City of Ashland
Vaughn Public Library

Facility Structural Assessment

January 8, 2019

Prepared By:

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PREPARED BY:
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Structural Engineer

Facility Assessment Report (Phase I Structural Assessment)

Submitted To:	Sarah Adams, Director Vaughn Public Library City of Ashland
Address	Vaughn Public Library 502 West Main Street Ashland WI 54806
Year Built	Estimated 1890
Building Type	Public Library, 3 Story Brick Exterior / Wood framing
Present at Inspections	Cory A Scheidler, AIA, Cedar Corporation Architect, Registered Interior Designer, Commercial Building Inspector Troy L Peterson, PE, Cedar Corporation Structural Engineer, Commercial Building Inspector Sarah Vaughn, Library Director Dan Homola, Facilities, City of Ashland Tom Sutarik, City of Ashland
Date of Inspection	November 29, 2018

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Introduction:

Cedar Corporation has been retained by the Vaughn Public Library to complete the first phase of a Facility Assessment for the Vaughn Public Library. The Facility Assessment has been divided into five phases to provide the Library Board a systematic approach to analyzing and planning future renovations and improvements to the library. The goal of the Vaughn Public Library Board is to provide a modern Library Facility that focuses on programming which is inviting and responsive to the public while maintaining the cultural and historic nature of the downtown facility to inspire a sense of community pride.

The first phase of the facility assessment includes a Structural Assessment of the overall condition of the building. The Assessment includes a visual inspection of the building exterior, foundations, interior framing, current loading to better understand what repairs or modifications might be needed to allow for continued use, and future renovations. As part of this initial phase, Cedar will evaluate the loading capacity of the existing floor systems, opportunity for programming modifications related to the structural systems, and opportunity for added programing at the second level of the library.

As part of the first phase of the Facility Assessment, Cedar has agreed to summarize other findings that were discovered during the first phase of the structural assessment. These items will include further evaluation in subsequent phases of the assessment. This assessment does not specifically include any evaluation of the building envelope or building systems, accessibility analysis, or code deficiencies.

The ultimate goal of this phase of the assessment is to define facility deficiencies, limitations in the current systems that may limit the renovations or programming for the future, and what opportunities may exist in the existing facility for added or improvements to the current programming. The first phase of the assessment is to evaluate the structural components of the existing facility. In subsequent phases, the building systems, layout, and flow will be further evaluated.

The facility assessment began with the evaluation of the existing plans and previous studies, followed by a visual examination of the building on November 29, 2018. The visual examination was limited to the structural elements that were accessible. Some portions of the structure were not accessible during the examination, and as such, our evaluation is limited to what was visible. As we go forward, if there are areas that were not visible and determined to be vital to a future project, selective demolition may have to be completed to fully evaluate design options.

Facility Overview:

General Summary

The Vaughn Public Library is located downtown at 502 Main Street in the West Second Street Historic District. The Vaughn Library was constructed in the late 1800's and has an extensive history. The Library originally utilized the second floor with a mercantile on the first floor and offices on the second level. Eventually the library expanded into the basement, first, and second level with the third level being utilized by various tenants. The facility has experienced various uses and renovations over the years, with the most recent extensive renovation in 1982.

The building consists of three stories and a basement with 6,700 square feet per floor and a gross square footage of 27,000 square feet. The building construction consists of non-combustible exterior masonry/ stone and brick walls with interior wood framing. The building construction appears to be a type five combustible construction; however, additional investigation may allow the building to be a type III construction.

Site Summary

The Library has a primary entrance on the east side and a secondary entrance on Main Street with a prominent Main Street façade. The site maintains good access to the public and has accessible entrances. Parking is limited with no off-street parking.

Building Envelope Summary

The building envelope consists of multi-wythe brick walls with no insulation, except for at the interior, which could not be verified. There are limited deficiencies on the exterior walls, however they are generally in fair to good condition. The walls require limited tuck-pointing, primarily on the west side of the building. Portions of the building have been tuck pointed or infilled with brick that do not match the original building. These brick are not in poor condition, however are not aesthetically desirable. Accenting these openings and infills may be more appropriate and historically correct. As part of the tuck-pointing, random brick replacements may be replaced with a matching brick. The entire building does require a cleaning to remove residue and staining.

The building windows and doors consist of a combination of storefront glass and casement windows that appear to be in fair condition. These components were not fully assessed and require further investigation.

The roof system consists of a PVC membrane roof system and appears to not include any roof insulation. The attic does contain limited insulation value. The roof system age is unknown and estimated to be less than 15 years old and in good condition. Additional investigation of the roof system, copings, and flashing is necessary.

General Structure Summary

The facility consists of a combination of stone, brick, concrete, and block foundations. The main basement had portions exposed to grade with the street level at the new basement level. The sub-basement, which is understood to be primarily a crawl space and small full basement, appears to be in fair to good condition; however, the crawl space could not be fully accessed. The street side that was once exposed to grade and now filled could not be inspected as part of the assessment. To assess these areas, demolition and special equipment will be necessary.

The exterior walls are comprised of multi-wythe brick from the grade level through all three levels up to the roof parapet and appear to be in fair condition. There are limited deficiencies as discussed in the structural section of this report.

The building framing systems area are comprised of wood joist and steel beams bearing on steel beams, columns, and masonry/brick/stone bearing walls. The general condition appears to be fair condition. Additional findings are included in the structural assessment of the report.

Building Partitions, Finishes Summary

The interior of the facility is a combination of various floorings, which have various useful life remaining and are in various conditions. The walls are primarily painted and in various conditions. The ceiling finishes are primarily 2x4 ceiling tile which are in fair condition. Additional evaluations and recommendations should be completed.

Mechanical Systems Summary

The buildings heating and cooling systems consist of air handlers, condensing units, rooftop HVAC units, boiler, and window air-conditioning units. Components of the HVAC system appear to be updated within the last five years; however, the systems do show age. Based on the system configurations and building use, an assessment of the HVAC systems should be completed and system commissioning should be considered.

Electrical/Technology/Security Systems Summary

The building electrical system appears to consist of new and old equipment. The lighting and technology components also appear to be a combination of new and aged components. A security system was not observed. In summary, the building electrical, technology, and security systems require assessment and recommendations for the future.

