U.S. Department of Transportation
Federal Highway Administration

Brent Spence Bridge
Replacement/Rehabilitation Project

Longworth Hall Impact Analysis Report Part Three: Potential Mitigation Measures

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1.0 Project Overview

1.1 Introduction

Interstate 75 (I-75) within the Greater Cincinnati/Northern Kentucky region is a major thoroughfare for local and regional mobility. Locally, it connects to I-71, I-74 and US Route 50. The Brent Spence Bridge provides an interstate connection over the Ohio River and carries both I-71 and I-75 traffic. The bridge also facilitates local travel by providing access to downtown Cincinnati, Ohio and Covington, Kentucky. Safety, congestion and geometric problems exist on the structure and its approaches. The Brent Spence Bridge, which opened to traffic in 1963, was designed to carry 80,000 vehicles per day. Currently, approximately 160,000 vehicles per day use the Brent Spence Bridge and traffic volumes are projected to increase to approximately 233,000 vehicles per day in 2035.

The I-75 corridor within the Greater Cincinnati/Northern Kentucky region is experiencing problems which threaten the overall efficiency and flexibility of this vital trade corridor. Areas of concern include, but are not limited to growing demand and congestion, land use pressures, environmental concerns, adequate safety margins, and maintaining linkage in key mobility, trade, and national defense highways.

To address these critical transportation needs, the Brent Spence Bridge Replacement/Rehabilitation Project is currently being undertaken. The purpose of the project is to:

- Improve traffic flow and level of service;
- Improve safety;
- Correct geometric deficiencies; and
- Maintain connections to key regional and national transportation corridors.

Throughout the Brent Spence Bridge Replacement/Rehabilitation project development process, specific measures were implemented to avoid, minimize or mitigate environmental impacts associated with the new Ohio River Bridge. These measures are identified and documented in the Environmental Assessment and will be implemented during detailed design and construction.

1.2 Longworth Hall

In Ohio, the proposed project will impact one historic resource, Longworth Hall located at 700 East Pete Rose Way in downtown Cincinnati. This building is located immediately west of I-71/I-75 and the preferred alternative for the project will pass through 204 feet of its northern and eastern end of Longworth Hall.

Longworth Hall was listed on the National Register of Historic Places (NRHP) in 1986. This resource is significant because it is a unique example of functional railroad architecture embellished with Romanesque Revival details. It exhibits distinctive characteristics of the style and is further enhanced because of its exceptional length of 1,160 feet. The building is also significant because it contributes to the understanding of freight movement by railroad during a period when this was an important mode of transportation.

Longworth Hall is a five-story, common bond brick railroad freight storage building. The existing structure consists of six adjacent blocks, designated Areas “A through F”. The exterior façades consist of 17-foot-on center repetitive bays. Longworth Hall has a concrete foundation and a flat roof and maintains a high degree of integrity despite several changes to its exterior. The first floor has rock-faced ashlar piers supporting columns rising to the fourth floor, from which decorative semi-circular arches adorn the façades. The structure was designed by M.A. Long and built in 1904 in order to consolidate several smaller obsolete warehouses. The B & O Railroad had placed an emphasis on Cincinnati as a major shipping center and transfer point, and the warehouse contributed to the functioning of the railroad until competition from trucks reduced its effectiveness and profitability.

Originally 1,277 feet long, the east end of the warehouse was reduced by 150 feet in 1961 to allow for the supporting piers of elevated I-71/I-75. A five-story 30,000 square foot brick addition was then built onto the northeast corner. A fire in the original building destroyed part of the fifth floor which was never rebuilt. The warehouse is an important surviving example of an industry that is losing its older distinctive buildings. A two-story brick building originally associated with the boiler room and round house is also associated with this resource.

1.3 Mitigation Measures

The Ohio Department of Transportation (ODOT), Ohio Historic Preservation Office (OHPO), and Federal Highway Administration (FHWA) met on July 15, 2010 to discuss impacts to Longworth Hall. Information about the impacts to this resource was sent to Ohio Section 106 consulting parties for comment and posted on the project website. A consulting parties meeting was held on October 7, 2010 to discuss impacts to Longworth Hall and possible mitigation measures. During the meeting several mitigation options were presented and discussed, which resulted in six feasible mitigation measures identified for further analysis. These mitigation options include:

- Preparation of Historic American Building Survey (HABS) Documentation on Longworth Hall
- Reconstruction of portion of the fourth floor of the building that was demolished by fire, which would allow the building to regain historic integrity and floor space that will otherwise be lost during construction of the bridge.

- Installation of appropriate storm window throughout the building to reduce traffic and ambient noise, reduce dust and debris from the roadway, and to protect historic windows.
- Rehabilitation of the associated scale house, located on the property north of Longworth Hall for interpretative use.
- Completion of a contextual study of extant large scale railroad freight house in Ohio.
- Minimal removal and reconstruction of the upper floors of Longworth Hall to allow for the bridge construction and whether any of the lower floors could remain in service.

1.4 Purpose of Report

This report presents the results of the analyses completed for each of the six mitigation measures. The mitigation options were developed to a conceptual level of detail and evaluated for reasonableness. Preliminary cost estimates were also estimated. The positive and negative aspects of each mitigation measures were identified.

Additional coordination will be undertaken with OHPO and consulting parties to determine the preferred mitigation measure for Longworth Hall. This will be specified in a Section 106 Memorandum of Agreement (MOA) to be developed for the Brent Spence Bridge Replacement/Rehabilitation project.

2.0 Preparation of Historic American Building Survey (HABS) of Longworth Hall

This mitigation option entails documentation of Longworth Hall through the HABS process. The HABS and the Historic American Engineering Record (HAER) are the national historical architectural and engineering documentation programs of the National Park Service, which promote documentation that is incorporated into the HABS/HAER collections in the Library of Congress. The goal of the documentation "is to provide architects, engineers, scholars, preservationists, and interested members of the public with comprehensive information on the historical, architectural, technological, or cultural significance of a building, site, structure, object or landscape" (U.S. Department of the Interior, National Park Service [USDOI-NPS] 2003:43160). Rooted in the concept of "Preservation through Documentation," a HABS "permits accurate repair or reconstruction of parts of a property, records existing conditions for easements, or may preserve information about a property that is to be demolished" (USDOI-NPS 1983:44730).

HABS documents generally include photographs, written data, and measured drawings that illustrate and describe the significance of the resource. In the event that the resource is lost or damaged by fire, natural disasters or demolition, measured drawings and photographs provide a record of the resource as it existed at the time of the documentation process. It should be noted that a thorough photographic record of the building and or a copy of existing plans often substitutes for measured line drawings. Although a HABS does provide a good written and photographic record of the building, it does not preserve the actual building itself. The HABS process has, however, been used for many years as an acceptable mitigation option when demolition of a resource was deemed necessary.

2.1 Advantages

- HABS documentation will provide future researchers a detailed record of Longworth Hall as presently constructed, prior to the impending demolition of the east end of the building.
- A HABS is non-evasive and non-destructive, meaning that current tenants will likely remain unaware of the documentation process.
- HABS documentation can provide a good basis for future interpretation projects.
- HABS documentation can help with future reconstruction or renovation projects, if and when such projects become feasible.
- HABS documentation can sometimes reveal new and insightful information about a historic resource.
- The costs of HABS documentation is relatively inexpensive when compared to other mitigation options.

2.2 Disadvantages

- HABS documentation provides only a written and photographic record of the historic resource. It does not actually preserve the historic fabric of the building.

2.3 Cost Summary

A HABS document for Longworth Hall would cost approximately $30,500.

3.0 Reconstruction of the Fifth Floor Area “E”

An approximately 200-foot section of the fifth floor of Longworth Hall was destroyed by fire in 1995. In repairing the fire damage, the walls and floor of the section were demolished and a roof membrane system applied to what was once the fifth floor. The mitigation alternative constituting reconstruction of this section of the fifth floor entails reconstruction of the exterior brick walls, window openings, and provision of a new roofing system. The structural and architectural rehabilitation of the fifth floor Area “E” would be accomplished through the use of salvaged brick and other materials from the controlled demolition of Areas “A” and “B” (See Figure 1). Wooden columns and beams with timber joists, all salvaged from Areas “A” and “B”, would comprise the structural system and roof supports for the reconstruction. Brick pilasters and arches would match the existing brickwork throughout the building and window openings with replacement wood-frame sash would match the existing openings.

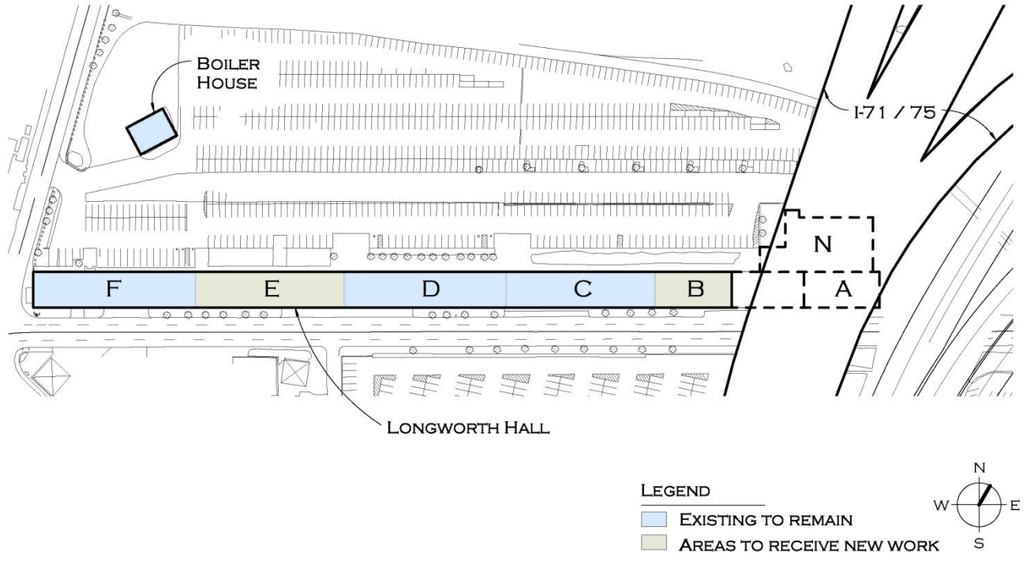


Figure 1: Site Plan

3.1 Advantages

- The reconstruction will return the remaining portion of Longworth Hall to its original appearance, restoring continuity to the roofline.
- Reconstruction of the fifth floor will provide 9,856 gross square feet of additional rental space which will help offset the loss of 93,015 gross square feet of rentable space on the demolished portion on the east end of the building.
- The reconstruction will reuse historic fabric taken from the controlled demolition of the east end of the building.

3.2 Disadvantages

- Reconstruction of the fifth floor is one of the more expensive mitigation alternatives.
- The addition of rentable floor space will not completely offset the loss of space due to demolition on the east end of the building.
- The elevator and other mechanical, electrical, and plumbing systems may be offline while work proceeds, disrupting other tenants.
- Reconstruction of the fifth floor may disrupt tenants on the floors below the work, due to noise, dust, and other construction-related factors.
- Appropriate reconstruction requires an experienced contractor familiar with the Secretary of the Interior’s Standards for Rehabilitation.

3.3 Cost Summary

The total cost for this mitigation alternative is approximately $1,398,743. Of the six proposed mitigation measures, this measure ranks among the more expensive, however, the return gained by adding additional rental space in the building and restoring the continuity of the roofline makes it a reasonable mitigation option. Details are provided in Section 3.8.

3.4 Architectural & Structural Summary

Following the 1995 fire that destroyed the top floor (fifth floor) of Area “E”, the walls and roof were demolished and a roof membrane system was applied to what once was the fifth floor (See Photo 1). This mitigation measure seeks to make the building “whole” again by restoring the fifth floor, reinstalling the exterior brick walls and windows and providing a new roof system (See Figures 2 and 3).

3.4.1 Architectural Rehabilitation

The new exterior walls of Area “E” will be an extension of the existing brick masonry built with brick salvaged from the demolition of Area “A” and partial demolition of Area “B”. New brick pilasters and arches constructed from salvaged brick shall match the existing brickwork to complete the building façade. Brick at Area “N” is not an historic brick and will not be salvaged for reuse. See Tables 1 and 2 in Section 8.0 for salvage brick quantities and brick quantities required for new work. To the greatest extent possible, the structural system for the addition will be built from materials salvaged from the demolition of Area “A” and will consist of wood timber columns and beams with wood timber joists. The new roof will be a modified bitumen. New stairs extending from the fourth floor to the roof will be added for egress. The existing elevator should be able to service renewed access to the fifth floor. A new elevator and stair shaft will extend the existing elevator and new stair. Gypsum board partitions will be added to provide corridor definition. To complete the addition, wood flooring salvaged from the demolition of Area “A” will be installed.

3.4.2 Structural Rehabilitation

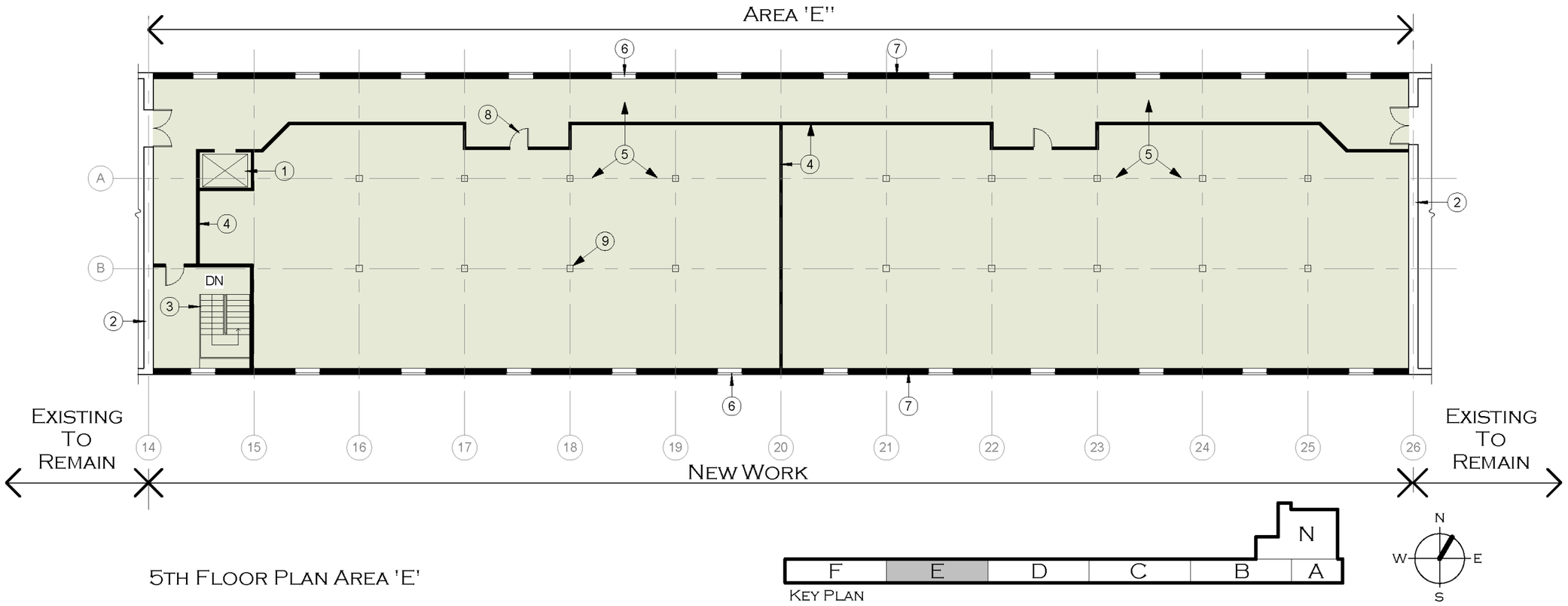
To the greatest extent possible, reconstruction will be completed using materials salvaged from Areas “A” and “B” (See Figures 2 and 3).The initial work will be to reinforce or supplement the fifth floor joists and subfloor areas that may have been damaged during the fire. Reinforcing or supplementary framing would be installed as necessary to restore the floor structure. Roof reconstruction will be completed to match the other segments and supported by timber columns. The exterior north and south brick masonry walls will be reconstructed from the salvaged components. The roof structure will also will be constructed utilizing salvaged materials to the greatest extent possible, including timber beams spanning parallel to the length of the building and joists spanning from the exterior walls to the beams and from beam to beam. As in the original building, the roof deck will be completed with boards spanning across the joists.

