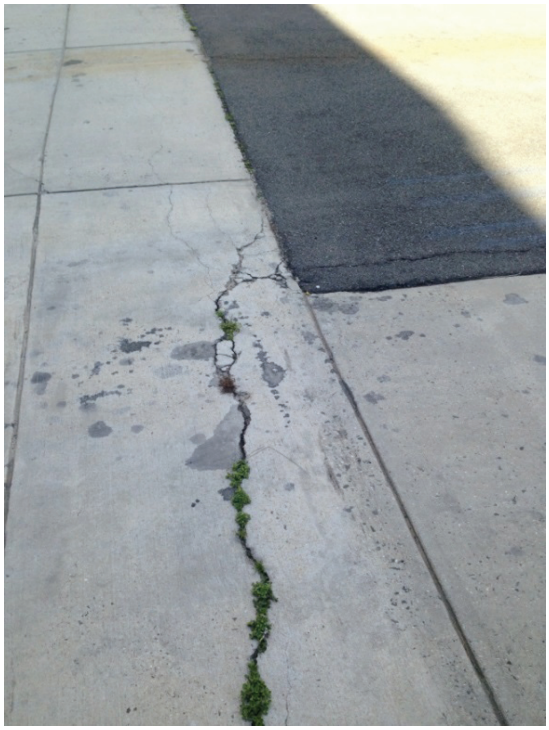


Figure 4-115: Concrete drive area backstage shows large cracks indicating failure of the subgrade. This location is where the existing parking garage ends and backfill begins (source: Alpha Corporation, March 2017).

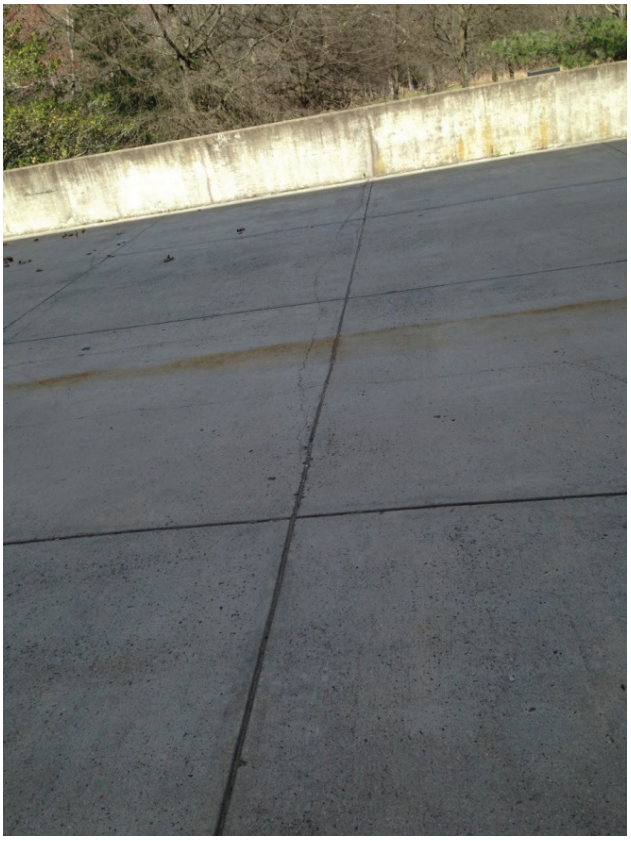


Figure 4-116: Additional concrete drive area showing large cracks. This is the same location and condition as noted in the previous photo (source: Alpha Corporation, March 2017).



Figure 4-117: Along the north wall, there are three cracks in the top of the wall within several feet of each other. Efflorescence is noticeable at the cracks. In addition, algae and moss are growing on the concrete surfaces (source: Alpha Corporation, March 2017).



Figure 4-118: Concrete reinforced columns beneath the parking garage all have a crack at the midpoint. Due to the consistency of this crack, it is due to the placement of the concrete during construction and does not cause any structural concern (source: Alpha Corporation, March 2017).



Figure 4-119: Typical construction of the parking garage roof beneath the rehearsal hall. Steel beam is missing fireproofing where pipe hangers were installed. This occurred in multiple areas (source: Alpha Corporation, March 2017).



Figure 4-120: Exterior concrete retaining walls adjacent to the loading dock have multiple vertical cracks (source: Alpha Corporation, March 2017).

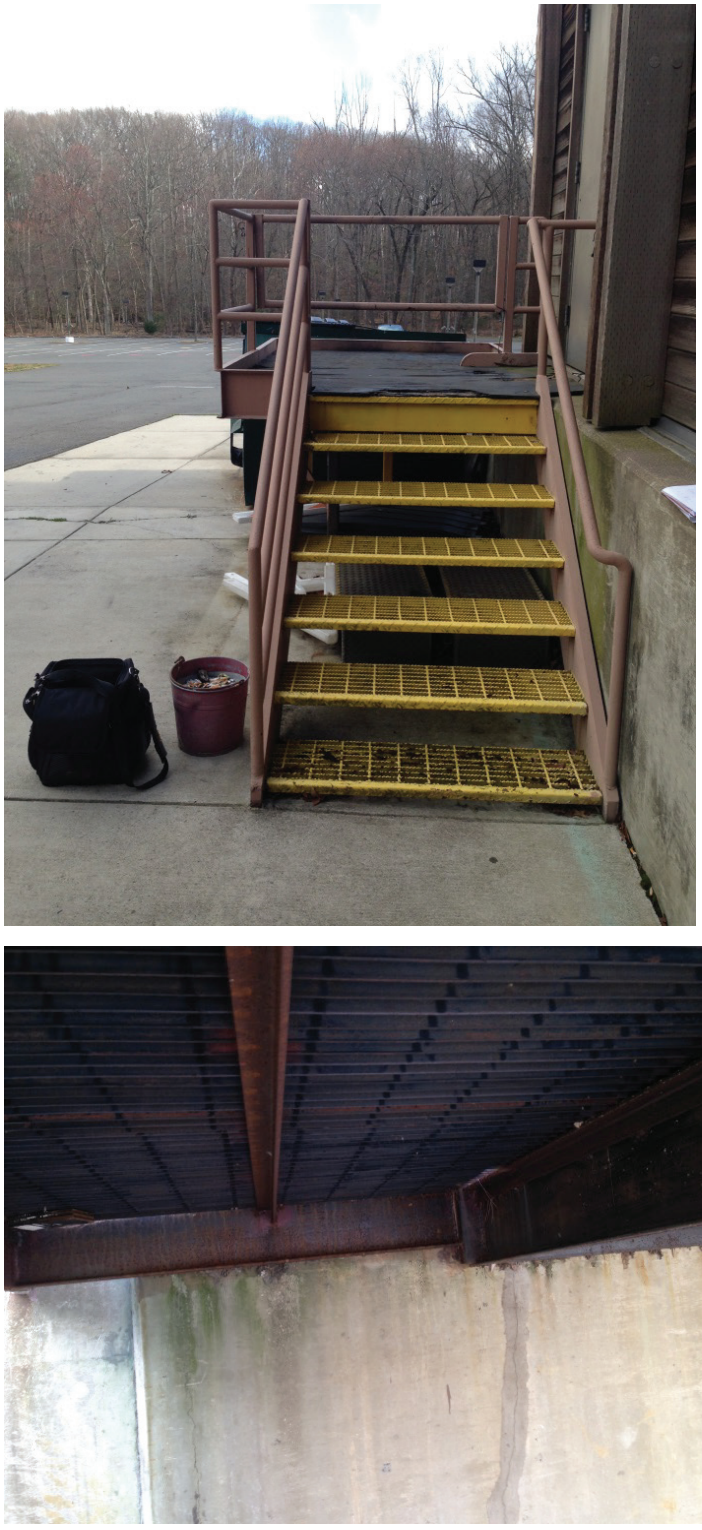


Figure 4-121: Metal framed walkway leading from the loading dock to the rehearsal hall. The plywood flooring sits on top of grating and is rotten. The steel framing beneath the deck shows signs of corrosion. The plywood holds moisture and speeds up corrosion of the substructure (source: Alpha Corporation, March 2017).



Figure 4-122: The exterior walls located along the north side of the loading dock are not aligned. The wall to the left is part of the parking garage. The wall to the right is a retaining wall and has moved 1" out of alignment with the adjacent wall. This aligns with the same location where the pavement has failed. Since there are no drawings it is possible the retaining wall is designed as a battered wall. To determine if the wall is failing additional testing is necessary. If unrepaired, the spall could lead to reinforcement corrosion and additional problems (source: Alpha Corporation, March 2017).



Figure 4-124: Several vertical and horizontal cracks are present in the concrete at the loading dock. Additional deterioration of the concrete will occur if these cracks are not repaired. The steel angle shows signs of corrosion (source: Alpha Corporation, March 2017).

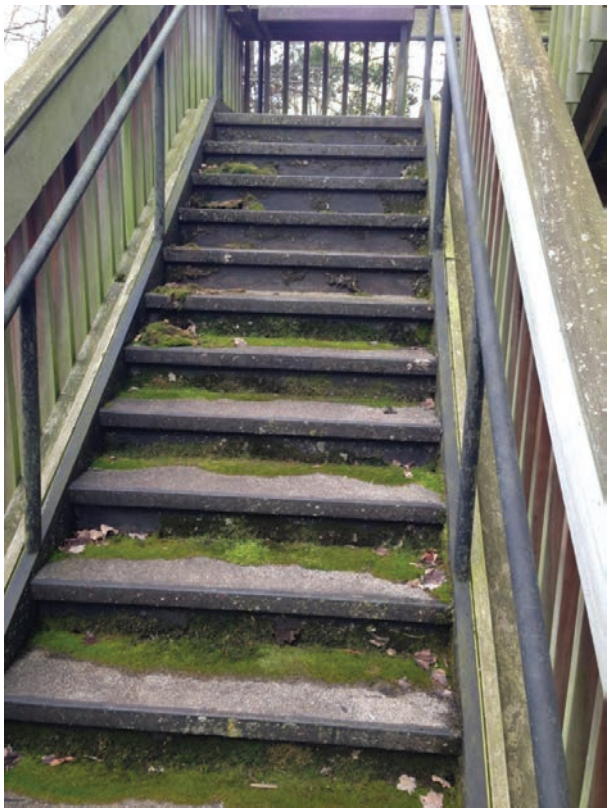


Figure 4-123: Stairwell on north wall adjacent to the green room has moss growing on the stairs. The moss will lead to deterioration of the stairs if not removed. The stairs are in good condition except for the algae and moss (source: Alpha Corporation, March 2017).



Figure 4-125: Stairwell on north wall adjacent to the green room has wood framing beneath the lower landing that is in bad condition (source: Alpha Corporation, March 2017).



Figure 4-126: Exterior concrete surfaces and wood siding are covered with algae and moss in several locations around the building (source: Alpha Corporation, March 2017).



Figure 4-127: This landing was constructed as a slab-on-grade, but the soil adjacent to the slab has eroded away because of the slope. The corner of the slab will fail if this erosion is not corrected (source: Alpha Corporation, March 2017).



Figure 4-128: Yellow and green algae and moss was evident on the exterior concrete at the base of the fins in the house area. The algae and moss has started to deteriorate the concrete (source: Alpha Corporation, March 2017).



Figure 4-129: The exterior lean-to which protects the mechanical equipment for the office area contains rotting plywood, discolored lumber and lumber that is not pressure treated (source: Alpha Corporation, March 2017).



Figure 4-130: The lean-to structure that protects the air conditioning unit is tilted and in poor condition. It is unlikely that it is designed for the snow drift from the main Filene Center structure. It lacks adequate lateral restraint (source: Alpha Corporation, March 2017).

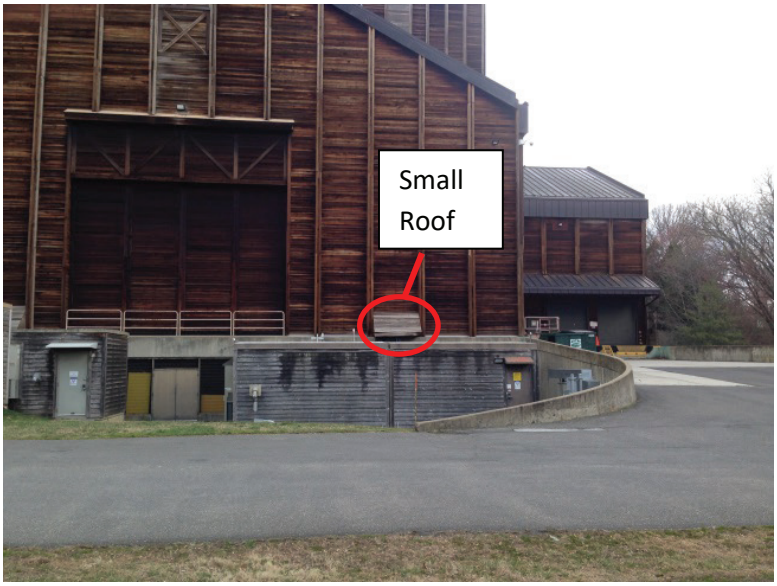


Figure 4-131: The small roof to the right of the large door was installed to protect electrical conduit that runs to the adjacent exterior structures. The roof is not protected from the elements with roofing material and trim. It is in poor condition and it is unlikely to be designed for the snow drift from the rehearsal hall roof. Failure of the roof could cause damage to the electrical wiring and possible fire. The single level structures in the fore front of the photo are not part of the building and were not included in the survey (source: Alpha Corporation, March 2017).

Column Foundations and Baseplates

Construction

For the most part, column baseplates and foundations were hidden from view and were not included in the visual inspection. In two areas, the foundation and baseplates were visually inspected. The top of the foundations in the house area was viewable. The baseplates and footing were not visible. Since the baseplates were not visible, it was assumed that the visible concrete was an overpour that helps protect the baseplate from corrosion and provides a common look at each column in the house area.

The steel baseplates and anchors for columns in the grass area beyond the house area were also visible.

Existing Conditions

Most of the pours around the columns in the house area were in good condition. Only one was noted as having an issue.

The exposed anchor bolts in the grass area were painted but over time have suffered some section loss due to corrosion. These anchors are located in an exterior location with no protection from the elements. The use of polyurethane coatings is advised for these locations.



Figure 4-132: The crack at the over pour portion at the column base extends up the sides and across the entire width of the pour. The column in the picture is not the structural column. It is a cavity that covers the structural column, rain gutters, fire protection pipes and other miscellaneous conduits (source: Alpha Corporation, March 2017).



Figure 4-133: Anchor bolts for columns supporting the walkway in the grassy area beyond the house area show signs of corrosion. It is anticipated that the section loss is less than 5% and has not created a structural issue to date. The corrosion is significant and concentrated in an area that catches and holds water. As the corrosion increases, it will trap more water and make the situation worse. Since the anchors are installed outside, polyurethane high performance coatings are advised for these types of anchor bolts (source: Alpha Corporation, March 2017).

ASSESSMENT

The Filene Center is in generally in good condition from a structural standpoint. The 1985 repairs made to the G1 and G2 girders above the house seating area have been effective in preventing further cracks in the girders. An inspection within one of the G3 girders showed that there was some corrosion on the girder interior. It should be expected that the other girders experience a similar degree of corrosion. The interior of the girders are not painted or otherwise coated. Because the Filene Center house is open to the weather, the humidity conditions are worse than for typical indoor structures, and these conditions promote increased corrosion rates. Based on this, the girders should be monitored for corrosion.

There is also some corrosion of other steel members. The degree of corrosion does not currently reduce the strength of the structure, but the corrosion should be removed and surfaces repainted. The anchor bolts in the grass area and the stair entrance at the rehearsal hall should be given priority since they were in the worst condition.

There are some girders and beams that are missing bolts, some these connections need to be evaluated and corrected if found to be inadequate. In a few cases, modifications to members may be required to install the missing bolts.

There are areas where fireproofing has detached from steel structures. A review of the fire codes to determine if and where fireproofing is necessary has not been accomplished.

Some of the concrete structures show cracks and minor spalls and there is a potential issue with the retaining wall adjacent to the loading dock. Most of the cracks and spalls are not significant and do not pose an immediate structural issue. The worst crack noted to the right of the loading dock is a deficiency that should be given priority for repair. The retaining wall requires further investigation and at a minimum should be monitored for any movement. Cracking where efflorescence is present will create future problems if not repaired. For the most part, these repairs are not expensive and can prevent more expensive issues in the future.

Several exterior wood structures were found to have multiple issues. Untreated wood should be protected from moisture and in some cases structures need to be replaced or repaired. These structures protect electrical or mechanical equipment. Failure of these structures could cause issues with existing systems and create a potential for fire.

There are outside areas of the building that are covered with yellow and green-colored algae and moss. The algae and moss promotes increased decay of wood surfaces, increases the potential for spalling on concrete surfaces and poses a slipping

hazard on walkways. The yellow and green algae and moss is particularly aggressive and is starting to damage the concrete surface at the shear walls. For the shear walls, the algae and moss removal should be a priority.