Plumbing Systems Summary

The existing plumbing systems appear to be have been updated in 1982. They are not all fully accessible and limited fixtures are available for the current programing and number of occupants. The systems appear to be in working order, however may be nearing the end of their useful life. Additionally, more water efficient fixtures are available, and additional accessible fixtures will benefit the overall use of the facility.

Life Safety Systems Summary

The building does not contain a fire suppression system. The building does contain a fire alarm system; however the system was not assessed for the compatibility of future renovations and added devices. Additional investigation is necessary.

Accessibility Summary

The facility was not evaluated for compliance with current building codes or accessibility requirements. During the structural assessment, elements of the facility, such as the restrooms, doorways, and clearances, were observed that might not be in compliance with the current American with Disabilities Act Accessibility Guidelines. We also understand that the library is reviewing options to update and improve the existing elevator.

Space Summary

The Library serves the City of Ashland and surrounding area. The Library consists of children's space, young adult space, and adult space along with various stack areas, reading areas, computer spaces, work rooms, offices, and meeting rooms. The current space of the library includes 13,400 square feet. The current programming needs have not been reviewed as part of this phase of the study and will be evaluated as a subsequent phase.

General Facility Assessment Summary

The intent of the first phase of the facility assessment is to assess the structural system of the facility. While completing the structural assessment, we identified the general findings of the other building components as outlined above. Generally the building is in good condition; however components of the facility are in need of updating, maintenance, and repairs. The building appears to continue to serve the City of Ashland. Based on the past renovations, the building is due for upgrades. A typical building of this type can be expected to meet the service needs for over 75 years. Through a facility's lifecycle, it will likely experience many renovations and improvements. A typical life expectancy and planned obsolesce cycle can generally be expected at 20-30 years. Understanding that the Library desires to improve the efficiency of the space and increase the programing, we recommend completing further assessments of the above-mentioned building components. A more thorough investigative process will define needs, options, and impacts that may affect the future renovations. In summary, the building is in fair to good condition, however, several components of the facility require updates.

Structural Assessment

General

The existing Vaughn Library building is a 50'-0" x 134'-0" three story building with a full basement. It is estimated that the building was constructed in the late 1800's.

The existing building construction consists of brick exterior wall construction with a plaster finish supported on stone basement foundation walls. The floor, ceiling, and roof systems consist of wooden joists spanning to steel or wood beams and interior and exterior walls, with wood floor decking and plaster ceiling finish. The framing system of the building consists of interior columns and other internal wall supports throughout the building.

Structural Assessment Process

The ultimate goal of this phase of the assessment is to define what the capacities and conditions of the existing library is. The facility assessment began with the evaluation of the existing plans and previous studies, followed by a visual examination of the building on November 29, 2018. The visual examination was limited to the structural elements that were accessible. Some portions of the structure were not accessible during the examination, and as such, our evaluation is limited to what was visible. As we go forward, if there are areas that were not visible and determined to be vital to a future project, selective demolition may have to be completed to fully evaluate design options.

Exterior Wall Investigation

The exterior walls were visually examined during our site visit. This was accomplished utilizing the City of Ashland's boom truck. The north, east, and south walls were accessible utilizing the lift. The west wall was not accessible but was examined from a distance.

The north wall is in good condition with some deteriorated brick on the upper parapet. There are some vertical cracks above the window arches.

The east wall is in good condition. There is a cracked sill under the 2nd story window (6th window south of the north corner).

The south wall is in fair condition. It was noted that there is a different brick on the upper 5 to 8-feet of the wall that was recently tuck pointed.

The west wall of the building is in fair condition. There is a chimney near the center of the wall that either needs to be rebuilt or removed due to the deterioration of the brick and mortar. There is a fair portion of the brick that exhibits decay to the exterior brick (hollowing out at the face). This face would require the most attention and substantial tuck pointing.

The multi-wythe brick walls are in generally good condition. There are areas that require some tuck pointing, and it appears that the west wall would require the most attention.

Lower Level/Basement Systems

The exterior walls are supported on a combination of stone foundation walls and brick foundation walls. The visual portions of the foundation walls appear to be in good condition, however most of the basement was furred out with wood framing and paneling. The basement has interior wood columns supporting the loads from the upper floors which appear to be in fair condition. Limited settlement of the columns and sagging of two beam spaces was observed in the central area of the basement. It appears as though these settlements have occurred a number of years ago and that no immediate settlement was occurring. This should be monitored. It should be noted that our inspection of the foundation is based on structural elements that were visible at the time of the inspection. In addition, for items not visible, adjacent structural elements were visually inspected to ascertain if there are any underlying structural issues with items such as footings.

1st Floor Structural System

The first floor consists of full sawn 2x14 wood joists spaced at 16-inches on center and span east to west. There are three interior beam lines that span north to south. The approximate span of the joists is 11.5-feet. Preliminary calculations were run on the joists and the joists have a live load capacity of 180 psf.

The beams are 8-inches wide by 12-inches deep. Preliminary calculations were run on the beams and were found to have a live load capacity of approximately 130 psf.

The overall condition of the first floor system appears to be good with the exception of some sagging of the beams. It appears that there may have been some differential settlement of the interior columns. Usually this settlement occurs during the early life of the structure. Over time this condition tends to stabilize.

2nd Floor Framing

The second floor is framed with full sawn 3-inch wide by 11 ¼-inch deep wood joists spanning east to west. The joists are supported by the exterior walls and 14-inch deep steel "I" beams on the interior of the structure spanning north to south. These steel 14-inch "I" beams then frame into a 21-inch deep steel "I" beam spanning east-west. The 21-inch deep beams are supported by the exterior walls and one interior column.

Preliminary calculations were run on this floor system and were found to have a live load capacity of 180 psf. The interior columns were not verified since they were not visible during our investigation and were not identified.

3rd Floor Framing

The third floor framing, from what was visible, appears to be 2x10's spaced 16-inches on center. The bearing points of the joists were not determined during our site visit. To determine the bearing locations, some selective demolition would have to be performed to visually determine the bearing locations. This floor will have a load carrying capacity that is substantially less than the lower two floors.