Photo 1: Aerial photo of Longworth Hall showing existing gap at Fifth Floor Area “E”

Photo 2: “Before” image of Longworth Hall showing gap at fifth floor Area “E”

Photo 3: “After” image of Longworth Hall reconstruction at fifth floor Area “E”

3.5 Existing Building / Repair Floor Plans 5, Roof



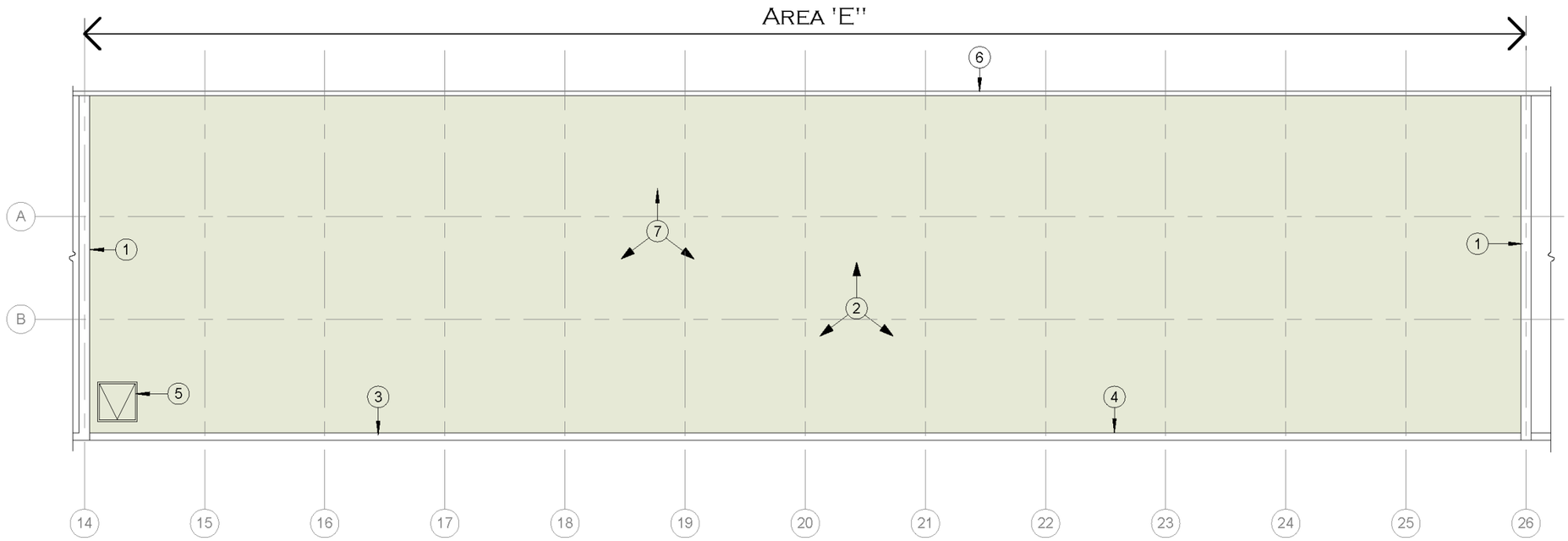
KEYED NOTES

1. EXISTING ELEVATOR WILL RESUME SERVICE TO THIS FLOOR.
2. EXISTING MASONRY WALL.
3. NEW STAIR WILL EXTEND FROM THE 4TH FLOOR TO ROOF ACCESS.
4. NEW GYPSUM BOARD PARTITION.
5. WOOD FLOOR SAVED FROM THE DEMOLITION OF AREA 'A' IS TO BE INSTALLED HERE.
6. NEW WOOD FRAME INSULATED WINDOW.
7. NEW BRICK MASONRY WALL WITH REBUILT EXTERIOR BRICK ARCHES TO MATCH EXISTING FACADE. BRICK SAVED FROM THE DEMOLITION OF AREA 'A' IS TO BE INSTALLED HERE.
8. NEW DOOR.
9. WOOD COLUMN SALVAGED FROM DEMOLITION.

LEGEND

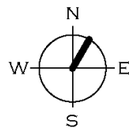
- EXISTING TO REMAIN
- AREAS TO RECEIVE NEW WORK
- EXISTING DOOR TO REMAIN
- EXISTING DOOR TO BE DEMOLISHED
- NEW DOOR
- EXISTING WALL TO REMAIN
- EXISTING WALL TO BE DEMOLISHED
- NEW WALL

Figure 2



ROOF FLOOR PLAN - AREA 'E'

KEY PLAN



KEYED NOTES

1. EXISTING MASONRY WALL.
2. NEW INSULATED MODIFIED BITUMEN ROOF SYSTEM.
3. NEW ALL BRICK MASONRY PARAPET BUILT WITH BRICK SAVED FROM DEMOLITION OF AREA 'A'.
4. NEW STONE COPING.
5. NEW ROOF HATCH.
6. NEW GUTTER.
7. NEW AND RELOCATED MECHANICAL EQUIPMENT.

LEGEND

- EXISTING TO REMAIN
- AREAS TO RECEIVE NEW WORK
- EXISTING DOOR TO REMAIN
- EXISTING DOOR TO BE DEMOLISHED
- NEW DOOR
- EXISTING WALL TO REMAIN
- EXISTING WALL TO BE DEMOLISHED
- NEW WALL

Figure 3

3.6 Mechanical, Electrical and Plumbing (MEP) Systems

The existing fourth floor roof in Area "E" has various mechanical, electrical and plumbing (MEP) components but is relatively clean (See Photos 4 thru 7). There is one rooftop unit, three condensing units, one elevator shaft ventilation duct hood, two plumbing vent pipes, three exterior light fixtures, and one satellite dish. There is no gas piping on the roof. The roof slopes downward towards the north side where gutters and downspouts are located.

See Figure 4 MEP general notes for the existing systems locations and corresponding locations for Photos E-1 thru E-5.

Photo 4: Packaged Rooftop Unit Condensing (noted Photo E-1 in Figure 4)

Photo 5: Computer Room Unit (noted Photo E-2 in Figure 4)

Photo 6: Elevator Ventilation Duct (noted Photo E-4 in Figure 4)

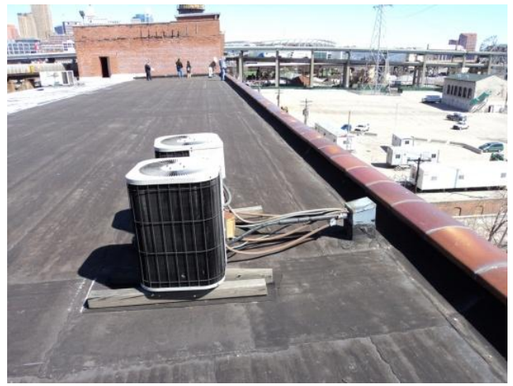
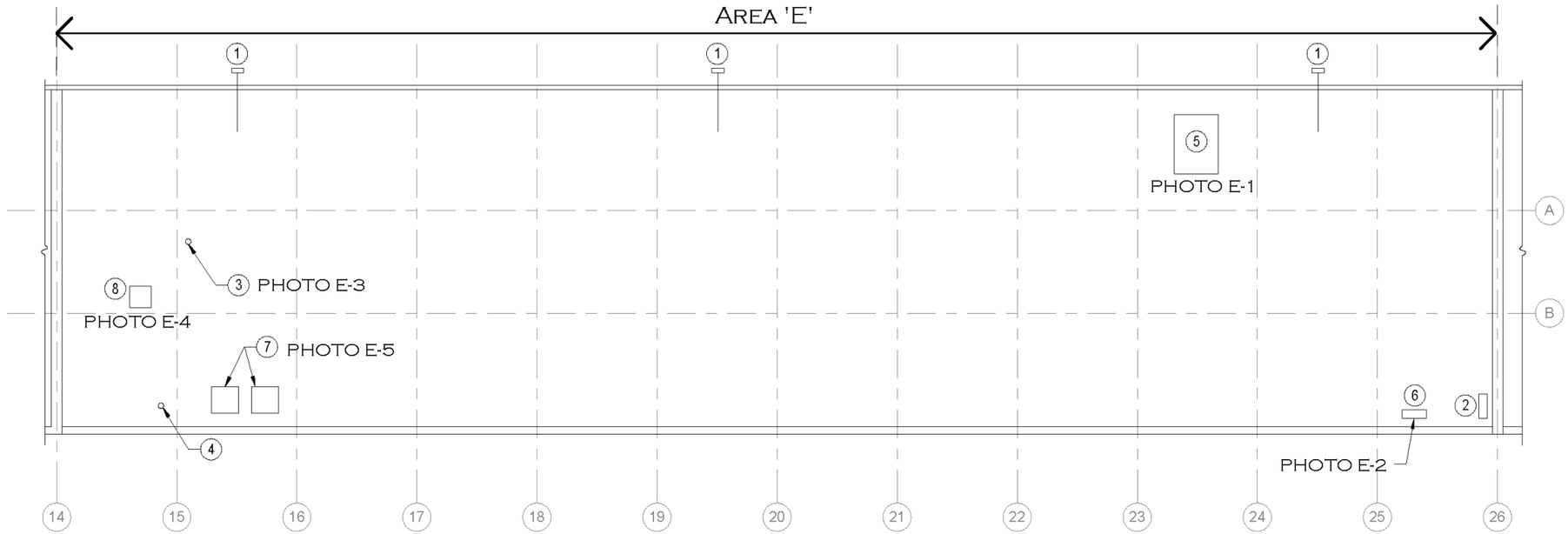


Photo 7: Condensing Units (noted Photo E-5 in Figure 4)

Photo 8: Plumbing Vent Pipe (noted Photo E-3 in Figure 4)

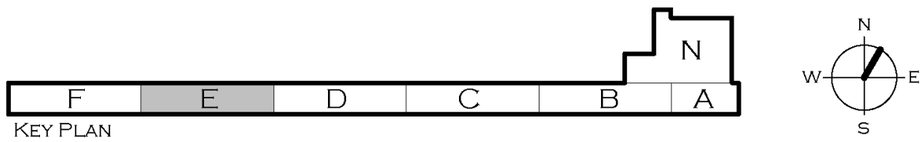
3.7 Existing Building – MEP Roof Plan



EXISTING BUILDING - MEP - ROOF PLAN - AREA 'E'

KEYED NOTES

1. REMOVE AND RELOCATE EXISTING EXTERIOR FACADE LIGHT FIXTURE ONTO NEW 5TH FLOOR ROOF.
2. REMOVE AND RELOCATE EXISTING SATELITE DISH TO NEW 5TH FLOOR ROOF AND EXTEND CABLE AND CONDUIT.
3. EXTEND EXISTING VENT PIPE AND WATER LINE WITH HOSE END VALVE UP THRU NEW 5TH FLOOR ROOF.
4. EXTEND EXISTING VENT PIPE UP THRU NEW 5TH FLOOR ROOF.
5. REMOVE AND RELOCATE EXISTING RTU-E1 TO NEW 5TH FLOOR ROOF. EXTEND ALL UTILITIES AND APPURTENANCES INCLUDING BUT NOT LIMITED TO ELECTRICAL, GAS PIPING, CONTROL WIRING, AND DUCTWORK.
6. REMOVE AND RELOCATE EXISTING CONDENSING UNIT E-4 SERVING TENANT ''BAREFOOT COMPUTER ROOM'' TO NEW 5TH FLOOR ROOF. EXTEND REFRIGERANT LINES, AND ELECTRICAL SERVICE.
7. REMOVE AND RELOCATE 2 EXISTING CONDENSING UNITS SERVING ARTISTIC GALLERY 1-E TO NEW 5TH FLOOR ROOF. EXTEND REFRIGERANT LINES AND ELECTRICAL SERVICE.
8. REMOVE EXISTING AREA 'E' ELEVATOR SHAFT VENTILATION DUCT AND PROVIDE A NEW RESIZED VENTILATION DUCT ON THE 5TH FLOOR.



GENERAL NOTES

1. PROVIDE A MINIMUM OF 4 TEMPORARY GAS-FIRED UNIT HEATERS.
2. PROVIDE GAS PIPE STUBBED IN SPACE TO SERVE FUTURE TENANT HVAC UNITS AND HOT WATER HEATER(S), AND TEMPORARY HEATERS.
3. PROVIDE PLUMBING WASTE PIPE STUBBED IN SPACE TO SERVE FUTURE TENANT(S) PLUMBING FIXTURE(S). CONNECT TO EXISTING PLUMBING STACK. REVISE SIZE OF EXISTING MAINS AS REQUIRED BY CODE.
4. PROVIDE DOMESTIC COLD WATER SERVICE STUBBED INTO SPACE FROM EXISTING WATER SERVICE FOR FUTRE TENANT(S) HOOK-UP.
5. PROVIDE EXIT SIGNS AND HOUSE LIGHTING FOR WAYFINDING/SAFETY EGRESS. PROVIDE POWER WIRING FOR TEMPORARY HEATERS. UTILIZE AN EXISTING ELEC. HOUSE PANEL FOR LIGHTING AND HEATER CIRCUITS.
6. PROVIDE FULL SPRINKLER FLOOR COVERAGE AND A STANDPIPE IN THE STAIRWELL.
7. PROVIDE VOICE/DATA BACKBONE CABLING FOR FUTURE TENANT(S) USAGE.