Building Systems

Mechanical

1. The mechanical systems that serve the facility were designed as part of the 1984 reconstructed Filene Center. In 1998, the mechanical systems were substantially replaced to include an air cooled chiller with a remote condenser, chilled water pumps, piping and two central station air handling units to serve the lower level spaces.
   a) The air cooled reciprocating chiller with remote air cooled condenser was replaced in May 2017. The chiller provides chilled water circulated by base mounted 7.5 hp centrifugal pumps to two York central air handling units located in the main mechanical room. The chiller operation is enabled when the outside air temperature is above 55°F ambient and there is a call for cooling by one of the two air handling units. No refrigerant monitoring system was observed to provide protection in the event of a refrigerant leak within the mechanical room.
   b) The two existing York air handling units provide ventilation and cooling to lower level spaces using 15 hp variable volume supply fans controlled by variable speed drives. See figure 4-134. These units deliver air to offices, chorus rooms, lounge, waiting and other staff spaces. Each unit serves half of the lower level spaces. Variable volume terminals with electric heating coils provide the temperature controlled conditioning to the spaces. Outside air ventilation is provided ducted from exterior wall louvers to the air handling units.
   c) Siemens replaced the automatic temperature controls for the air handling units in 2015 providing new direct digital controls to include new electric actuated dampers and valves to replace the pneumatic actuators.

2. The three floors of offices and support areas on south side of the facility as well as the crew lounge area on the opposite side of the building are cooled and heated with the glycol cooled vertical heat pumps.
   a) A 3” piping loop circulates the glycol solution to the heat pumps on both sides of the Filene Center. This system was designed in 1984 with components replaced as part of 2015 energy project. A new Heatcraft dry cooler, piping and pumps were provided located at grade on the south side of the building. See figure 4-135.



Figure 4-134: York air handling units (source: Summer Consultants, Inc., February 2017).



Figure 4-135: Piping loop circulating glycol solution to the heat pump (source: Summer Consultants, Inc., February 2017).

   b) Vertical heat pumps provide between ½ ton and 1-1/2 ton of cooling capacity and as well as space heating depending on the size of the space.
   c) There does not appear to be outside air ventilation provided to the occupied spaces in accordance with current code requirements.
   d) The crew mezzanine rooms were reported to have inconsistent cooling which could be related to the inability of the heat pumps to provide the required cooling based upon the variety of cooling loading conditions or if there is an operational constraint in operating the system. Toilet spaces adjacent to the crew mezzanine rooms are exhausted, however, there is no direct outside air ventilation provided to the rooms.

3. A split direct expansion, 5 ton air conditioning unit serves the IT closet.
4. A horizontal direct expansion, 5 ton fan coil unit with a remote condensing unit serves the lighting control room.
5. Four large roof mounted exhaust fans each sized for 25,000 cubic feet per minute (CFM) ventilation serve the stage tower area controlled by remote switches. These fans are scheduled to be replaced in late 2017 or early 2018.
6. Toilet room spaces are served by ceiling exhaust fans and heated with electric cabinet heaters.
7. Storage rooms and the generator room are exhausted and heated with electric cabinet unit heaters.
8. The switchgear room and elevator machine room are exhausted with wall mounted propeller fans.

Plumbing

1. The building is served by a 3” domestic water service. See figure 4-136.
2. A 300 kW Patterson-Kelly electric water heater dated 1983 and large storage tank provide domestic hot water to serve the facility.
3. Private toilet rooms are located throughout the lower level adjacent to training rooms for the usage of the performers to include water closets, lavatories and shower facilities. None of the observed fixtures appear to be ADA accessible.
4. There are two public toilet room areas in the lower level, one accessed from the south side building entrance requiring the patrons to descend to the lower level. Larger men’s and women’s toilet facilities are located on the north side of the facility, accessed from exterior doors. These toilet rooms include water closets, urinals and lavatories to include ADA accessible fixtures. See figure 4-137. The flush valves have been retrofitted and the lavatory faucets provided with low flow aerators.
5. Electric water coolers are located adjacent to the toilet room areas to include an ADA accessible water cooler.



Figure 4-136: Domestic water service (source: Summer Consultants, Inc., February 2017).



Figure 4-137: Public toilet rooms (source: Summer Consultants, Inc., February 2017).

Electrical

1. Dominion Power provides the Filene Center at Wolf Trap with a 4,000 amp three phase 480/277V service. The 4,000A main switchgear is located in the main electrical room located in the northeast corner of the lower level. The main switchgear is original to the 1984 reconstruction of the Filene Center and is reaching the end of its useful life. See figure 4-138 for the main switchgear.
    a) The main switchgear provides 480V to panelboards located throughout the center. Small dry type transformers are located mainly in electrical closets which transform the 480V power to 120/208V to serve the 120/208V branch circuit panelboards. Most of the dry type transformers and branch circuit panelboards are original to the 1984 reconstruction and are reaching the end of their useful life.
    b) A 3000A GE Power Break Switchboard is located in the lighting control room. This Switchboard servers the all of the lighting control equipment.



Figure 4-138: Main switchgear, (source: Summer Consultants, Inc., February 2017).

2. The Filene Center is provided with a 300kW/375kVA 277/480V 3 phase life safety generator. The generator provides backup power to the 75f Horse Power (HP) fire pump, egress lighting, and the Cell Panel. See 4-139 for the generator.
   a) The active loads fed out of the cell panel are Transformer TLC-1, Coop transformer, Panel W and a Transformer that serves Verizon.
   b) In the event of a power failure the emergency generator currently does not serve all the loads necessary that would allow for equipment to be move out of or into the Filene Center which can cripple the incoming or outgoing show from either setting up or take down.



Figure 4-139: Generator (source: Summer Consultants, Inc., February 2017).

3. Most of the lighting in the Filene Center lower level consists of recessed 2x4 lensed fixtures retrofitted with LEDs. The work lights for the stage and rehearsal hall generally consist of LED high bays and wall mounted fixtures. The office spaces uses a 2x4 volumetric fixture. See figures 4-140 to 4-142 for interior lighting.
   a. The lamps and fixtures were replaced recently under an energy savings contract.
   b. The stage itself has specialty stage lighting and is controlled by a lighting control system located in the Lower Level.
   c. Occupancy Sensors are located throughout the lower level.
   d. The exit lights are LED.



Figure 4-140: Office lighting (source: Summer Consultants, Inc., February 2017).



Figure 4-141: Back stage work lights (source: Summer Consultants, Inc., February 2017).

e. The lighting on the exterior of the building consists of LED Wall Paks. See figure 4-143 for the exterior wall pak fixture.
f. There are box type pole lights in the parking lots. See figure 4-144.



Figure 4-142: Recessed lensed 2x4 (source: Summer Consultants, Inc., February 2017).

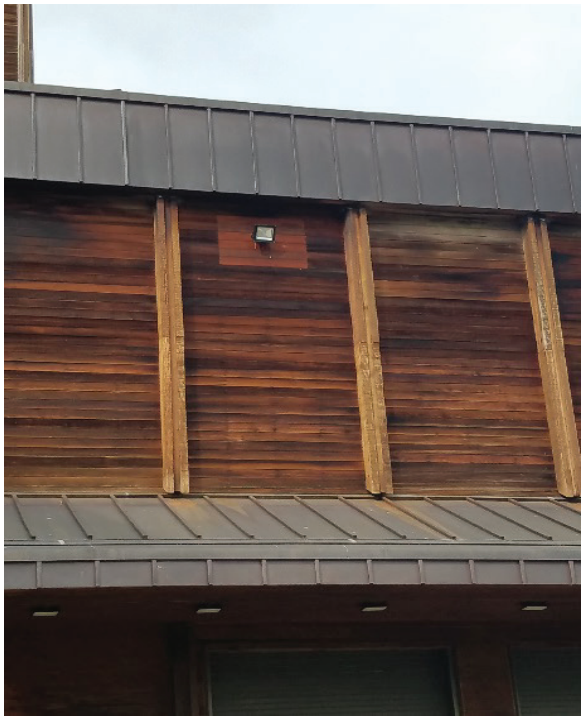
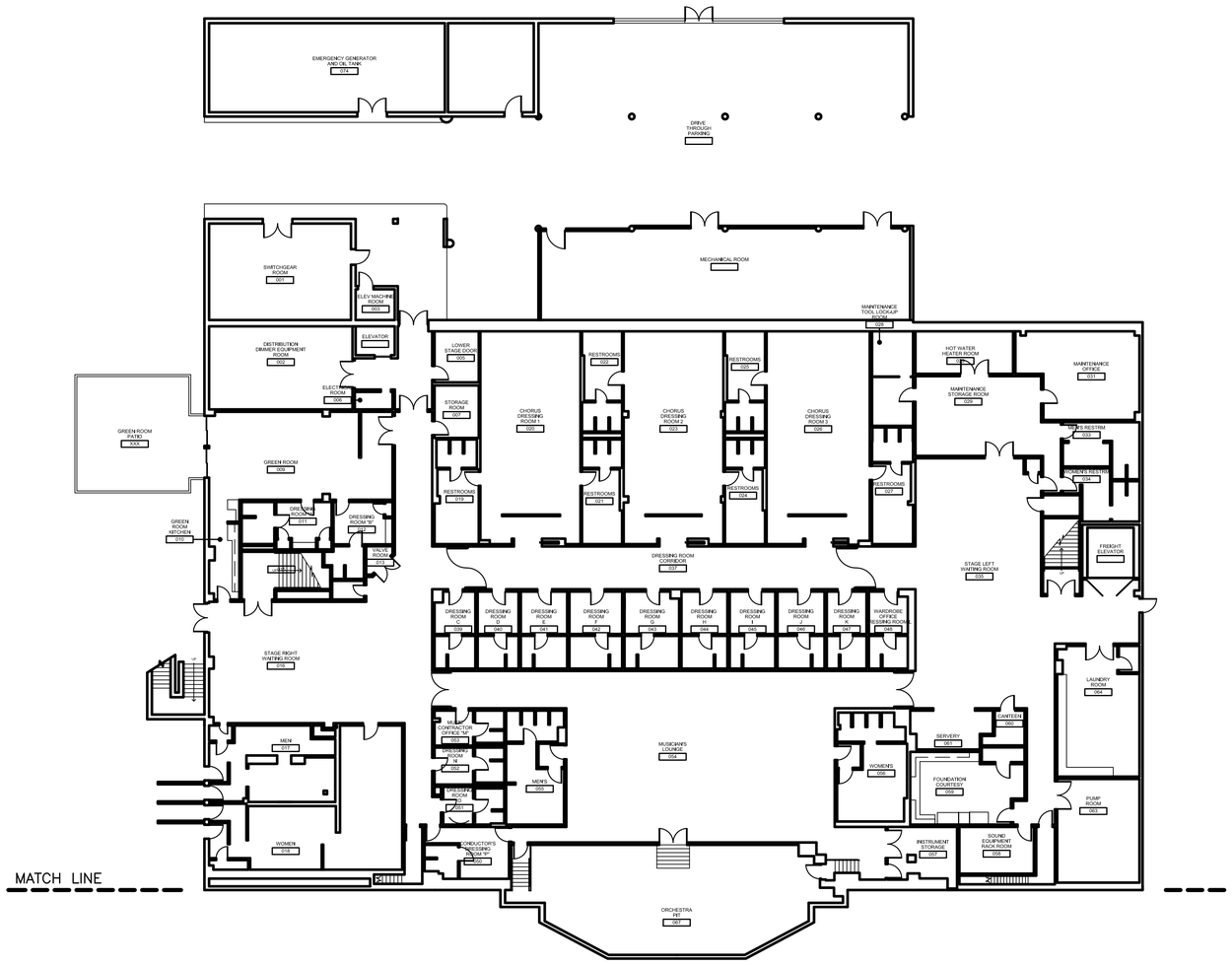


Figure 4-143: Exterior LED wall pak (source: Summer Consultants, Inc., February 2017).



Figure 4-144: Parking lot box type pole fixture (source: Summer Consultants, Inc., February 2017).



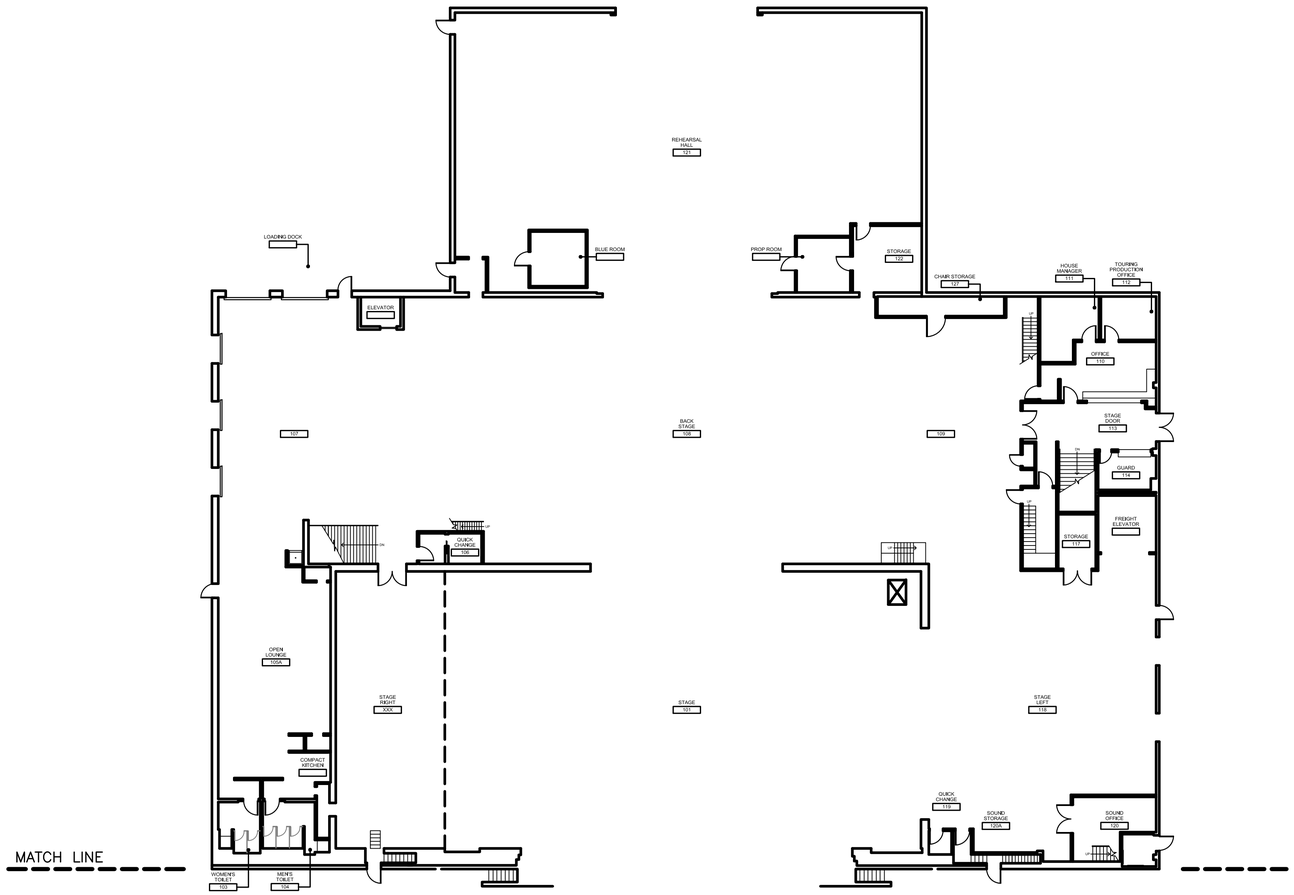
1 / A1 LOWER LEVEL PLAN

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SCALE OF FEET

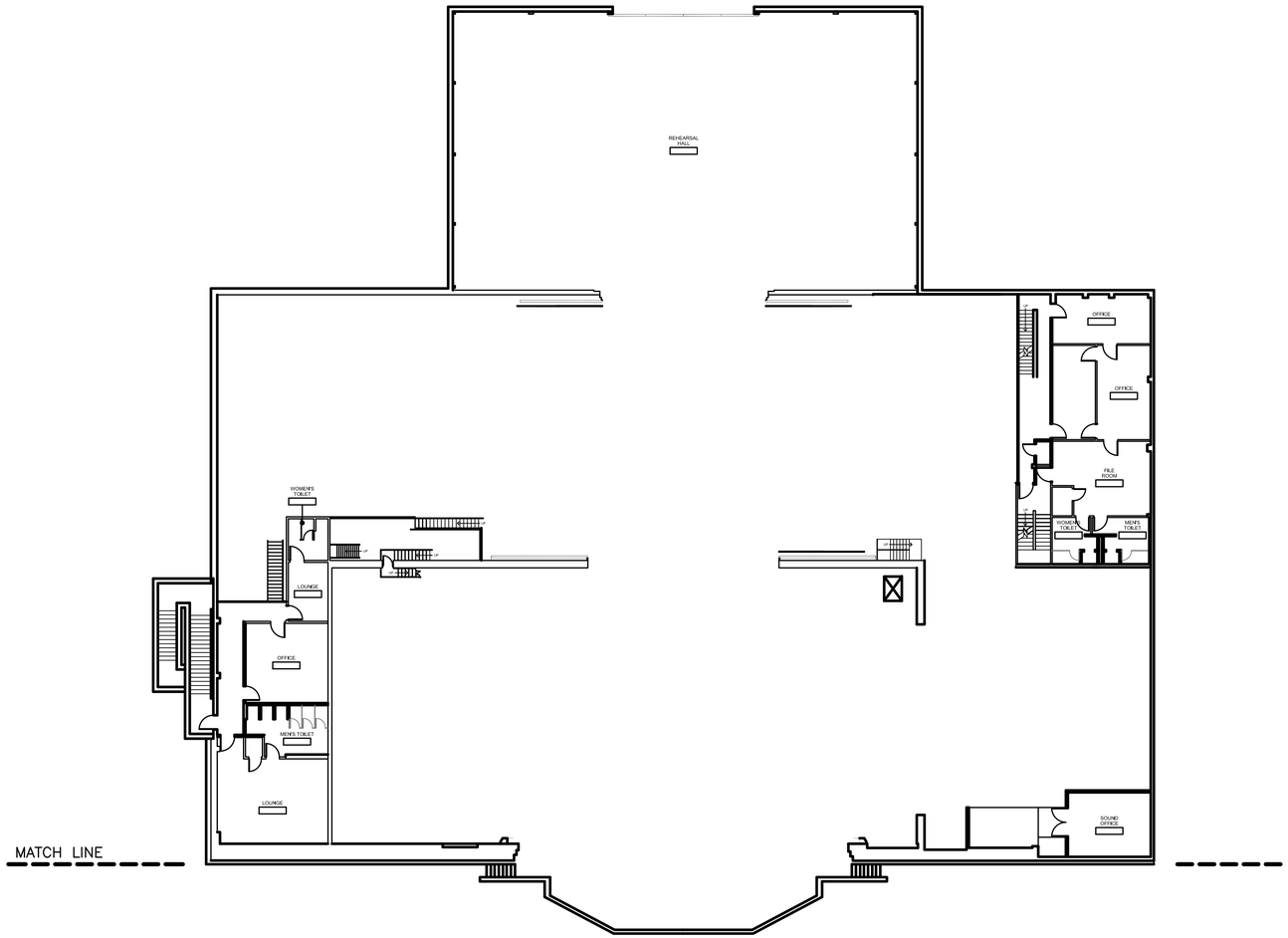
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DATE: 06/26/17			



