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CITY OF BATH
VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES
Bath, Maine
Project No. 23138

~~MAY 31, 2024~~
REVISED JUNE 6, 2024

FINAL REPORT

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CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

BUILDING CONDITIONS SUMMARY

Introduction

The City of Bath retained Harriman to provide assessments on the condition of town facilities to help determine vulnerabilities and strategies for adaptation to changing conditions. The assessments are a visual, non-invasive review of the current conditions, and have been broken down into the following categories:

1. Site/Civil
2. Architectural:
    a. Exterior and interior finishes.
    b. Construction systems.
    c. Codes Compliance.
3. Engineering systems:
    a. Structural
    b. Plumbing
    c. Mechanical
    d. Electrical

Intent

The primary intent of the Vulnerability Assessment Study update is to inform the city of Bath with assessment and analysis information about building concerns that fall under the project Scope of Services. Assessment findings and recommendations are intended to give the town a roadmap for decisions related to addressing deferred maintenance, occupant safety, and occupant comfort. Additionally, information is included with layout options for improved utilization of space in each of the buildings.

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

Consultant Team
The city of Bath commissioned Harriman to conduct the study and prepare this report. Harriman is an integrated architecture, engineering and planning firm with a legacy dating back to the firm's founding in 1870 and regional offices located throughout northern New England.

Harriman Staff
Mark Lee, AIA - Principal-in-Charge.
William Gatchell, AIA - Project Manager, Lead Architect.
Dan Ellingson, AIA – Architect.
Jen Robinson, AIA – Architect.
Tom Emery, RLA – Landscape Architect.
Rob Nelson, PE – Structural Engineer.
James Hebert, PE - Electrical Engineer.
Jeff LaPierre, PE - Mechanical Engineer.
Richard Marchessault - Plumbing Designer.

Gale, Building Enclosure Specialists, assessed the exterior building envelope of each of the facilities.

Study Findings
This report highlights observations of the existing facilities that focus on building systems deficiencies and vulnerabilities, as well as strategies to adapt to changing conditions and requirements. Deficiencies and vulnerabilities typically limit the occupants/tenants' abilities to achieve optimized efficiency and effectiveness and include issues relating to the following types of categories: health, safety, thermal comfort, accessibility, building material condition, building assembly condition, and building systems.

The following is a list of city facilities included in this study:

City Hall
Recreation Center
Department of Public Works
- Main Building
- Salt Shed
- Storage Building

Facility Assessment Observations & Recommendations can be found in each detailed chapter.

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

City Hall

Facility priorities include addressing air and water infiltration issues throughout the building, improving accessibility (into and throughout the building), addressing limitations of the site by investigating the purchase of adjacent parcels, improving occupant comfort via new HVAC systems, and improving spaces throughout the building to better support work and support functions.

Space Utilization Assessment
The current layout of City Hall was analyzed in terms of efficiency, adjacencies, and accessibility. Harriman developed plans with suggested layouts for each floor addressing these deficiencies, including accessible access through a side entrance. With limitations to original building's masonry construction, emphasis was given to reusing plumbing, limiting demo of existing walls, and potential furniture solutions to alleviate that majority of concerns.

Energy Analysis
City Hall was benchmarked using utility data and found to be 37% better than the national median for the building type. Harriman used energy modeling to explore energy saving measures, and projected that a VRF heat pump would improve energy performance and eliminate natural gas consumption, with limited added operating cost.. Benefits to upgrading the facility HVAC equipment also include occupant comfort in compliance with ASHRAE Standard 55, and would eliminate the need to install and remove window air conditioners. Energy offsets could be considered as a renewable source for providing electricity for the system to offset costs. Photovoltaic panels would need to be located off-site due to the limitation of adjacent open space in downtown Bath. Potential net metering benefits from City-owned solar power will need to be considered relative to the operating costs of new, all-electric HVAC systems.

Vulnerabilities and Adaptation Strategies
Vulnerabilities of City Hall were assessed, including the categories of flooding, security, litigation, and energy. Harriman consulted with GEI, whose recently completed flood analysis confirmed that City Hall is not vulnerable to flooding by the Kennebec River. Key areas of improvement were identified, and recommendations given to address the vulnerabilities. Strategies for adapting to change over the next decades were developed.

Opinion of Probable Cost
Detailed conceptual estimates for the listed recommended improvements for City Hall that were developed for each of the building systems.

Prioritized Action and Phasing Plan
The prioritized action and phasing plan is developed from the recommendations and conceptual estimates and is a suggested plan for making the recommended improvements, along with associated costs and suggested time frame.

CITY HALL EXISTING PLANS

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

Donald Small School – *Referred to in this report as the Recreation Center*

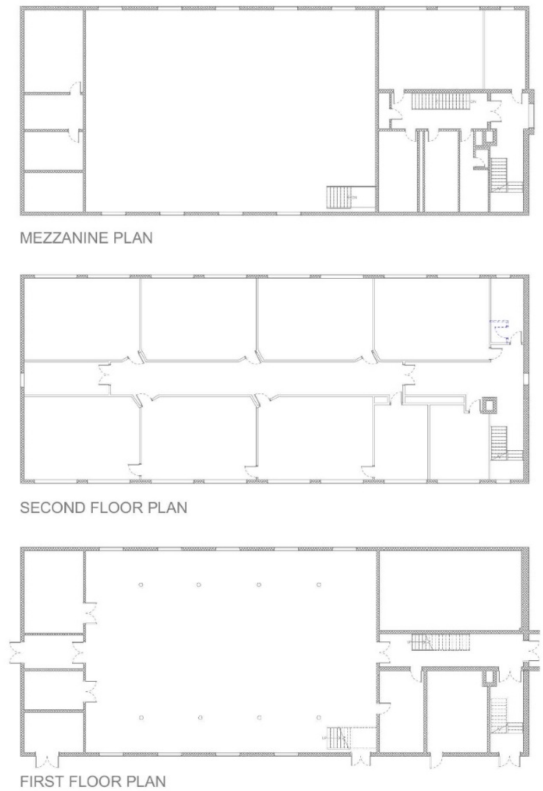
Space Utilization Assessment
The current layout of the Rec Center was analyzed in terms of adjacencies, and accessibility. Harriman developed plans with suggested layouts for each floor addressing these deficiencies, including options for accessible restrooms on the ground floor, and additional restrooms on the second floor. The second floor reconfiguration would allow ample space for multi-purpose classrooms and offices to coexist. Harriman proposes exploration of the unexcavated area to add additional square footage to meet the suggested commercial kitchen need.

Energy Analysis
The Recreation Center was benchmarked using utility data and found to be 56% better than the national median for the building type. Harriman used energy modeling to explore energy saving measures, and projected that a VRF heat pump would improve energy performance and eliminate natural gas consumption, though the system will not pay back since it is more expensive to operate than the current HVAC system. Benefits to upgrading the facility HVAC equipment also include occupant comfort in compliance with ASHRAE Standard 55 and would eliminate the need to install and remove window air conditioners. Energy offsets could be considered as a renewable source for providing electricity for the system to offset costs, though photovoltaic panels would need to be located off-site.

Vulnerabilities and Adaptation Strategies
Vulnerabilities of the Recreation Center were assessed, including the categories of security, litigation, and energy. Key areas of improvement were identified, and recommendations given to address the vulnerabilities. Strategies for adapting to change over the next decades were developed.

Opinion of Probable Cost
Detailed conceptual estimates for the listed recommended improvements for the Recreation Center that were developed for each of the building systems.

Prioritized Action and Phasing Plan
The prioritized action and phasing plan is developed from the recommendations and conceptual estimates and is a suggested plan for making the recommended improvements, along with associated costs and suggested time frame.



REC CENTER EXISTING PLANS

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

Public Works

Space Utilization Assessment
The current layout of Public Works was analyzed in terms of efficiency, adjacencies, and accessibility. Harriman developed plans with suggested layouts to maximize the current administrative area into private areas or enclosed offices. A new entrance vestibule with more visible door location, either with or without a public restroom, is proposed. Additionally, Harriman suggests renovating the existing locker/restrooms into two individual shower and restrooms. A newly constructed wall in the director's office would act as a sound barrier to the garage, as well as relocating the hallway door to provide a vestibule to the garage for additional sound and smell barriers. Finally, it is proposed to add an either one or two bay carport, or fully enclosed addition to the current garage bays in an effort to meet the current needs of the fleet.