Figure 4

*See corresponding photos on Page 9 for Photos E-1 through E-5

3.8 Cost Estimate

	QUANTITY		UNIT COST	TOTAL
Remove Existing Roofing/decking	9696	sf	$ 2.85	$ 27,634
Remove Existing Brick Veneer	408	sf	$ 7.50	$ 3,060
Remove Roof Edge Flashing	404	lf	$ 3.00	$ 1,212
New Exterior Masonry Walls	6464	sf	$ 64.00	$ 413,696
Install Salvaged window sills	116	lf	$ 18.00	$ 2,088
Tuckpoint Brickwork	1632	sf	$ 9.50	$ 15,504
Bonus for Brick Arches	1020	sf	$ 6.50	$ 6,630
New Cast Stone Wall Copings	404	lf	$ 84.00	$ 33,936
Install Salvaged Wood Columns	286	lf	$ 6.25	$ 1,788
Install Salvaged Wood Beams	1034	lf	$ 9.60	$ 9,926
New Stair Landings	72	sf	$ 34.00	$ 2,448
New Stair Treads & Risers	162	sf	$ 38.00	$ 6,156
New Steel Handrails	24	lf	$ 27.00	$ 648
New Steel Stair Railings	54	lf	$ 48.00	$ 2,592
Install Salvaged Wood flooring	9540	sf	$ 3.50	$ 33,390
Install Salvaged Timber Joists	19872	bf	$ 0.60	$ 11,923
Joist Pockets @ Ex Brick walls	92	ea	$ 46.50	$ 4,278
Install Salvaged Wood Flr Decking	18584	sf	$ 2.30	$ 42,743
New 3/4" Plywood Decking	9292	sf	$ 1.85	$ 17,190
New 4" Polyiso/Mod Bitu. Roofing	9292	sf	$ 8.50	$ 78,982
Wall Edge Flashing - exist. walls	92	lf	$ 11.00	$ 1,012
Wall Edge Flashing - new walls	404	lf	$ 15.00	$ 6,060
New Large Roof Hatch Unit	1	ea	$ 4,600	$ 4,600
Install Salvaged Square Window Units	563	sf	$ 4.65	$ 2,618
New Drywall Shaft Walls	1027	sf	$ 7.15	$ 7,343
New Drywall Partitions - Demising	3341	sf	$ 5.65	$ 18,877
Paint Drywall Walls	8216	sf	$ 0.50	$ 4,108
Install New Door Units - 3070	5	ea	$ 975	$ 4,875
Finish Doors/Frames	5	ea	$ 60	$ 300
Elevator Unit - Add Stop/Travel	1	ls	$ 20,500	$ 20,500
Remove/Relocate:				
Exterior Lite Fixtures	3	ea	$ 215	$ 645
Satellite Dish	1	ea	$ 500	$ 500
Condensing Units	3	ea	$ 680	$ 2,040
Roof TOP Unit RTU-E1	1	ea	$ 2,500	$ 2,500
Remove Existing Elev. Vent Duct	1	ea	$ 350	$ 350
New Fire Sprinkler System	9696	sf	$ 2.75	$ 26,664
Extend Standpipe @ Stairwell	1	ls	$ 4,500	$ 4,500
New Temporary Gas Fired Unit Heaters	4	ea	$ 2,800	$ 11,200
New Elevator Vent Duct system	1	ea	$ 4,000	$ 4,000
Extend Services for 3T Condensers	2	ea	$ 1,200	$ 2,400
Extend Services for 1.5T Condensers	1	ea	$ 1,000	$ 1,000
Extend Services for Ex RTU-E1	1	ea	$ 3,000	$ 3,000

	QUANTITY		UNIT COST	TOTAL
Extend Vent Pipes to New Roof	2	ea	$ 650	$ 1,300
Extend Water Line to New Roof	1	ea	$ 575	$ 575
New Gas Main on 5th Floor	300	lf	$ 35	$ 10,500
New Cold Water Service main	350	lf	$ 25	$ 8,750
New Sanitary Bulk Main @ 4th Flr 4Clg.	400	lf	$ 20.00	$ 8,000
New Egress/Wayfinding Lighting	2367	sf	$ 3.75	$ 8,876
Install New Fire Alarm System	9292	sf	$ 1.10	$ 10,221
New Phone/Data Backbone Cabling	9292	sf	$ 1.50	$ 13,938
		sf	$ -	$ -
General Conditions				$ 90,708
General Contractor Fees 6%				$ 59,867
				=========
Subtotal				**$ 1,057,651**
Design Contingency - 15%				**$ 158,648**
Constr. Contingency - 15%				**$ 182,445**
				==========
Total Costs				**$ 1,398,743**

4.0 Storm Window Installation & Masonry Repair and Tuck Pointing

This mitigation alternative includes the addition of either interior or exterior storm windows to the existing windows throughout Longworth Hall. This alternative also includes masonry repair and mortar re-pointing to the north and/or west and south building façades. This alternative will reduce traffic and ambient noise, reduce dust and debris from the surrounding roadways, and protect the historic window sash. The principle advantage of exterior storm windows is that they will protect the historic window sash, while interior storm windows would leave the historic sash exposed. Repairing the masonry would reduce entry of dust into the building, as well as restore the visual and physical integrities of the building. This alternative actively works to preserve and protect the historic fabric of the building.

4.1 Advantages

- Exterior storm windows would lengthen the life of the historic wood sash by protecting them from the weather.
- Adding storm windows can improve the thermal efficiency of any window. A 2002 study confirmed that installing a storm window over a historic window can achieve a similar thermal performance to that of a new low-E vinyl replacement window (http://www.nps.gov/history/hps/tps/weather/windows_doors.html).
- Interior or exterior storm windows would increase the comfort levels of the building tenants by reducing the amount of dust and noise that enters the building.
- Interior or exterior storm windows would not compromise the historic fabric of the building.
- Interior storm windows would be easier to install, as installation would take place from inside of the building and it would not be dependent on weather conditions; interior storm windows are approximately $10,000 less to install than exterior storm windows.
- Masonry repair and re-pointing would preserve and protect the visual and physical integrities of the masonry and should last at least 30 years.
- Masonry repair and re-pointing would lessen the amount of dust that enters the building.

4.2 Disadvantages

- Adding storm windows creates higher maintenance costs because the condition of the historic windows will need to be checked more often.
- Exterior storm windows could be more difficult to install and may be dependent on favorable weather; exterior storm windows are approximately $10,000 more to install than interior storm windows.
- Cost of installing storm windows and masonry repair and tuck pointing of north, west, and south façades is the second most expensive of the six Item alternatives ($1,647,474 total, if installing exterior storm windows).
- Exterior storm windows will obscure the appearance of the historic sash.
- Interior storm windows would not protect the historic sash from outside dirt and debris damage.
- The installation process of the storm windows may damage the historic sash.
- Installation of storm windows may promote condensation that could damage the historic wood sash; condensation may be greater in rooms with higher humidity, such as kitchens and bathrooms.
- Installing storm windows, especially interior, could disrupt current building tenants.
- Masonry repair and re-pointing can be noisy, create a lot of dust, and may necessitate the temporary closure of entrances, thus disrupting current building tenants.
- New mortar must be compatible with the historic materials or else the repairs and re-pointing will not be sustainable, therefore it is recommended to only use an experienced contractor familiar with the Secretary of the Interior's Standards for Rehabilitation.
- Masonry repair and re-pointing would be dependent on favorable weather for the physical and proper curation of the mortar.

4.3 Cost Summary

Interior storm window installation will cost approximately $297,015, while exterior installation will be slightly higher at $307,383. The masonry repair and tuck-pointing will cost approximately $1,369,289. Details are provided in Section 4.5.

4.4 Architectural Summary

The existing windows of Longworth Hall are original to the building and in need of protection from the environment (See Photos 9 and 10); the addition of storm windows is a recommended measure of protection. The exterior masonry shows signs of cracks, voids, crumbling mortar, and areas of deteriorating masonry units. Also present are large holes and washed out mortar (See Photos 11 and 12).

4.4.1 Mitigation

This mitigation measure provides storm windows at all exterior wood windows throughout the building. (See Figure 5 for existing window sizes and styles.) The storm windows will provide protection of the historic wood windows along with a reduction in ambient and traffic noise. The storm windows may also provide some reduction in dirt and debris from adjacent roadways. Masonry repair will provide additional reduction in dirt and debris, as well as reduction of water infiltration.

4.4.2 Resolution

The storm windows will be triple track storms with sightlines matching the profile of the existing wood frames. The storms will also have a horizontal mullion to match the sight line of the existing wood window sash. All tuck-pointing will use the U.S. Department of the Interior Office of Historic Preservation standards (The Secretary of Interior's Standards for the Treatment of Historic Properties, National Park Service, 1995 [http://www.nps.gov/history/hps/tps/standards_guidelines.htm, accessed June 28, 2011]) to preserve the appearance and to avoid irreparable damage from modern mortar. It is important that new mortar match the original in porosity and compressive strength.

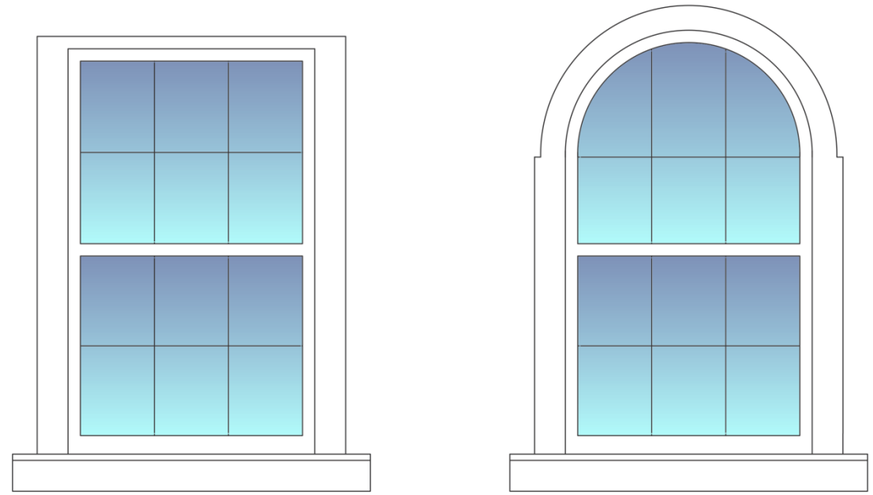


Figure 5: Existing Window Sizes and Styles

Photo 9: North Side of Longworth Hall – Existing Windows

Photo 10: South Side of Longworth Hall - Existing Windows

Photo 11: Minor Masonry Damage

Photo 12: Major Masonry Damage

4.5 Cost Estimates

Storm Windows - Interior

	QUANTITY		UNIT COST	TOTAL
Storm windows - Arched Tops	3261	SF	$ 25.70	$ 83,808
Storm windows - Square Tops	6786	SF	$ 20.15	$ 136,738
General Conditions				$ 22,055
General Contractor Fees -6%				$ 14,556
				=========
Subtotal				**$ 257,156**
Design Contingency - 10%				**$ 25,716**
Constr. Contingency - 5%				**$ 14,144**
				==========
Total Costs				**$ 297,015**

Storm Windows – Exterior

	QUANTITY		UNIT COST	TOTAL
Storm windows - Arched Tops	3261	SF	$ 26.50	$ 86,417
Storm windows - Square Tops	6786	SF	$ 20.90	$ 141,827
General Conditions				$ 22,824
General Contractor Fees -6%				$ 15,064
				=========
Subtotal				**$ 266,132**
Design Contingency - 10%				**$ 26,613**
Constr. Contingency - 5%				**$ 14,637**
				==========
Total Costs				**$ 307,383**

Tuck-Pointing and Brick Repair – North Façade

	QUANTITY		UNIT COST	TOTAL
Tuck Pointing	21040	SF	$ 14.50	$ 305,080
Brick Repair	9017	SF	$ 26.00	$ 234,442
General Conditions				$ 23,952
General Contractor Fees -6%				$ 35,608
				=========
Subtotal				**$ 629,083**
Design Contingency - 15%				**$ 94,362**
Constr. Contingency - 15%				**$ 108,517**
				==========
Total Costs				**$ 831,962**

Tuck-Pointing and Brick Repair – West and South Façade

	QUANTITY		UNIT COST	TOTAL
Tuck Pointing	13590	SF	$ 14.50	$ 197,055
Brick Repair	5823	SF	$ 26.00	$ 151,398
General Conditions				$ 34,845
General Contractor Fees -6%				$ 22,998
				=========
Subtotal				**$ 406,296**
Design Contingency - 15%				**$ 60,944**
Constr. Contingency - 15%				**$ 70,086**
				==========
Total Costs				**$ 537,327**

5.0 Boiler House (Scale House) Rehabilitation

The Boiler House (Scale House) located to the north of Longworth Hall originally provided heat for Longworth Hall, as well as the offices and roundhouse connected to the Boiler House (See Figure 6). The building, included in the National Register boundaries of the Longworth Hall property, is in a state of severe disrepair and structurally compromised. This mitigation alternative would stabilize the structure by bracing external structural walls with an internal structural steel column and beam support system. The brick masonry walls would be repaired with brick salvaged from the controlled demolition of Areas "A" and "B" of Longworth Hall, and tuck-pointed with a matching mortar. Completing the shell rehabilitation of the Boiler House will be an alternate for a roof system which is priced separately.

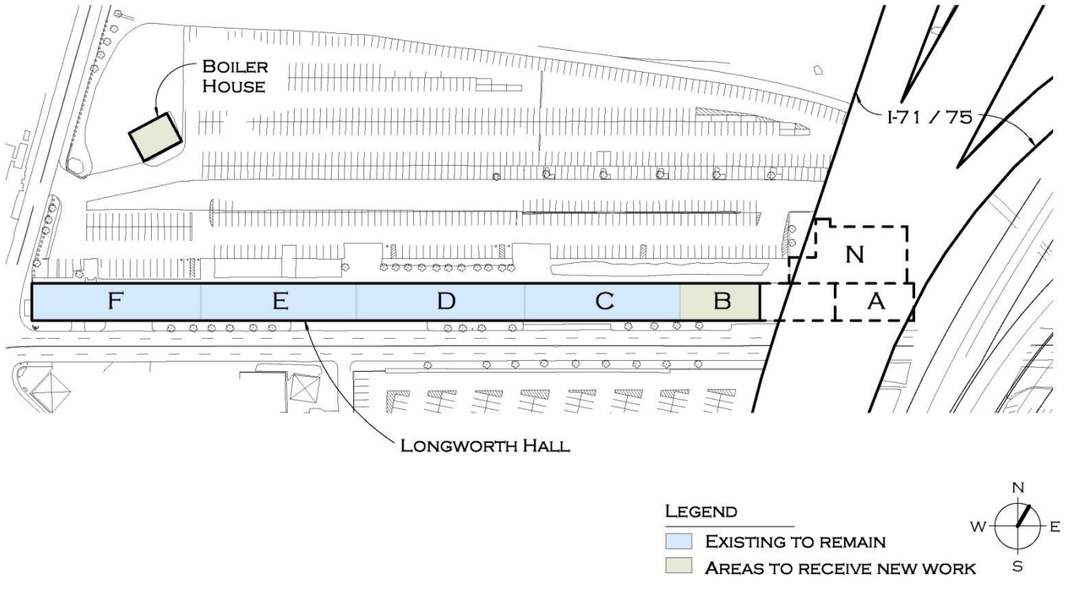


Figure 6: Site Plan

5.1 Advantages

- The stabilization of the Boiler House would prevent its inevitable collapse, helping to preserve a visible component of the National Register-listed Longworth Hall property.
- A stabilized Boiler House could be used as an interpretive element of Longworth Hall.
- If the Roof System Alternate mitigation measure is completed along with the stabilization of the Boiler House, the space could be returned to usable space.

5.2 Disadvantages

- This mitigation alternative is costly, totaling approximately $316 per square foot for all proposed actions, including the Roof System Alternate.
- If the Roof System Alternate is not undertaken, the building would not be usable for tenants.
- If the building is stabilized without adding the Roof System Alternate, the rebuilt walls would be open to the elements and would continue to deteriorate.
- The building would still not be serviced by utilities, limiting usage options after stabilization.
- Appropriate rehabilitation requires an experienced contractor familiar with the Secretary of the Interior's Standards for Rehabilitation.

5.3 Cost Summary

The cost for this mitigation alternative is approximately $586,782 without the Roof System Alternate. Without providing a weatherproof roof, the exposed brick masonry walls would continue to deteriorate, and the space would not be usable for tenants. Adding the Roof System Alternate would bring the total cost to approximately $632,630. The Boiler House Rehabilitation and Roof System Alternate mitigation alternative is a reasonable mitigation option, however, it may be cost prohibitive. Details are provided in Section 5.6.

5.4 Architectural & Structural Summary

The Boiler House is an existing building adjacent to Longworth hall that was once part of a larger turn of the century roundhouse rail support structure. Over the years the Boiler House has fallen into extreme disrepair and is close to a point of collapse. The building has no roof, floor or associated structural support system. All that remains of the original building are seriously deteriorated exterior brick walls with boarded up windows (See Photos 13 thru 16).

5.4.1 Mitigation

This mitigation measure seeks to rehabilitate the Boiler House to a level where the building is safe and where the exterior walls are protected from failure.

5.4.2 Architectural Rehabilitation

The exterior walls will be braced with an internal structural steel column and beam system. The interior and exterior side of the existing brick masonry walls will be repaired and tuckpointed. Brick salvaged from the demolition of Longworth Hall Area “A” will be used for brick repair on this building to the greatest extent possible. The existing windows will be bricked in while a large arched opening on the south façade will receive a pair of wood doors (See Figure 7). The refurbished walls will receive a limestone cap. The existing floor will be removed and replaced with a concrete slab on grade. The building is currently not serviced by utilities.

Completing the shell rehabilitation of the Boiler House will be an alternate for a roof system which is priced separately. This roof will be a modified bitumen system on protection board on wood decking salvaged from the demolition of Area “A”. The wood decking will rest on timber joists also salvaged from the demolition of Area “A”. The roof will slope from a high end parapet to a low end gutter and downspout.

5.4.3 Structural Rehabilitation

The Boiler House structure consists of deteriorating brick masonry perimeter walls and a limited amount of severely deteriorated and disintegrating wood framing. The proposed stabilization of the Boiler House involves removal of the existing wood framing due the severity of the deterioration. Exterior walls will be restored with damaged areas reconstructed using brick salvaged from the Boiler House and Area “A”. Restoration of the brick masonry will require pointing of all mortar joints at both the interior and exterior faces.