1 / A2 STAGE LEVEL
SCALE (A)

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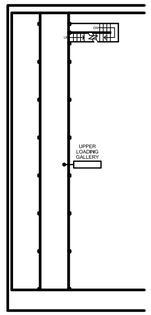
1 / A3 PRODUCTION OFFICE, SOUND DEPARTMENT OFFICE, CREW QUARTERS

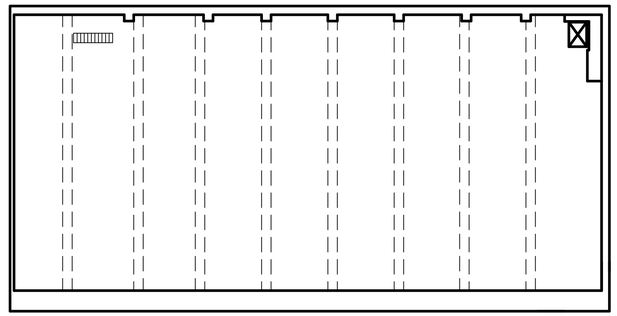
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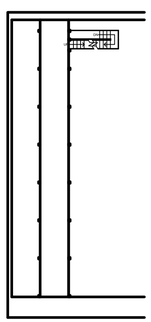
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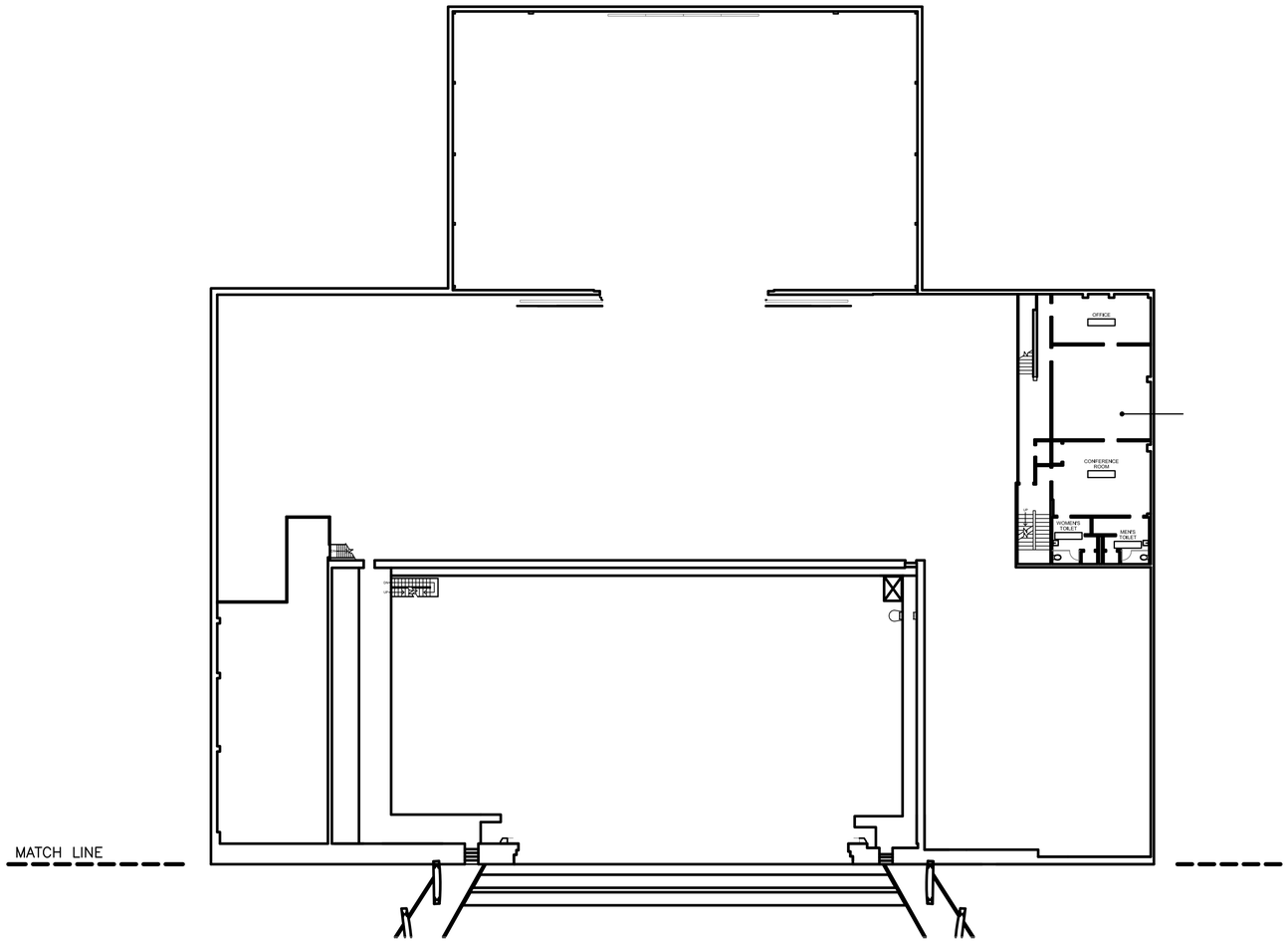




1 / A4 GRIDIRON LEVEL
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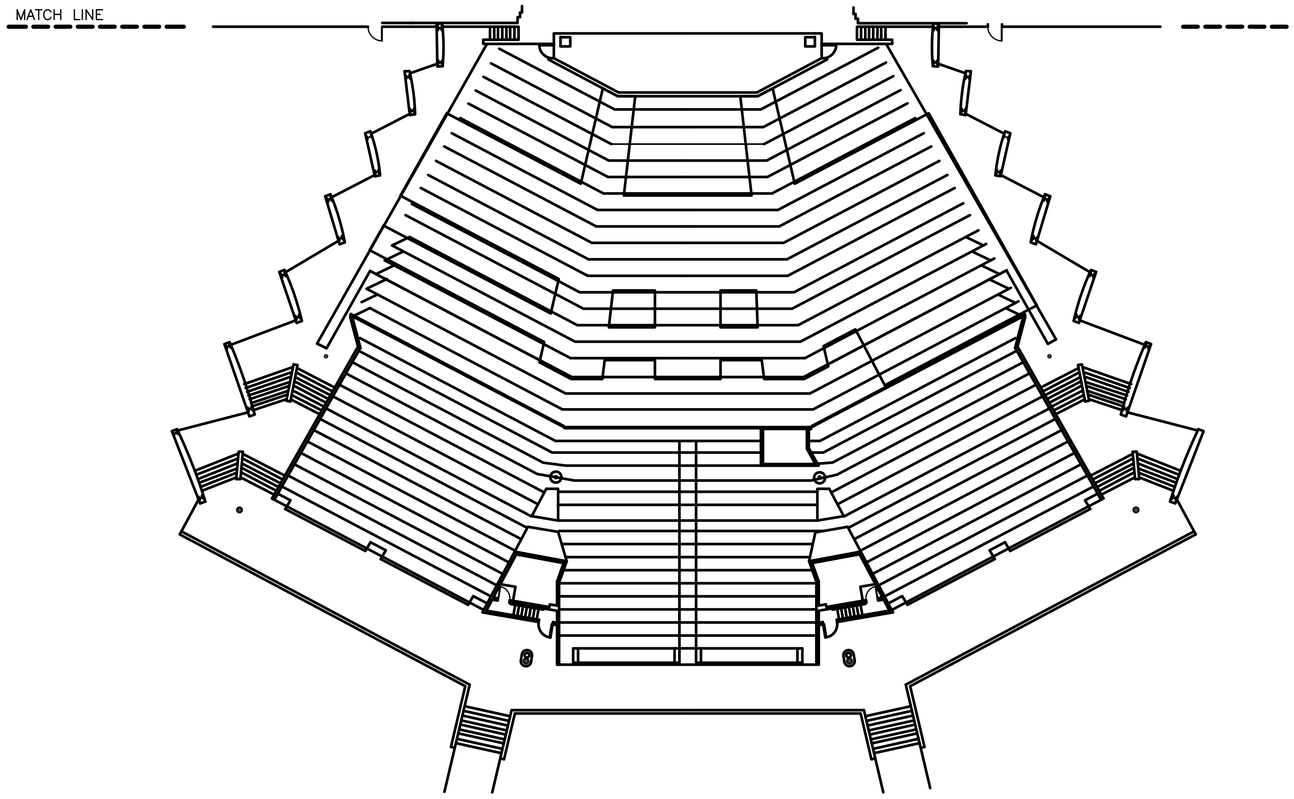
1 / A5 THIRD LEVEL – FOUNDATION OFFICES, STORAGE LOFT, 35' LOFT

SCALE Ⓐ

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SCALE OF FEET

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1 / A6 HOUSE SEATING AREA – ORCHESTRA LEVEL

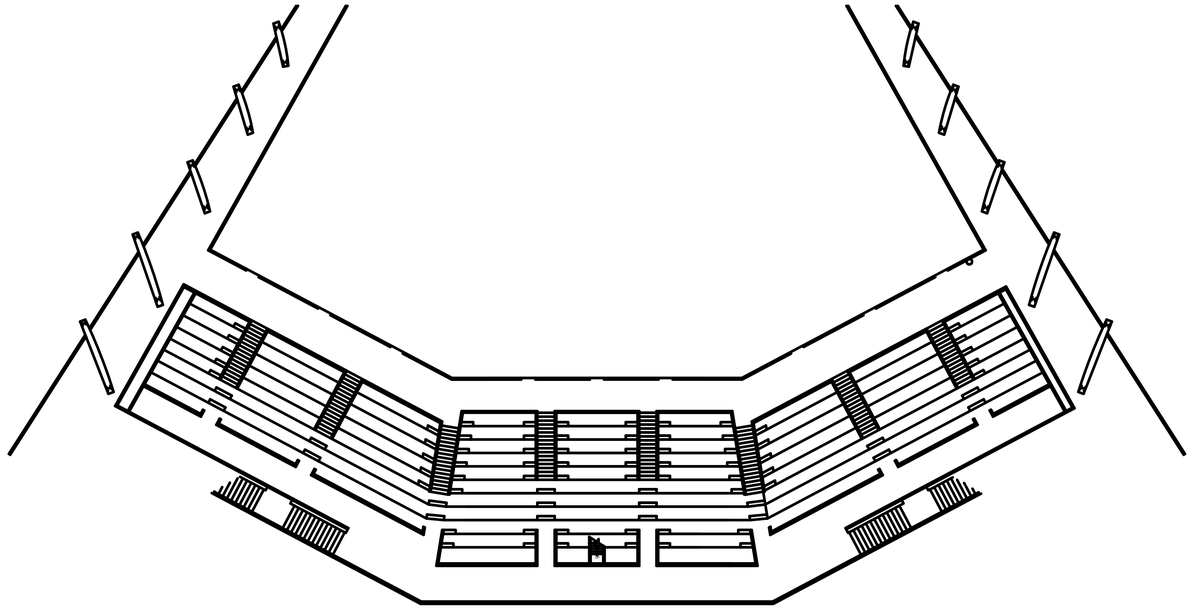
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MATCH LINE