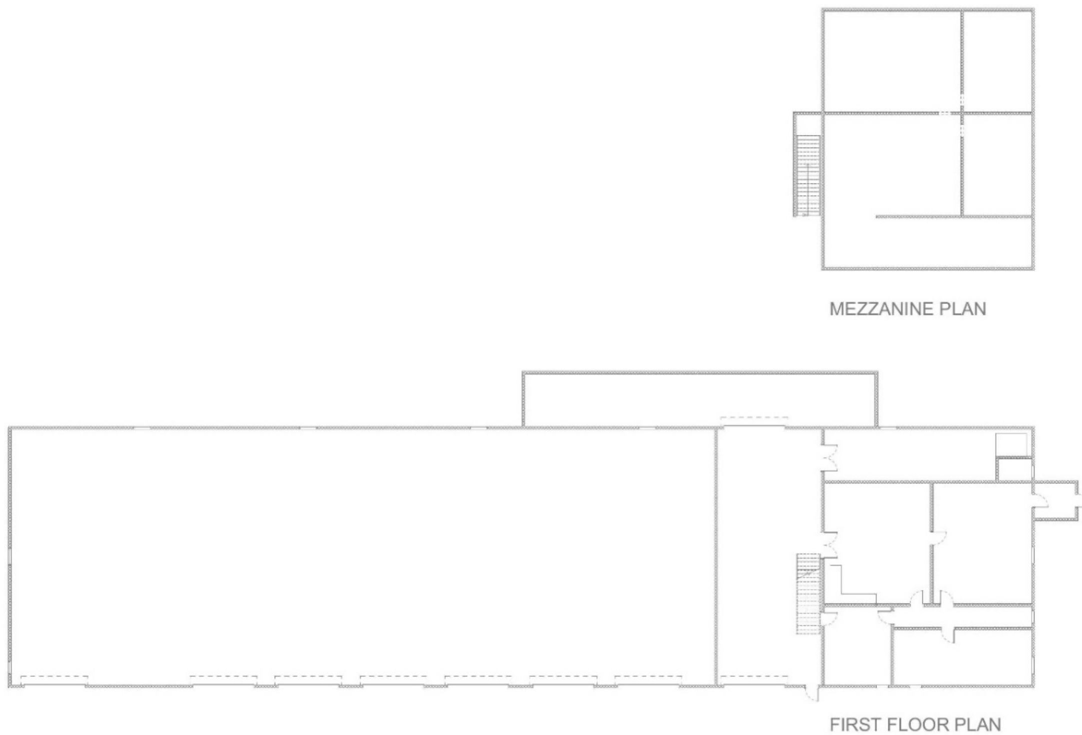
Energy Analysis
Full facility replacement is recommended for Public Works, however a reduced scope renovation and minor addition was suggested in the interim. Efficiency improvements are not being considered due to the efficiency of current equipment. Modifications to the building envelope were deemed most viable for the short-term.

Vulnerabilities and Adaptation Strategies
Vulnerabilities due to security, energy, and litigation are less critical than at the other facilities, especially in anticipation of building replacement within ten to twenty years. There is limited public interaction and traffic than in other parts of the city.

Opinion of Probable Cost
Detailed conceptual estimates for the listed recommended improvements for the Recreation Center that were developed for each of the building systems.

Prioritized Action and Phasing Plan
The prioritized action and phasing plan is developed from the recommendations and conceptual estimates and is a suggested plan for making the recommended improvements, along with associated costs and suggested time frame.

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT



PUBLIC WORKS EXISTING PLANS

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CITY HALL

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SUMMARY

Building Name	City Hall
Address	55 Front Street, Bath Maine
Building Area (GSF)	19,150 sf
Year of Construction	1928
Year of Additions	
Construction type	
Building Use	
Occupancy Class	
Current Zoning	
Total Number of Floors (M=Mezzanine)	Four
Harriman Project Number	23138

Total Scores	
Category	*Average Score*
Exterior	2.6
Life Safety	4.0
Interior	3.1
Civil	3.0
Structure	3.0
Electrical	1.3
Lighting	2.0
Mechanical	2.4
Plumbing	2.0
Fire Protection	N/A

Scoring System	
1	Very Poor
2	Poor
3	Fair
4	Good
5	Very Good
N/A	Not Applicable

PRIORITY NOTES:

a. Perform investigations and repair work as necessary to address water infiltration issues.
b. Replace exterior doors.
C. Replace steel and aluminum windows.

ARCHITECTURE			
	Score		Average
Building Exterior			
Exposed Foundation	3	Building Exterior Average Score	2.6
Brick / Masonry	4		
Siding / Cladding			
Windows	3		
Doors	1		
Canopies / Overhangs	N/A		
Roof / Flashing	2		
Life Safety			
Fire Alarm / Strobes	4	Life Safety Average Score	4.0
CO / Smoke Detector	4		
Life Safety: Exit Signs	4		
Life Safety: Emergency Lighting	4		
Interior			
Walls and Base	3	Interior Average Score	3.1
Flooring	3		
Ceiling	3		
Stairs	4		
Handrails	3		
Doors	3		
Glazing	3		

CIVIL AND STRUCTURE			
	Score		Average
Civil			
Site Drainage	4	Building Exterior Average Score	3.0
Utilities	4		
ADA Accessibility	2		
Site Features	3		
Pavement conditions	3		
Parking	2		
Structure			
Structural Framing	3	Structure Average Score	3.0
Observable Masonry	3		
Headers / Lintels	3		
Central Stair	3		

MEP SYSTEMS			
	Score		Average
Electrical			
Service Entrance	1	Electrical Average Score	1.3
Panel / Distribution	2		
Standby Power	1		
Lighting	2	Lighting Average Score	2.0
Lighting Controls	2		
Mechanical			
Building Envelope	2	Mechanical Average Score	2.4
Heating Plant	3		
Cooling Plant	N/A		
Heating Distribution	3		
Cooling Distribution	3		
Ventilation	1		
Controls	2		
Specialty Areas	N/A		
Plumbing			
Toilet Rooms	2	Plumbing Average Score	2.0
Kitchen	2		
Domestic Water	2		
Showers	N/A		
Sprinkler Riser	N/A	Fire Protection Average Score	N/A
Sprinkler Distribution	N/A		

NOTES

ARCHITECTURAL EXTERIOR NOTES:

Walls: replace cracked/spalled brick; repair deteriorated mortar joints; repair cracked/spalled stone, concrete; scrape, prime, and paint rusted lintels and metal railings at balcony; clean areas of stain, rust, and algae growth; repair locations of abandoned fastener holes; remove and replace failed sealant; fully repoint brick masonry chimney. Windows: scrape, prime and paint existing wood window frames; remove and replace existing steel and aluminum window systems with new thermally-broken aluminum windows. Roofs: remove and replace existing roof system as noted in report; install new through-wall flashing at brick masonry as noted; replace skylight; remove and replace existing standing seam copper panels.

ARCHITECTURAL INTERIOR NOTES:

Walls are primarily painted plaster and are in primarily stable condition, with some isolated locations of water damage. Flooring includes carpeting, apparent vinyl-asbestos tile, finished concrete and finished wood; many finishes are in need of replacement and potential abatement. There are accessibility issues, including restrooms in particular, and stair rails and guardrails do not comply with code requirements. Many door handles do not meet ADA requirements.

CIVIL NOTES:

Update parking and paint striping and signage to current ADA requirements, and provide a designated accessible route. Provide curbing/ wheel stops to protect the building wall. Repair brick sidewalk, bring accessible ramp at driveway up to code. Clarify parking for meetings, provide lighting. Provide wayfinding signage.

STRUCTURAL NOTES:

Investigate wood rot at bell tower and structural steel framing at location of water leaks, repair as necessary. Investigate cracks in exposed concrete floors.

ELECTRICAL NOTES:

Replace electrical service entrance in kind; replace light fixtures throughout the building with LED-source fixtures, decorative sconces and chandeliers desired to be kept to be cleaned and rewired; remove and replace exit signs with self-testing diagnostics; replace branch circuit panels and load centers throughout.

MECHANICAL NOTES:

Heating plant consists of one cast iron steam boiler that is dual fuel and in working condition. Steam radiators are used to distribute heat throughout the building, with electronically controlled steam valves tied to a local thermostat. Ventilation of occupied spaces is acomplished through operable windows since the building does not incorporate a central ventilation system. Space cooling is provided by a small split air conditioning system on the roof, and window air conditioners installed during the summer.