Roof Framing

The roof framing consists of wood/steel truss joists spaced at 16-inches on center that span east to west from exterior wall to exterior wall with 5/8-inch plywood decking. These are relatively new and in good condition.

Loadings

Per current code, library loading consists of the following:

Reading Rooms	60 psf
Stack Rooms	150 psf *
Corridors above 1st Floor	80 psf

*The code provides additional information on stack room and reads as follows:
The loading applies to stack room floors that support non-mobile, double-faced library book stacks subject to the following limitations: (1) The nominal book stack unit height shall not exceed 90 in.; (2) the nominal shelf depth shall not exceed 12 in. for each face; and (3) parallel rows of double-faced book stacks shall be separated by aisles not less than 36 inches wide.

Deficiencies, Limitations, and Opportunities

The Vaughn Library building is generally in fair to good condition and is expected to have additional service life as a library. The existing structural components of the facility require limited maintenance and repairs, which may be considered as part of a renovation. Portions of the lower level/basement require monitoring to ascertain that additional settlement does not occur. Any renovations or modifications to the structural system should be carefully considered due to the age and construction of the building. The basement level does not lend itself well to a renovation since many of the walls are structural bearing walls and the space has several columns throughout. The first and second levels are similar in construction and loading capacity. The first floor is generally open floor space, and modifications to the layout are easily accommodated without modifications to the structural system. The second level has several interior walls, which we anticipate can be partially removed to improve the efficiency of the space; however portions of walls and/or columns will be necessary to carry the loads of the third floor. The third floor has limited structural capacity and we anticipate that no change of use will occur.

First Floor Openings to Adjacent Floors and Main Entrance

Through our investigation, we considered options to open main level to Main Street. The Main Street Entrance is not accessible at this time, however this could be easily modified to accommodate an accessible entrance. This could also then be utilized for a secondary access to the third level.

We also reviewed options to open the first floor level to adjacent floors. Originally the first floor and second floor of the library were interconnected by an open stairway in the east entrance lobby. This was infilled in the early 80's. The building already has two stair shafts serving all three levels. Based on the structural systems and configuration, opening this floor area is feasible. We also reviewed options to create a floor opening toward the front of the building interconnecting the first and second levels. This is possible, however may require added structural modifications. We looked at options to open the basement to the first floor and allow added programing opportunities in the basement level. While this is possible, it will likely create added challengers in the egress system. As we review options for opening the first floor to the second floor, we need to understand that there will be significant building code and life safety implications. We will likely only be able to create an opening interconnecting two floors and will likely need to include a fire suppression system.

Any renovation to the Main Street entrance or to interconnect, the floors will require careful evaluation and consideration. A detailed code assessment will be required to assess the impacts of the modifications. Additionally, the building systems, egress, life safety, and egress will be impacted and require modifications and replacements. The building programming will be drastically impacted and renovation to the adjacent spaces and programing will be necessary to provide an efficient and effective space that meets the needs and goals of the library.

SUMMARY:

The primary building structural system appears to be in good condition without any major deficiencies. Floors one and two appear to have a live load capacity of approximately 180 psf. This is a substantial load and can support library functions. We would have to arrive at stack locations and maximum stack weight to make sure that the existing floor capacity is not exceeded. The third floor will have a substantially lower load carrying capacity. If the use of the third floor is expected to change, further investigation should be completed to verify existing load carrying capacity and if any strengthening is required. In summary, this building has no major deficiencies and appears to have good live load capacity on the first two floors of the structure. This assessment only covers the visible structural elements of the building. The assessment is to determine the possibilities of utilization of the 2nd floor for library functions.

Recommendations:

Summary

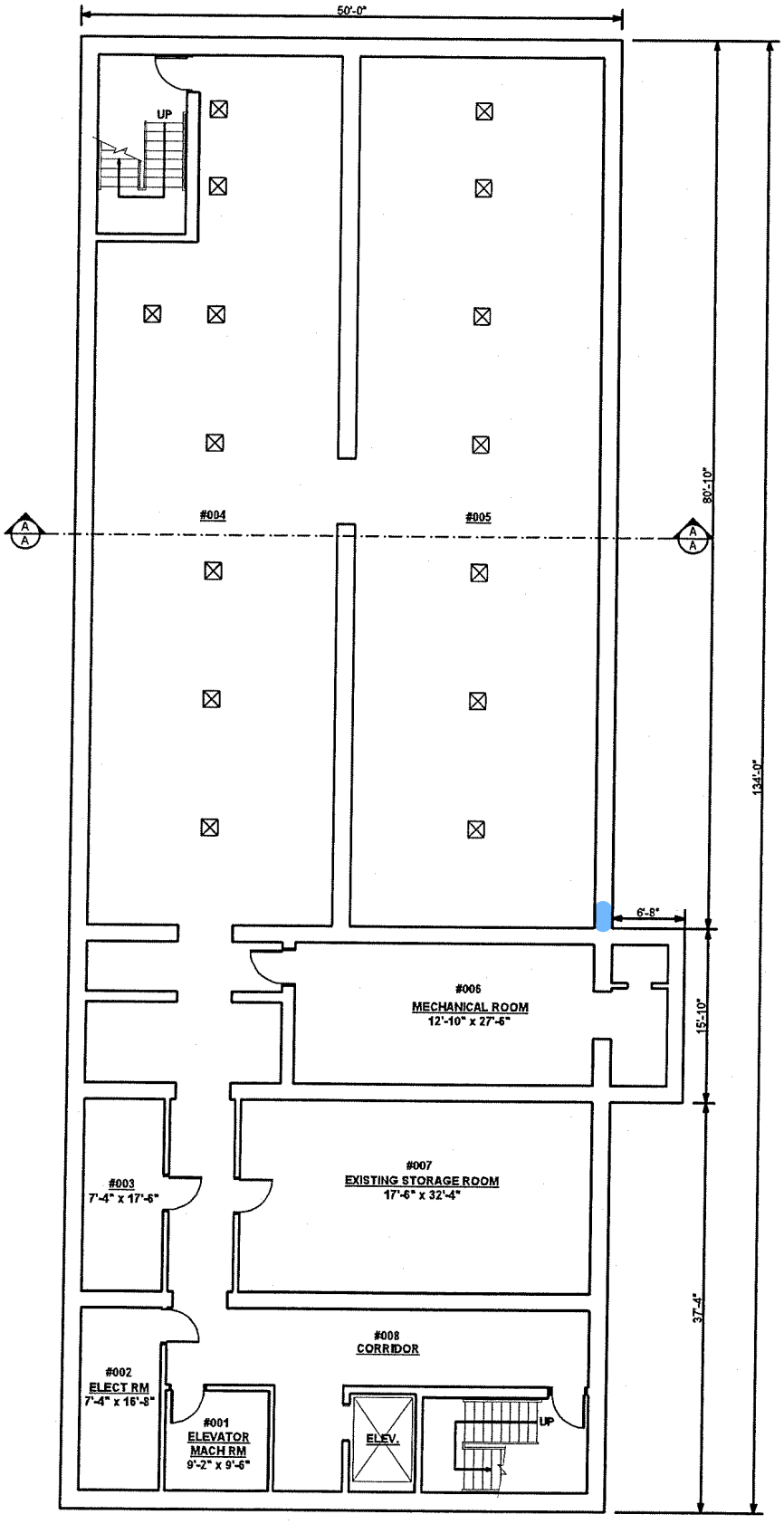
Based on the findings within this assessment, it is our opinion that the facility is in fair to good condition. The facility requires ongoing maintenance and is at a point in the facility life cycle where it is due for a renovation and improvements. The Library is also needing additional programing and will benefit from a more efficient layout. The obvious modification to allow for the added programing is to expand to the second level. Therefore, a renovation is necessary. This renovation should consider all aspects of the facility. This may include a long-term capital improvement plan for the facility that provides for improvements and maintenance over a 2, 5, 10, and 20 year approach. It is generally most cost effective to address the primary building components as part of the renovation.