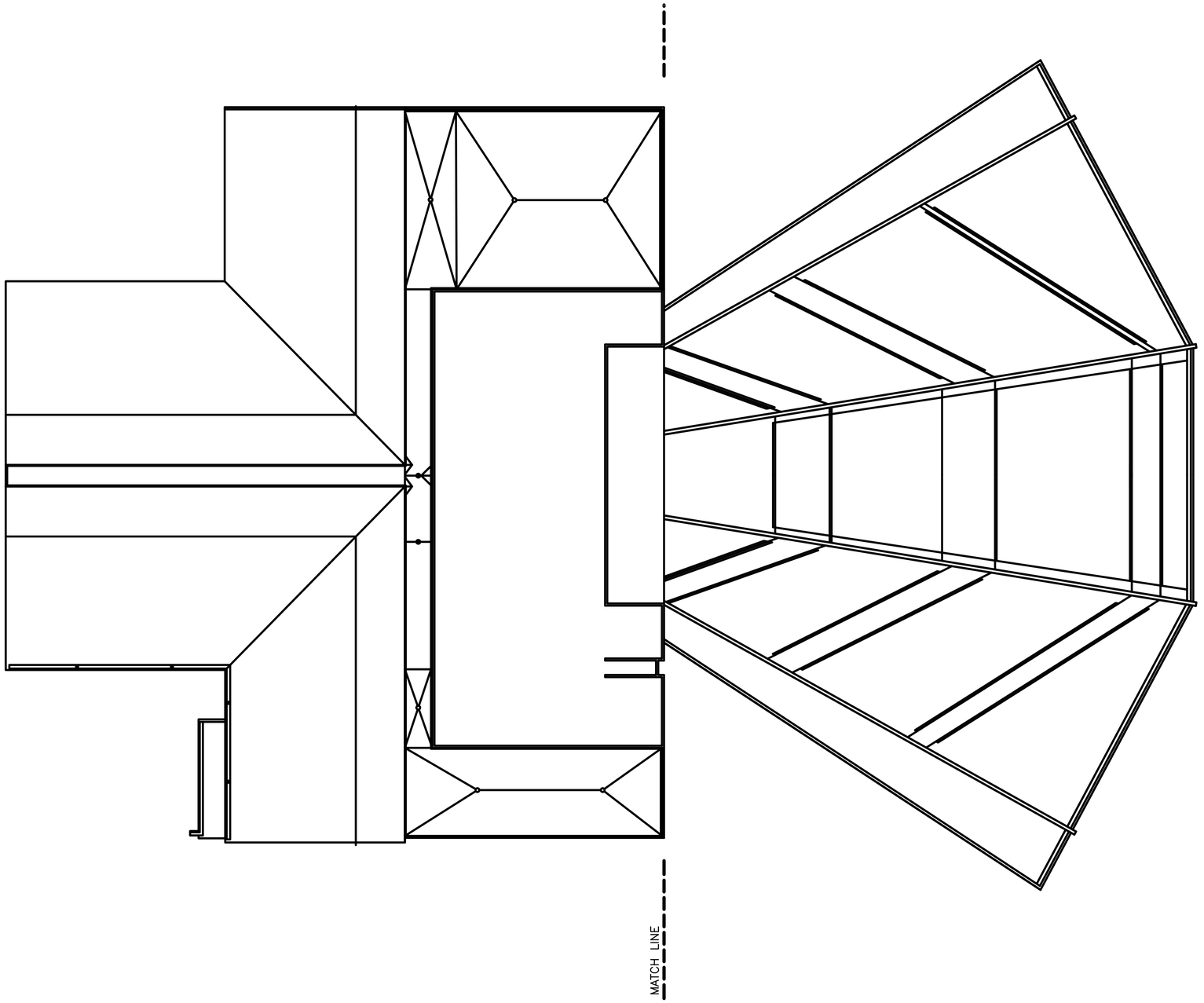
1 / A7 LOGE TIER LEVEL

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SCALE OF FEET

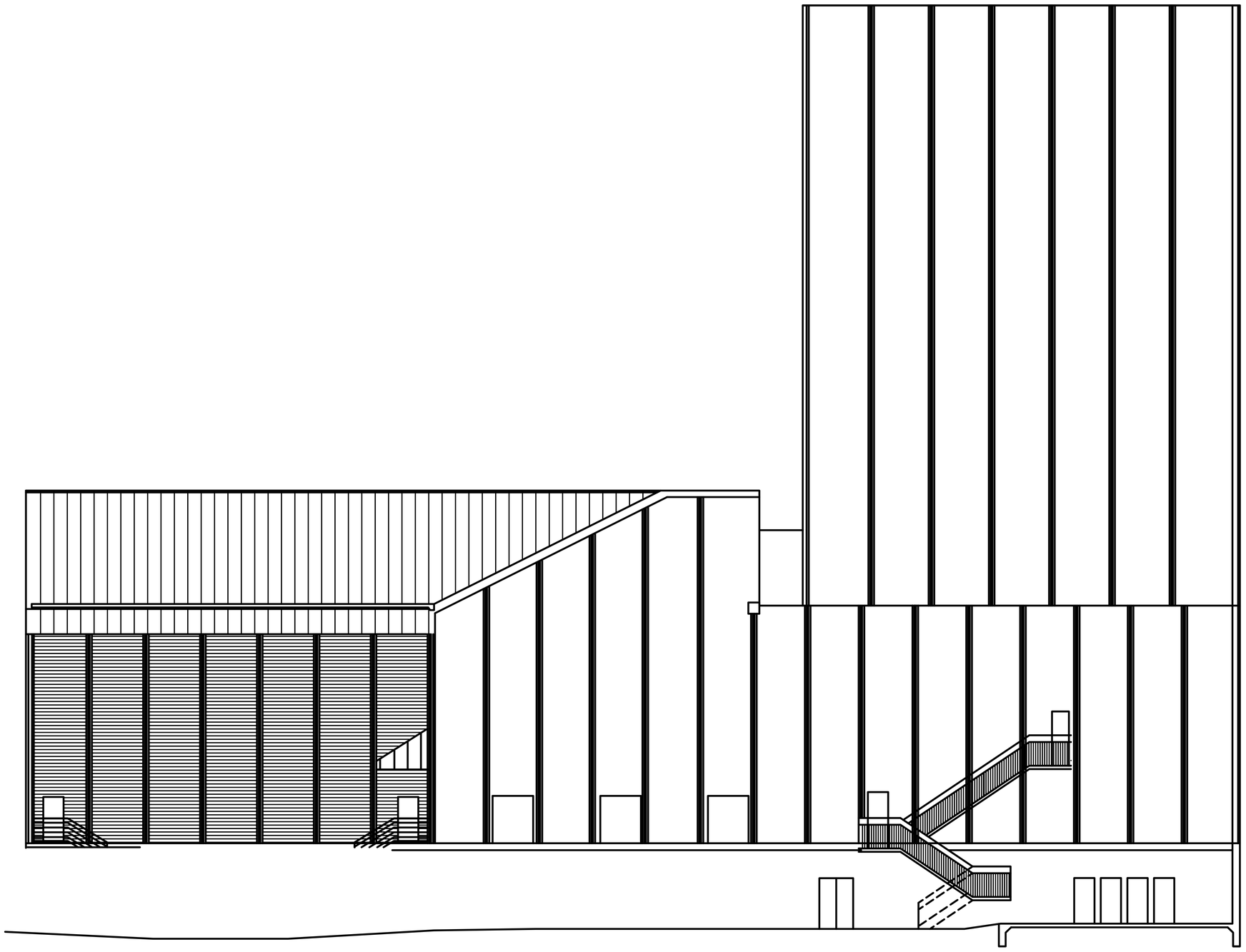
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1 / A8 ROOF PLAN
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SCALE OF FEET

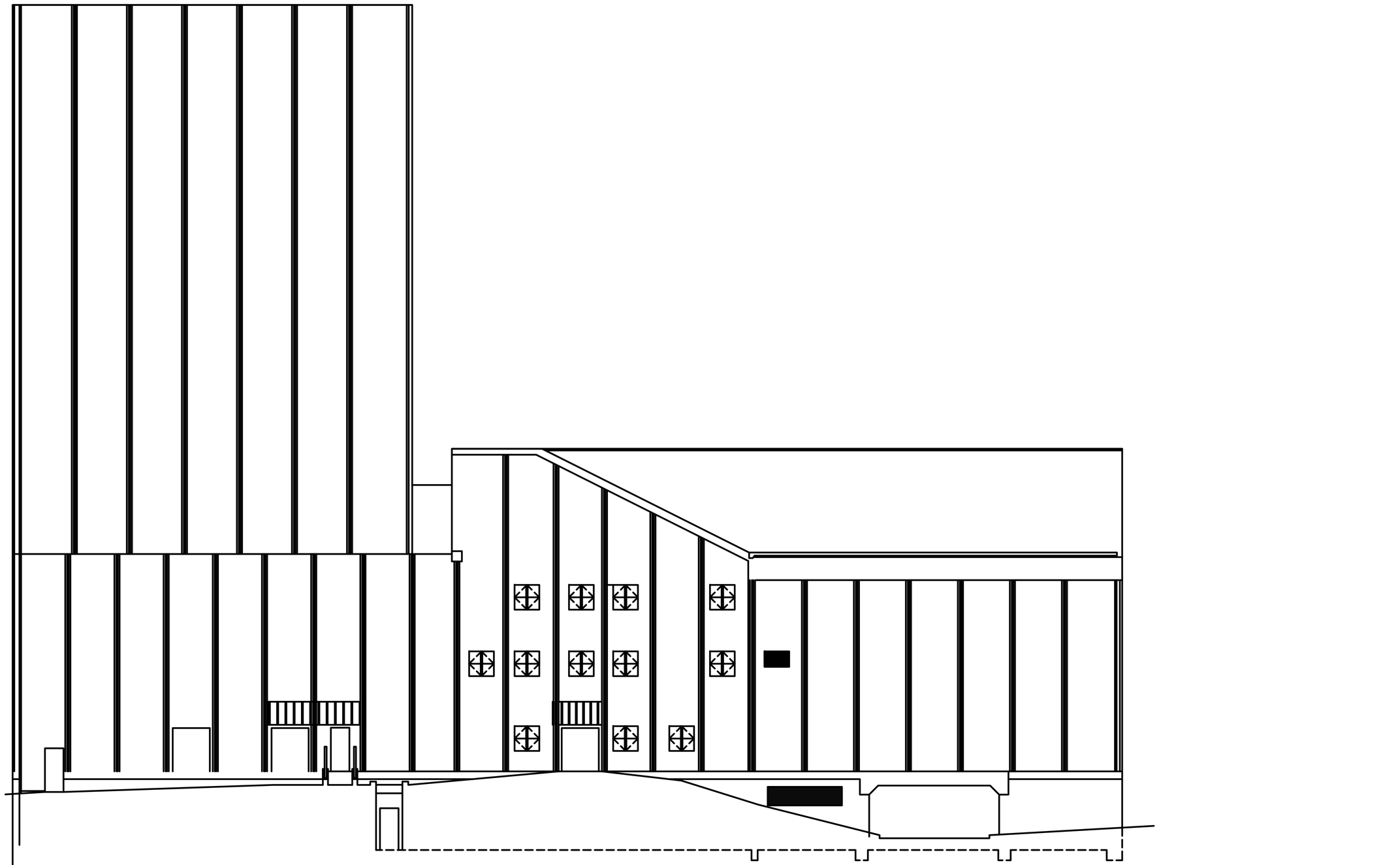
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SCALE Ⓐ 8 0 8 16
SCALE OF FEET

1 / A9 EAST ELEVATION
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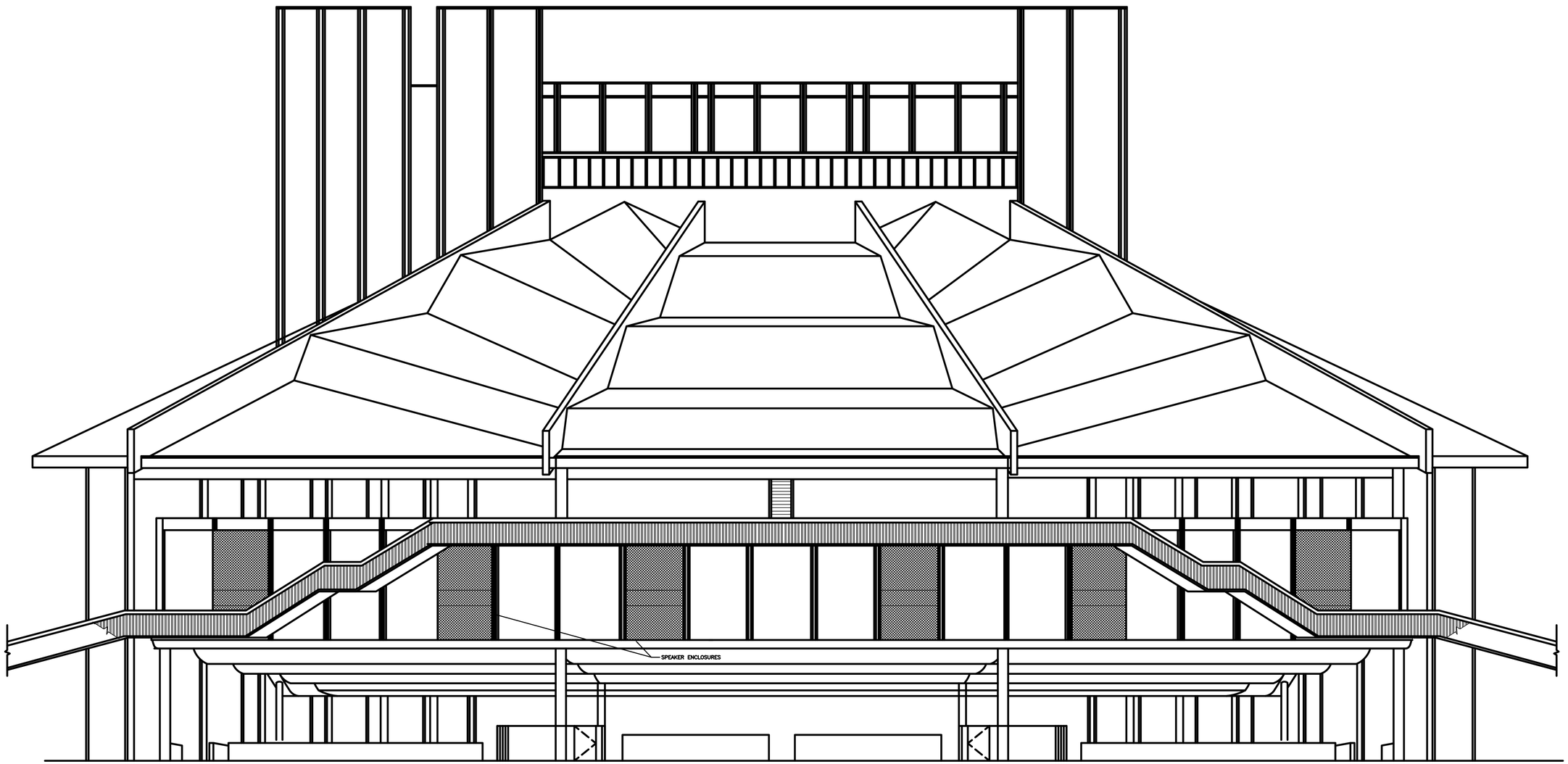
1 / A10 WEST ELEVATION

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1 / A11 NORTH ELEVATION
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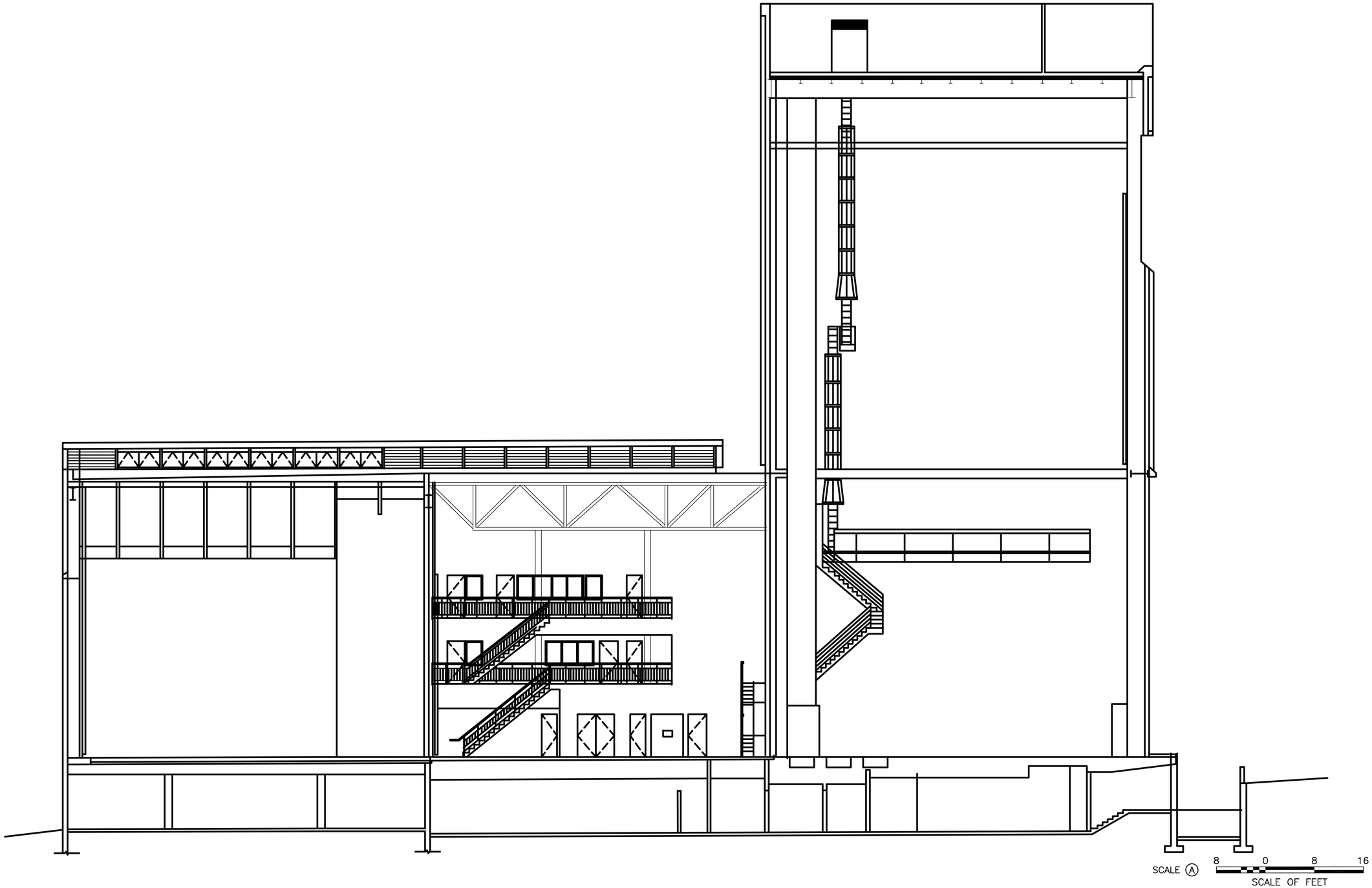
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SCALE OF FEET

1 / A12 SOUTH ELEVATION

SCALE Ⓐ

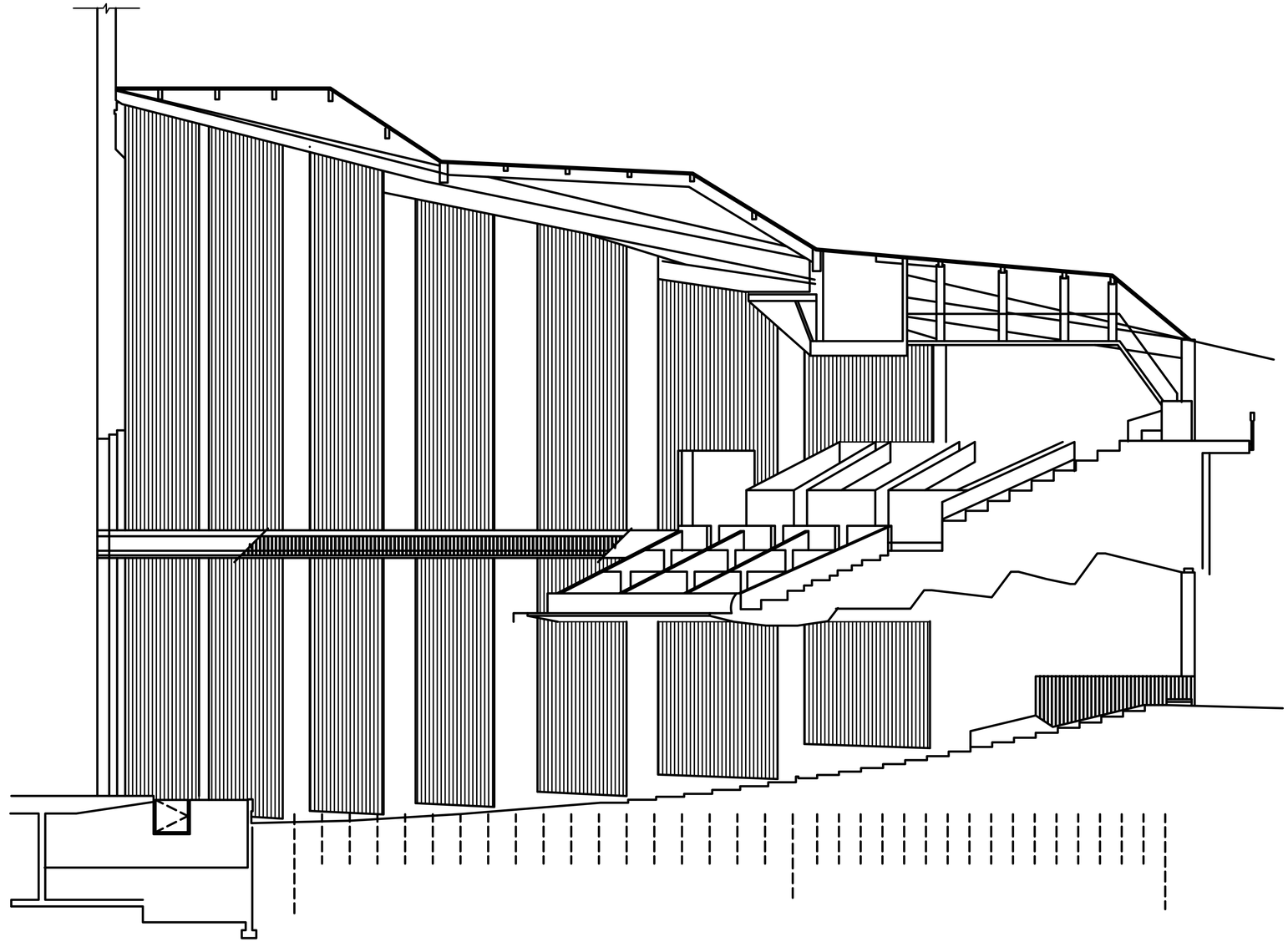
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SCALE Ⓐ 8 0 8 16
SCALE OF FEET

1 / A13 LONGITUDINAL SECTION
SCALE Ⓐ

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SCALE Ⓐ 8 0 8 16
SCALE OF FEET

1 / A14 LONGITUDINAL SECTION
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DESIGNED: MV CADD MV TECH. REVIEW: TR DATE: 06/26/17	SUB SHEET NO. A14	TITLE OF SHEET LONGITUDINAL SECTION HISTORIC STRUCTURE REPORT FOR THE FILENE CENTER	DRAWING NO. 646 / 124865 PMIS/PKG NO. GATE201069C SHEET 1 OF 6

Chapter 5: Treatment Analysis

Ultimate Treatment and Use

The Secretary of the Interior has established standards and guidelines for the appropriate treatment of historic properties. These standards identify three approaches that might be considered for treatment and use of the Filene Center: preservation, restoration, and rehabilitation (the fourth approach, reconstruction, is not an applicable treatment approach for this site).