PLUMBING NOTES:

Replace all piping, plumbing fixtures and water heater. Provide backflow preventer at water service.

LIFE SAFETY NOTES:
Stair handrails and guardrails do not meet current code requirements for height and railing continuity. A hinged window at the balcony and fire escape stair do not meet current code egress requirements. Most restrooms do not comply with required clearances, lavatories are at incorrect heights and there have been partial accommodations made such as the addition of grab bars at some toilets. The elevator does not meet state cab size requirements. The ramp at the south side does not meet landing and slope requirements, or meet handrail requirements. Some doors do not meet ADA requirements due to approach clearances and/or door hardware.

OPERATIONAL NOTES:
Basic renovations to City Hall include adding an accessible ADA lift, either on the north or south side of the building, and accessible restroom(s) on the ground level. Additional renovations involve reconfiguring city offices on upper levels – see floor plan layouts for detailed information on the two options.

ENERGY USE INTENSITY (EUI) NOTES:
The EUI for City Hall is calculated to be 81.8, which is 37% better than the national median of 129.5 for this type of building. Replacing windows and incorporating a VRF heat pump with heat recovery eliminates the use of natural gas and is modeled to result in an improved EUI of 27.08.

FACILITY VULNERABILITIES NOTES:
Vulnerabilities at the City Hall include security, litigation, and energy supply systems. Currently, there is unsupervised access to all levels of the building, including the storage of documents. Shortcomings in meeting accessibility and codes requirements leaves the City vulnerable to litigation. Energy supply systems are susceptible to interruption in continuity of service during storms with exposed power lines and lack of a backup generator. The lack of land limits vehicular maneuverability and potential expansion. Adapting the building to changing conditions is restricted due to accessibility and egress shortcomings, failing aspects of the building and layout limitations. Minimal impacts appear to be a potential due to climate change.

SUSTAINABLE OPPORTUNITIES NOTES:
The City Hall is on a small footprint and with no available land around it for sustainable energy installations. An option would be to achieve energy offsets by providing renewable energy on city property elsewhere in town. Some potential locations for photovoltaic panels could be the high school roof and parking canopy, the middle school roof, and any other unused land. The increased electrical energy could help offset the increased costs and electrical demands of the proposed VRF mechanical system.

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CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

CITY HALL

Civil

Introduction
Bath City Hall is located at 55 Front Street at the head of Centre Street. The site is very small (7,841 sq. ft.) and utilizes a right-of-way or easement shared with the adjacent bank for parking. The building is oriented to Front Street; however, the public entrance is located on the north (left) side of the building facing the parking lot.

Site Context (Image Source Google Maps)

Tax Map 27/ Lot 124
Area: 0.18 Ac
Zoning District: C1 Downtown Commercial
Year Built: (Dedicated May, 1929)
Adjacent Land Uses: Commercial and Parking

Topographic Conditions

Sloped lot toward Front Street (south)

West Façade

Slope behind building

- General site slopes: The site is located at the top of Front Street. The slopes are moderate to steep.
- Site Topography:
    - West: The west or front of the building is located on Front Street. The building sits proud of the adjacent sidewalk. The 'ceremonial' front door is accessed with 3-granite steps. The public sidewalk in front slopes to the street.
    - North: The main entrance is located on the north side of the building. The grade slopes gently along the base of the building front to back, but moderately to steeply away from the building.
    - East: The area behind the building is paved. The parking lot has a moderate cross slope toward an abutting building. Note that the parking lot is not part of the city property.
    - South: The south side of the building slopes moderately away from the building and steeply from the front of the building to the rear. The lawn is not part of the city hall parcel.
- There were no eroded areas as the area around the building is primarily pavement.
- There is a low area in the brick pavement at the southwesterly corner of the building at the base of a wood ramp. There is also a drainage issue under the landing of the wood ramp on the south side of the building.

Puddling near ramp

ADA Accessibility - Parking spaces and signage

- There are two HC parking spaces near the side/ main entrance of the building. The slopes appear to exceed the 2% maximum (cross slope and longitudinal slope). The ADA signage is building-mounted and should be update to current ADA standards. The signs are placed too low (less than the required 60-inches to the bottom of the sign).

HC Parking and signage at main entrance

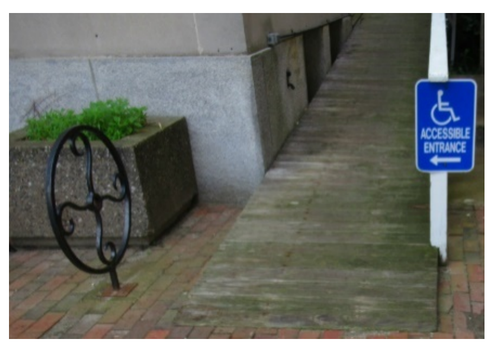
HC Parking at wall

- There are no curbs or ramps at the main entrance. There are curb ramps in the public sidewalk on the west side of the building. These are not on the same parcel as city hall, although both are city-owned. There is settling in the brick pavement at these locations.
- There is no dedicated, accessible route to the main entrance. There is no access aisle at the head of the HC parking spaces which are tight to the building foundation. The access aisle between the two ADA spaces is narrow and not clearly marked/ striped. HC access is behind the parking spaces in the travel lane of the parking lot.

ADA accessibility from exterior doors

- The only at-grade entrance or egress is at the main entrance on the north side of the building. The ‘ceremonial entrance’ at the front of the building (Front Street) is not used. The door sill is approximately 18” above the sidewalk.
- There is a wood ramp to the right of the front of the building. Although it includes a HC sign, the signage is confusing as to where the arrow is directing a visitor. It may be to the ramp itself, or to the side (main) entrance. However, the ramp on which the sign is mounted is not ADA compliant as there are no hand rails extending beyond the bottom of the ramp.

Front Street Entrance



ADA signage at bottom of wood ramp

Utilities

- Manholes: Based on visual inspection of covers only they appear in good condition.
- Catch basins: There were no on-site catch basins.

- Town/city water and sewer: The existing building is served by public water and sewer.
- Gas service: The gas entrance and meter are located on the south side of the building under/ close to a wood ramp and landing.
- Power and Communication: Refer to electrical engineer's report.
- Heating oil service: An oil fill pipe and vent are located on the north side of the building to the right of the main entrance.
- Damage to drain inlets and/ or pipes: None observed.

Gas service entrance

Site Infrastructure - Pavements

The condition of the existing pavements was based on the following criteria:

(Excellent = new pavement with NO cracks)
(Good = relatively new pavement with very few minor cracks)
(Fair = well-worn pavement with several cracks, but in a serviceable condition)
(Poor = very badly cracked, heaved, much 'alligator-cracking, must be replaced)

- Brick pavements are in fair condition. Brick pavement is an extension of the public sidewalk on the front/ west side of the building and extends a few feet back along the north and south sides of the building.
- Parking lot pavement is fair condition. The parking lot is on an easement or right-of-way shared with the adjacent bank business to the north.

Brick pavement at Front Street

Site Improvements

- Curbing: Granite curbing is located along Front Street. at the front of the building. The curb is older type but in good condition. Some settling was noted including the curb ramp at public sidewalk. Newer granite curbing is located along the parking area driveway and brick sidewalk and terminates at the building wall on the north side.
- Concrete curbing is located along the head of some parking stalls to the right of the main building entrance. It is located too close to the building wall to prevent damage to the building from vehicles.
- Benches: Newer metal benches are located along the public sidewalk and are in good condition.
- Bollards: Granite posts/bollards with heavy "marine" chains are in the public sidewalk behind the street curbing and are in good condition. These are part of a historic revitalization undertaken from the 1970s into the 2000s.
- Dumpsters: NA
- Fencing: NA
- Site lighting: The front area of the building has building-mounted, decorative/ historic sconce lighting flanking the front (ceremonial) entrance. There is no area lighting on-site because the site is so small and boundary lines are just a few feet away from the building walls. The public sidewalk in front has pole-mounted decorative/ historic lighting. Illumination levels are unknown. Refer to electrical engineer's assessment. The main building entrance is illuminated with ceiling fixtures mounded on the marquee/ canopy over the entrance.

Curb at head of parking

Site lighting – building & streetscape

Landscaping

- General observation: There is no landscaping on-site due to the small urban site except for season plantings (annuals) and street trees in the public sidewalk. Flower boxes are located at sidewalk level mounted on bases and are suspended from the decorative light poles.
- Maintenance: Seasonal plantings are well maintained and in good condition.