The next step is to further evaluate the building systems and components as part the remaining phases of the facility assessment and then to review the space needs and programing for the library. Upon understanding the remaining building component condition and life expectancy, along with the current and future space needs, a plan can be developed to create a future program for the library. This will lead to a conceptual plan, opinions of probable cost, budgeting, and planning. This process may take several years and begins with discovery, understanding, and planning.

As the Library and City desire to move forward with the remaining phases of the assessment, we are prepared to complete the remaining work. We propose the subsequent phases of the assessment be included in an updated report so that the library has a comprehensive assessment report. Additional steps may include funding and grant research, application preparation and assistance, additional studies, capital improvement plan preparation, and preparation of cost opinions.

EXHIBIT A

Plans



BASEMENT FLOOR PLAN (EXISTING)

SCALE: 1/16" = 1'-0"

PLAN VIEWS BASED ON 2ND FLOOR
STRUCTURAL ASSESSMENT
C&S DESIGN & ENGINEERING INC. 2008

STRUCTURAL COMPONENT

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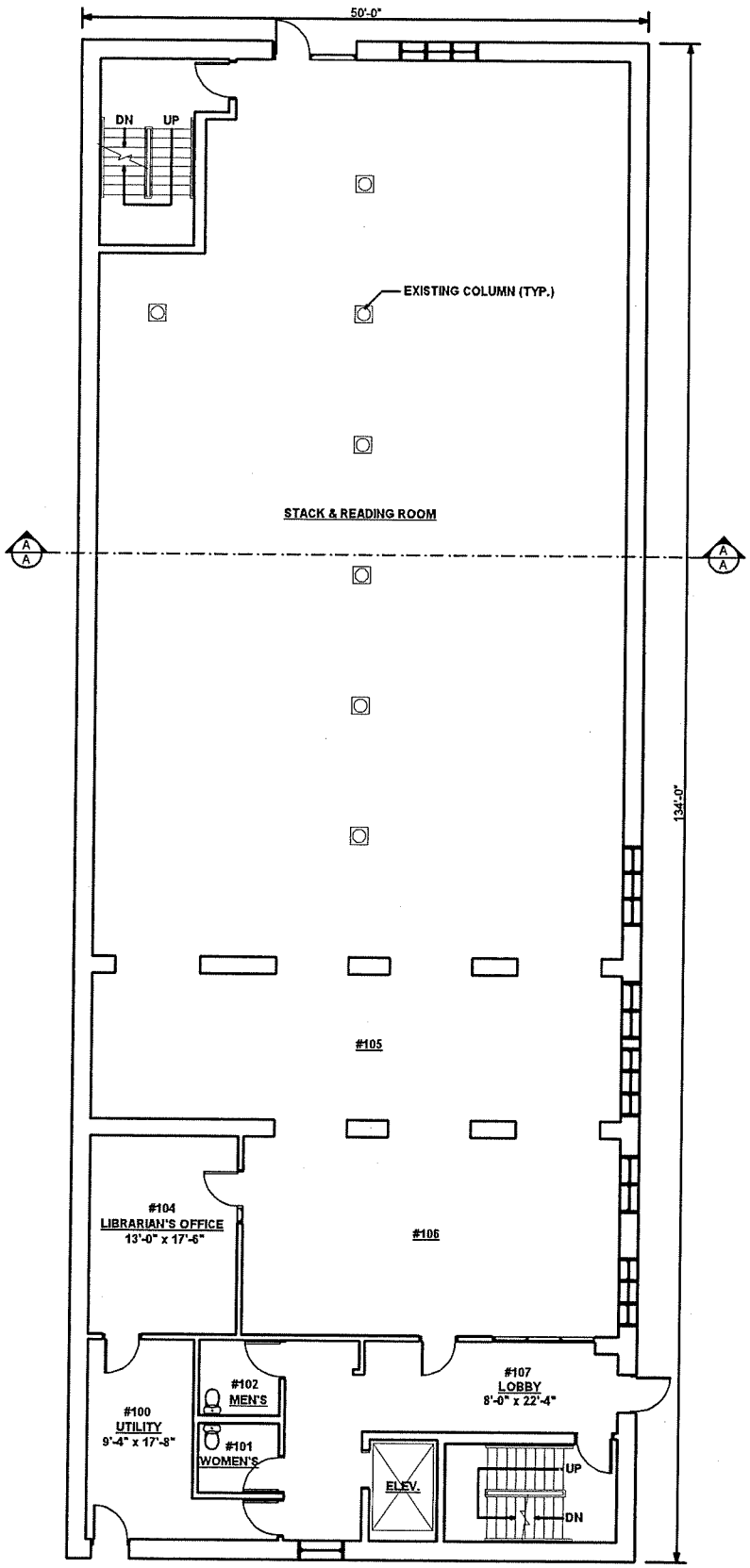