Preservation
Preservation is defined as “the act or process of applying measures necessary to sustain the existing form, integrity, and materials of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction. New exterior additions are not within the scope of this treatment; however, the limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a preservation project.” Under preservation, the Filene Center would be maintained in more or less its present state, with the minimal maintenance necessary to continue it in its present condition. It would continue to have the additions and alterations that have occurred. Simply repairing and preserving the building in its current state would not meet the mandates of the enabling legislation or the needs of the park, and therefore preservation is not an appropriate approach.

Restoration
Restoration is defined as “the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period. The limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a restoration project.” This

approach as applied to the Filene Center would likely mandate its restoration to the period of significance (its original construction dates). Although restoration is an appropriate approach given the significance of the Center, it would not address ongoing issues with conducting performances, meeting technical requirements, and accommodating visitors, and in fact would remove necessary square footage and functions. Restoration is therefore not a viable approach.

Rehabilitation

Rehabilitation is defined as "the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values." A rehabilitation approach to treatment would provide the most flexibility in the use of the Filene Center. This approach emphasizes the retention and repair of historic materials, but more latitude is provided for replacement because it is assumed the property is more deteriorated prior to work. Like those for preservation, the standards for rehabilitation focus attention on the preservation of those materials, features, finishes, spaces, and spatial relationships that, together, give a property its historic character. Therefore, rehabilitation is the recommended approach to treatment for the Filene Center.

Proposed Use

The Filene Center was constructed as a performing arts facility as well as providing amenities for visitor comfort. Given the building's location and historic use, it is most appropriate to continue its use as a performing arts facility. No other alternative uses have been identified, nor are there plans for construction of a new facility. The current General Management Plan calls for the Filene Center to continue in its present use. This HSR is being prepared to guide the future rehabilitation of the Filene Center with that assumption.

For the purpose of this report, the Filene Center is being treated as a historic structure. While it has not yet been determined eligible for the National Register, the evaluation in Chapter 3 recommends that the building be treated as eligible until its status can be formally determined. This HSR is written with the assumption that the building is eligible and makes recommendations accordingly.

While there will always be a need for additional historical and architectural research and while physical conditions change over time, the data so far collected provides a good foundation of knowledge on which to plan for the building's future.

Preservation Zones

To aid in future planning and work, the spaces of the Filene Center have been classified into preservation zones. Zones are defined as follows:

Primary: Primary zones are defined as those that were designed as important public spaces, were original to the design of the Filene Center, and retain integrity to the period of significance. Great care should be taken to preserve the character-defining features of these spaces when undertaking any future work. Necessary alterations should be concealed or complementary to the original design but remain distinct from the character of the original fabric. Examples of primary zones include the auditorium (main level and balcony seating) and the front and main stages.

Secondary: Secondary zones are defined as those that were designed as important public spaces but have subsequently lost some degree of integrity through alterations; or that were added after the period of significance but designed to complement the character of the original design. Greater latitude is permitted in making necessary alterations in these areas, but work should remain complementary to the original design. Examples of secondary zones include the corridors, musician/performer lounges, orchestra pit, and green room, all on the lower (dressing room) level.

Tertiary: Tertiary zones are defined as those that were designed as utilitarian or non-public spaces, or have been significantly altered in a manner not complementary to the character of the original design. Significant alterations are permissible in these spaces, but care should be taken to ensure that alterations preserve any remaining historic fabric and do not impact the character of the primary and secondary zones. Examples of tertiary spaces include the back stage, rehearsal hall, and office/support spaces on the stage level, dressing rooms and storage/utility spaces on the lower (dressing room) level, the parking garage, and the offices, support spaces, and crew quarters on the second and third levels.

Diagrams illustrating the preservation zones are provided at the end of this chapter.

Requirements for Treatment and Use

A number of laws, regulations, and functional requirements circumscribe treatment and use of the historic structures in our National Parks. In addition to protecting the cultural resource, these requirements also address issues of human safety, fire protection, energy conservation, abatement of hazardous materials, and handicapped accessibility. Some of these requirements may contradict or be at cross purposes with one another if they are rigidly interpreted. Any treatment must be carefully considered in order that the historic fabric of the structure be preserved.

Authorizing Legislation

On October 15, 1966 Congress accepted a gift of property from Catherine Filene Shouse and through Public Law 107-219 authorized the creation of the Wolf Trap Farm Park (The Park's original name) in Vienna, Virginia. In 2002, Congress changed the name of the park to the Wolf Trap National Park for the Performing Arts. It was, and still is, the only national park established for the performing arts.

The Purpose Statement for the park reinforces the foundation for future park management and use decisions. The following is the Purpose Statement for the park:

"The purpose of Wolf Trap National Park for the Performing Arts is to provide opportunities to experience live performances, related educational programs, and associated recreation in a pastoral setting within the National Capital area."

Foundation Document

The Foundation Document was prepared for Wolf Trap National Park for the Performing Arts in May 2013 and it identifies the fundamental resources and values associated with the park as well as the park significance and interpretive themes. Preparation of the Foundation Document included an assessment of planning and data needs, other important resources and identification of key park-wide and major issues. All of these were prioritized and connected with stewardship priorities.

Purpose Statement
The Purpose Statement for the park reinforces the foundation for future park management and use decisions. The following is the Purpose Statement for the park:

"The purpose of Wolf Trap National Park for the Performing Arts is to provide opportunities to experience live performances, related educational programs, and associated recreation in a pastoral setting within the National Capital area."

Park Significance

Significance statements express why Wolf Trap National Park for the Performing Arts resources and values are important enough to merit national park unit designation. Statements of significance describe why an area is important within a global, national, regional, and system wide context. These statements are linked to the purpose of the park unit and are supported by data, research, and consensus. Significance statements describe the distinctive nature of the park and inform management decisions, focusing efforts on preserving and protecting the most important resources and values of the park unit.

"The following significance statements have been identified for Wolf Trap National Park for the Performing Arts. (Please note that the statements are in no particular order):

- First and only national park for the performing arts. Wolf Trap National Park for the Performing Arts is the first and only national park for the performing arts.
- Home of the Filene Center. Wolf Trap National Park for the Performing Arts is home to the Filene Center, a premier outdoor performing arts venue that has developed technical and operational capabilities which supports a high variety, density, and caliber of programming.
- Collaborative partnership authorized by Congress. The collaborative partnership between the Wolf Trap National Park for the Performing Arts and the Wolf Trap Foundation was authorized by Congress to aid the park in presentation of performing arts and related educational and cultural programming.
- Bringing the performing arts to the public. Wolf Trap National Park for the Performing Arts was the realization of the vision of Catherine Filene Shouse to bring a diversity of performing arts to the public in the National Capital area. Her donation of the land that became the park allowed the vision to become reality.
- Cultural arts in an outdoor setting. Wolf Trap National Park for the Performing Arts conserves a former agricultural site that allows visitors to experience cultural arts and compatible recreation in a outdoor setting.

The above is from the "Foundation Document – Wolf Trap National Park for the Performing Arts"' prepared by the National Park Service, WOTR 627/120678, May 2013.

General Management Plan (GMP)

The Wolf Trap Farm Park (now Wolf Trap National Park for the Performing Arts) General Management Plan states:

> "One of the factors important to the success of Wolf Trap Farm Park is its setting. Located within suburban northern

> Virginia, the natural environment and the country setting make this an extraordinary and distinctive entertainment facility.
>
> Most parks undergo dramatic changes with the seasons; blankets of snow and silence give way to summer sun as crowds return to the canyon, the beach, the trail. At Wolf Trap, the metamorphosis happens daily.
>
> Another aspect of Wolf Trap that is distinctive is the management arrangement. By legislative directive, the Wolf Trap Farm is co-managed by the National Park Service and the Wolf Trap Foundation. This partnership enables both entities to bring to the public excellence of programming and a high quality concert experience."

National Historic Preservation Act

The National Historic Preservation Act of 1966, as amended (NHPA), mandates federal protection of significant cultural resources, including buildings, landscapes, and archeological sites listed in or eligible for listing in the National Register of Historic Places.

Section 106

A routine step in the park's planning process for the treatment of cultural resources is compliance with Section 106 of NHPA. This requires that prior to any undertaking involving National Register or National Register-eligible historic properties, federal agencies "take into account the effect" of the undertaking on the property and give the Advisory Council on Historic Preservation (Advisory Council) "a reasonable opportunity to comment with regard to such under-taking."To satisfy the requirements of Section 106, regulations have been published (36 CFR Part 800, "Protection of Historic Properties") that require, among other things, consultation with local governments, State Historic Preservation Officers, and Indian tribal representatives. They also establish criteria under which the Advisory Council may comment, but as a practical matter, the vast majority of Federal undertakings do not involve review by the Advisory Council. The entire point of Section 106 review is to ensure that all interested parties have a voice in the treatment of our nation's cultural heritage.

The Secretary of the Interior's Standards

The Secretary of the Interior's Standards for the Treatment of Historic Properties (Standards) provide a philosophy to underpin historic preservation that is widely understood and almost universally accepted in the United States. By separate regulation, the Secretary has required the application of the Standards in certain programs that the Secretary administers through the National Park Service. They have also been widely adopted

by state and local governments and by the private sector, and are intended to be applied to a wide variety of resource types, including buildings, sites, structures, objects, and districts. The Standards, revised in 1992, are codified as 36 CFR Part 68 in the 12 July 1995 Federal Register (Vol. 60, No. 133). The revision replaced the 1978 and 1983 versions of 36 CFR 68 entitled "The Secretary of the Interior's Standards for the Treatment of Historic Properties". The Standards are neither technical nor prescriptive, but are intended to promote responsible preservation practices that help protect the nation's irreplaceable cultural resources. For example, they cannot, in and of themselves, be used to make essential decisions about which features of the historic building should be saved and which can be changed. But once a treatment is selected, the Standards provide philosophical consistency to the work.

The Standards describe four broad approaches to the treatment and use of historic properties. These are, in hierarchical order:

- Preservation, which places a high premium on the retention of all historic fabric through conservation, maintenance and repair. It reflects a building's continuum over time, through successive occupancies, and the respectful changes and alterations that are made.
- Rehabilitation, which emphasizes the retention and repair of historic materials, but provides more latitude for replacement because it is assumed the property is more deteriorated prior to work. (Both Preservation and Rehabilitation standards focus attention on the preservation of those materials, features, finishes, spaces, and spatial relationships that, together, give a property its historic character.)
- Restoration, which focuses on the retention of materials from the most significant time in a property's history, while permitting the removal of materials from other periods.
- Reconstruction, which establishes limited opportunities to re-create a non-surviving site, landscape, building, structure, or object in all new materials.

Regardless of treatment approach, the Standards put a high priority on preservation of existing historic materials and not just the architectural form and style. The Standards also require that any alterations, additions, or other modifications be reversible, i.e., be designed and constructed in such a way that they can be removed or reversed in the future without the loss of existing historic materials, features, or character.

As noted above, rehabilitation has been identified as the most appropriate overall approach to the treatment of the Filene Center. Within the overall approach, treatments adhering to other standards may be deemed appropriate for individual elements.

Americans with Disabilities Act of 1990

The Americans With Disabilities Act of 1990 (ADA) establishes comprehensive civil rights protection for disabled Americans, both in employment and in their right to free, unaided access to public buildings. While people with restricted mobility have most frequently benefited from ADA, protection also extends to those with other disabilities, including those with impaired vision or hearing. Requirements for full compliance with ADA regulations are extensive and easiest to apply to new construction. Full compliance for historic buildings is more difficult and sometimes would require significant alterations to the historic character of the property. Where that is the case, ADA authorizes a process for arriving at alternatives to full compliance that can preserve historic character while maximizing a disabled visitor's access to the historic building.

Architectural Barriers Act (ABA)

Standards issued under the Architectural Barriers Accessibility Act (ABAA) apply to facilities designed, built, altered, or leased with certain federal funds. Passed in 1968, the ABAA is one of the first laws to address access to the built environment. The law applies to federal buildings, including post offices, social security offices, federal courthouses and prisons, and national parks. Coverage is limited to those funding programs that give the federal agency awarding grants or loans the authority to establish facility standards.

The Filene Center provides a high level of universal accessibility and the facilities meet the ABAA specific requirements. Very few deficiencies exist, including some out-of-compliance parking and a few ramps on the exterior of the building that are too steep. The entire site is not disabled accessible.

International Building Code

Building codes are generally applicable to all buildings whether they are historic or not. For the purpose of reviewing building code requirements, the Filene Center is considered a historic building. As a matter of policy, the NPS and the State of Virginia are guided by the International Building Code, which includes this statement regarding codes and historic buildings: 3406.1 Historic Buildings: "The provisions of this code related to the construction, repair, alteration, addition, restoration and movement of structures, and change of occupancy shall not be mandatory for historic buildings where such buildings are judged by the building official to not constitute a distinct life safety hazard [emphasis added]." Threats to public health and safety should always be eliminated, but because the Filene Center is potentially historic, alternatives to full code compliance are always sought where compliance would needlessly compromise the integrity of the

historic building. NFPA Code 914The National Fire Protection Association (NFPA) has promulgated codes for historic buildings, most notably NFPA 909, “Code for the Protection of Cultural Resources Properties - Museums, Libraries, and Places of Worship,” and NFPA 914, “Code for Fire Protection of Historic Structures.” The Filene Center appears to meet current building code requirements as a theater, and, given the large number of electrical systems in the building, it is in good condition.

NFPA Codes

The National Fire Protection Association (NFPA) has promulgated codes that include theater and assembly uses. These include: NFPA 1, Uniform Fire Code, NFPA 101, Life Safety Code, and NFPA 5000, Building Construction and Safety Code. NFPA 914, “Code for Fire Protection of Historic Structures,” may also be applicable.

National Park Service Management Policies

The NPS General Management Policies (2006) guide overall management of historic properties, especially Chapter 5 “Cultural Resource Management.”Based upon the authority of some nineteen Acts of Congress and many more Executive orders and regulations, these policies require planning to ensure that management processes for making decisions and setting priorities integrate information about cultural resources, and provide for consultation and collaboration with outside entities. These policies also support good stewardship to ensure that cultural resources are preserved and protected, receive appropriate treatments (including maintenance), and are made available for public understanding and enjoyment.

Section 5.3.5, “Treatment of Cultural Resources,” provides specific directives, including a directive that “the preservation of cultural resources in their existing states will always receive first consideration.”The section also states that treatments entailing greater intervention will not proceed without the consideration of interpretive alternatives.

The appearance and condition of resources before treatment, and changes made during treatment, will be documented. Such documentation will be shared with any appropriate state or tribal historic preservation office or certified local government, and added to the park museum cataloging system. Pending treatment decisions reached through the planning process, all resources will be protected and preserved in their existing states. The management policies lay out rules for use of historic properties under the control of the National Park Service. Chapter 5 of this document directs that “compatible uses for structures will be found whenever possible [to] help prevent the accelerated deterioration of historic structures due to neglect

and vandalism," but goes on to warn against uses of structures that would "threaten the…character of a structure…or that would entail alterations that would significantly compromise its integrity."

Director's Order-28

Also circumscribing treatment and use of historic properties in our National Parks is Director's Order 28, Cultural Resource Management Guideline. It requires that the NPS plan for the protection of cultural resources such as the Filene Center and reinforces the requirement to use existing buildings for NPS purposes. In Chapter 8, "Management of Historic and Prehistoric Structures, "observes that "[t]he primary preservation issue… is the compatibility of the use with the structure." DO-28 also requires that no historic structure be rehabilitated or restored without an appropriate historic structure report.