Seasonal plantings

Miscellaneous/Regulatory

- Driveway intersection site distances and speed limits: Site distance is not an issue with one-way circulation into the site from Front Street. The speed limit is 25 mph but travel speeds are further slowed by the intersection of Front and Center streets, on-street parking, and the historic streetscape.
- Zoning: The site is located in the C1 Downtown Commercial District. The space and bulk standards are designed for flexibility and commercial growth. There is no required minimum lot area; or lot width. Minimum setbacks are 0-ft. and maximum lot coverage is 100%. There is no maximum building height restriction under the space and bulk regulations.

Driveway at Front Street looking north

Recommendations or Corrective Actions

- Accessibility: update parking, paint striping and signage to current ADA requirements. Provide a designated, accessible route away from the vehicular travel lane.
- Provide curbing/ wheel stops to protect the building wall.
- Work with the city to repair brick sidewalks and bring accessible sidewalk ramp at the driveway up to current code.
- Parking: verify where parking is provided for public meetings and provide pedestrian routes and adequate lighting for the parking areas.
- Signage: provide wayfinding signage to guide visitors to parking areas as most of the nearby parking is signed as reserved or otherwise off-limits to public use.

Off-site parking

Off-site parking

- Verify drainage and snow storage impacts or needs as the site is extremely small and either covered by buildings or pavements.
- Consider land acquisition in order to alleviate the limitations of the site.

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CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

CITY HALL

STRUCTURAL

General/Introduction
A limited review of the existing structure was completed based on information that could be gathered from the available original construction documents and from the visible and accessible structural system components observed during a site visit.

Existing Conditions Description
The original building is a three-story structure with a basement which is constructed of load bearing masonry walls and wide flange steel columns which support the elevated floor and roof framing. The elevated floors and roof are generally constructed of wide flange steel beams spanning between steel columns and masonry walls which support open web steel joists with 2-inch-thick reinforced concrete slabs placed on Hy-Rib mesh. The Municipal Court floor at the ground level is constructed of a reinforced concrete beam system which supports a 5½ inches thick reinforced concrete slab. The bell tower on the roof is constructed of wood framing with steel angle bracing.

The building is supported entirely on a concrete foundation system comprised of perimeter foundation walls on continuous strip footings and isolated spread footings at steel column locations. The ground floor is constructed of a concrete slab-on-grade.

That lateral force resisting system was not specifically observed or identified in the available documents but is assumed to be comprised of CMU shear walls, structural steel diagonal brace frames, structural steel moment frames, or a combination of these systems.

Based on our limited review of the existing building, the main structural systems appear to be in generally good condition.

List of Concerns
- Wood rot was observed at the bell tower framing.
- Roof leaks have been reported, which may result in corrosion of the structural steel framing.
- Floor cracks were observed in several exposed concrete floors.

Wood rot at the bell tower

Concrete floor cracks

Recommendations
1. The wood rot at the bell tower should be investigated further to determine the extent of the damage and to provide appropriate recommendations for repairs.

2. The structural steel framing should be observed at the locations where leaks have been reported to determine if any corrosion or other damage has occurred. Repair recommendations should be provided if necessary.
3. The cracks in the exposed concrete floors should be investigated further in order to determine the cause of the cracks and to provide appropriate recommendations for repairs.
4. Any proposed structural renovations and additions to the structure will follow the gravity and lateral (wind and seismic) loading provisions stipulated by the 2015 International Building Code (IBC), the 2015 International Existing Building Code (IEBC) and the American Society of Civil Engineers (ASCE) Standard 7-10 *Minimum Design Loads for Buildings and Other Structures*. These are the applicable building codes currently adopted by the State of Maine. It should be understood that current building codes are more stringent than the codes in place at the time of original construction. If significant structural modifications are required to construct the proposed renovations, the entire existing structure may need to be analyzed and upgraded if found to be deficient.
5. The building code requires that lateral forces (wind and seismic forces) introduced by renovations to an existing structure are considered. These forces are determined through consideration of numerous criteria related to soil type, exposure, height, and type of structural system. The IEBC 2015 does not require structural upgrades to an existing building unless an addition, alteration (such as an increase in roof insulation) or change of use prompts or causes an increase in loads beyond specified thresholds. Depending on the scope of future additions or renovations, further lateral force resisting system analysis and/or upgrades may be necessary.

May 29, 2024

Re: Building Enclosure Evaluation
City of Bath - Municipal Facilities Planning
City Hall Building
Bath, ME
Gale JN 841640

Dear Mr. Gatchell:

In accordance with our agreement, Gale Associates Inc. (Gale) performed a visual evaluation of the in-place roof, window, and building enclosure systems components for the City of Bath, Maine - Municipal Facilities Planning, which included a review of the City Hall, Recreation Center, and Department of Public Works (DPW) Buildings. Representatives from Gale visited the project on June 25, 2023 to conduct this evaluation. Access to the roof and building interiors was coordinated and provided by Harriman Associates (HA) and City of Bath (Bath) personnel.

The purpose of the evaluation is to provide HA with a better understanding of the conditions observed and how they may be contributing to reported moisture related issues. The purpose of this report is to provide our opinions to address the existing conditions that may be associated with interior moisture infiltration.

Background Information

Bath City Hall is a three-story office building, constructed circa 1929, located at 55 Front Street in Bath, ME. The building's exterior has a decorative limestone façade with solid brick masonry walls at the rear and sides of the building. Windows consist of both double hung replacement aluminum windows, and original steel windows within punched openings. The roofing systems include low slope elastomeric membrane with copper clad parapet walls, as well as isolated locations of steep slope standing seam copper panel roofs. A decorative wood framed bell tower with a copper roof is prominent above the main entrance. The City Hall is located within the Bath Historic District, and is listed on the National Register of Historic Places.

Figure 1: *Bath City Hall west elevation.*

To assist Gale in performing the evaluation of the City Hall, representatives from HA provided Gale with the following documents:

- Drawings for the City Hall - Bath, ME dated March 17, 1928 by Charles G. Loring, Architect. The set of drawings includes architectural, structural, electrical, and plumbing sheets.

Interior Leak Audit

As part of the evaluation, representatives from Gale performed an interior leak audit to evaluate areas of potential moisture infiltration. In general, the interior of the City Hall presented evidence of moisture infiltration at isolated locations including blistering paint and deteriorated plaster finishes. Please refer to the attached reduced size drawings for the approximate locations of observed leak locations. The following is a summary of Gale's observations.

Leak Location #1 is located at the Third Floor (3rd Fl.) and includes peeling/bubbling paint at the ceiling, walls and associated trim [refer to Figure 2]. The water damage is adjacent to the roof skylight, brick masonry chimney, and copper clad penthouse above, which were each observed to be in poor condition.

Leak Location #2 is located adjacent to the large stairwell window at the Second Floor (2nd Fl.), which continues down to the Ground Floor. Peeling/bubbling paint, deteriorated plaster finishes, and water staining were observed at the adjacent wall and ceiling below [refer to Figures 3 and 4].

Leak Location #3 is located at the ceiling of the Court Room below Roof Area D and includes peeling/bubbling paint [refer to Figure 5].

Figure 2: *Peeling/bubbling paint at Leak Location #1.*

Figure 3: *Peeling/bubbling paint at Leak Location #2.*

Figure 4: *Peeling/bubbling paint at Leak Location #2.*

Figure 5: *Deteriorated plaster ceiling at Leak Location #3.*

Existing Conditions and Observations

On June 25, 2023, representatives from Gale performed a visual evaluation of the brick masonry façade, windows, roof, and associated components. The intent of the evaluation was to document the extent and approximate location of deficiencies within the as-built conditions. Visual observations were performed from the Ground Level with the assistance of binoculars, while access to the roof area was coordinated with HA and Bath. To visually review the higher elevations, Gale utilized our DJI Phantom 4 UAV drone to provide photographs of the associated building enclosure components. *Please refer to the attached supporting information related to Gale's evaluation including photographic documentation and reduced size drawings with general locations of observed defects.* The following is a summary of Gale's observations:

Exterior Walls:

- The main entrance is located on the west elevation and is a round shaped structure that includes granite steps, Juliet balconies at the Second Floor (2nd Fl.) with wrought iron railings, and four (4) Tuscan-style columns extending form the Second Floor (2nd Fl.) to the underside of an entablature which is engraved with "Bath City Hall". Rust staining and peeling paint is located at the granite at railing posts, and mortar joints between the granite steps were typically deteriorated. The wood and glass entry way door is flanked by two (2) metal sconces installed at the adjacent limestone walls.
- The exterior wall assembly at the west elevation consists of limestone block with a partially exposed granite foundation. The First Floor (1st Fl.) includes limestone block with rusticated edges, while the upper floors include ashlar coursed limestone. In general, the limestone appears to be in good condition with isolated locations of cracked stone, deteriorated mortar joints, atmospheric staining, and algae growth [refer to Figures 6 and 7].
- The typical exterior wall assembly at the remaining portion of the building consists of brick masonry constructed in the running bond pattern. Brick masonry units are yellow standard

size units with mortar joints at approximately one-quarter of an inch (1/4”) in width and constructed in the “struck” profile. A row of soldier coursing is located below the roof line, as well as above the foundation transition.