FIRST FLOOR PLAN (EXISTING)

SCALE: 1/16" = 1'-0"

PLAN VIEWS BASED ON 2ND FLOOR
STRUCTURAL ASSESSMENT
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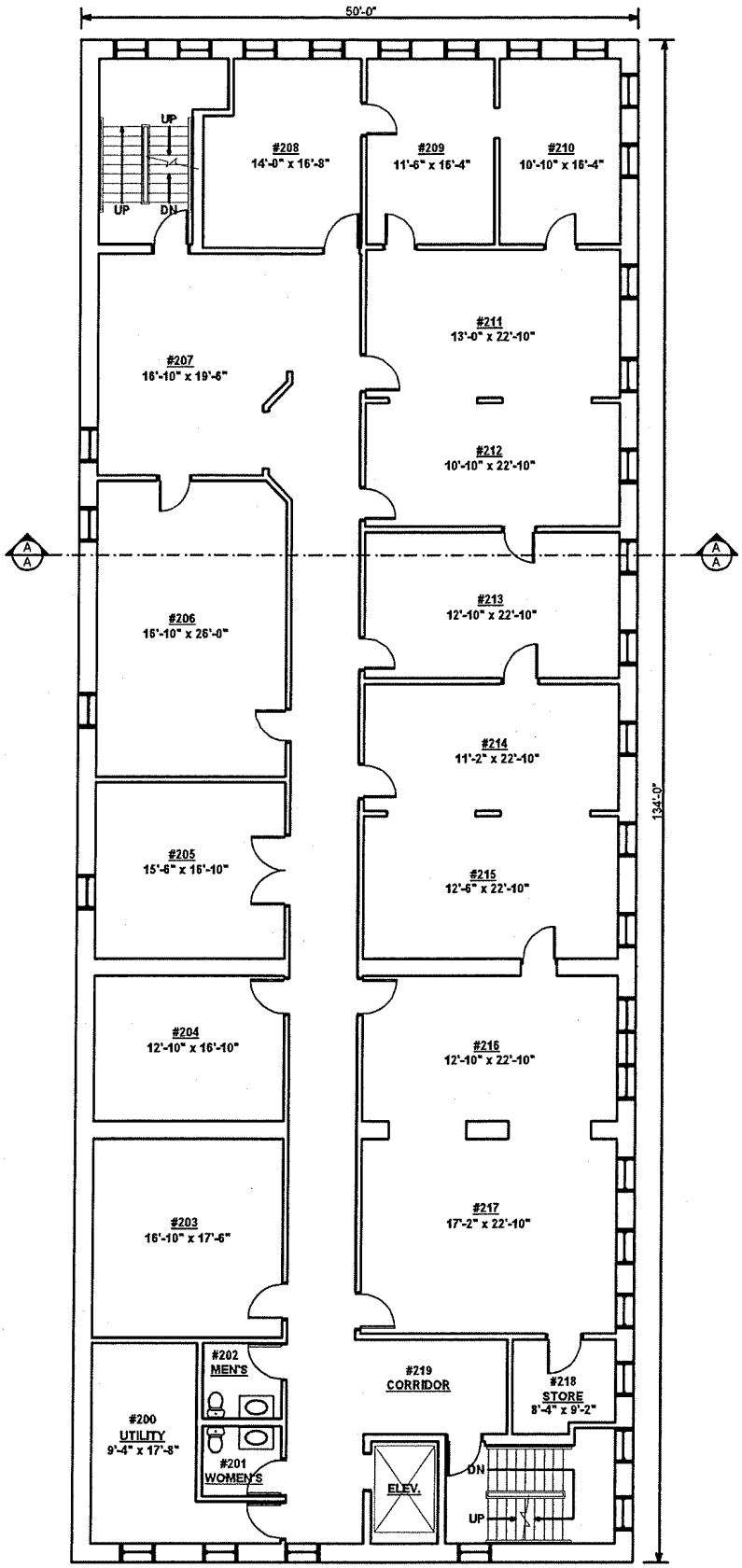

SECOND FLOOR PLAN (EXISTING)

SCALE: 1/16" = 1'-0"