Building Code Summary

The recommendations in this document are in accordance with the International Code Council (ICC) Model Codes and Standards, 2015 editions and the NFPA National Fire Codes, including but not limited to the following:

BUILDING: 2015 ICC International Building Code (IBC); 2015 ICC International Existing Building Code; ANSI/ASSEZ117.1, Safety Requirements for Confined Spaces; 2015 NFPA Life Safety Code (NFPA 101) – the most restrictive requirement will dictate.

MECHANICAL: 2015 ICC International Mechanical Code (IMC)

PLUMBING: 2015 ICC International Plumbing Code (IPC)

FIRE: 2015 ICC International Fire Code (IFC); NFPA National Fire Codes, Including Annexes (except NFPA 5000)

ENERGY: 2015 ICC International Energy Conservation Code (IECC)

FUEL GAS: 2015 ICC International Fuel Gas Code (IFUGC)

Other Guidelines, Codes, Regulations and Local Utility Requirements:

- National Fire Protection Association (NFPA) 70, 2017 National Electrical Code

Federal Government Legislation, Regulations, Standards and Guidelines:

- 2004 Architectural Barriers Act and ABAAS Guidelines
- Americans with Disabilities Act (ADA) 2010 Design Guidelines

- ANSI A117.1 2003
- Uniform Federal Accessibility Standards (UFAS)
- Occupational Safety and Health Administration (OSHA)

The authority having jurisdiction (AHJ) for the National Capitol Region is James King, Branch Chief Fire and Emergency Management.

Codes Introduction

The following summary is an initial analysis to inform alternatives that might be explored during the design of any proposed renovation work. This analysis is not comprehensive and needs to continue to be updated and expanded throughout the design process. Additional information regarding code requirements and fire life safety for National Parks Service projects can be found at https://www.nps.gov/dscw/ds-safety-fire.htm#bcis. The final code analysis should include all elements listed on this site.

Occupancy Type

(Chapter 3 IBC: Use and Occupancy classification): the Filene Center has multiple use groups:
- A-1 – Assembly ((Assembly use with fixed seating)
- A-3 - Assembly (Museum and Assembly Areas of greater than 50 people),
- B – Business (staff support spaces), and
- S-1 Storage (moderate hazard storage)

Construction Type

The building is a Type III construction.

Fire-Resistance Ratings

Building Element	**Type III**
Primary structural frame	0
Bearing walls - Exterior	Type III
Bearing walls - Interior	0
Nonbearing walls and partitions - Exterior	0
Nonbearing walls and partitions – Interior	0
Floor construction and associated secondary members	0
Roof construction and associated secondary members	0

Stages greater than 50 feet require a 2-hour proscenium wall with a fire curtain (Sections 410.3.4 and 410.3.5). Between the stage and the back-of-house spaces (e.g. dressing rooms, storage rooms, green rooms, etc.) also requires a 2-hour separation (Section 410.5.1).

Occupancy Load Factor
(Chapter 7, 2015 NFPA 101):

- Assembly use, concentrated use with fixed seating = 7(sf/person) net (Table 7.3.1.2)
  - Auditorium – occupants

- Assembly Use, less concentrated use without fixed seating = 15(sf/person)net (Table 7.3.1.2)
  - Orchestra Pit
  - Musicians Lounge
  - Stage Left Waiting Room
  - Stage Right Waiting Room
  - Green Room
  - Chorus Dressing Rooms

- Business use = 100 (sf/person) net; Concentrated business use = 50 (sf/person)net (Table 7.3.1.2)
  - Office Areas
  - Stage Areas
  - Stage Left
  - Stage Right
  - Scene Dock
  - Rehearsal Hall

- Exits shall be sufficient for simultaneous occupancy of both the assembly occupancy and the other parts of the building, except where the AHJ determines that the conditions are such that simultaneous occupancy will not occur (12.1.3.3 2015 NFPA 101).

Egress

Egress element requirements are based on the prescriptive provisions of the 2015 NFPA Life Safety Code. A performance based option is available and can be explored as a project moves forward.

Means of Egress

- The number of means of egress from any balcony, mezzanine, story, or portion thereof shall be not less than two, except under one of the following conditions (7.4.1.1)
- The number of means of egress from any story or portion thereof, other than for existing buildings as permitted in Chapters 11 through 43, shall be as follows (7.4.1.2):
- Occupant load more than 500 but not more than 1000 – not less than 3.
- Occupant load more than 1000 – not less than 4.
- It is not the intent to require four means of egress from each level of an assembly occupancy building having a total occupant load of more than 1000 where, individually, the floors have occupant loads of less than 1000 (A.12.2.4).

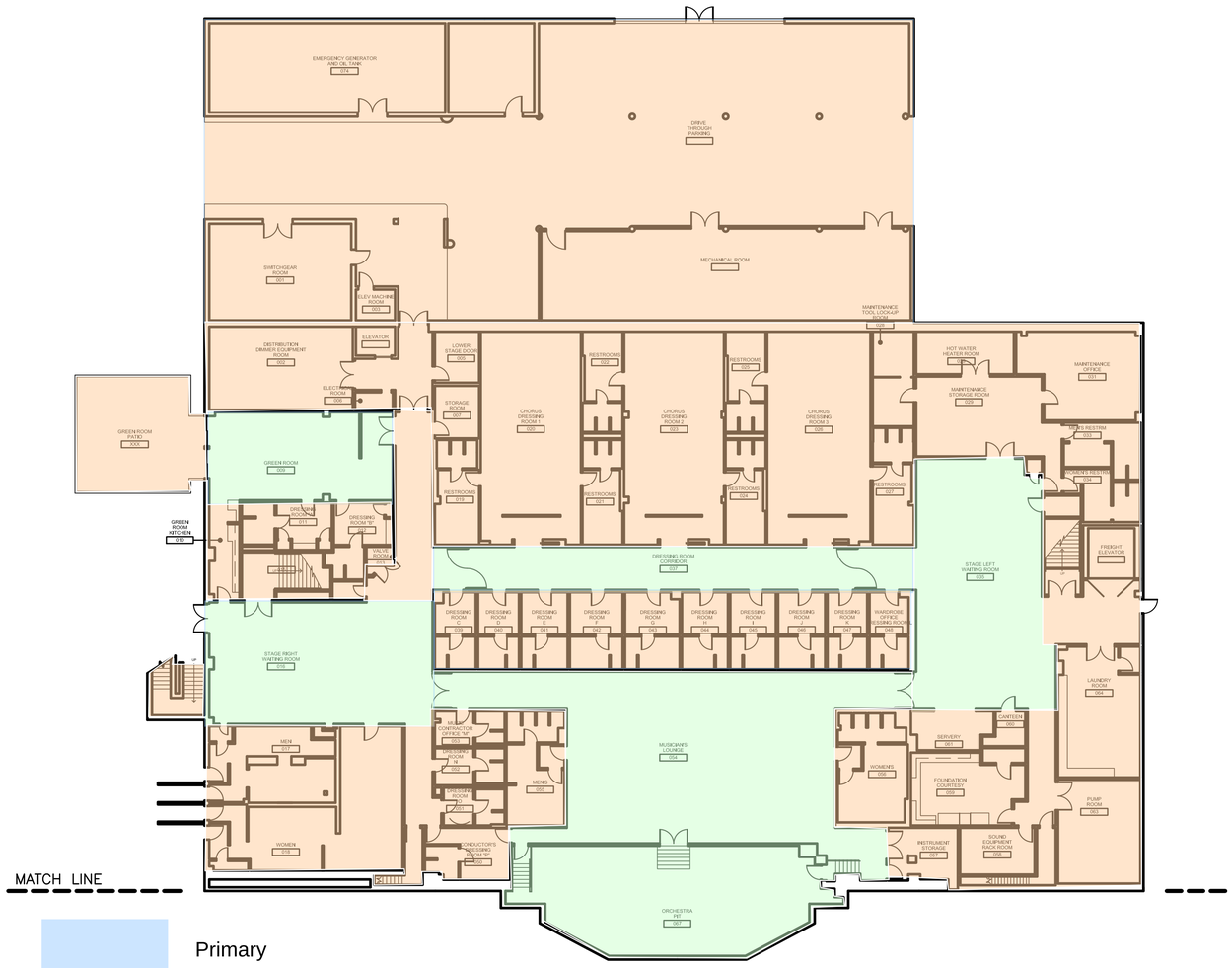
Arrangement of Means of Egress

- Where two exits, exit accesses or exit discharges are required, they shall be located at a distance from one another not less than one-half the length of the maximum overall diagonal dimension of the building or area to be served, measured in a straight line between the nearest edge of the exits, exit accesses, or exit discharges, (7.5.1.3.2).
- Areas accessible to people with severe mobility impairment, other than existing buildings, shall have not less than two accessible means of egress, unless otherwise provided in 7.5.4.1.2 through 7.5.4.1.4 (7.5.4.1).
- Common path limit for unsprinklered building (Table A7.6):
  Assembly 20 ft (>50 people)/75 ft (< 50 people)
  Mercantile (Class A, B, C) 75 ft
  Business 75 ft
- Dead End Corridor limit for unsprinklered building (Table A7.6):
  Assembly 20 ft
  Mercantile (Class A, B, C) 20 ft
  Business 20 ft
- Travel Distance Limit for unsprinklered building (Table A7.6):
  Assembly 200 ft
  Mercantile (Class A, B, C) 150ft
  Business 200 ft.
- In assembly occupancies, other than those listed in 12.2.3.6.2(1), the main entrance/exit shall be of a width that accommodates one-half of the total occupant load (12.2.3.6.2(2)).
- Where the main entrance/exit from an assembly occupancy is through a lobby or foyer the aggregate capacity of all exits from the lobby or foyer shall be permitted to provide the required capacity of the main entrance/exit, regardless of whether all such exits serve as entrances to the building (12.2.3.6.5).
- In assembly occupancies where there is no well-defined main entrance/exit, exits shall be permitted to be distributed around the perimeter of the building provided that the total exit width furnishes not less than 100% of the width needed to accommodate the permitted occupant load. (12.2.3.6.6).

Egress Components

- Per Table 7.3.3.1, the capacity factor for stairways is 0.3 inches/person. The capacity factor for level components and ramps is 0.2 inches/person.

The Filene Center is in compliance with these requirements.



MATCH LINE

Primary

Secondary

Tertiary

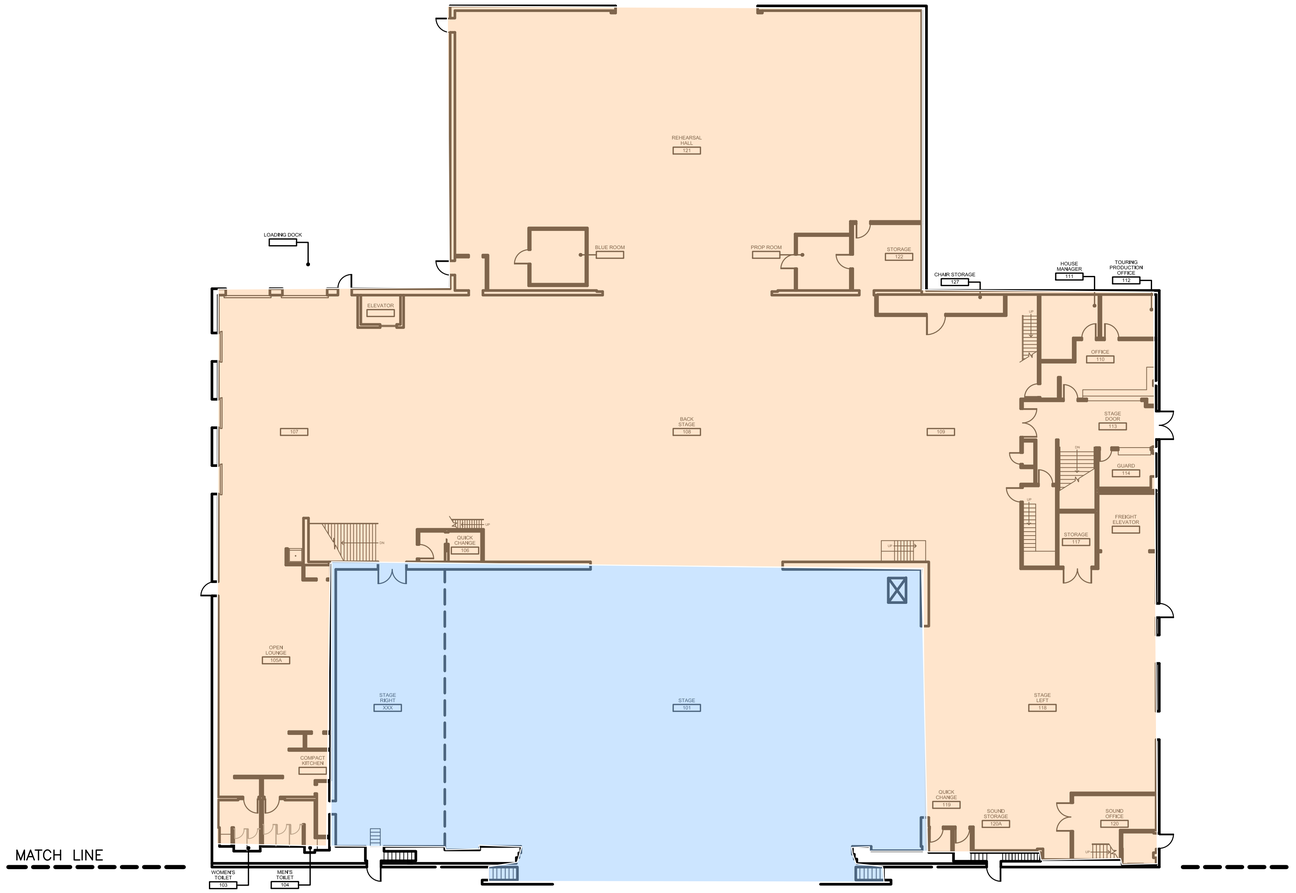
1 / A1 LOWER LEVEL PLAN

SCALE Ⓐ

SCALE Ⓐ 16 0 16 32

SCALE OF FEET

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CADD: MV			PMIS/PKG NO. GATE201069C
TECH. REVIEW: TR			SHEET 1 OF 6
DATE: 04/21/17			



Primary

Secondary

Tertiary

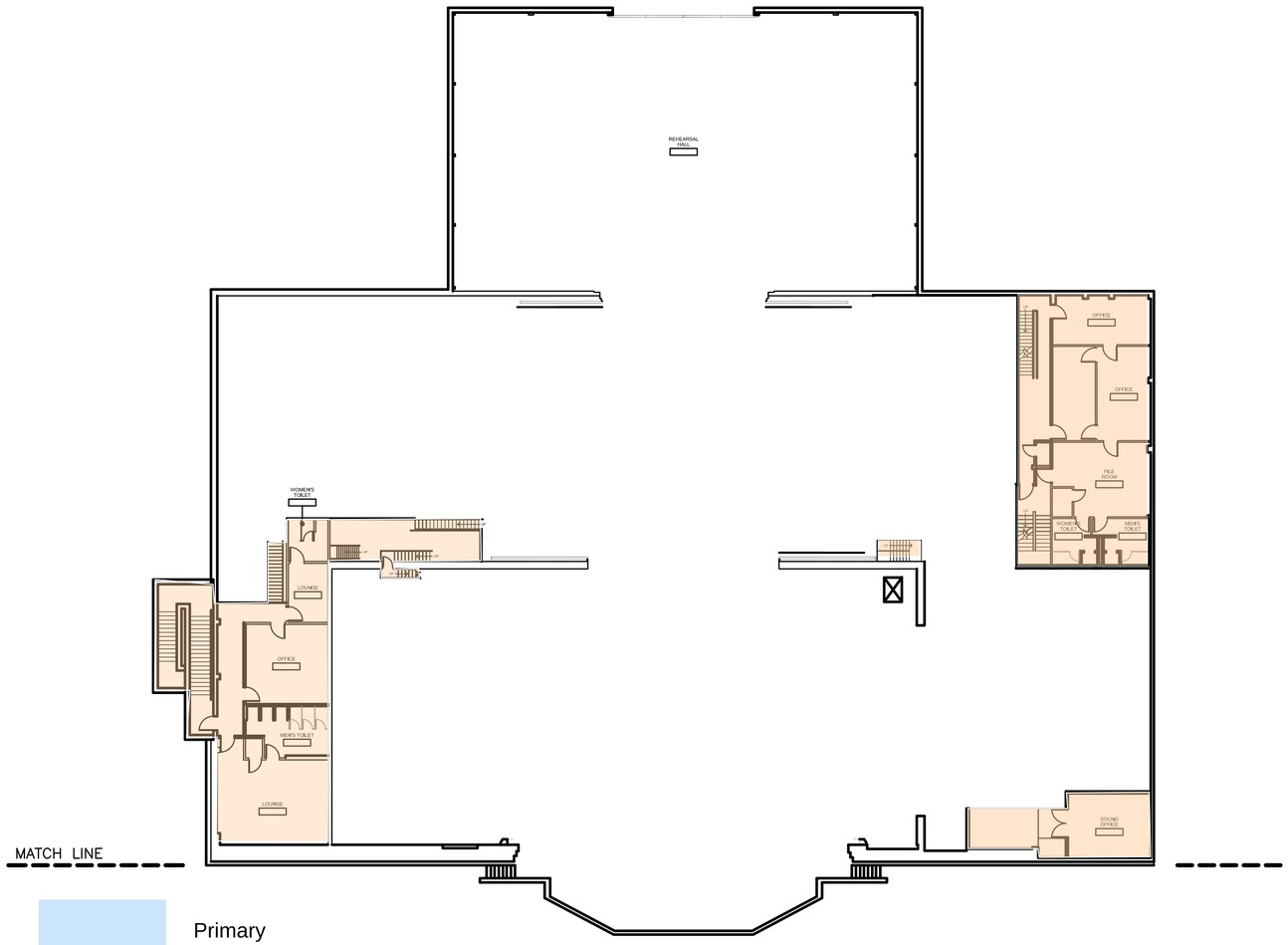
1 / A2 STAGE LEVEL

SCALE Ⓐ

SCALE Ⓐ 16 0 16 32

SCALE OF FEET

DESIGNED: MV CADD MV TECH. REVIEW: TR DATE: 04/21/17	SUB SHEET NO. A2	TITLE OF SHEET STAGE LEVEL PLAN HISTORIC STRUCTURE REPORT FOR THE FILENE CENTER	DRAWING NO. 646 124865 PMIS/PKG NO. GATE201069C SHEET 1 OF 6