- The brick masonry and associated mortar joints appeared to be in fair condition with isolated locations of cracked/spalled bricks, deteriorated mortar joints, atmospheric staining, and step cracks. Previous mortar repairs appear to have been performed at isolated locations, based on the different mortar colors.
- The northeast corner of the building appeared to have been previously rebuilt [refer to Figure 8]. At the masonry to concrete foundation wall at this corner, the concrete is cracked and spalled. Copper flashing and weeps above the concrete foundation appear to have been installed during the masonry corner rebuild as a remedial repair. A portion of masonry at the south elevation above the lower roof also appeared to have been rebuilt.
- The exposed concrete foundation wall includes a paint coating. Several cracks within the concrete were observed at the east elevation, and rust staining at the coating was typically located below steel window locations [refer to Figure 9].
- Several steel lintels above window locations were observed to be rusted [refer to Figure 10].
- Various steel window locations at the Ground Floor of the appeared to have been previously infilled with CMU. At the south elevation, one (1) CMU unit is broken, exposing the window behind [refer to Figure 11].
- A steel fire escape is located on the north elevation and is fastened through the brick. Rust staining at the masonry is typical adjacent to the fire escape.

Figure 6: *Typical cracked limestone.*

Figure 7: *Typical deteriorated mortar joint at limestone.*


Figure 8: *Brick masonry soldier course rebuilt at the corner with copper flashing and weeps. Note the cracked and spalling concrete.*


Figure 9: *Typical cracked/spalled concrete at basement level windows. Note the steel security bars within the concrete opening.*


Figure 10: *Typical rusted lintel above window location with peeling/blistered paint.*


Figure 11: *Broken CMU at window infilll.*

<u>Windows:</u>

- The existing window systems vary throughout the building, and include original steel windows, replacement aluminum windows, and replacement wood and aluminum composite windows.
- Steel framed windows are located at the Basement Level and appear to be original to the building's construction. The steel windows include single pane glass with true divided lites and operable projected units. Some locations include wire glass, however a majority of the glazing is opaque as it is painted from the exterior. Several glass lites are cracked, and the steel frames are typically rusted. Operable units were observed to not be fully closed and are rusted in a partially open position. Steel windows also include steel security bars installed within the concrete opening which are typically rusting and appear to be causing cracks and spalls in the adjacent concrete [refer to Figure 12.]

- Windows at the south elevation appear to consist of replacement aluminum hung windows with insulated glazing units (IGUs), and limestone sills. These windows do not include wood trim or a muntin grid to match the other window configurations on the building, with the exception of the large window opening at the stairwell, which includes muntins. Based on the manufacturer's stamp on the glazing, the windows on the south elevation appear to have been installed in 1984. Condensation was typically observed within the IGUs, which gives the glass a hazy and foggy appearance. Isolated insect screens were missing/damaged [refer to Figure 13].
- Windows at the north and west elevations appear to consist of replacement wood and aluminum composite hung windows with IGUs and a typical twelve-over-eight muntin grid. The windows appear to be installed within the original wood framing. The existing wood framing is painted and was observed to be typically deteriorated/peeling at several window locations [refer to Figure 14]. Isolated locations of deteriorated/damaged wood trim on the interior were observed [refer to Figure 15].
- One (1) window location adjacent to the metal fire escape landing appeared to be a wood framed fixed window with hinges along the jamb.
- At the west elevation, a piece of obscure glass framed with wood appears to be installed on the exterior of a narrow window as a storm window. The glass and wood framing was observed to be displaced, refer to Figure 16.
- Three (3) windows located at the Basement Level on the east elevation appear to be replacement aluminum projected hopper style windows with IGUs. Based on the manufacturer's stamp at the glazing, the windows appear to have been installed in 1995, and the glazing includes a Low-E coating [refer to Figure 17].
- At the north elevation, a side entrance is located at the Ground Floor, which includes a wood and glass door surrounded within a wood framed arched transom window with single pane glass. The existing wood and frame are painted and was observed to be typically peeling at the wood framing.

Figure 12: *Typical cracked glass and rust deterioration at original steel windows. Note the cracked and spalling concrete.*

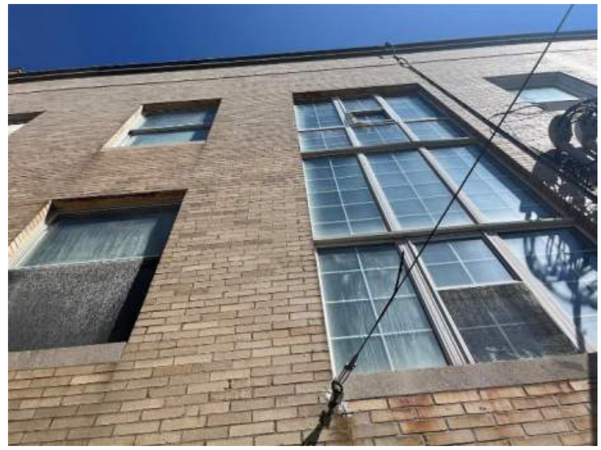


Figure 13: *Typical condesation with IGU at the south elevation windows. Note the hazy and foggy appearance of the windows.*

Figure 14: *Typical peeling paint at existing wood window frames.*

Figure 15: *Deteriorated and damaged wood at the interior of the wood composite windows.*

Figure 16: *Displaced storm window at the north west elevation.*

Figure 17: *Projected windows at the basement level.*

<u>Roofing:</u>

- Based on the manufacturer's stamp, the existing roofing systems at Roof Areas A, B, C, and D consist of an adhered single-ply sixty millimeter (60 mil) thick elastomeric membrane over an unknown thickness of insulation and appear to be installed at various dates. In general, Roof Areas A, B, and C were observed to be in poor condition with multiple locations of unadhered membrane, open seams, fastener backout, cupping insulation, and evidence of ponding water [refer to Figures 18 and 19]. Stripping membrane was not installed at membrane seams, and several patches were observed throughout the roof.
- Drainage of Roof Area A is achieved by a structural slope towards a single roof drain. One (1) overflow scupper is located at the north elevation.
- The roof skylight is constructed with copper and wire glass and was observed to be in poor condition. The glass is broken/cracked at several locations, and the perimeter sealant is failed [refer to Figure 20]. A brick masonry chimney is located at the roof and appears to be in poor condition with cracked/spalled brick, deteriorated mortar joints, atmospheric staining, vegetative growth, step cracks, and previous repairs at the chimney cap, which appear to include a self-adhered membrane and duct tape [refer to Figure 21].
- Based on the manufacturer's stamp, the interior face of the parapet walls are clad with sixteen-ounce (16 oz.) standing seam copper panels. Roof counterflashing as well as parapet flashing area also constructed with copper. A reflective metallic repair coating appears to have been installed at isolated locations of copper counterflashing [refer to Figure 22].
- Limestone parapet caps are installed along the top of the roof parapet and include copper cap flashing below. At one (1) capstone location, copper straps were installed at a crack along the top of the cap. The fasteners used to secure the straps were observed to be corroded [refer to Figure 23].