The perimeter brick walls of the Boiler House are approximately twenty eight feet tall. In the original building configuration, the walls were connected and braced by the roof and at least partially by a second floor or mezzanine. The proposed work will include installation of the bracing necessary to stabilize the wall. Reconstruction of a complete weatherproof roof is considered an additional work alternative and shown as a cost alternative. The planned wall bracing structure will be structural steel.

Wide flange steel columns located inside the walls at each corner and at the mid-point of each wall will support steel beams at the mid-height and at the roof level at the top of the wall. Connection of the wall to these beams will be accomplished by using anchor bolts that will be built into the rehabilitated brick, or drilled and adhered into the brick masonry and fastened to the steel beams. Steel braced frames consisting of diagonal steel members connecting between columns from the roof level brace to the mid-height brace, and from the mid-height brace to the base of the column at each wall, will restrict lateral movement. Four additional diagonal steel braces connecting the columns at the roof framing level will be installed to maintain the alignment of the steel framing and distribute lateral loads to the columns and the associated braced frames (See Figure 8 for structural support system drawings).

At the ground level, concrete foundations extending below the frost depth will be constructed to support and anchor the columns. The existing floor within the Boiler House walls will be excavated to approximately one foot below the existing elevation and reconstructed with approximately eight inches of compacted aggregate fill and a four inch thick concrete slab-on-grade floor.

Photo 13: Boiler House: West Elevation

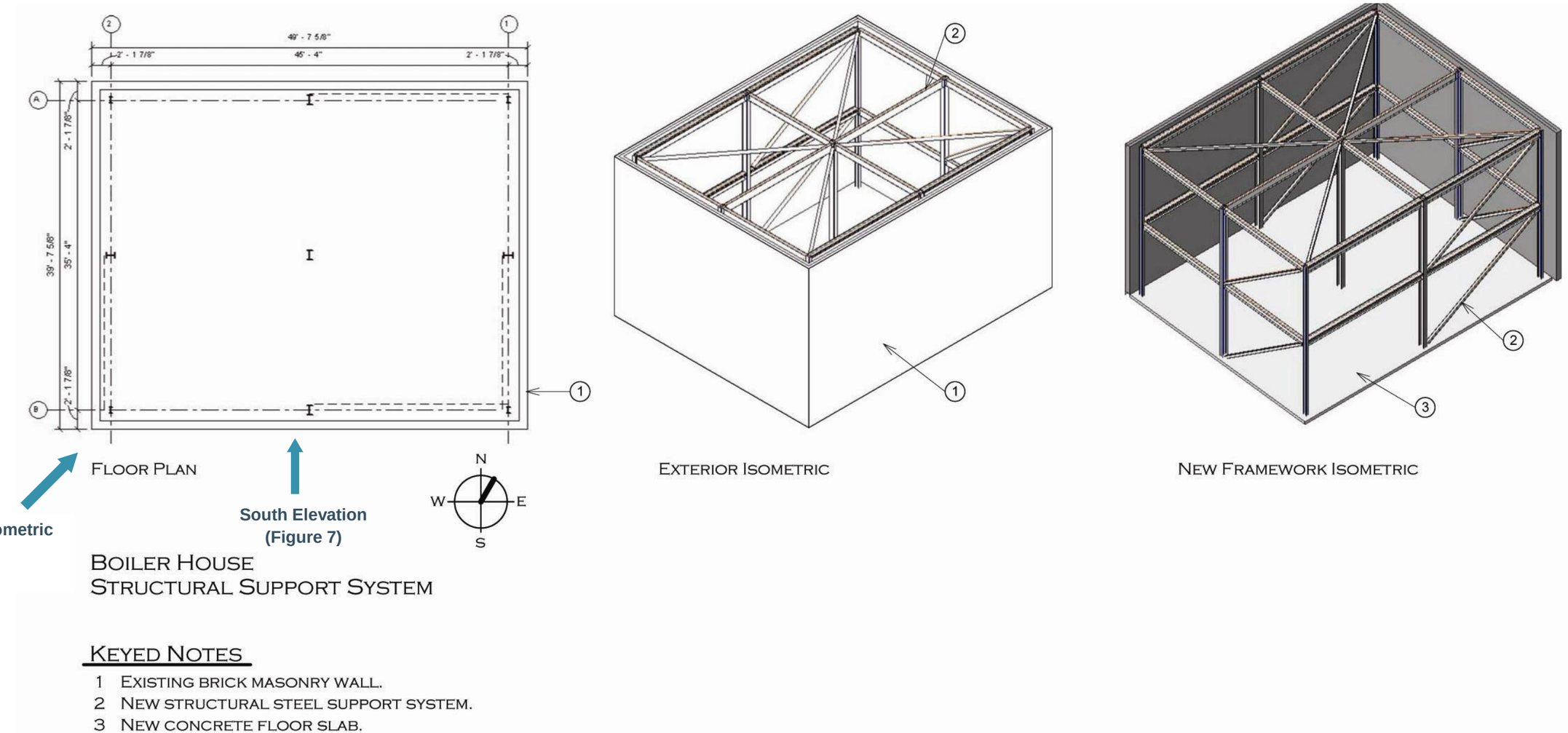
Photo 15: Boiler House: South Elevation

Photo 14: Boiler House: East Elevation

Photo 16: Boiler House: North Elevation

5.5 Diagrams

Figure 7: Boiler House Proposed South Elevation



Exterior Isometric

South Elevation
(Figure 7)

Figure 8: Structural Diagrams

5.6 Cost Estimate

Boiler House

	QUANTITY		UNIT COST	TOTAL
Remove Existing Slab on Grade	2000	sf	$ 3.25	$ 6,500
Remove Existing Roofing/Decking	2000	sf	$ 1.00	$ 2,000
Remove Existing Wall Vegetation	5040	sf	$ 1.25	$ 6,300
Remove Roof Edge Flashing	180	lf	$ 6.00	$ 1,080
Remove Opening Closures	514	sf	$ 2.50	$ 1,285
Install Salvaged Window Sills	37	lf	$ 18.00	$ 666
Tuckpoint Brickwork	10080	sf	$ 14.50	$ 146,160
Brick Repairs	2200	sf	$ 26.00	$ 57,200
Brick Infill @ Existing Openings	472	sf	$ 64.00	$ 30,208
New Cast Stone Wall Copings	180	lf	$ 84.00	$ 15,120
New Steel Columns	12376	lbs	$ 1.20	$ 14,851
New Steel Beams	27050	lbs	$ 1.30	$ 35,165
New Steel Braces	1908	lbs	$ 1.50	$ 2,862
New Column Spread Footings	14	cy	$ 245.00	$ 3,430
New Concrete Slab on Grade	2000	sf	$ 4.75	$ 9,500
New Sidewalks	2200	sf	$ 3.75	$ 8,250
New Concrete Curbs	220	lf	$ 14.50	$ 3,190
Misc. Site Grading Work	1	ls	$ 1,200	$ 1,200
Joist Pockets @ Ex Brick walls	98	ea	$ 46.50	$ 4,557
Wall Edge Flashing - exist. walls	180	lf	$ 11.00	$ 1,980
Custom Wood Double Door Entry System	2	ea	$ 4,500	$ 9,000
New Wood Arched Transom	220	sf	$ 32.00	$ 7,040
New Wood Sidelites	265	sf	$ 32.00	$ 8,480
New Bronze Plaque	1	ls	$ 4,500	$ 4,500
		sf	$ -	$ -
General Conditions				$ 38,052
General Contractor Fees 6%				$ 25,115
				=========
Subtotal				**$ 443,691**
Design Contingency - 15%				**$ 66,554**
Constr. Contingency - 15%				**$ 76,537**
				==========
Total Costs				**$ 586,782**

Boiler House Roof System Alternate

	QUANTITY		UNIT COST	TOTAL
Install Salvaged Timber Joists	3920	bf	$ 0.85	$ 3,332
Install Salvaged Wood Decking	2000	sf	$ 3.25	$ 6,500
New Protection Board	2000	sf	$ 1.45	$ 2,900
New 4" Polyiso/Mod Bitu. Roofing	2000	sf	$ 8.50	$ 17,000
		sf	$ -	$ -
General Conditions				$ 2,973
General Contractor Fees 6%				$ 1,962
				=========
Subtotal				**$ 34,668**
Design Contingency - 15%				**$ 5,200**
Constr. Contingency - 15%				**$ 5,980**
				==========
Total Costs				**$ 45,848**

6.0 Historic Context for Railroad Freight Houses in the State of Ohio

This mitigation measure calls for completion of a statewide historic context for railroad freight houses. Unlike a HABS document, a statewide historic context would offer a much more encompassing examination of the resource type. Such a context would help facilitate better understanding of Longworth Hall, as it existed within the greater, regional railroad network. As stated by the National Park Service, “The significance of a historic property can be judged and explained only when it is evaluated within its historic context. Historic contexts are those patterns or trends in history by which a specific occurrence, property, or site is understood and its meaning (and ultimately its significance) within history or prehistory is made clear” (USDOI-NPS 1997a:7).

A preliminary review of extant freight houses in the State of Ohio and the Midwest indicates that few of these resource types survive. Longworth Hall now constitutes the largest extant railroad freight house in Ohio, and is among the largest building of its type in the country. Unlike their passenger counterparts, railroad freight depots and warehouses have been overshadowed by more personable aspects of railroad history and architecture. Consequently, freight houses have been largely neglected by historians and preservationists. A statewide contextual study of railroad freight houses would provide much needed information for this often overlooked yet integral component to the railroad industry. Important not only for the interpretation of Longworth Hall, a comprehensive survey of the state’s railroad freight handling facilities would provide future researchers an invaluable resource for understanding one of the more significant aspects of transportation history in Cincinnati and the State of Ohio.

6.1 Advantages

- A statewide historic context for railroad freight houses might provide new and insightful information about both the history and construction methods of this often overlooked aspect of transportation history.
- A contextual study of Ohio’s railroad freight houses might generate much needed attention for the state’s remaining examples, as well as other examples throughout the country.
- A contextual study of freight houses would serve as good basis for future interpretation and or restoration projects for Longworth Hall and other preserved freight houses.
- The cost of a historic context for railroad freight houses is relatively inexpensive when compared to other mitigation options.

6.2 Disadvantages

- Few large-scale freight houses remain standing within Ohio, making it difficult to compare similar extant resources.
- A statewide context for railroad freight houses does nothing to preserve the historic fabric of Longworth Hall.

6.3 Cost Summary

An historic context for freight houses in the State of Ohio would cost approximately $30,100.

7.0 Removal of Longworth Hall Upper Floors for I-71/I-75 Bridge

This mitigation alternative involves removing the upper three floors of Longworth Hall, east of column line 57 (See Figure 9). The floors would be removed to accommodate the new I-71/I-75 bridge, which would pass above the lower two floors of the building. Once the upper floors are removed, repairs to the roof and the end of the building will take place. These repairs and modifications include:

1. A new masonry shear wall with 12-inch fully grouted concrete masonry will be installed to close off the exposed end of the building left by the demolition of Areas “A” and “N”. Brick salvaged from the demolition of Area “A” will be used to face the interior and exterior sides of the concrete masonry wall. Brick pilasters and arches present on the existing historic façade will be replicated on the exterior face of this new wall.

2. Windows added at the new shear wall will be wood framed windows with insulating glazing. The new windows’ scale and proportion will match the existing window types.

3. A new elevator and stair will be added to all floors to complete egress and circulation systems required by 2006 International Building Code.

4. Interior floors will be the existing wood floors with any required new wood floors constructed from the wood flooring salvage from the demolition of Area “A”.

5. New walls will be gypsum board on metal studs.

6. New doors will be wood doors on hollow metal frames.

7.1 Advantages

- Retention of the lower two floors would maximize retention of historic building fabric.

- Retention of the lower two floors would preserve some of the rentable floor space that will be otherwise lost.
  Maintaining the current length of the building helps convey the impressive size of the building.

7.2 Disadvantages

- Cost of this alternative is the most expensive of the options at approximately $3.6 million.

- Due to security regulations, permanent tenants would not be able to occupy the portion of the building located beneath a federal highway, thus limiting the potential use of the lower floors. Retaining the lower two floors in addition to the loss of a portion of the fifth floor in the 1990s, would give the building a stepped elevation, which would diminish the historic character of the once monolithic building plan.

- A two-story portion of the building would not be sensitive to the building’s original design, and therefore, would diminish its historic character.

7.3 Cost Summary

The removal of existing roofing, brick walls, window units and sills, floor joists/decking, and associated debris will cost approximately $665,000. The salvage of the existing brick, window units and sills, and floor joists/decking to be reused in mitigation option “Reconstruction of the Fifth Floor Area “E” will cost approximately $155,000. The restoration of the remaining two lower floors, including the installation of new roofing, new building materials, new elevator, and utility revisions will cost approximately $1.6 million. The total cost for this mitigation option is approximately $3.6 million, including general conditions, contractor fees, and design and construction contingencies. Details are provided in Section 7.8.

7.4 Architectural & Structural Summary

An investigation and analysis has been performed to determine the physical impacts of the proposed Brent Spence Bridge Replacement/Rehabilitation Project over the top of Longworth Hall. This study identifies the number of floors to be removed at the east end of Longworth Hall in order to accommodate the project over the top of the building. The determination of the number of floors to be removed is based on the opportunities within the building's architectural, structural and mechanical systems, along with a provision for both building and highway safety and maintenance clearances. The height of the overpass is 50-feet from grade to the bottom of the overpass structure. The maintenance distance between the bottom of the overpass and the new height adjusted top of any roof obstruction on Longworth Hall should be no less than 15-feet. Given these parameters the new height of Longworth Hall needs to be no more than 35-feet from grade to the top of the any item placed on top of the new building. (See Photos 16 thru 17 depicting structure diagram over the building.) This translates into the needed removal of three upper floors of Longworth Hall from just east of column line 57 at Areas "B", "A", and "N". (See Figure 9 for the proposed removal of Areas "A" and "N" along with pages 23 through 26 for the proposed removal of Area "B".) The reduced height of the building puts the top of the new parapet at approximately 30-feet. Mechanical equipment on the roof should be no taller than five feet, which puts the total height of the new building at 35-feet.

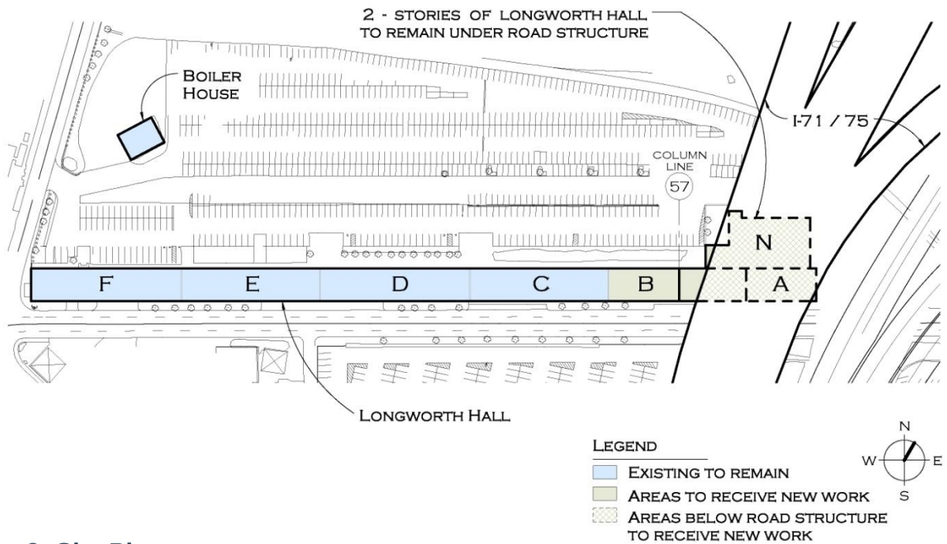


Figure 9: Site Plan

7.4.1 The Existing Building Envelope

The Longworth Hall building envelope consists of solid brick walls constructed of multi-wythe brick with stone trim at the base and window sills, along with concrete copings at the top of walls. The façades consist of simple brick detailing along with brick pilasters, and arches. The brick is turn of the century pressed brick. Current brick manufacturing techniques make it difficult and expensive to match the brick type found at Longworth Hall, thus it is recommended that brick be saved where possible, from demolition for reuse as part of the mitigation efforts. A great majority of the building's original windows are in place. These existing windows are wood framed single pane and counterbalanced in the jamb. It is recommended that any replacement windows be wood framed insulated glass to match the profile and character of the existing openings.