Primary

Secondary

Tertiary

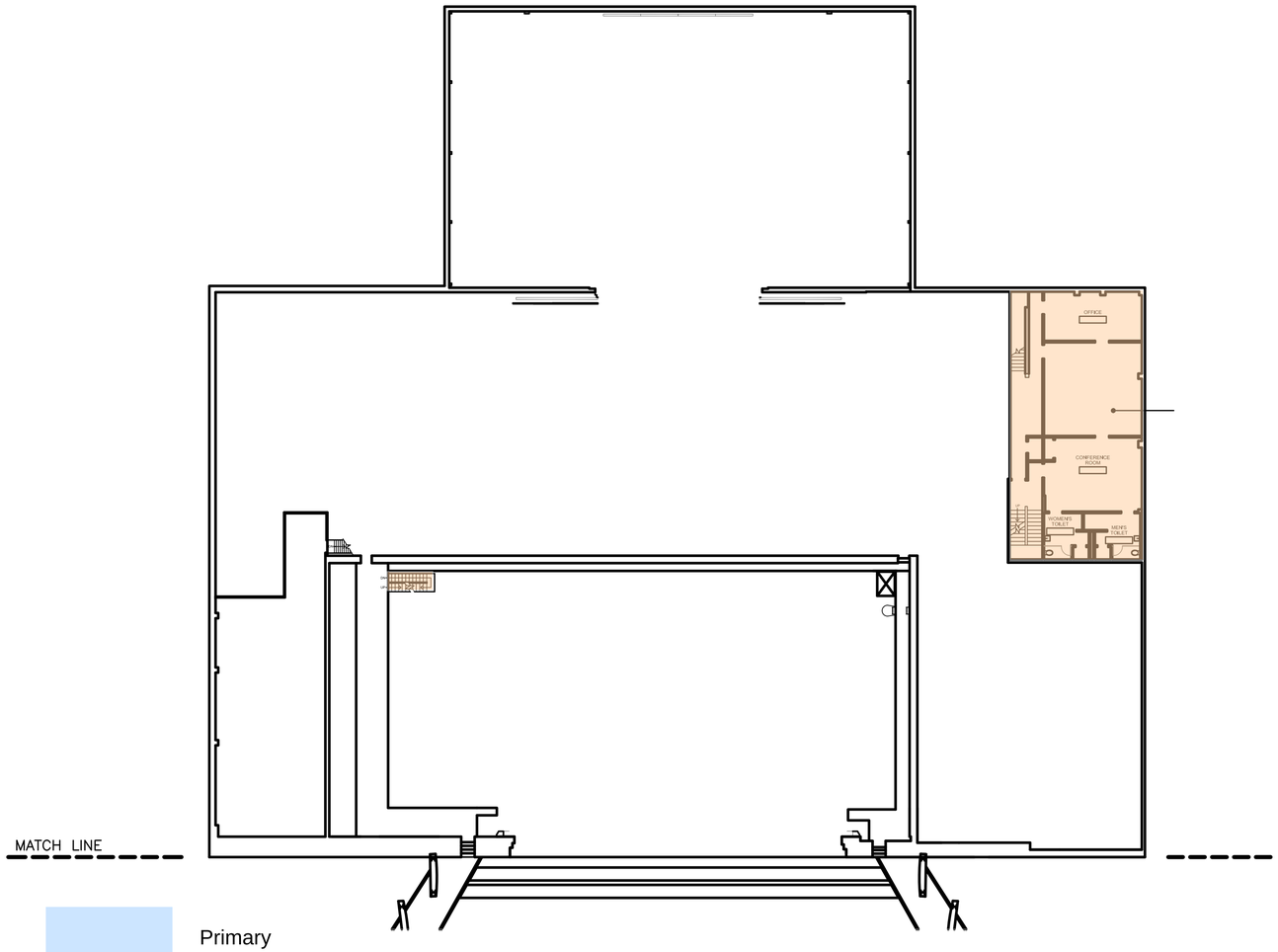
1/A3 PRODUCTION OFFICE, SOUND DEPARTMENT OFFICE, CREW QUARTERS

SCALE Ⓐ

SCALE Ⓐ 16 0 16 32

SCALE OF FEET

DESIGNED: MV CADD MV TECH. REVIEW: TR DATE: 04/21/17	SUB SHEET NO. A3	TITLE OF SHEET SECOND LEVEL HISTORIC STRUCTURE REPORT FOR THE FILENE CENTER	DRAWING NO. 646 124865 PMIS/PKG NO. GATE201069C SHEET 1 OF 6



Primary

Secondary

Tertiary

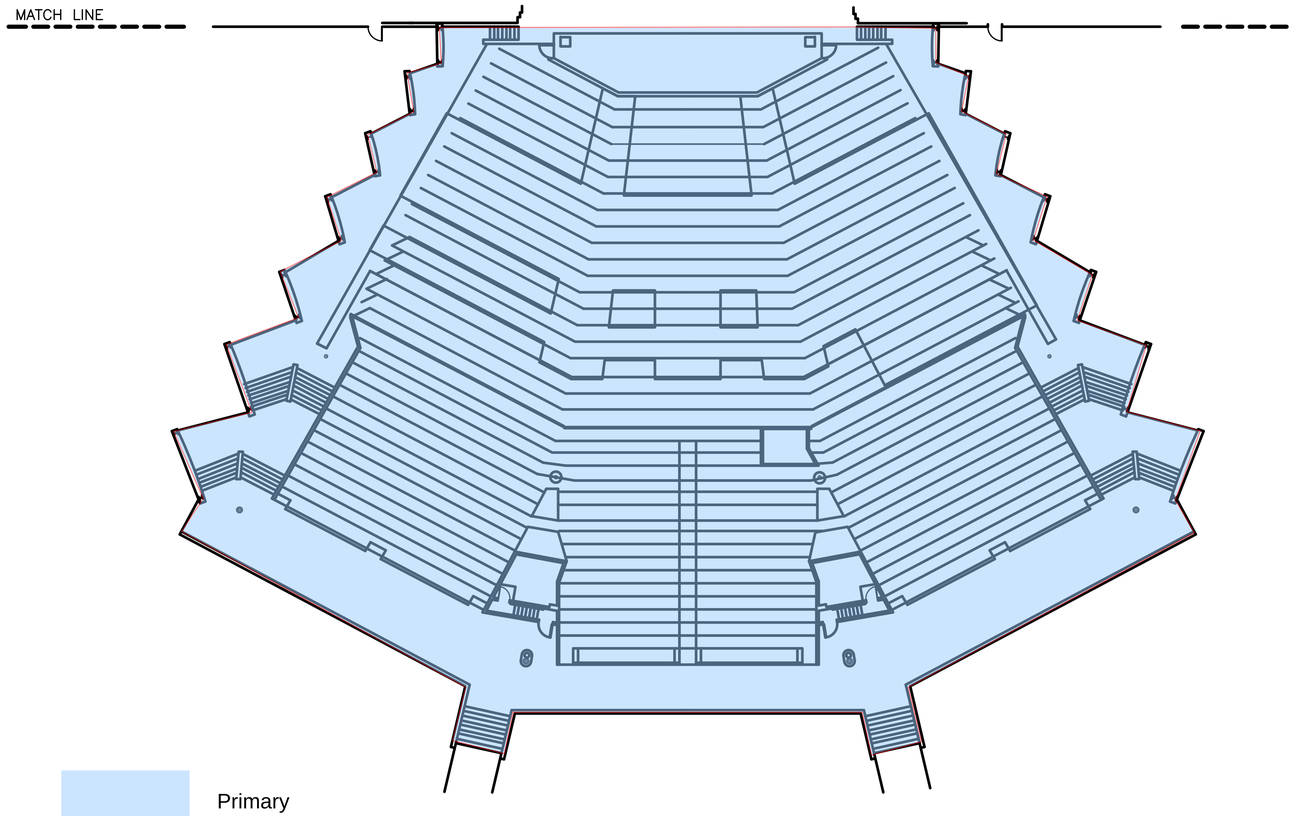
1 / A5 THIRD LEVEL – FOUNDATION OFFICES, STORAGE LOFT, 35' LOFT

SCALE Ⓐ

SCALE Ⓐ 16 0 16 32

SCALE OF FEET

DESIGNED: MV CADD MV TECH. REVIEW: TR DATE: 04/21/17	SUB SHEET NO. A5	TITLE OF SHEET THIRD LEVEL HISTORIC STRUCTURE REPORT FOR THE FILENE CENTER	DRAWING NO. 646 124865 PMIS/PKG NO. GATE201069C SHEET 1 OF 6



1 / A6 HOUSE SEATING AREA – ORCHESTRA LEVEL

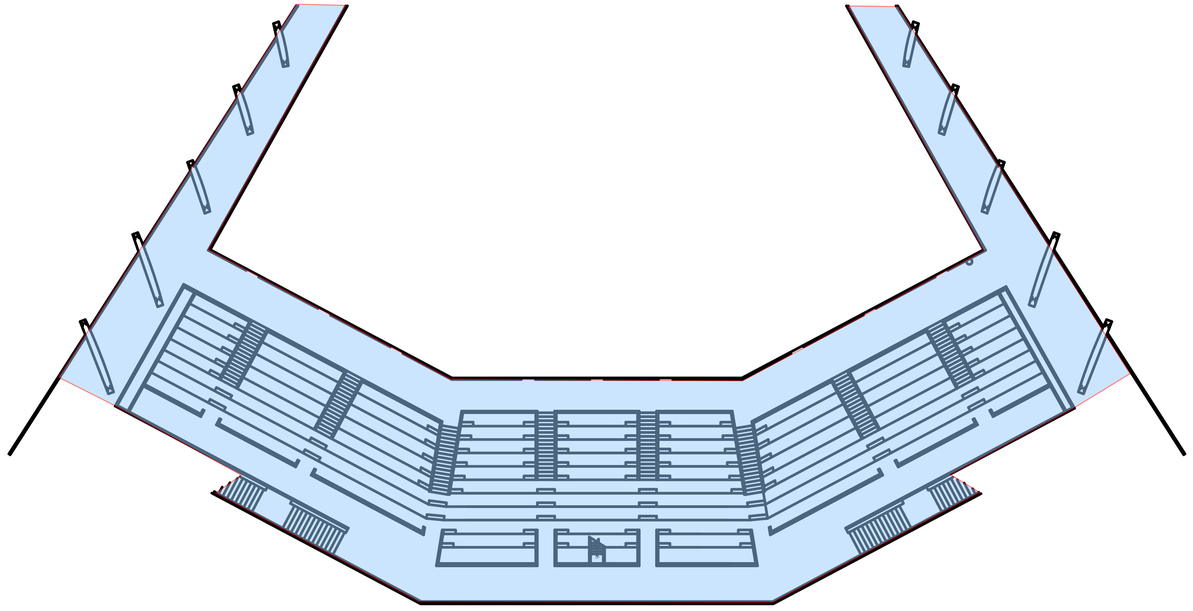
SCALE Ⓐ

SCALE Ⓐ 16 0 16 32

SCALE OF FEET

DESIGNED: MV CADD MV TECH. REVIEW: TR DATE: 04/21/17	SUB SHEET NO. A6	TITLE OF SHEET ORCHESTRA LEVEL HISTORIC STRUCTURE REPORT FOR THE FILENE CENTER	DRAWING NO. 646 124865 PMIS/PKG NO. GATE201069C SHEET 1 OF 6

MATCH LINE



Primary

Secondary

Tertiary

1 / A7 LOGE TIER LEVEL
SCALE Ⓐ

SCALE Ⓐ 16 0 16 32
SCALE OF FEET

DESIGNED: MV CADD MV TECH. REVIEW: TR DATE: 04/21/17	SUB SHEET NO. A7	TITLE OF SHEET LOGE TIER LEVEL HISTORIC STRUCTURE REPORT FOR THE FILENE CENTER	DRAWING NO. 646 124865 PMIS/PKG NO. GATE201069C SHEET 1 OF 6

Chapter 6: Treatment Recommendations

In general, the Filene Center is very well maintained. The issues identified are generally related to functionality, on-going maintenance, and long-term projects for the future. There are a few specific areas that could be improved but most of the improvements noted are part of the Filene Center's long range improvement plans already identified by the staff.

Site Recommendations

The walkways from the visitor parking lots to the Filene Center and into the auditorium appear to meet ADA and ABAAS requirements. There are no site recommendations.

Exterior Envelope Recommendations

Exterior Siding

The National Park Service has hired a consultant to study and prepare drawings and specifications for the replacement of the wood siding and battens. The exterior siding can be considered as a renewable material, similar to wood shingles on a roof. Replacing them in kind would meet the Secretary of the Interior's Standards.

They could be replaced with a different material if visually it matched the current siding but there are potential problems with this choice and thoughtful discussions should occur before moving forward with this alternative. Should alternative materials be considered, mockups should be prepared to assess the impact on the visual character of the Center.

Auditorium Space

Weathered and damaged areas of wood siding on the auditorium walls, stage front wall, ceiling, follow spot booth, and under balcony area should be refinished or replaced in kind.

Balcony

The wood members of the balcony need to be refinished and the damaged ones replaced.

Auditorium Roof

The roofs are all recently replaced and in good condition, and require no work beyond routine maintenance.

Exterior Doors and Windows

The exterior doors and windows are in fair to poor condition and should be replaced in kind.

Interior Recommendations

The NPS has maintained the interior in generally good condition, and there are no specific architectural recommendations. See Structural and Building Systems recommendations, below.

Structural Recommendations

The Filene Center is in generally good structural condition, but there are a few minor concerns in some areas that should be addressed for continued operation. The level of required structural repairs is such that the work can be performed within the normal maintenance schedule. Identified areas that require maintenance and the recommended corrective actions are provided below.

Dywidag Bars

The Dywidag bars were installed during 1986 to address the concern of cracks in the welds in the G1 and G2 girders above the house seating area. These are the largest and most important girders in the facility's roof. The flanges of the G1 girders are three inches thick, and the welds are roughly the same thickness. A large crack occurred in the north G1 beam in January 1985, very soon after the reconstructed facility was reopened after the 1982 fire. The crack propagated from the weld and into the base metal in the lower flange and the girder's web, causing the roof to sag. Although the cracked beam was repaired and other welds inspected, post-tensioned Dywidag bars were installed to address concerns regarding the low toughness of remaining welds in the G1 and G2 beams.

The Dywidag bars were inspected in 2011. That inspection identified that there are some areas where the waxy coating on the Dywidag bars was missing, allowing corrosion to occur. The amount of corrosion was not structurally significant at

the time of inspection. However, there is no evidence that the corrosion observed in 2011 was removed, or the bars recoated as recommended. The Dywidag bars are high-strength carbon steel, and without a protective coating, they are susceptible to corrosion in the Filene Center's non climate-controlled environment. The Dywidag bars were not reinspected during the recent inspections because of lack of access. The Dywidag bars should be reinspected, visible corrosion removed, and the coating should be reapplied in any areas where it is missing.

Internal Surfaces of Roof Girders

As shown in figure 4-78, there is some corrosion on the internal surface of the G3 girder near the follow spot booth. Other roof girders and roof beams are also hollow-sections similar to the G3 girder. Since the main seating area of the Filene Center is not climate-controlled, there is a greater risk of corrosion to steel members due to environmental exposure. Unlike the external surfaces, the internal surfaces of the beams and girders have only been primed, they have not been protected by corrosion-preventive paint. The internal surfaces of the other roof girders were not included in the recent inspection due to lack of access. There is available evidence that the rate of corrosion of closed steel sections is lower than for surfaces exposed to the atmosphere. However, any corrosion protection inherent to closed sections is related to isolating the internal space from atmospheric oxygen. The G3 girder had an access panel removed, allowing contact with atmospheric oxygen and the girder's internal surfaces showed some light corrosion. Since there is no evidence that measures have been taken to exclude oxygen from the inside of the members, corrosion from the inside remains a concern. The amount of corrosion on the interior of the G3 girder is not structurally-significant at present. The existing girders have been in place for about 33 years, with only limited corrosion observed. However, few inspections have been performed.