- Two (2) roof penthouses (Roof Areas B and F) provide access to the main roof area and are clad in standing seam copper panels. The panels were observed to be in poor condition with several residual fastener holes, previous sealant repairs, open/torn sheet metal seams, and staining [refer to Figure 24]. The roof system at Roof Area F appears to be sheet metal covered with a reflective metallic coating, and includes a large satellite antenna installed on top.
- The bell tower platform is accessed via a steel ships ladder into the belfry. The base of the bell tower is clad in copper, which was painted white, while the remaining structure of the belfry is framed with exposed round wood columns that support its roof [refer to Figure 25]. The base of the wood columns and decorative elements at the bell tower appear to be flashed to the elastomeric roof membrane with an unknown white membrane that appeared to be deteriorated. The bronze bell is a Revere Bell and was cast in Boston and dated 1802, according to its inscription. The flat seam copper roof at the top of the bell tower appeared to be in relatively good condition, and includes a decorative weathervane with a detailed mast ship.
- Roof Area D is located at the south elevation and includes a copper gutter and downspout at the perimeter. The roof membrane is secured to the adjacent brick masonry with a termination bar, fasteners, and sealant, and does not include counterflashing above. One (1) section of previously rebuilt masonry above the roof includes a small section of throughwall flashing.
- Roof Area E is a steep-sloped roof constructed with standing seam copper panels. Based on historic photos, the original vent stack at this location appears to have been previously removed and replaced with the copper roof.

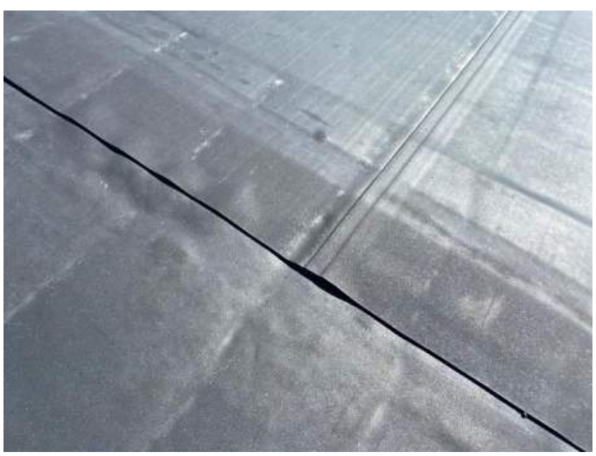


Figure 18: *Typical open seam at roof membrane.*

Figure 19: *Ponding water at the roof drain.*

Figure 20*: Cracked glass at the copper and wire glass skylight.*

Figure 21: *Previous repairs at the chimney cap include a self-adhered membrane and duct tape.*

Figure 22: *Previous repairs at the copper parapet cladding include aluminum coating.*

Figure 23: *Copper straps at cracked parapet cap.*

Figure 24: *Standing seam copper panel clad penthouse in poor condition.*

Figure 25: *Deteriorated flashing membrane at bell tower penetrations.*

Discussion and Opinions

Exterior Walls:

Based on Gale's visual evaluation, it appears that the existing exterior façade including brick masonry and limestone walls are in fair condition that exhibit isolated defects. Masonry defects including, but not limited to, isolated locations of deteriorated mortar, cracked/spalled brick, step cracks, cracked/spalled limestone and concrete presented throughout the building. These defects do not appear to pose a structural concern; however, deterioration within the brick masonry, limestone, and concrete components can result in excess moisture within the masonry wall and can potentially result in moisture infiltration on the interior. Defects within the exterior façade can also further deteriorate at an accelerated rate due to freeze-thaw cycling. It is Gale's opinion that Bath consider remedial repair/replacement work to address the observed defects to maintain and prolong the service life and performance of the building's exterior wall system.

Deteriorated mortar is mortar that has become soft, eroded and washed out, or brittle, cracked, and delaminated from the brick surface. Deteriorated mortar was observed at locations shown on the drawings and could be sufficiently repaired by spot repointing only the affected areas. However, maintenance of the mortar joints that do not receive repairs should be anticipated and budgeted for future repair work. Evidence of mortar repairs appear to have occurred at multiple times throughout the building's history as the mortar color and texture varies. Please also note that spot pointing of masonry walls will be noticeable from the ground and could affect the aesthetics of the building. While contractors will make an effort to match the colors and material, it is difficult to match them identically because of the weathering on the existing mortar. For the aforementioned reasons, one hundred percent (100%) repointing of mortar joints is often considered.

Deteriorated mortar repointing should be performed in accordance with the Brick Industry of America's (BIA's) Technical Note 7F, which requires the removal of existing mortar to a predetermined depth and replacement with a mortar mix appropriate for the masonry units and the surrounding environment. The proper procedure includes cutting existing joints back to at least three-quarters of an inch (3/4") in depth or deeper until sound mortar is encountered, and applying new mortar of an appropriate strength and composition in lifts (thin applications) until the full depth of the cut is solidly packed. It is Gale's opinion that a qualified engineering firm designs, and a qualified masonry contractor performs the masonry repairs so that repairs are performed in accordance with BIA requirements.

Abandoned fasteners and anchors should be removed and disposed of, and all resulting holes should be repaired. Hole repair could be accomplished by patching the mortar joint or removing and replacing the masonry unit, depending on the method used for attachment and its location.

The brick masonry chimney at the roof level was observed to be in poor condition with deteriorated mortar, cracked brick masonry, and step cracks. Additionally, the chimney cap appeared to have been temporarily repaired. It is Gale's opinion that the brick masonry chimney be one hundred percent (100%) repointed. Bath shall confirm if the chimney is still active and if a new chimney cap can be installed.

Cracked and spalled concrete was typically observed at the basement level of the building. These locations should be repaired and re-coated to match the existing. Cracks within the limestone façade should also be repaired. Locations of algae growth, atmospheric staining, and rust staining can be removed using various masonry cleaning products.

Windows:

Several different window systems are constructed throughout the building, and appear to be in various conditions. Steel windows appear to be original to the building's construction, while wood composite windows appear to be replacement windows to replicate the original wood windows. Aluminum windows on the south elevation also appear to be replacement windows. The wood composite windows comprise a majority of the fenestrations at the facility were observed to be in fair condition, with typical peeling paint at the original window frames. The wood frames should be scraped, primed, and painted to reestablish the waterproofing integrity of the paint.

The steel and aluminum windows appear to be in poor condition, cannot be feasibly or economically maintained, and should be removed and replaced. Several of the glass lites at the steel windows were observed to be cracked and broken, creating a direct path for air and moisture infiltration. The steel windows also include single pane glass, which provide poor thermal performance and energy efficiency. Perimeter sealants, glazing putties, and associated components were aged and deteriorated. Additionally, the steel frames are typically rusted and not operable. IGUs at the aluminum windows are typically failed with condensation. The aluminum windows do not appear to match the historic aesthetic of the rest of the building, and do not include muntins.

Typical window systems have a service life of between twenty to thirty years (20-30 yrs.) depending on the type of system, frequency of use, and exposure to weather. Window units that see frequent sun tend to experience quicker deterioration of weather-stripping and glazing gaskets. The steel windows appear to be original to the construction of the building, which would make them approximately 94-years-old, and based on the manufacturer's stamp, the aluminum replacement windows are approximately 39-years-old. Therefore, these windows have reached the end of their serviceable life. The frame and glazing systems appear to lack adequate air and moisture protection due to failed sealants and glazing caulk, cracked glazing, failed IGUs, and the thermally inefficient systems provide minimal resistance to heat and cold transfer through the frames and glazing. It is Gale's opinion that steel and aluminum windows be removed and replaced with new, thermally broken aluminum windows with insulated glazing units to match the original historic appearance and aesthetics of the building. To reduce solar heat gain and solar glare, insulated glazing units can include a tint.

Several steel lintels were observed to be rusted, and appeared to be concentrated at the south elevation. The lintels can be scraped, primed, and painted. However, should Bath consider window replacement at the existing aluminum windows, it is Gale's opinion that the rusted lintels be removed and replaced, and new throughwall flashing with weeps be installed above window head locations.

Failed perimeter sealants should be removed and replaced. When the perimeter sealant has failed, water has the potential of migrating into the adjacent wall and/or window systems, which may result in interior moisture infiltration.

Roofs:

Roof systems at Roof Areas A, B, C, and F appear to be in poor condition with typical defects including, but not limited to, open seams, punctured membrane, unadhered membrane, cupping insulation, fastener backout, and ponding water. The observed defects are potential sources for moisture infiltration and may be contributing to interior leak locations observed below. As moisture infiltrates the roof system, it reduces the effectiveness of the insulation in terms of thermal efficiency and R-value, as well as lead to moisture infiltration at the interior spaces below. Typically, EPDM roof systems can be expected to have a service life of approximately fifteen to twenty years (15-20 yrs.) or beyond, depending on the thickness of the membrane installed, if system details were enhanced, and the type of lap seam technology that was utilized. Although the installation date of the roof systems is unknown, the existing elastomeric roof system appears to be past it's service life and should be replaced.