PLAN VIEWS BASED ON 2ND FLOOR
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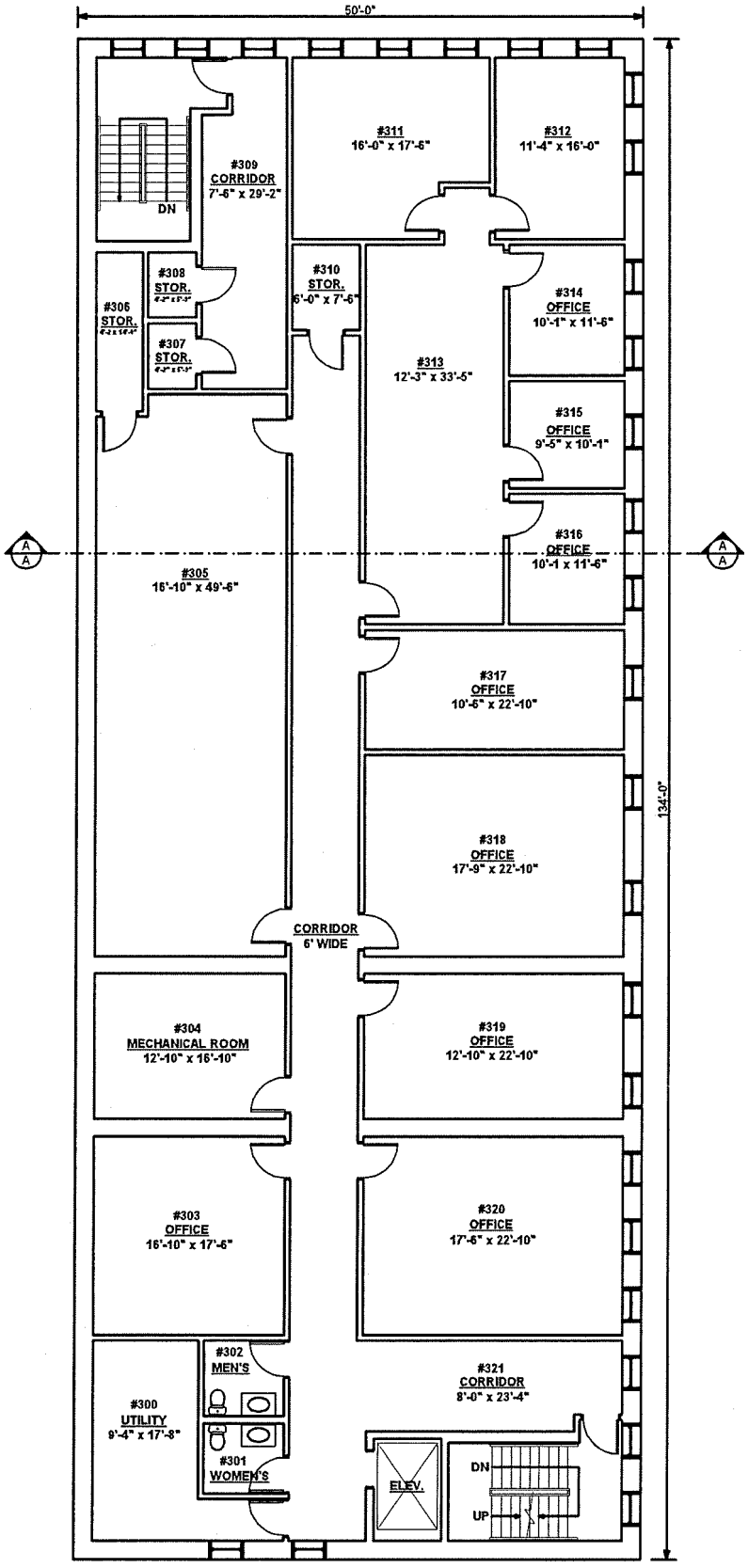

THIRD FLOOR PLAN (EXISTING)

SCALE: 1/16" = 1'-0"

PLAN VIEWS BASED ON 2ND FLOOR
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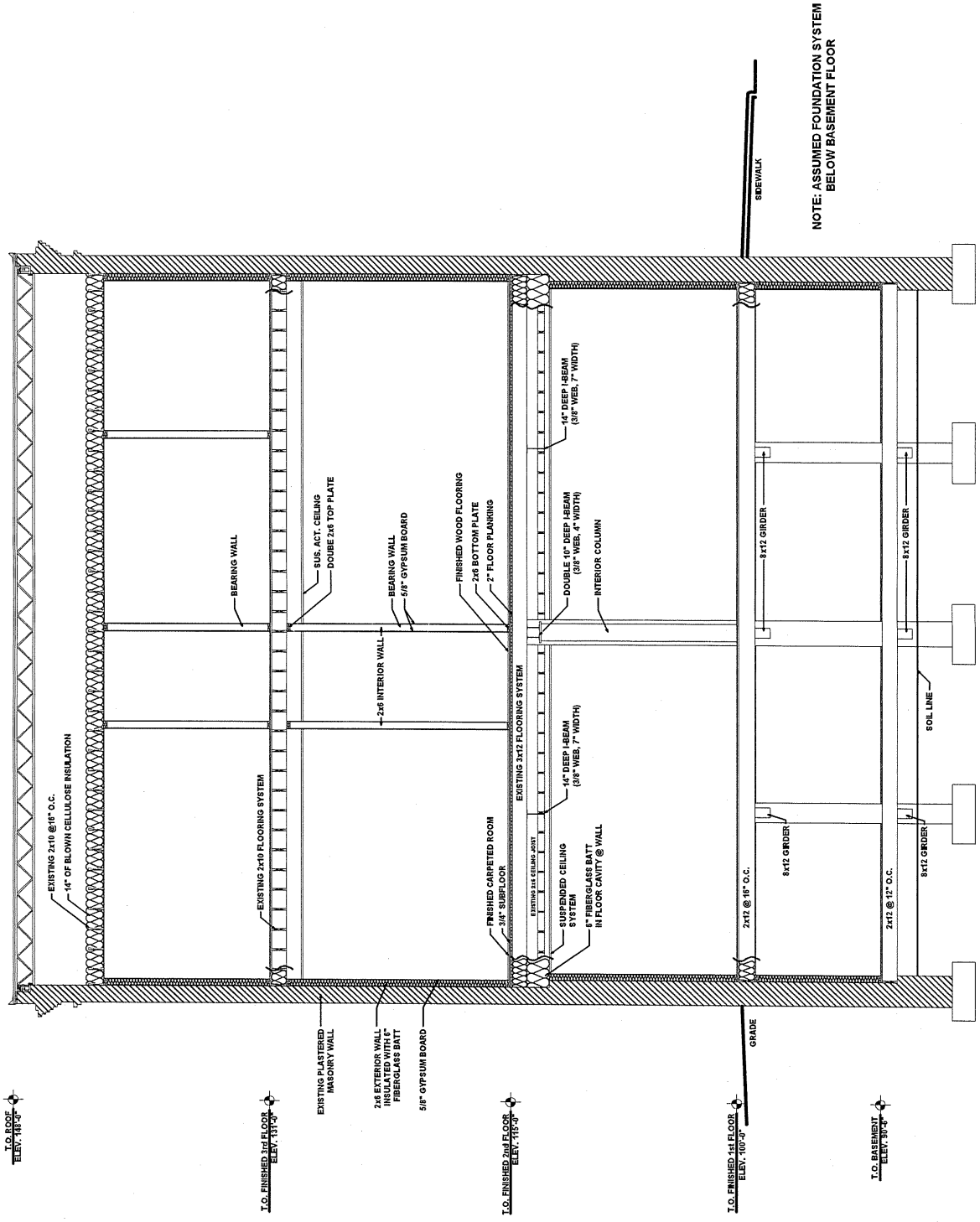