7.4.2 The Existing Building Structure

Longworth Hall has a structural steel column and beam system with timber floor joists at floors one through five. The fifth floor consists of a combination of timber and steel columns supporting timber beams and timber and dimensional lumber joists. Both the floor and roof decking are a true two-inch wood lumber. The wood flooring is a true one-inch wood lumber.

7.4.3 The Existing Building Interior

Longworth Hall is currently occupied by businesses with egress at the upper floors occurring at a stair in the southwest corner of Area "B". The second means of egress for the upper floors is at the east end of Area "B" through a stair in the northeast corner of Area "A".

7.5 Architectural Rehabilitation

Once the three floors at the east end of Longworth Hall are removed, repairs to the roof and end of the building will include the following (See Photos 17 and 18):

1. A new masonry shear wall with 12-inch fully grouted concrete masonry will be installed to close off the exposed end of the building left by the demolition of Areas “A” and “N”. Brick salvaged from the demolition of Area “A” will be used to face the interior and exterior side of the concrete masonry wall. Brick pilasters and arches present on the existing historic façade will be replicated on the exterior face of this new wall (See Figures 14 thru 19 for new wall location). See Tables 1 and 2 in Section 8.0 for salvage brick quantities and brick quantities required for new work.

2. Windows added at the new shear wall will be wood framed windows with insulated glazing. The new window’s scale and proportion will match the existing window types.

3. A new elevator and stairs will be added to complete egress and circulation systems required by 2006 International Building Code (See Figures 14 thru 19 for new stair and elevator location).

4. Interior floors will be the existing wood floors with any required new wood floors constructed from wood flooring salvaged from the demolition of Area “A”.

5. New walls will be gypsum board on metal studs.

6. New doors will be wood doors in hollow metal frames.

7. For additional information on areas to be removed see Figures 10 thru 13 for the demolition of Area “A” and the partial demolition of Area “B”.

7.6 Structural Rehabilitation

An alternative to the complete demolition of Longworth Hall east of column line 57 involves removal of the top floors, retention of the lowest two floors, and, construction of a wall immediately east of column line 57 to create the new east façade above the lowered roof. Similar to the construction required for the complete demolition east of column line 57, the wall adjacent to column line 57 would also extend to the ground level foundation to re-establish the lateral load resisting capacity of the building.

The work that would be performed to accommodate this reduced amount of demolition at the existing east end of Longworth Hall, in a scenario that would retain the lowest two floors of the building east of column line 57, involves essentially the same requirements and process as will be required for the full demolition and reconstruction. Construction of the new full height reinforced concrete masonry unit (CMU) wall immediately east of column line 57 to provide lateral load resistance will require additional work to address the remaining second and third floor joist and floor construction (See Figures 14 thru 19). The floor areas noted would prevent the placement of the CMU shear wall and may be removed temporarily and later reinstalled, or, shored in place during the construction. In either option, the joists and flooring will be cut short of the east face of the new wall and connected to the wall to deliver gravity and lateral loads.

Photo 17: Longworth Hall - “Before” the introduction of the proposed Brent Spence Bridge Replacement/Rehabilitation Project.

Photo 18: Longworth Hall - “After” the top three floors are removed and the bottom two are refurbished.

7.7 Existing Building / Proposed Demolition Floor Plans 3-5, Roof

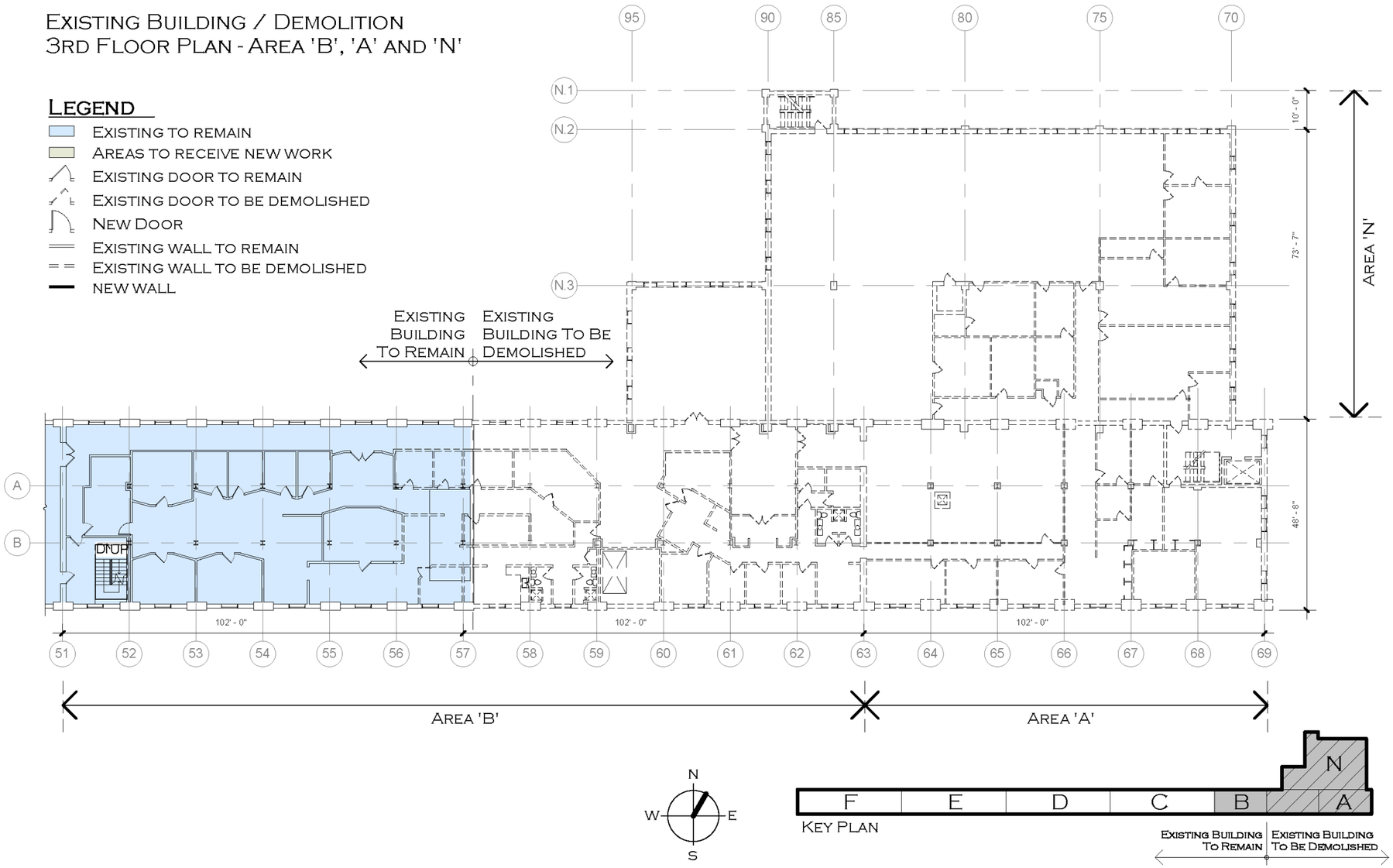
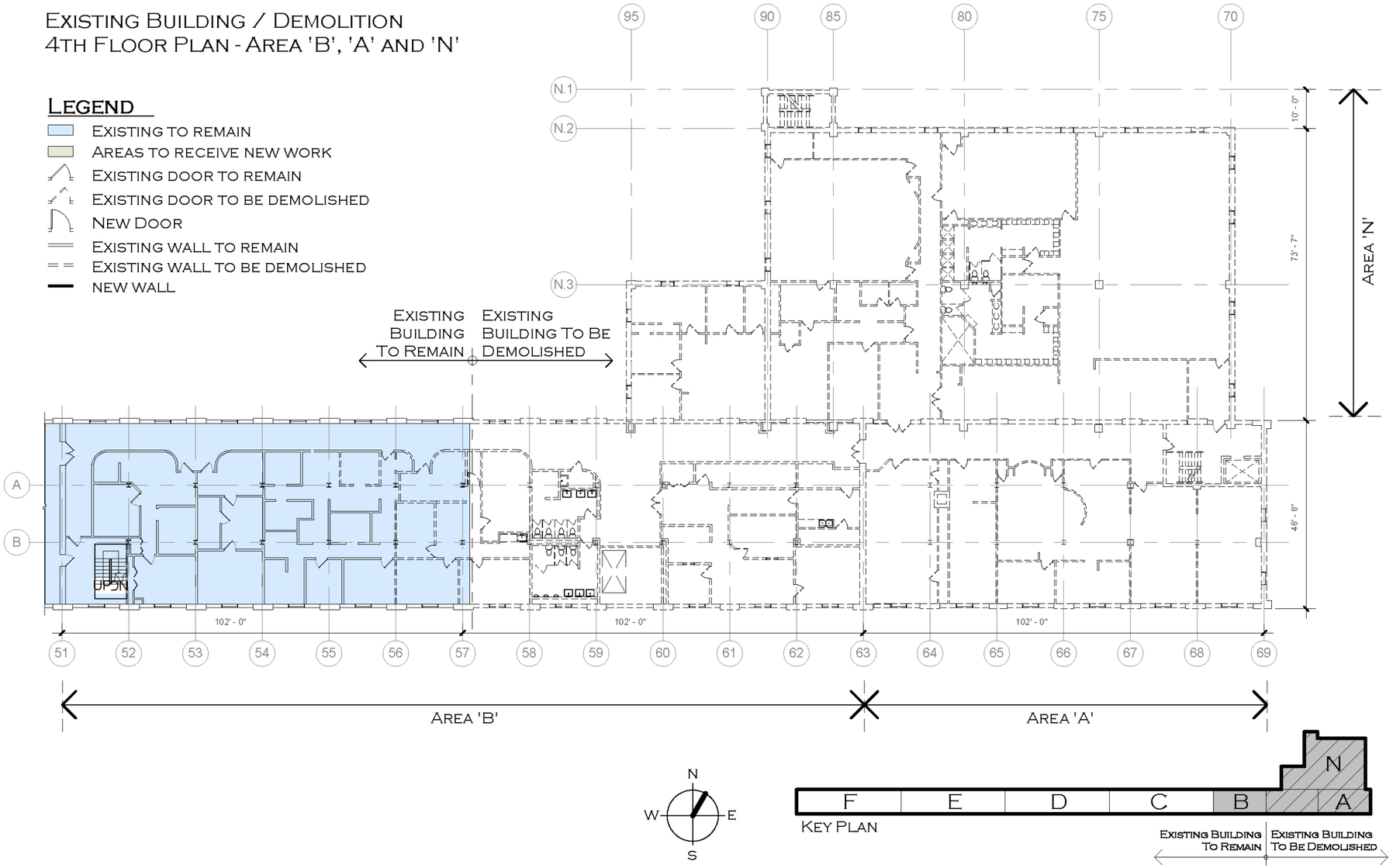


Figure 10


EXISTING BUILDING / DEMOLITION
4TH FLOOR PLAN - AREA 'B', 'A' AND 'N'
LEGEND
EXISTING TO REMAIN
AREAS TO RECEIVE NEW WORK
EXISTING DOOR TO REMAIN
EXISTING DOOR TO BE DEMOLISHED
NEW DOOR
EXISTING WALL TO REMAIN
EXISTING WALL TO BE DEMOLISHED
NEW WALL
EXISTING BUILDING TO REMAIN
EXISTING BUILDING TO BE DEMOLISHED
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85
80
75
70
N.1
N.2
N.3
10' - 0"
73' - 7"
4'-8"
AREA 'N'
A
B
UP
DN
102' - 0"
102' - 0"
102' - 0"
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67
68
69
AREA 'B'
AREA 'A'
N
W
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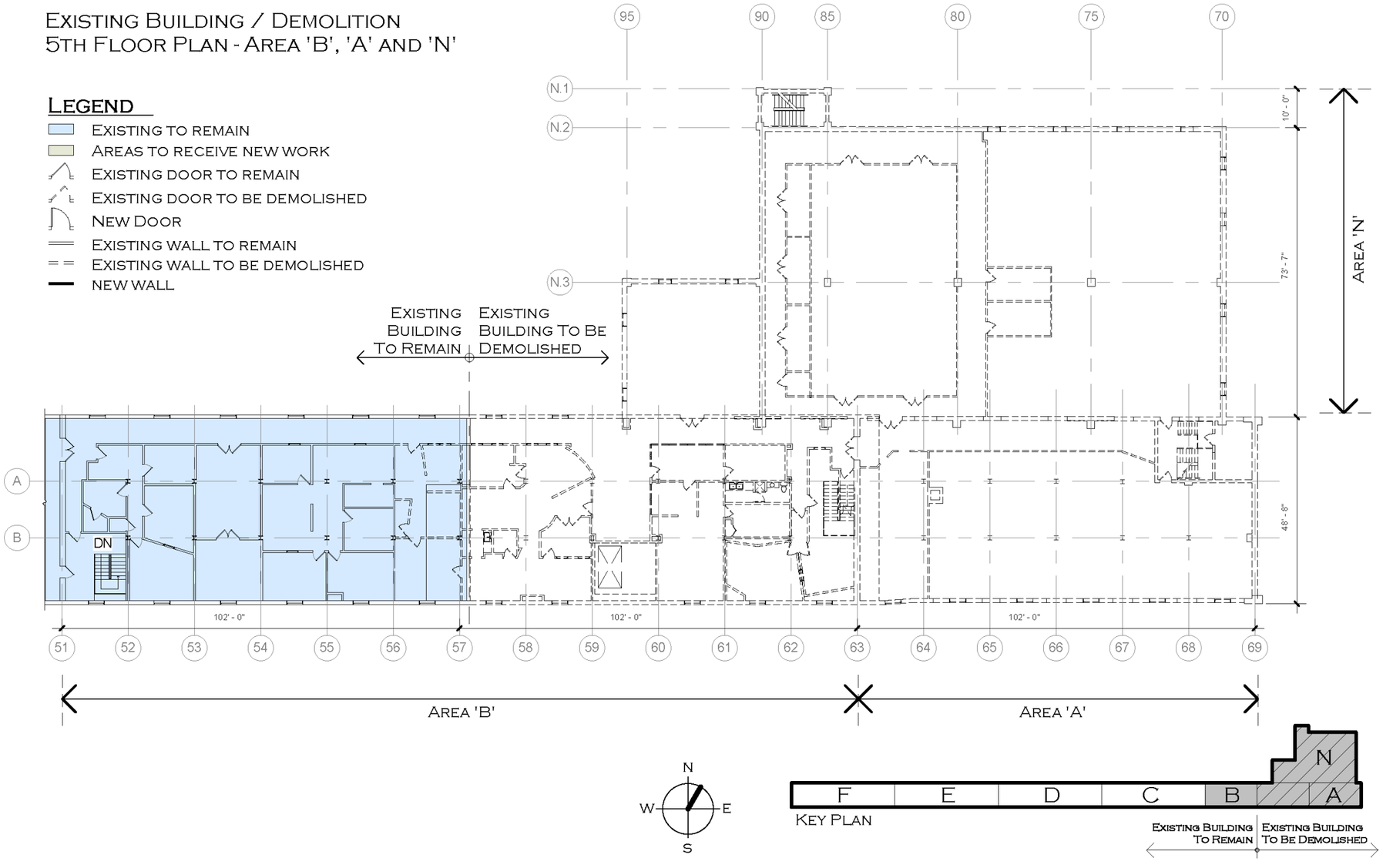
KEY PLAN
EXISTING BUILDING TO REMAIN
EXISTING BUILDING TO BE DEMOLISHED