The roof includes parapet walls which are clad with standing seam copper panels at the interior face. The copper extends beneath the limestone parapet caps to form parapet cap flashing. Copper throughwall flashing is installed at the EPDM membrane at the rising walls. At isolated locations, the copper flashing included a metallic repair coating and appeared to have holes that were previously repaired with sealant. The copper cladding at the roof penthouses (Roof Areas B and F) was observed to be in poor condition and should be removed and replaced.

The existing copper skylight at the roof is in poor condition and should be replaced. Leak Location #1 appears to be located adjacent to both the skylight and the chimney, both of which were observed to be in poor condition.

Access was not provided to Roof Area D, however a leak location was reported below the roof. Based on images from the aerial drone survey, It appears that the membrane is in fair condition, however the membrane is secured to the adjacent brick masonry with a termination bar and fasteners. It is Gale's opinion that new throughwall flashing and counterflashing be installed at the adjacent brick masonry.

When selecting a replacement roof system for this building, there are several different roof membrane options that can be considered. Due to the limited amount of roof top equipment and penetrations, it is Gale's opinion that Roof Areas A, B, C, and F be replaced with a new, single-ply roof system such as elastomeric (EPDM) or thermoplastic (PVC) roofing system. The City of Bath is currently utilizing the Maine Uniform Building and Energy Code (MUBEC), which includes the 2015 International Energy Conservation Code (IECC). The 2015 IECC required a minimum of R-30 for continuous insulation above the roof deck. Although the existing insulation heights at most of the roof areas are unknown, roof top equipment and rising wall flashings may need to be raised to accommodate the industry standard eight-inch (8") minimum flashing height.

Summary of Opinions

Exterior Walls:

- Remove and replace cracked/spalled brick masonry units.
- Repair deteriorated mortar joints.
- Scrape, prime, and paint rusted lintels.
- Repair cracked/spalled stone.
- Clean areas of atmospheric staining, rust staining, algae growth.
- Repair cracked/spalled concrete.
- Scrape, prime, and paint metal railings at balcony.
- Repair locations of abandoned fastener holes.
- Remove and replace locations of failed sealant.
- Repoint brick masonry chimney 100%.

Windows:

- Scrape, prime, and paint existing wood window frames.
- Remove and replace existing steel and aluminum window systems with new, thermally broken aluminum windows .

Roofs:

- Remove and replace existing roof system at Roof Areas A, B, C, D, and F with new single-ply adhered membrane with insulation to meet current energy codes.
- Install new throughwall flashing at the brick masonry rising wall at Roof Area D.
- Replace existing skylight.
- Remove and replace existing standing seam copper panels at penthouse Roof Areas B and F.

We trust this information suits your needs at this time. Please do not hesitate to contact us if you require additional information regarding this matter.

Best regards,

GALE ASSOCIATES, INC.

Jane V. Leven

Jane V. Leven
Senior Designer
Building Enclosure Design and Technology Group

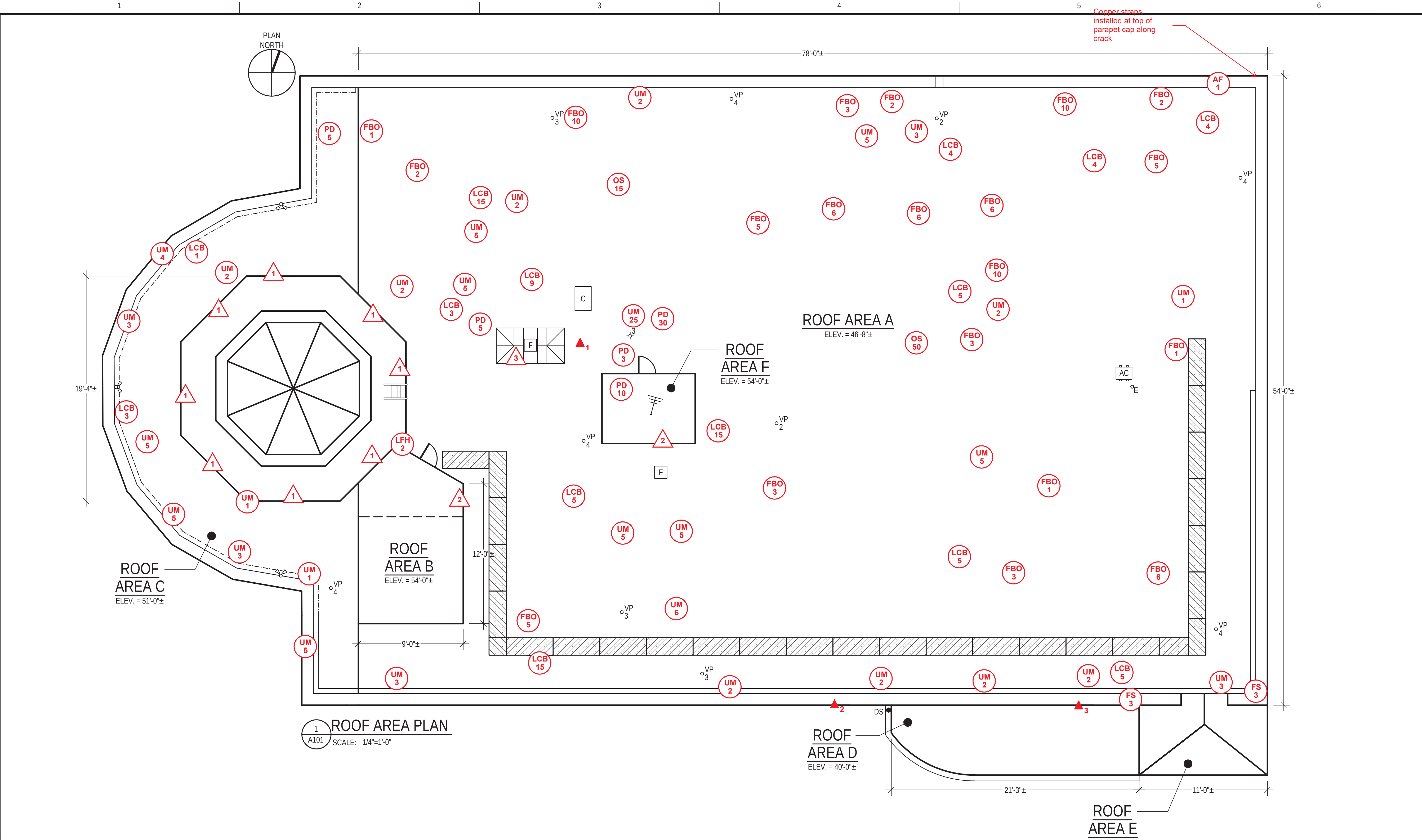
JVL/gmt

Enclosures: Appendix A - Reduced Size Drawings

I:\841640\01 Evaluation\report\841640 City Hall Evaluation Report 2023 1030.docx

Appendix A

Reduced Drawings



1 A101 ROOF AREA PLAN
SCALE: 1/4"=1'-0"

LEGEND

ALL ITEMS ARE EXISTING UNLESS OTHERWISE NOTED

ROOF EDGE	DOOR
PARAPET	VENT PIPE; # INDICATES DIAMETER
CONDUIT	ROOF DRAIN; # INDICATES DIAMETER
GUTTER AND DOWNSPOUT (DS)	OVERFLOW SCUPPER
F FAN	WALL MOUNTED LIGHT FIXTURE
AC AIR CONDITIONING UNIT	E ELECTRICAL PENETRATION
C CHIMNEY	ACCESS LADDER
SATELLITE ANTENNA	WALKWAY PADS
	SKYLIGHT

ROOFING DEFECT LEGEND

AF # ABANDONED FASTENER; # INDICATES LINEAR FEET	FBO FASTENER BACKOUT #I INDICATES UNITS
OM # OPEN/TORN / SLICED / PUNCTURED MEMBRANE; # INDICATES LINEAR FEET	LFH # LOW FLASHING HEIGHT # INDICATES HEIGHT FROM ROOF
OS # OPEN SEAM; # INDICATES LINEAR FEET	FS # FAILED SEALANT # INDICATES LINEAR FEET
PD # PONDING WATER; # INDICATES SQUARE FEET	LCB # LOOSE COVERBOARD #INDICATES SQUARE FEET
UM # UNADHERED MEMBRANE; # INDICATES SQUARE FEET	▲# APPROXIMATE LEAK LOCATION; REFER TO REPORT

GENERAL NOTES

1. THE INFORMATION SHOWN ON THIS DRAWING HAS BEEN COMPILED FROM VARIOUS SOURCES AND MAY NOT REFLECT THE ACTUAL CONDITIONS AT THE TIME OF CONSTRUCTION.
2. HATCH PATTERNS ARE FOR REPRESENTATION ONLY AND SHOULD NOT BE USED AS A MEANS FOR QUANTIFYING.
3. THE DEFECTS NOTED INDICATE APPROXIMATE LOCATIONS. THEY ARE NOT INTENDED TO DEFINE LIMITS OF WORK.