BUILDING SECTION A-A (EXISTING)

SCALE: 3/32"=1'-0"

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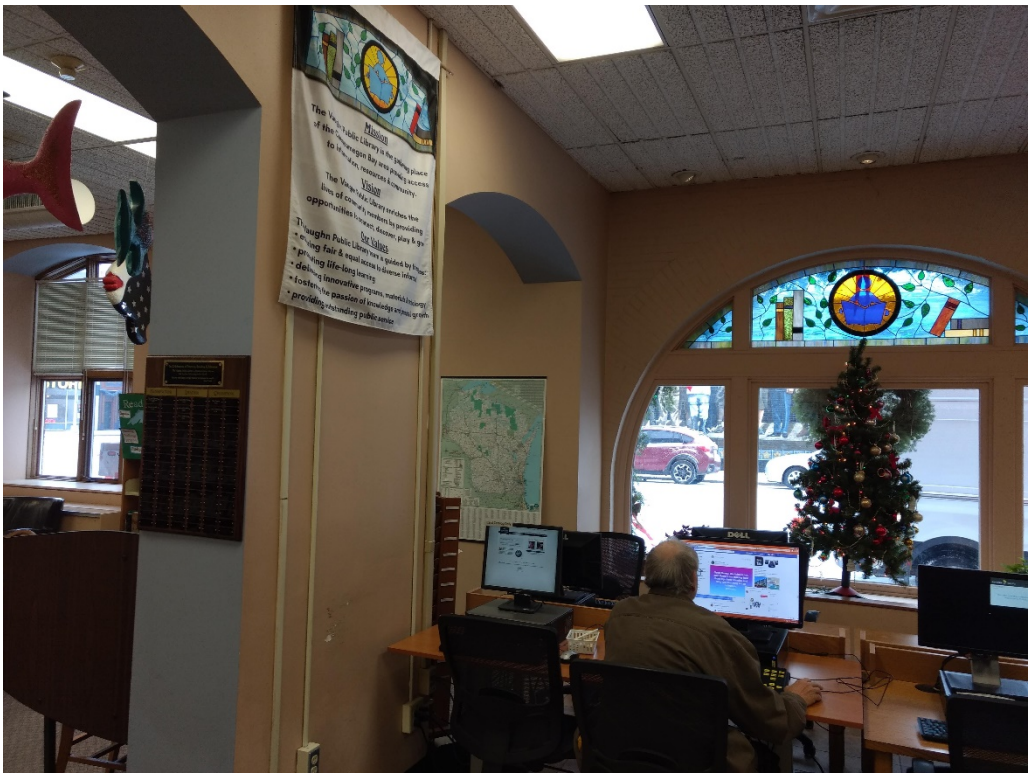
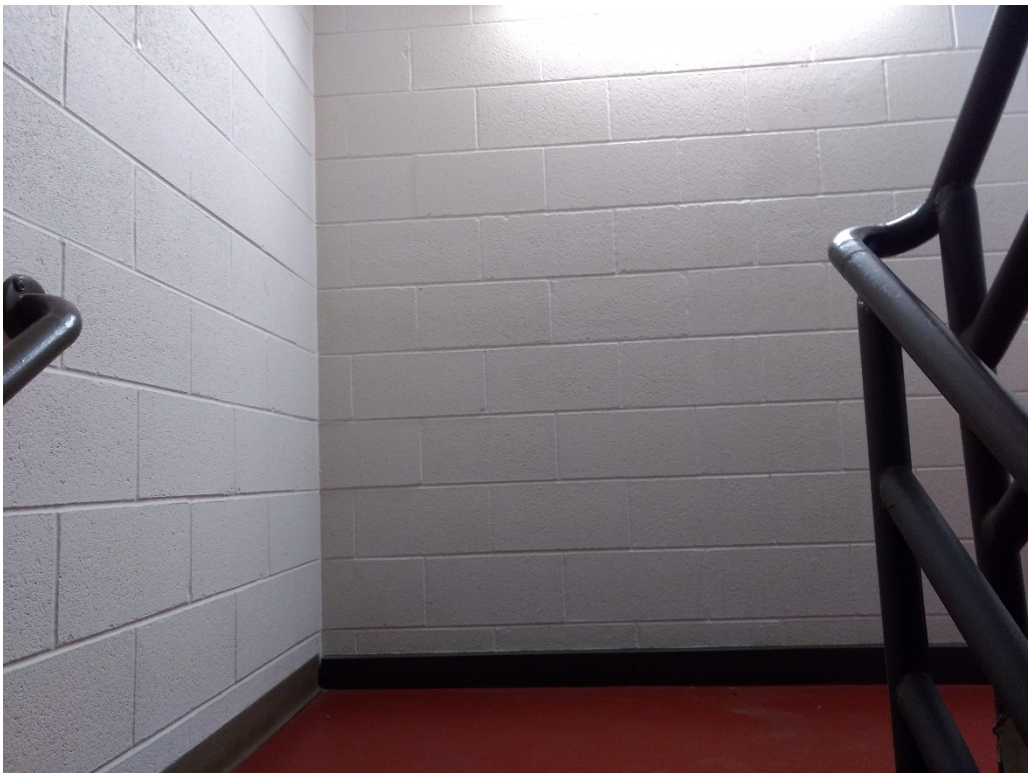
EXHIBIT B

Photos

1st Floor Library (North, Looking South)