Access to the interior of the beams is limited, making maintenance difficult. Evidence to date suggests that at present the levels of corrosion on the inside surfaces of the beams and girders is not structurally-significant, but this evidence is based on a few spot-checks. No complete inspection or test program has been conducted. It is not recommended to repaint the interior surfaces of all the girders at this time. Instead, the degree of corrosion of the beams and girders should be monitored. An ultrasonic thickness guage or other tool should be used to monitor internal corrosion. At any available opportunity, cover plates for access holes should be checked for airtightness. Small holes that may admit oxygen into the members should be sealed with elastomeric compound. Missing bolts should be replaced to seal bolt holes.

Connection between the G2 (North) and G5 (North) Girders

As shown in figure 4-51, the angle bracket that supports the northeast end of the North G5 girder is not attached to the G2 girder on one side. Neither design drawings nor calculations for this connection are available. The connection should be evaluated and repaired, as required.

Beam Connection with Ineffective Bolts

As shown in figure 4-55 only one half of the bolts in the bracket are connected to the beam. The bracket is welded to the beam which was completed as a repair for this issue; however, there is no documentation for this repair. We recommend that this connection be evaluated and repaired as required.

Beam Connection

The connection shown in figure 4-56 has two bolts out of four missing. No welds are present to compensate for the missing two bolts, and neither design drawings nor analyses for this connection are available. While it is possible that the connection is adequate to sustain the design loads, this cannot be verified at this time. The connection should be analyzed and repaired, if necessary.

Stage Bridge Superstructure Fasteners

As shown in figures 4-63 to 4-67, many of the threaded rods and other fasteners for the stage bridge superstructure have corroded. While some of the rods have been painted, others appear to be uncoated carbon steel. While the degree of corrosion at present is minor with no material loss, the rate of corrosion should be expected to accelerate if not addressed. The rust should be removed and the rods painted to minimize future corrosion. Alternatively, the corroded rods, nuts, and other hardware could be replaced with galvanized members. Also, as shown in figures 4-63 to 4-67, many members in the superstructure bridge are corroding. It appears that only primer has been applied to the members. Primer does not provide sufficient protection against moisture and corrosion. Existing corrosion should be removed and the superstructure repainted with a weatherproof protective paint.

A second issue is illustrated in figure 4-68 Steel brackets are used to connect equipment for performances. The brackets are left in place after the equipment is removed. There is very little corrosion protection provided for these brackets. Galvanized or painted brackets and hardware should be used if the brackets are to be left in place to prevent causing premature rusting of the steel bridge; otherwise, the brackets should be removed and reinstalled as needed for equipment installation. Hardware

should be tightened properly to prevent failure of the bracket during use due to lateral loads from wind, seismic and usage.

General Corrosion of Roof Beams

As shown in figures 4-49,4-52, 4-53, and 4-57 through 4-61, many of the beams and girders in the roof over the house seating area have some exterior corrosion. Since these members are exposed to the elements, dew and other moisture can collect on them, making corrosion more likely. The degree of corrosion at present does not have a significant effect on the members' structural capacity; there is no loss of metal section. Existing rust should be removed and the members should be repainted. Since the members are visible to the public, this is at present more of an aesthetic concern than a structural concern; however, an accelerated rate of corrosion should be expected to occur on members that have already sustained light corrosion until repainting is performed.

Debris Collection

As shown in figures 4-49, 4-50, and 4-59, debris and/or sealant was installed to bird-proof openings or to seal leaks. While these materials have no direct influence on the structural integrity of the center they should be monitored to make sure they are not loose and are not trapping water inside the roof structure.

Loge Beam Fireproofing

As shown in figures 4-69 to 4-73, the fireproofing material is missing from some of the structural members supporting the loge. Surface corrosion is visible in areas where the fireproofing is missing. While degree of corrosion is not structurally significant at this time, visible corrosion should be removed and areas treated with corrosion-preventative paint before the fireproofing is replaced.

Follow Spot Booth Structure

As shown in figures 4-76 and 4-77, the stairway, floor, railings, and other structures associated with the follow spot booth show signs of corrosion. No significant metal loss is present at this time, but the corrosion should be removed and the surfaces repainted. Also, as shown in figure 4-79, there are no bars or fencing in the follow spot booth railing below the top bar. It is recommended that bars or fencing in accordance with Section 1013.4 of the International Building Code be installed on the railing.

House Area Floor

As shown in figure 4-80, there are some small cracks in the concrete stairs and other areas. Small cracks in the middle of a concrete section (as shown in figures 4-81 and 4-82) should

be filled with epoxy. Cracks up to ¼" should be repaired by epoxy injection. This generally requires the surface of the crack between injection points to be sealed before injection is performed. Small cracks where concrete members intersect (as shown in figure 4-80), or at control joints or construction joints (figure 4-85) should be filled with a polyurethane elastomeric sealant. The stair shown in figure 4-83 should be replaced with a new stair with a corresponding expansion joint.

While it is possible to repair cracks in walkways using a number of products, the repairs are generally visibly objectionable, especially for areas requiring large or numerous repairs. It is often possible to repair such areas without complete replacement of the concrete. First, in areas requiring many repairs, cracks ¼" or less in thickness should first be repaired with injected epoxy grout. Larger cracks should be repaired by routing, installing backer rod and polymer modified Portland cement. Then once the cracks are repaired, then the surface of the walkway can be covered with a polymer modified topcoat. All flat concrete surfaces exposed to moisture should be periodically sealed to minimize future cracking.

Where pumping of water occurs beneath slabs pushing subsurface water up through cracks, the crack repairs are pressurized from below. The best solution is to provide proper drainage and add stone beneath the walkway to prevent water from collecting and creating pressure beneath the slab. This requires the demolition of the existing slab and installation of a new slab. When this is not practical or affordable, the cracks can be repaired where the pressure is minimal. For cracks up to ¼", epoxy grouting is recommended. For larger cracks, polymer modified mortar can be used to seal the crack. Manufacturers can provide additional information on the amount of pressure a product can withstand; however, the amount of pressure is difficult to calculate, and may exceed the assumed numbers making this solution more problematic for a permanent solution. Once the crack is repaired, polyurethane caulk or a concrete overlay as noted above is recommended, but not required.

Rehearsal Area

The bolt missing from the connection between the angle and the glulam beam shown in figure 4-88 should be replaced. The bolt's size can be determined by the size of the existing hole and should extend the entire width of the wood member. A washer and nut should be used to secure the headed bolt. Similarly, the connection between the bracket and the girder shown in figure 4-89 should be evaluated to determine the number and size of bolts necessary to correct this connection The missing nail in the connection shown in figure 4-90 should be installed. The size of the nail can be determined by the existing nails, and the length

should be as required to extend a minimum of three quarters of the depth of the beam.

Orchestra Shell Ceiling Storage Area Roof

Areas of the roof truss showing signs of corrosion (as shown in figure 4-92) should be surface prepped, primed, and repainted to minimize future corrosion. The connection between the perpendicular open truss joist shown in figure 4-94 and the framing needs to be evaluated and reinspected. Because bolts are missing, the inspection needs to verify whether the connection has welds equivalent to the bolts intended in the original design. Similarly, the connection between the diagonal beam shown in figure 4-95 is nonstandard, and needs to be evaluated to determine whether it is equivalent to the bolts originally specified. As shown in figure 4-96, a member has been removed from the roof framing. This location needs to be evaluated to verify whether the missing beam should be replaced, and whether additional repairs need to be made to the beam because of the web distortion.

Stage Wing Left Roof

As shown in figure 4-98, there are concentrated loads attached to steel joists. Even though there has been no issues reported regarding problems with the joists, joists have to be designed for point loads and are more susceptible to point loads than steel beams. For this reason, we recommend that the joists be evaluated for the point loads. Where the capacity of the joist is less than the capacity of the hoist, the maximum load capacity of the joist should be applied with a visible sticker.

Main Stage Roof Structure

As shown in figures 4-99 and 4-100, some areas of the main stage roof structure require repainting. Surfaces should be cleaned and prepped, primed, and painted. In addition, the bolt missing from the connection shown in figure 4-101 should be replaced.

Main Level Floor Framing

As shown in figure 4-104, there are a few areas where fireproofing has separated from the structural floor beams. This fireproofing should be replaced. The fireproofing is not considered a structural issue and is mentioned because it was apparent during the structural inspection that fireproofing was delaminating from the steel structure in multiple locations. A complete assessment should be completed to determine the full extent of the areas where delamination of fireproofing has occurred and where fireproofing is required by code to be installed.

Basement Mechanical Room

As shown in figure 4-106, a notch was cut in beam just above the water main to allow installation of the water main. In addition, the ceiling beams show signs of corrosion. The beam notch should be evaluated. In addition, the steel beams should be prepped and repainted with corrosion-resistant paint. Fireproofing should be repaired as required by code.

Lower Level Beneath Stage

As shown in figure 4-107, some new joists have been installed beneath the stage area without fireproofing the joists. Wood framing was noted in this area as well, but it is unclear whether the wood framing is fire-resistant, fireproof, or untreated. The construction in this area should be reviewed to determine if fireproofing is required by current fire code. If required based on the code review, proper fireproofing should be added in this area.

Green Room Fireproofing

As shown in figure 4-108, no fireproofing was present on the structural columns in the Green Room above the drop ceiling. The construction in this area should be reviewed per the current fire code. If required by the code review, fireproofing should be added in this area.

Mechanical Room Adjacent to Parking Garage

As shown in figure 4-109, some of the original fireproofing has delaminated from steel framing. The missing fireproofing in this area should be replaced if required by code.

Exterior Structures and Parking Garage

Several forms of degradation were observed on outside structures that require repair, including cracks and spalls.

- As shown in figures 4-110 to 4-114, 4-116 and 4-117, 4-120, and 4-124, there are many large cracks in exterior concrete structures. Cracks of ¼” and smaller should be repaired by using epoxy injection. Where the joint exceeds ¼” towards the surface, polymer modified mortar can be used to more closely match the color of the concrete and seal the surface. The installer should take care to maintain the proper depth of mortar required based on the manufacturer’s recommendations for the products used. For spall repairs, all loose material should be removed and polymer modified mortar installed. Bonding agents should be used whenever installing new to existing concrete. Bonding agents can be installed separately or combined as an additive in the repair mortar. Where rebar is exposed, the reinforcing should be

properly prepared and coated with anti-corrosion coatings prior to installation of mortar.

- Epoxy injection can be used as noted above for cracks shown in figures 4-110, 4-112, 4-114, 4-117,4-120, and 4-124. The crack shown in figure 4-110 should be repaired immediately, since this is in a critical location. The crack in figure 4-112 should be repaired as soon as possible. Other cracks noted should be repaired within six months to a year to prevent further deterioration of the concrete and internal reinforcing. Every crack may not be noted in the report and additional cracks may occur prior to completion of repairs. Cracks similar to what is depicted herein should be repaired in similar fashion.

- Concrete spalls shown in figures 4-111 and 4-122 should be repaired as noted above. Exterior concrete surfaces should be regularly sealed to minimize future cracking and spalling. The crack in figure 4-111 should be repaired as soon as possible since rebar is exposed.

- The crack shown in figure 4-113 is significant and should be addressed immediately. It appears that the crack extends to an additional surface which cannot be sealed and the thickness exceeds ¼" for the entire depth of the crack; therefore, epoxy injection is not practical. Additional testing can be used to confirm the extent of the crack and the deterioration of the reinforcing prior to determining the proper repair. Otherwise removal of existing concrete within the cracked area should be removed and replaced with new polymer modified concrete. Existing concrete will need to be removed carefully minimizing damage to the existing reinforcing. Once exposed, reinforcing will need to be prepped and coated with corrosion inhibiting coating. A bonding agent should be used to bond new concrete with existing. Shoring may be necessary to prevent backfill from failing during the repair.

- The damaged concrete roadway by the loading dock shown in figure 4-115 is too severe to be effectively repaired without replacing the section of concrete. Before the new concrete is placed, the subgrade should be compacted and tested to prevent further settlement. Repairing the subgrade may require additional concrete to be cut and replaced depending on the condition of the subgrade. The subgrade should be inspected and tested by a geotechnical engineer once exposed.

- The misaligned retaining wall shown in figure 4-122 should be monitored. If the misalignment increases, the wall should be repaired or replaced. The backfill will need to be tested prior to the repair by a geotechnical engineer, since the adjacent slab shows signs of failure in the same area. The

spall should be repaired using a typical spall repair noted previously in the report.

- The plywood flooring on the rehearsal hall entrance shown in figure 4-121 should be removed. If a smooth floor is necessary in this area, galvanized steel such as diamond plate should be used instead of plywood. The decking should be prepped and recoated with corrosion-resistant paint.

- As shown in figure 4-119, there are steel beams in the ceiling of the parking area where the fireproofing is missing. The missing fireproofing should be replaced on these beams.

- As shown in figure 4-123, the moss is trapping moisture and growing on the existing steel with concrete infill stairs. The growth needs to be removed as soon as possible and the concrete repaired if necessary. At a minimum the concrete should be sealed once the growth is removed. Any corrosion to the steel framing should be removed and the steel coated as well.

- As shown in figure 4-125, warped and decayed wood framing under the exterior stairway landing adjacent to the Green Room requires replacement. As shown in figure 4-127, the eroded area under the concrete landing should be repaired. Due to the slope, the best solution to this future problem is to hand dig 24” below grade and place an 8” thick concrete wall beneath the edge of the slab. The concrete should fill voids beneath the existing slab when placed. The lean-to that protects air-conditioning equipment shown in figure 4-129 should be repaired. All decayed members should be replaced. Wood that has not been pressure-treated should either be replaced or primed and painted with products rated for exterior exposure.

- The small lean-to structure shown in figure 4-130 should be replaced. The replacement structure should include lateral restraint that the existing structure lacks. The structure should also be designed for the potential snow drift from the adjacent multiple story structure.

- The small roof visible in figure 4-131 is not protected by roofing material and is not designed for potential snow loads. The small roof should be replaced with a more substantial structure covered by roofing material.

- Many exterior surfaces are covered with algae and moss (see figures 4-114, 4-117, 4-123, 4-125, 4-126, and 4-128). This algae and moss should be removed. Surfaces should be treated with an algaecide to prevent recurrence. Application of a sealant to concrete and wood surfaces will assist in preventing recurrence. The concrete surface beneath the

yellow mold on the concrete fins was starting to pit. The mold on the fins should be removed as soon as possible to prevent further damage to the concrete surface.

Column Foundations and Baseplates

Because of the crack in the plinth shown in figure 4-132, it is recommended that an internal inspection of the cavity within the column be performed to verify the adequacy of the structural column and baseplate within the cavity. Required repairs, if any, are dependent on the results of the internal inspection. The crack in the column plinth shown in figure 4-132 should be repaired by epoxy-injection. The corrosion of the anchor bolt shown in figure 4-133 should be removed and the section re-primed and painted with polyurethane or other high-performance outdoor coating. Based on the degree of corrosion at this location, it is possible that the corrosion could be associated with the application of salt or deicer on the elevated walkway during winter months. Care should be taken when applying salt or deicer to prevent contact with steel structures. In addition to the corroded bolt shown in figure 4-133, a coating product such as polyurethanes should be applied to all anchor bolts susceptible to salt or deicer.

Building Systems Recommendations

Mechanical

1. Recommendations are presented in near and medium term.
2. Near term, provide two direct expansion outside air systems using hot gas reheat for dehumidification control where there is currently no direct outside air ventilation being provided. One system would be provided on the south side of the facility to serve the three floors of offices and support areas.
3. The second system would be provided to serve the crew lounge mezzanine area on the north end of the building to allow for 24 hour operation when the space is used and occupied for performances.
4. Medium term (between 5-10 years), recommend replacing systems nearing the end of their useful life.
    a) Fans and unit heaters from the 1984 reconstruction remain in service. They will have reached of their useful life within the next 5-10 years and should be planned for replacement. (The roof-mounted exhaust fans are scheduled for replacement in late 2017 or early 2018).
    b) The split systems that serve the IT closet and lighting control room will have reached of their useful life within the next 5-10 years and should be planned for replacement.
    c) The two existing York air handling units deliver air to offices, chorus rooms, lounge, waiting and other staff spaces. These units were provided in 1998 and could remain in service for another 10 years if not longer.

Recommend planning on replacing with the next 10 years.

d) The three floors of offices and support areas on the south side of the facility as well as the crew lounge area on the opposite side of the building are cooled and heated with the glycol cooled vertical heat pumps provided in 2015. This system is new and could last 15 years before replacement.

Plumbing

1. A 300 kW Patterson-Kelly electric water heater dated 1983 and associated large storage tank provide domestic hot water to serve the facility. This water heater has exceeded its life expectancy and should be planned for replacement within the next 5-10 years, sized for the current shower usage requirements.
2. Accessible plumbing fixtures should be provided in the lower level.

Electrical

1. The majority of the electrical distribution system is original to 1984 and is reaching the end of its useful life and should be considered to be replaced in the next 5-10 years as replacement parts are becoming more difficult to obtain.
2. The emergency generator and emergency distribution system should be replaced and increased in capacity. Currently, if a power outage were to occur, the equipment required to move stage props on and off stage is not on emergency power. This can cripple stage hands from moving current performance equipment and props off stage and preventing them from setting up for the next performance. This should be done in the next 1-2 years.
3. The majority of the lighting in the Filene Center has been replaced with LED lighting in the past few years. The remaining non LED fixtures should be replaced.

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