Figure 11


EXISTING BUILDING / DEMOLITION
5TH FLOOR PLAN - AREA 'B', 'A' AND 'N'
LEGEND
EXISTING TO REMAIN
AREAS TO RECEIVE NEW WORK
EXISTING DOOR TO REMAIN
EXISTING DOOR TO BE DEMOLISHED
NEW DOOR
EXISTING WALL TO REMAIN
EXISTING WALL TO BE DEMOLISHED
NEW WALL
EXISTING BUILDING TO REMAIN
EXISTING BUILDING TO BE DEMOLISHED
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75
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N.3
A
B
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10' - 0"
73' - 7"
48' - 8"
AREA 'N'
102' - 0"
102' - 0"
102' - 0"
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69
AREA 'B'
AREA 'A'
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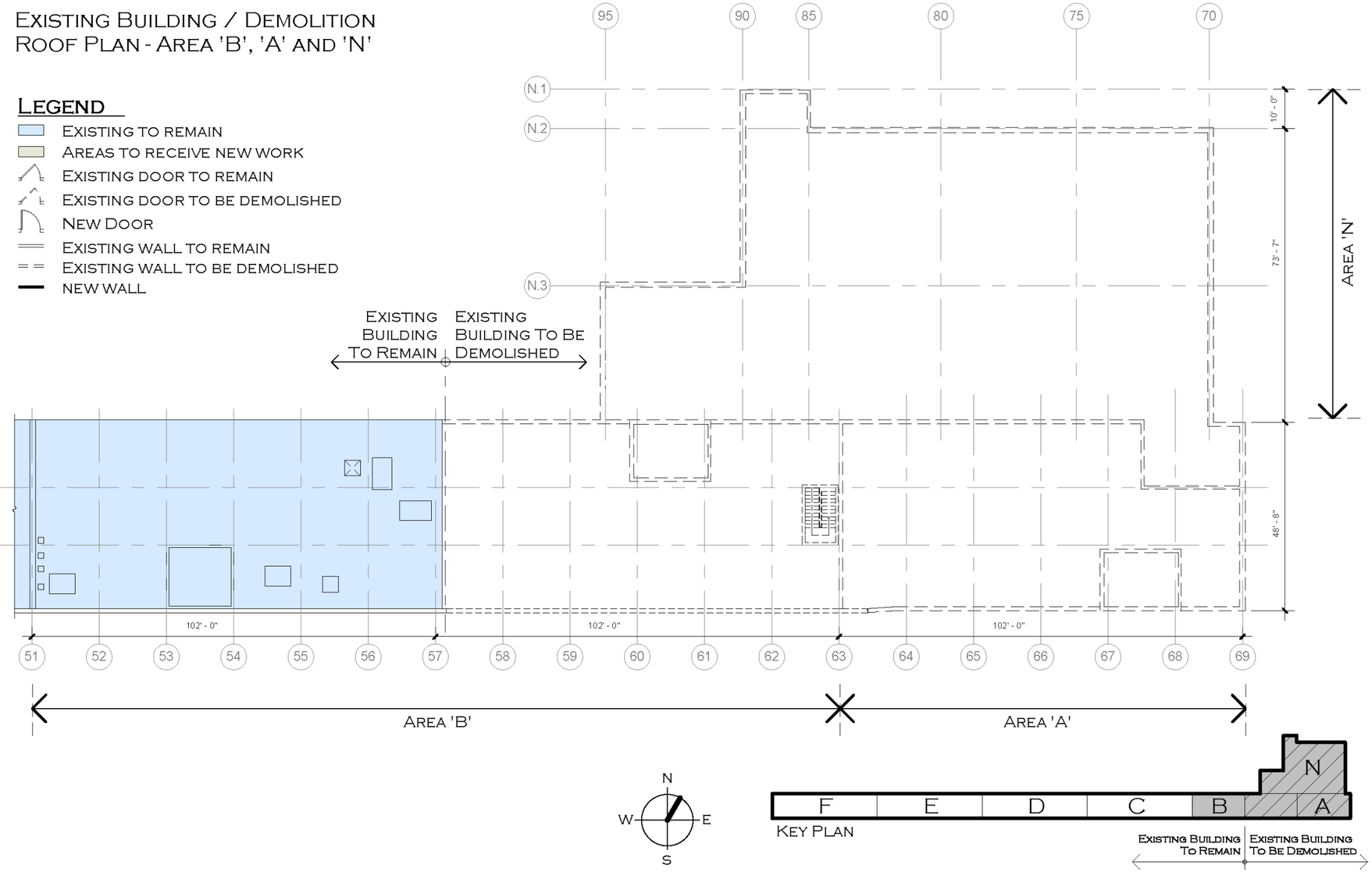
KEY PLAN
EXISTING BUILDING TO REMAIN
EXISTING BUILDING TO BE DEMOLISHED

Figure 12


EXISTING BUILDING / DEMOLITION
ROOF PLAN - AREA 'B', 'A' AND 'N'
LEGEND
EXISTING TO REMAIN
AREAS TO RECEIVE NEW WORK
EXISTING DOOR TO REMAIN
EXISTING DOOR TO BE DEMOLISHED
NEW DOOR
EXISTING WALL TO REMAIN
EXISTING WALL TO BE DEMOLISHED
NEW WALL
EXISTING BUILDING TO REMAIN
EXISTING BUILDING TO BE DEMOLISHED
95
90
85
80
75
70
N.1
N.2
N.3
10' - 0"
73' - 7"
48' - 8"
AREA 'N'
A
B
102' - 0"
102' - 0"
102' - 0"
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AREA 'B'
AREA 'A'
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N
KEY PLAN
EXISTING BUILDING TO REMAIN
EXISTING BUILDING TO BE DEMOLISHED

Figure 13

7.8 Existing Building / Repair Floor Plans 1-5, Roof

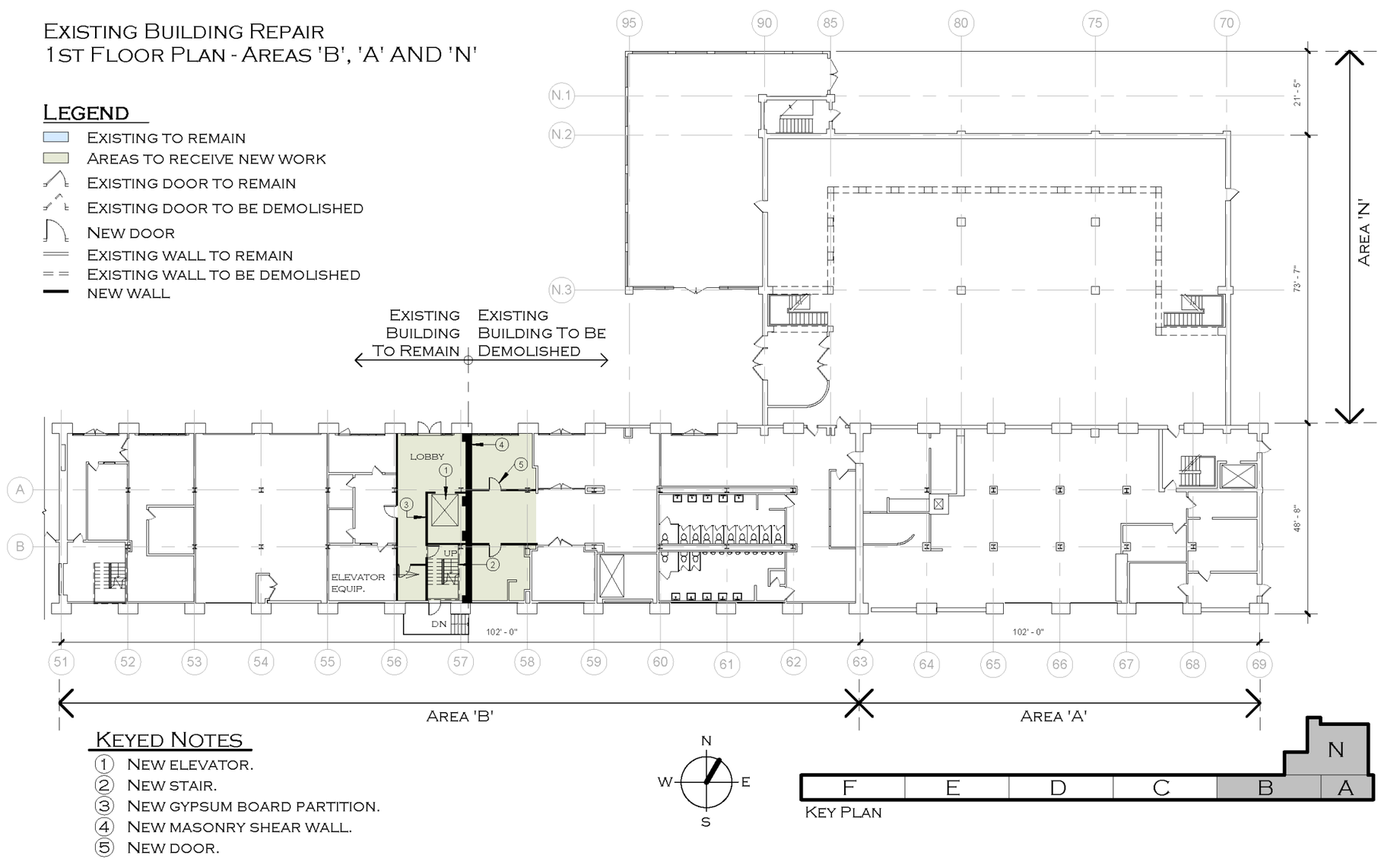


Figure 14

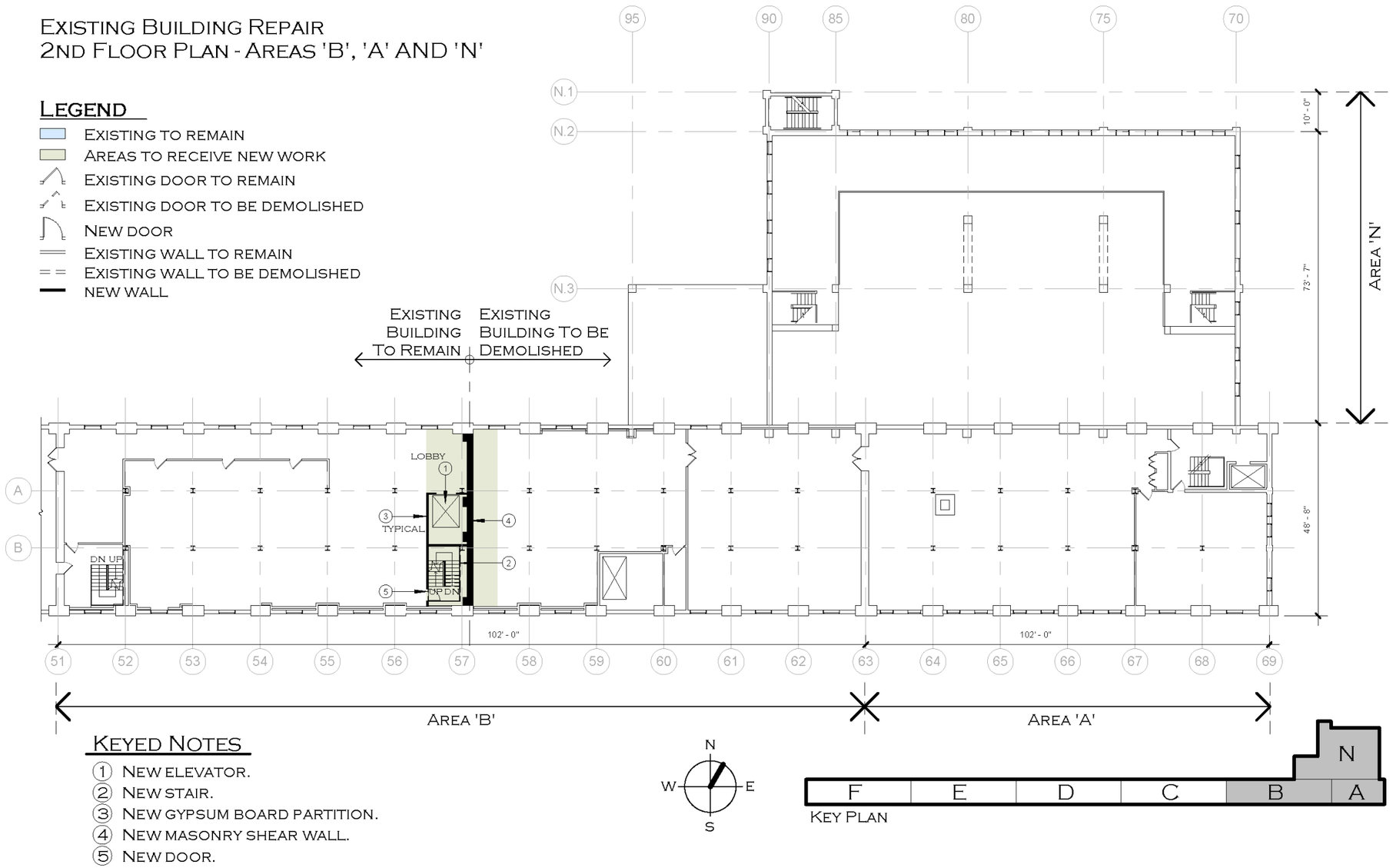
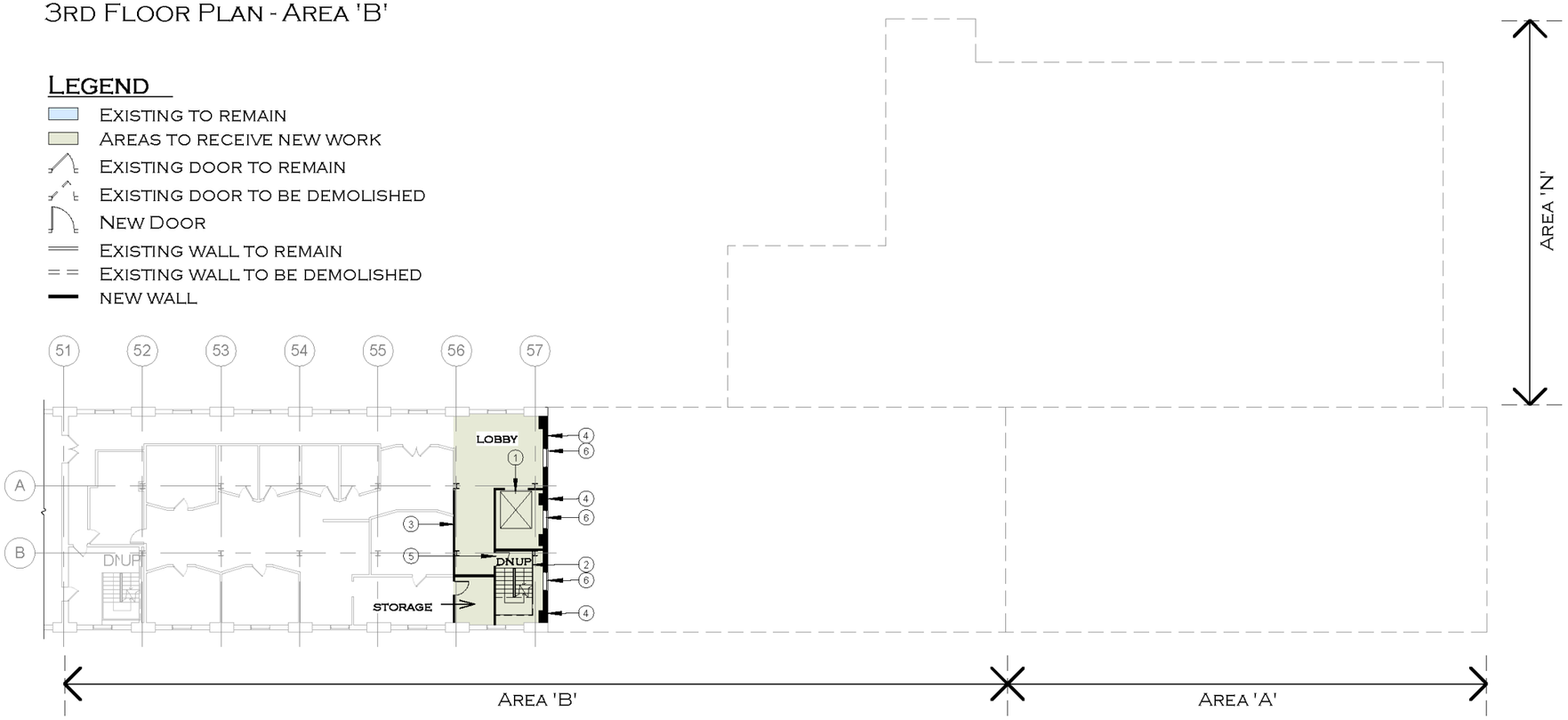