1st Floor Library, Bearing Wall at Circulation Desk

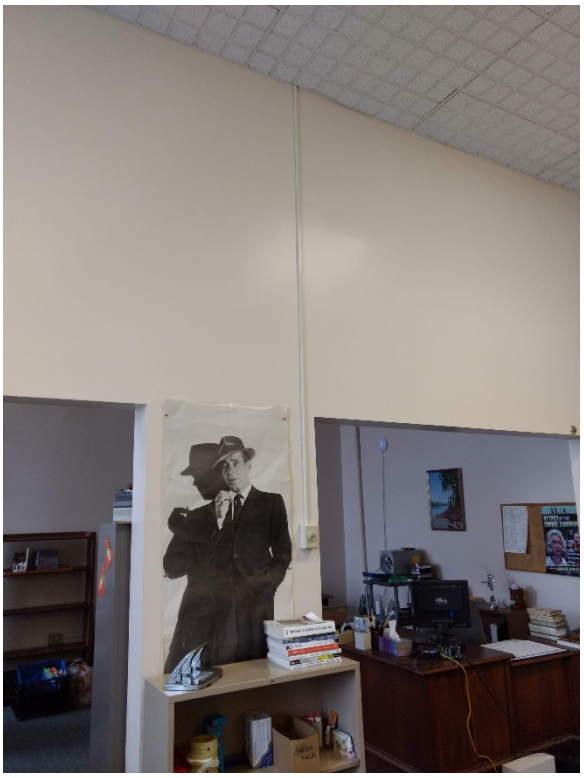


Masonry Stair Shafts, Good Condition

1st Floor Beam for 2nd Floor

2nd Floor Hallway

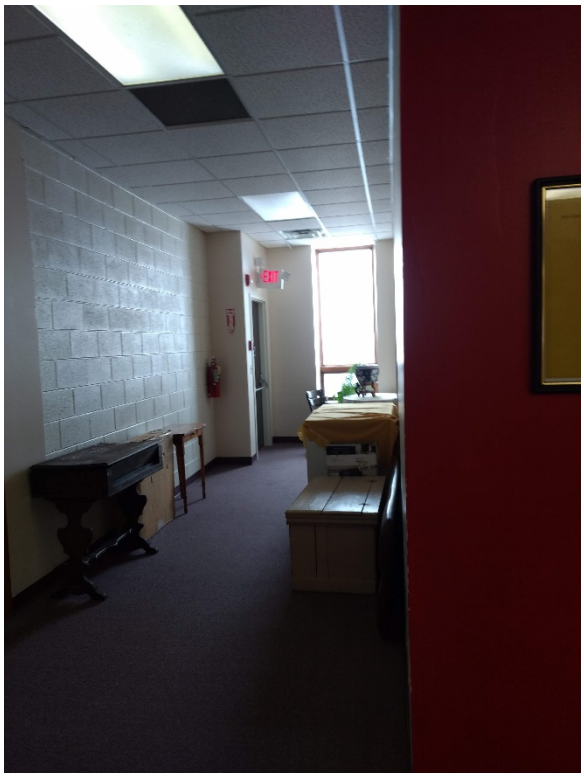
2nd Floor Hallway



2nd Floor

2nd Floor

3rd Floor Hallway, East Looking West



3rd Floor Corridor

3rd Floor Corridor

Northeast Corner

Northeast Corner

North Exterior

North Exit

Northwest Corner

North Wall Parapet

Northeast Wall (Condition Typical)

Northeast Wall (Condition Typical)

Northeast Wall (Condition Typical)

Northwest Corner

East Wall

East Wall Entrance

East Wall (Former Balcony)

East Wall (Former Coal Chute)

East Wall

East Wall

Basement

Basement

Basement Core

Basement (Center Core)

Basement (Previous Repairs)

Sub-Basement (Crawl Space)

Basement Wall, Stair Shaft

Basement Rubble Wall

Basement North Wall

Southeast Corner

South Side

West Side

Southeast Side

Chimney Deterioration

Chimney Deterioration

Chimney Deterioration

West Wall

Chimney Deterioration

Chimney Deterioration

South Wall Patching

3rd Floor Lobby

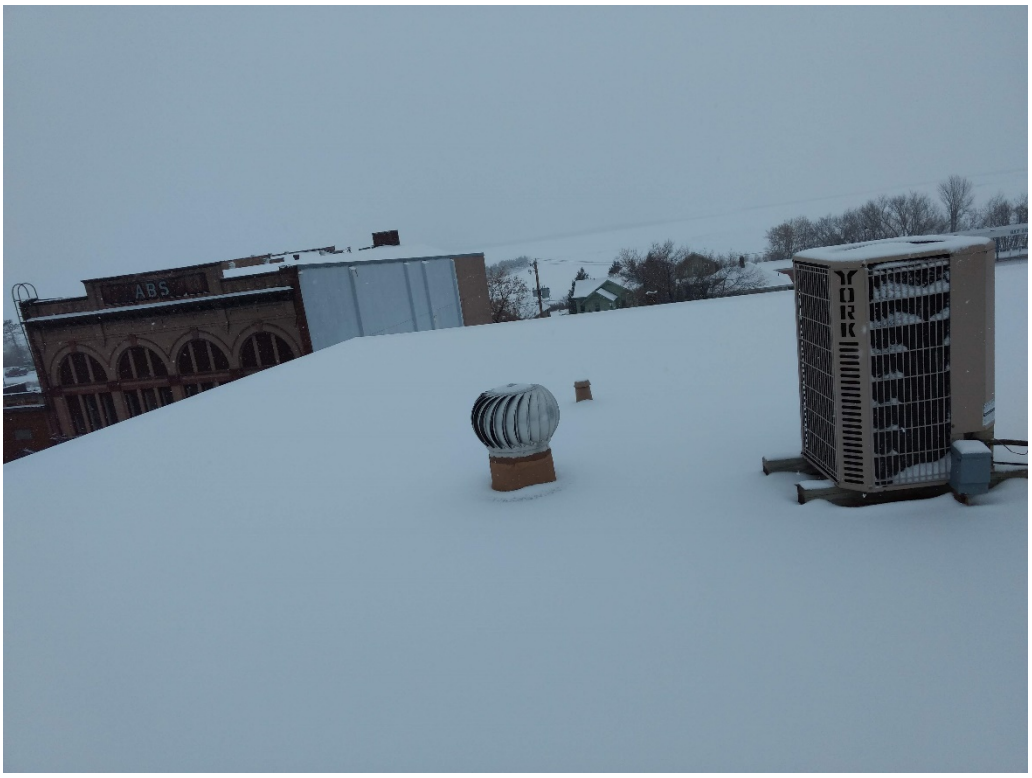
3rd Floor North Stair Shaft

Roof Framing

Roof Framing

Roof Framing

Roof Framing



Roof

Roof

Historic Representation

Historically Correct