EXISTING BUILDING REPAIR
2ND FLOOR PLAN - AREAS 'B', 'A' AND 'N'
LEGEND
EXISTING TO REMAIN
AREAS TO RECEIVE NEW WORK
EXISTING DOOR TO REMAIN
EXISTING DOOR TO BE DEMOLISHED
NEW DOOR
EXISTING WALL TO REMAIN
EXISTING WALL TO BE DEMOLISHED
NEW WALL
EXISTING BUILDING TO REMAIN
EXISTING BUILDING TO BE DEMOLISHED
95
90
85
80
75
70
N.1
N.2
N.3
10' - 0"
73' - 7"
48' - 8"
AREA 'N'
LOBBY
TYPICAL
DN UP
UP DN
102' - 0"
102' - 0"
A
B
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
AREA 'B'
AREA 'A'
KEYED NOTES
1 NEW ELEVATOR.
2 NEW STAIR.
3 NEW GYPSUM BOARD PARTITION.
4 NEW MASONRY SHEAR WALL.
5 NEW DOOR.
N
W
E
S
F
E
D
C
B
A
N
KEY PLAN

Figure 15

EXISTING BUILDING / REPAIR
3RD FLOOR PLAN - AREA 'B'

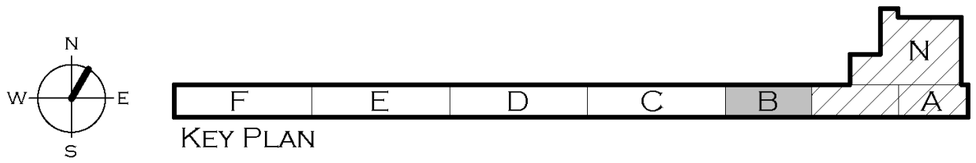
LEGEND

- EXISTING TO REMAIN
- AREAS TO RECEIVE NEW WORK
- EXISTING DOOR TO REMAIN
- EXISTING DOOR TO BE DEMOLISHED
- NEW DOOR
- EXISTING WALL TO REMAIN
- EXISTING WALL TO BE DEMOLISHED
- NEW WALL



KEYED NOTES

1. NEW ELEVATOR.
2. NEW STAIR.
3. NEW GYPSUM BOARD PARTITION.
4. NEW MASONRY SHEAR WALL.
5. NEW DOOR.
6. NEW WOOD FRAME INSULATED WINDOW.



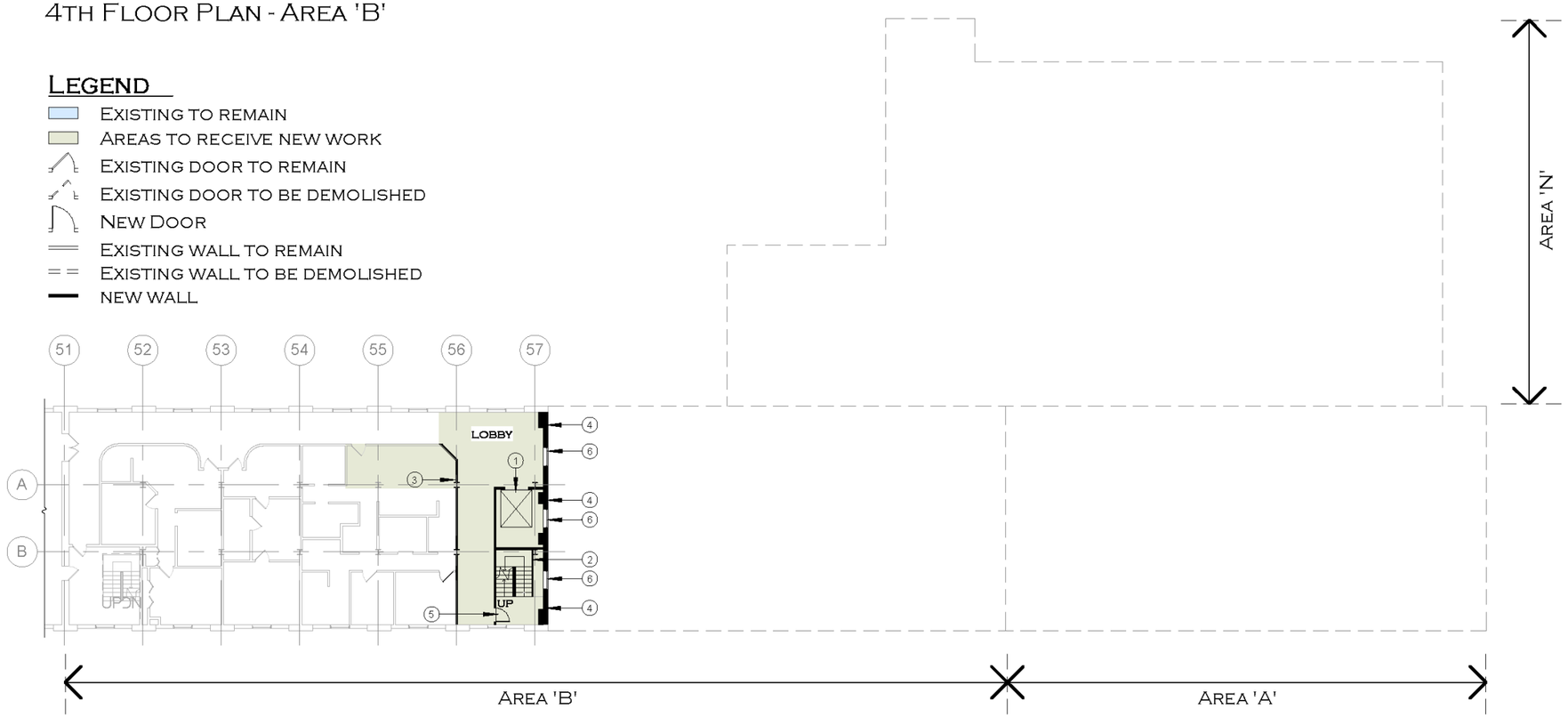
KEY PLAN

Figure 16

EXISTING BUILDING / REPAIR
4TH FLOOR PLAN - AREA 'B'

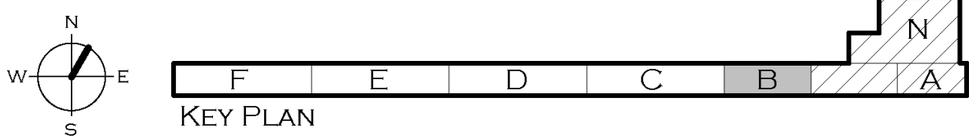
LEGEND

- EXISTING TO REMAIN
- AREAS TO RECEIVE NEW WORK
- EXISTING DOOR TO REMAIN
- EXISTING DOOR TO BE DEMOLISHED
- NEW DOOR
- EXISTING WALL TO REMAIN
- EXISTING WALL TO BE DEMOLISHED
- NEW WALL



KEYED NOTES

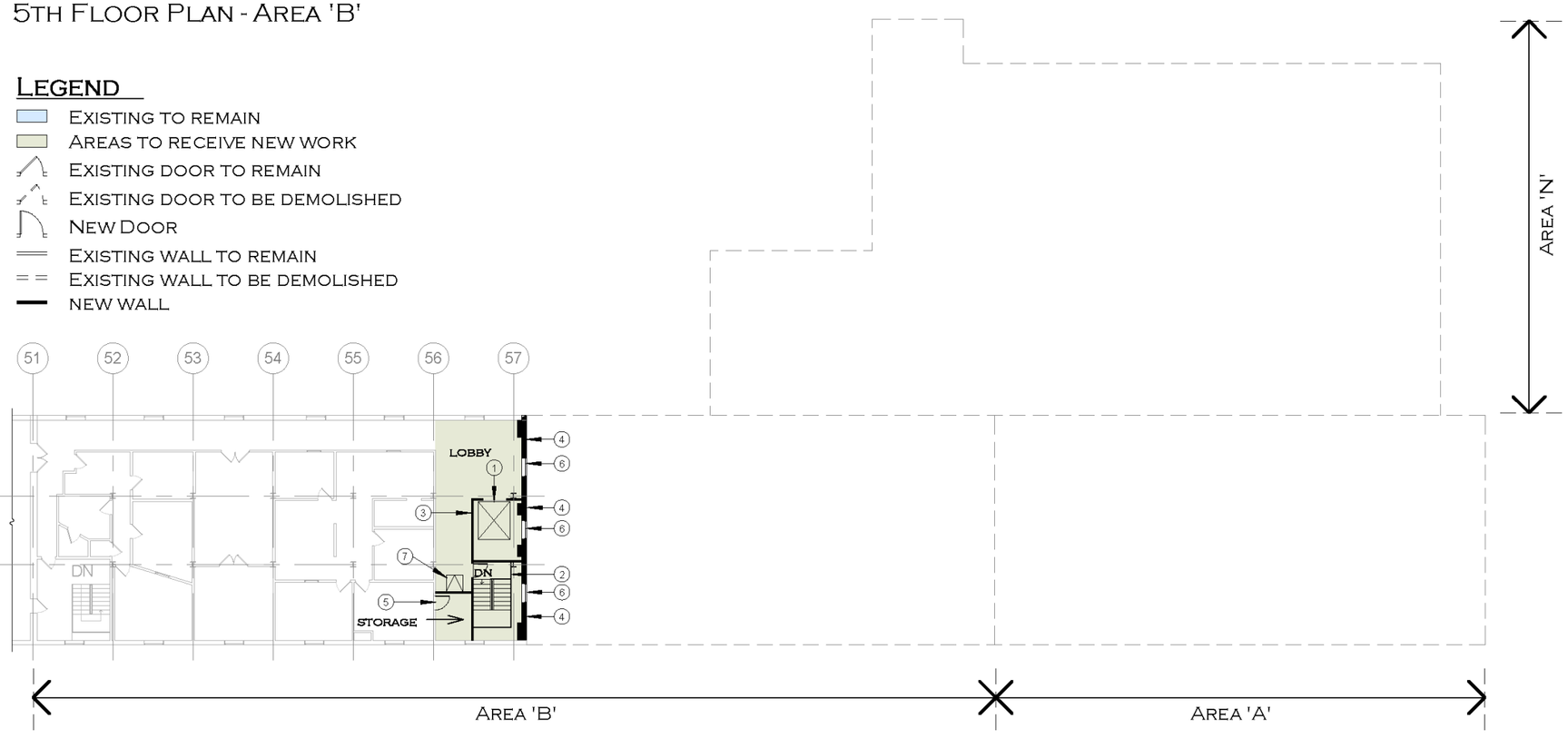
1. NEW ELEVATOR.
2. NEW STAIR.
3. NEW GYPSUM BOARD PARTITION.
4. NEW MASONRY SHEAR WALL.
5. NEW DOOR.
6. NEW WOOD FRAME INSULATED WINDOW.



KEY PLAN

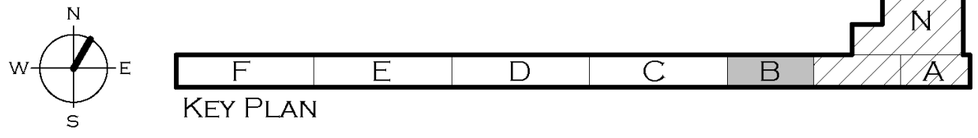
Figure 17

EXISTING BUILDING / REPAIR
5TH FLOOR PLAN - AREA 'B'



KEYED NOTES

1. NEW ELEVATOR.
2. NEW STAIR.
3. NEW GYPSUM BOARD PARTITION.
4. NEW MASONRY SHEAR WALL.
5. NEW DOOR.
6. NEW WOOD FRAME INSULATED WINDOW.
7. NEW LADDER TO ROOF HATCH ABOVE.



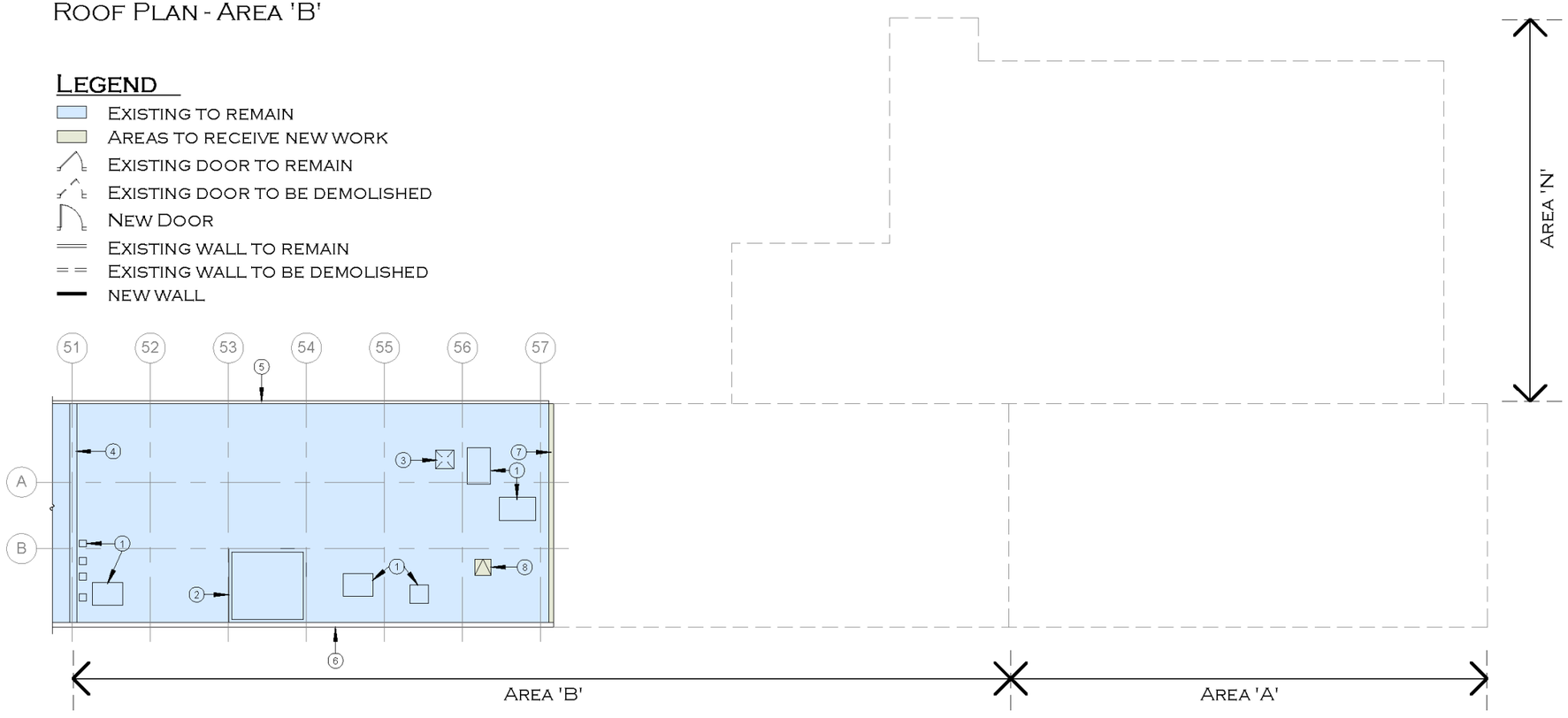
KEY PLAN

Figure 18

EXISTING BUILDING / REPAIR
ROOF PLAN - AREA 'B'

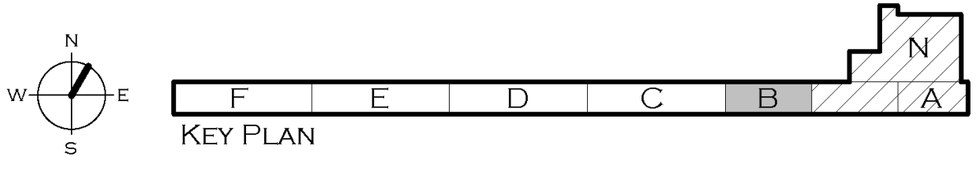
LEGEND

- EXISTING TO REMAIN
- AREAS TO RECEIVE NEW WORK
- EXISTING DOOR TO REMAIN
- EXISTING DOOR TO BE DEMOLISHED
- NEW DOOR
- EXISTING WALL TO REMAIN
- EXISTING WALL TO BE DEMOLISHED
- NEW WALL



KEYED NOTES

1. EXISTING MECHANICAL UNIT.
2. EXISTING ELEVATOR PENTHOUSE.
3. EXISTING SKYLIGHT.
4. EXISTING BRICK MASONRY PARTY WALL.
5. EXISTING GUTTER.
6. EXISTING PARAPET.
7. NEW BRICK MASONRY PARAPET.
8. NEW ROOF HATCH.



KEY PLAN

Figure 19

7.9 Mechanical, Electrical and Plumbing (MEP) Systems

Due to the removal of Longworth Hall's upper three floors east of column line 57, mechanical, electrical and plumbing (MEP) systems will be modified. All MEP equipment, ductwork, piping, and wiring in the upper three floors and roof will be removed east of column line 57. Proper disposal of hazardous materials will be required in addition to refrigerant recovery at heating, ventilation and air conditioning (HVAC) equipment. Disposal of materials off-site will be in accordance with local, state and federal regulations. In order for the remainder of the facility to stay functional an MEP impact analysis has been done and is divided by disciplines.

7.9.1 Heating, Ventilation and Air-Conditioning (HVAC)

Existing Conditions -

1. Area "N": Three grade mounted packaged units, four roof-mounted packaged units, two split-systems with roof-mounted condensing units. Miscellaneous indoor air handling units (AHUs) with gas fired heat, and heaters.

2. Area "A": Two roof-mounted packaged units, one split-system with a roof-mounted condensing unit. Multiple indoor AHUs with electric or gas fired heat, and heaters. Existing abandoned brick boiler chimney from first floor through roof.

3. Area "B": East of column line 57 – Two roof-mounted packaged units. Four roof-mounted condensing units. Roof-mounted elevator ventilation duct. Multiple indoor AHUs with electric or gas fired heat, and heaters.

Photo 19: Grade mounted RTU

Impact Analysis – HVAC components on the roof and floors three, four and five will be removed. Grade mounted equipment (Photo 19) and units located on floors one and two can remain. Ductwork, controls, flues, gas piping and other utilities/accessories to the units serving the remaining floors will be modified. New ventilation ducts with gooseneck terminations at the roof will be provided for the modified elevators. The abandoned brick chimney will be removed below the new roof level.

7.9.2 Plumbing and Gas Piping

Existing Conditions -

1. Areas "A", "B", "N": Roof mounted gas piping, roof vent pipes, one roof drain (Area "B").

2. Areas "A", "B", "N" East of column line 57: Third Floor – Four water closets, four lavatories. Fourth floor – Two mop basins, two sinks, twelve lavatories, twelve water closets, five urinals, eight showers. Fifth floor – Six water closets, one urinal, three lavatories, one sink, one shower.

3. Area "B": Incoming gas service at column line 61 (Photo 20).

Impact Analysis – Plumbing components on the roof and floors three, four and five will be removed. Water, waste and vent pipes serving fixtures on remaining floors will be modified. The gas piping and other utilities/accessories to hot water heaters and plumbing equipment serving remaining floors will be modified. The new roof for Areas "A", "B", and "N" will need gutters to be provided for storm water drainage. The gas piping originating east of column line 57 feeding Area "B" and partial Area "C" HVAC equipment west of column line 57 will be re-routed inside the facility for floors three, four, five and roof.

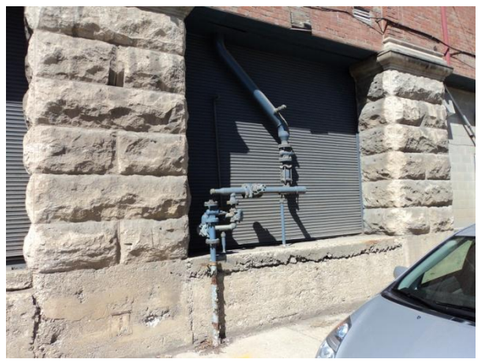


Photo 20: Area B incoming gas pipe

7.9.3 Fire Protection

Existing Conditions -

1. Areas “A”, “B”, “N”: Fully sprinklered.
2. Fire department siamese connection on south elevation at column line 67 (Photo 21).
3. Areas “A” & “N”: Sprinkler water piping originates near column line 67.
4. Area “B”: Sprinkler water piping originates near column line 54.

Impact Analysis – The sprinkler heads and piping on floors three, four, and five will be removed. The existing sprinkler piping riser(s) on the second floor will be capped downstream of the branch piping serving the second floor.

7.9.4 Electrical

Existing Conditions -

1. Area “A”: Incoming overhead line service with tenant and house meters for Area “A” near column lines 68 and 69, south elevation.
2. Area “B”: Incoming overhead line service with tenant and house meters for Area “N” near column line 63, south elevation.
3. Area “B”: Incoming overhead line service with tenant and house meters for Area “B” between column lines 54 and 55, south elevation.
4. Areas “A”, “B”: Exterior wall mounted power wiring for elevators, north elevation.
5. Areas “A”, “B”, “N”: Multiple interior distribution panels located on each floor.

Impact Analysis – The electrical components (lighting, receptacles, conduits, panels, etc.) on floors three, four, and five will be removed. The electrical lines from the utility poles to the south elevation of the facility will be modified (currently attaches to facility above second floor windows, Photo 22). The circuits originating east of column line 57 feeding Area “B” west of column line 57 will be re-routed inside the facility for floors three, four, five and the roof. The exterior lighting will be modified. The exterior wall mounted power wiring (Photo 23) for the elevators on the north elevation will be modified (currently located above second floor windows) including service to a new Area “B” elevator.

7.9.5 Telecommunications / Systems

Existing Conditions - Areas “A”, “B”, “N”: Incoming overhead line service for tenants and landlord enters the facility above the second floor windows between column lines 67 and 68, south elevation (Photo 24). The Longworth Hall facility main telecommunications closet (Photo 25) is located on the second floor near column lines for Area “A” and 67.

Impact Analysis – The telecommunications on floors three, four and five will be removed. The communications lines from the utility poles to the south elevation of the facility will be modified. The communication lines serving Longworth Hall west of column line 57 will be re-routed inside the facility for floors three, four and five. There are two fiber optic lines currently routed below the third floor and can remain as is.

Photo 21: Fire Siamese Connection

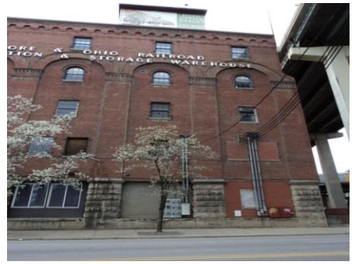


Photo 22: Area A Incoming Power

Photo 23: Elevator. Power Lines (top)

Photo 24: Incoming Communication Lines

Photo 25: Main Communications Closet

7.10 Cost Estimates

	QUANTITY		UNIT COST	TOTAL
Remove Existing Roofing	20015	sf	$ 4.00	$ 80,060
Remove Existing Brick Walls	31683	sf	$ 11.65	$ 369,107
Salvage Existing Brick	20000	sf	$ 4.80	$ 96,000
Remove Salvage Window Units	113	ea	$ 150.00	$ 16,950
Remove Floor Joists/Decking	60045	sf	$ 2.00	$ 120,090
Salvage Ex. Floor Joist/Decking	25000	sf	$ 1.55	$ 38,750
Remove Salvage Window Sills	472	lf	$ 7.00	$ 3,304
Debris Removal	1	ls	$ 75,000	$ 75,000
Create Elev./Stair Floor Openings	1560	sf	$ 8.00	$ 12,480
Gut Existing Floor Spaces	60045	sf	$ 4.50	$ 270,203
Continous Concrete Footings	14	cy	$ 325.00	$ 4,550
Pilaster Concrete footings	5	cy	$ 350.00	$ 1,750
12" Load Bearing CMU Wall	3196	sf	$ 18.00	$ 57,528
CMU Pilasters - 24"	272	lf	$ 160.00	$ 43,520
Brick Veneer - Air Space - Insul.	1845	sf	$ 21.00	$ 38,745
Bonus for Brick Arches	466	sf	$ 6.50	$ 3,029
Bonus for Corbelling	3126	sf	$ 12.00	$ 37,512
Interior Brick Veneer	2961	sf	$ 18.00	$ 53,298
New Cast Stone Wall Copings	873	lf	$ 84.00	$ 73,332
New Steel Columns	3816	lbs	$ 1.70	$ 6,487
New Steel Beams	12600	lbs	$ 1.85	$ 23,310
New Stair Landings	194	sf	$ 34.00	$ 6,596
New Stair Treads & Risers	351	sf	$ 38.00	$ 13,338
New Steel Handrails	46	lf	$ 27.00	$ 1,242
New Steel Stair Railings	215	lf	$ 48.00	$ 10,320
New Roof Protection board	20485	sf	$ 1.45	$ 29,703
New 4" Polyiso/Mod Bitu. Roofing	20485	sf	$ 8.50	$ 174,123
Wall Edge Flashing - exist. walls	948	lf	$ 11.00	$ 10,428
Wall Edge Flashing - new walls	94	lf	$ 15.00	$ 1,410
New 36"x36" Roof Hatch Unit	1	ea	$ 1,800	$ 1,800
Install Salvaged Window Units	213	sf	$ 4.65	$ 990
New Drywall Shaft Walls	3696	sf	$ 7.15	$ 26,426
New Drywall Partitions - Demising	2041	sf	$ 5.65	$ 11,532
Paint Drywall Walls	10739	sf	$ 0.50	$ 5,370
Install New Door Units - 3070	13	ea	$ 975	$ 12,675
Finish Doors/Frames	13	ea	$ 60	$ 780
New Elevator Unit - 5 stop 53lf travel	1	ls	$ 112,000	$ 112,000
	1	ls	$ 13,000	$ 13,000

	QUANTITY		UNIT COST	TOTAL
Elevator Pit/Overrun				
Remove Roof Top Units	26	ea	$ 2,500	$ 65,000
New Fire Sprinkler System	5600	sf	$ 2.75	$ 15,400
New Standpipe @ Stairwell	1	ls	$ 22,500	$ 22,500
HVAC system Revisions	40030	sf	$ 2.00	$ 80,060
New Elevator Vent Duct system	1	ea	$ 4,000	$ 4,000
New Roof Drains	24	ea	$ 1,800	$ 43,200
Plumbing system revisions	40030	sf	$ 2.00	$ 80,060
Elevator Sump Pump system	1	ea	$ 4,000	$ 4,000
Telecomm System Revisions	40030	sf	$ 1.00	$ 40,030
Electric Service Revisions	1	ls	$ 50,000	$ 50,000
Electric Distribution Revisions	40030	sf	$ 1.75	$ 70,053
Revisions to Extr. Lighting	1	ls	$ 15,000	$ 15,000
		sf	$ -	$ -
General Conditions				$ 234,604
General Contractor Fees 6%				$ 154,839
				=========
Subtotal				**$ 2,735,483**
Design Contingency - 15%				**$ 410,322**
Constr. Contingency - 15%				**$ 471,871**
				==========
Total Costs				**$ 3,617,676**

8.0 Summary

In summary, the six, feasible mitigation measures for Longworth Hall include:

- Preparation of Historic American Building Survey (HABS) of Longworth Hall
- Reconstruction of the fifth floor of Area “E”
- Installation of storm windows and tuck-pointing and repair of brick masonry
- Rehabilitation/stabilization of the boiler house
- Preparation of a contextual study of Ohio’s railroad freight houses
- Minimal removal of the upper floors of the east end of Longworth Hall

The options range in price from $30,100 for a contextual, state-wide study of railroad freight houses to $3,617,676 for minimal removal of the upper three floors of the east end of Longworth Hall. Each option presents positive and negative aspects, with overall utility ranging from reduced noise and dust pollution within the building to the creation or re-creation of usable floor space to the minimalization of the loss of floor space at the east end of the building.

The overall feasibility of the reconstruction and stabilization options is made possible through the use of brick salvaged from the partial or complete demolition of the east end of the building. Calculations show that demolition of the upper three floors of Areas “A” and “B” alone will render approximately 11,915 square feet of usable, salvaged brick (Table 1). Closure of the east end wall at Area “B” at the upper three floors would require approximately 1,848 square feet of brick. Reconstruction of Area “E” fifth floor would require approximately 6,464 square feet of brick. In total, the amount of brick required to enclose the upper three floors of the east end of the building, and to reconstruct the fifth floor of Area “E” equates to approximately 8,312 square feet. With an approximate 11,915 square feet of available salvaged brick, demolition of the upper three floors of Areas “A” and “B” would provide more than enough material to enclose the upper three floors of the east end of the building and to reconstruct the fifth floor of Area “E”. Rehabilitation of the boiler house would require 2,200 square feet of brick. Demolition of the upper three floors of Areas “A” and “B” of Longworth Hall would provide quantities of salvaged brick sufficient to complete any of these options. Table 2 summarizes the quantity of salvaged brick as needed to complete each of the reconstruction options, as well as the total cost estimate for each mitigation option. Detailed salvaged material quantities can be found in the cost summaries of each mitigation option.

Table 1: Summary of Salvage Brick Quantities

Wall Location	Total Wall Area (square feet)
South Façade; Floor 3-5	7,312
North Façade (column lines 57 – 61); Floors 3-5	2,437
North Façade (column lines 61 – 69); Floors 3-5	2,166
Total Salvaged Brick	**11,915 square feet**

Table 2: Summary of Mitigation Options

Mitigation Option	Quantity of Salvaged Brick Required	Salvaged Brick Available	Cost estimate
Preparation of HABS of Longworth Hall	N/A	N/A	$30,500
Reconstruction of Fifth Floor Area "E"	6,494 square feet brick[1]	7,110 square feet	$1,398,743
Storm Windows - Interior	N/A	N/A	$297,015
Storm Windows - Exterior	N/A	N/A	$307,383
Tuck-Pointing and Brick Repair – North Façade	N/A	N/A	$831,962
Tuck-Pointing and Brick Repair – West and South Façade	N/A	N/A	$537,327
Boiler House Rehabilitation	2,200 square feet brick[2]	2,420 square feet	$586,782
Boiler House Roof System Alternate	N/A	N/A	$45,848
Historic Context for Railroad Freight Houses	N/A	N/A	$30,100
Removal of Longworth Hall Upper Floors	1,848 square feet[3]	2,033 square feet	$3,617,676
Totals	**10,512 square feet**	**11,563 square feet[4]**	

Notes:

1. (6,096 square feet plus 368 square feet of brick for toothing into existing brick wall). All brick is salvaged from the demolition of the upper three floors of Areas A and B.
2. Brick repair with brick salvaged from the demolition of the upper three floors of Areas A and B.
3. New exterior closure wall at east end of Area B constructed with brick salvaged from the demolition of the upper three floors of Areas A and B.
4. There will be approximately 11,915 square feet of brick salvaged from the demolition of the upper three floors of Areas A and B. This leaves about 350 square feet of surplus brick (wall area) for the owner to stock pile for future repairs. The “Salvaged Brick Available” numbers shown in this table include a 10% contingency over and above the “Brick Quantities Required”.