DEFECT NOTES

1. EXPOSED FASTENERS ALONG CUPOLA FLASHING; TYPICAL.
2. COPPER STANDING SEAM PANELS AT PENTHOUSE IN POOR CONDITION WITH ABANDONED FASTENER HOLES, FAILED SEALANT, AND DENTED/DAMAGED PANELS
3. SKYLIGHT IN POOR CONDITION WITH CRACKED GLASS AND FAILED SEALANT

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Boston Baltimore Orlando Hartford Manchester Portland

PROJECT
BATH MULTIPLE BUILDING EVAL PROJECT
4 SHERIDAN RD
BATH, ME 04530

OWNER
PREPARED FOR HARRIMAN ASSOCIATES
FOR THE CITY OF BATH MUNICIPAL FACILITIES PLANNING
BATH, ME 04530

NO.	DATE	DESCRIPTION	BY

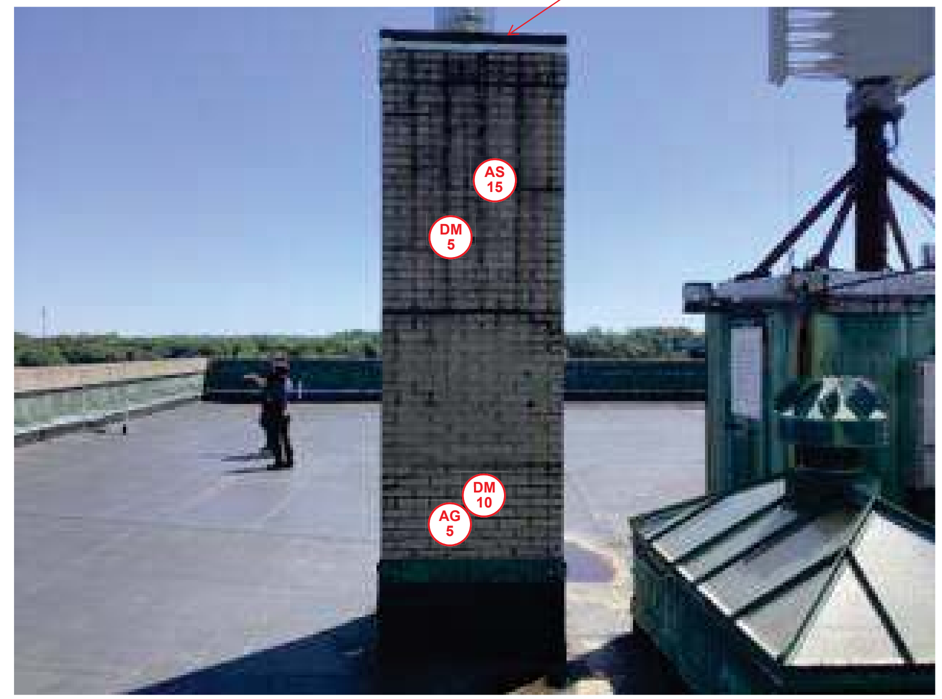
PROJECT NO.	
CADD FILE	841640 A100s City Hall
DESIGNED BY	JVL
DRAWN BY	MRS
CHECKED BY	ACP
DATE	8/15/23
DRAWING SCALE	1/4"=1'

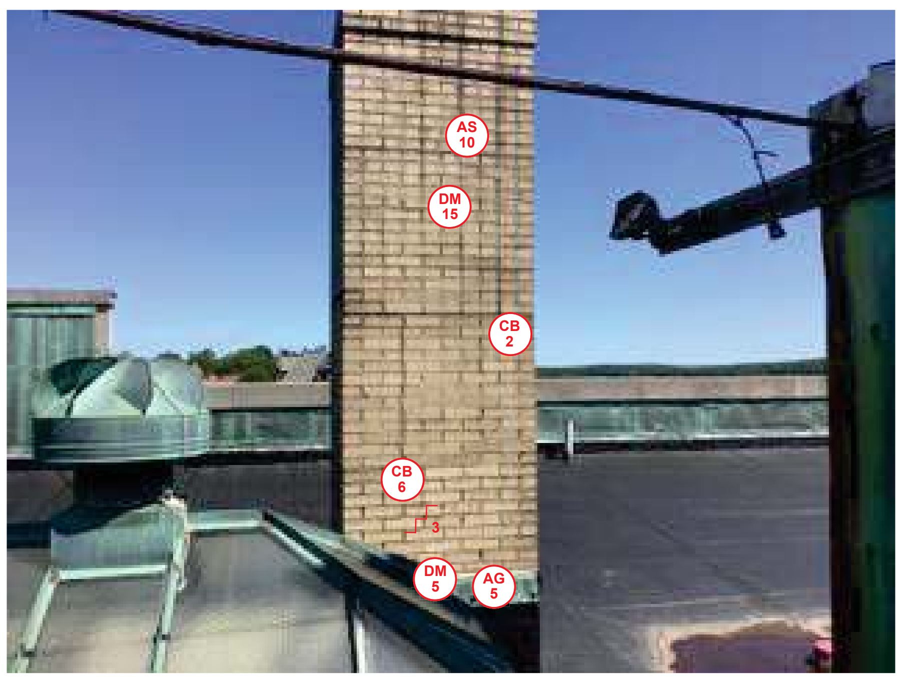
GRAPHIC SCALE
0 2' 4' 8'

SHEET TITLE
CITY HALL
ROOF PLAN

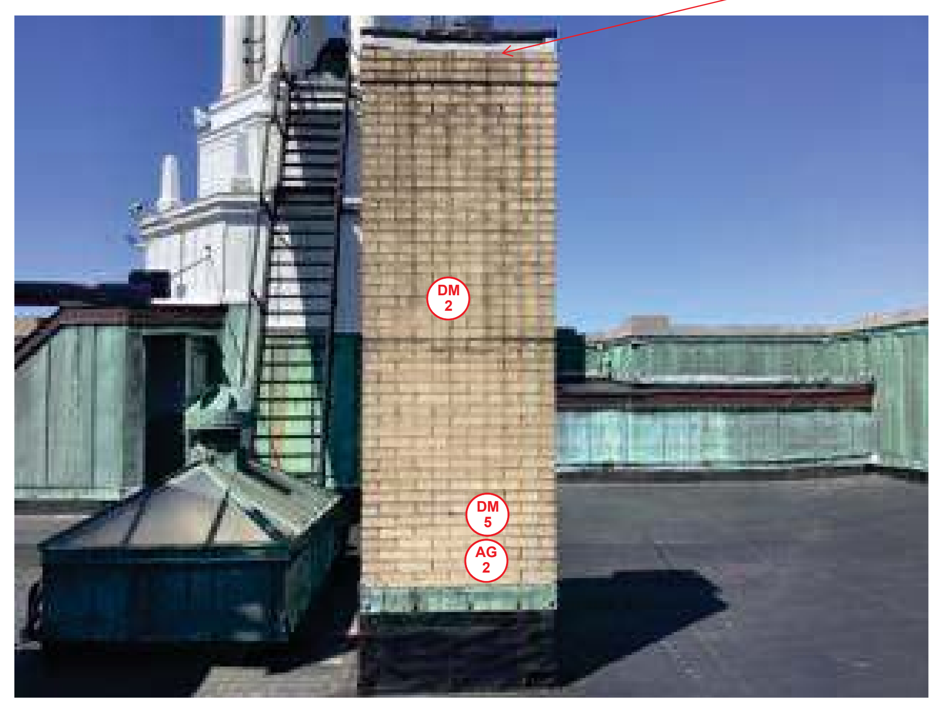
DRAWING NO.
A101

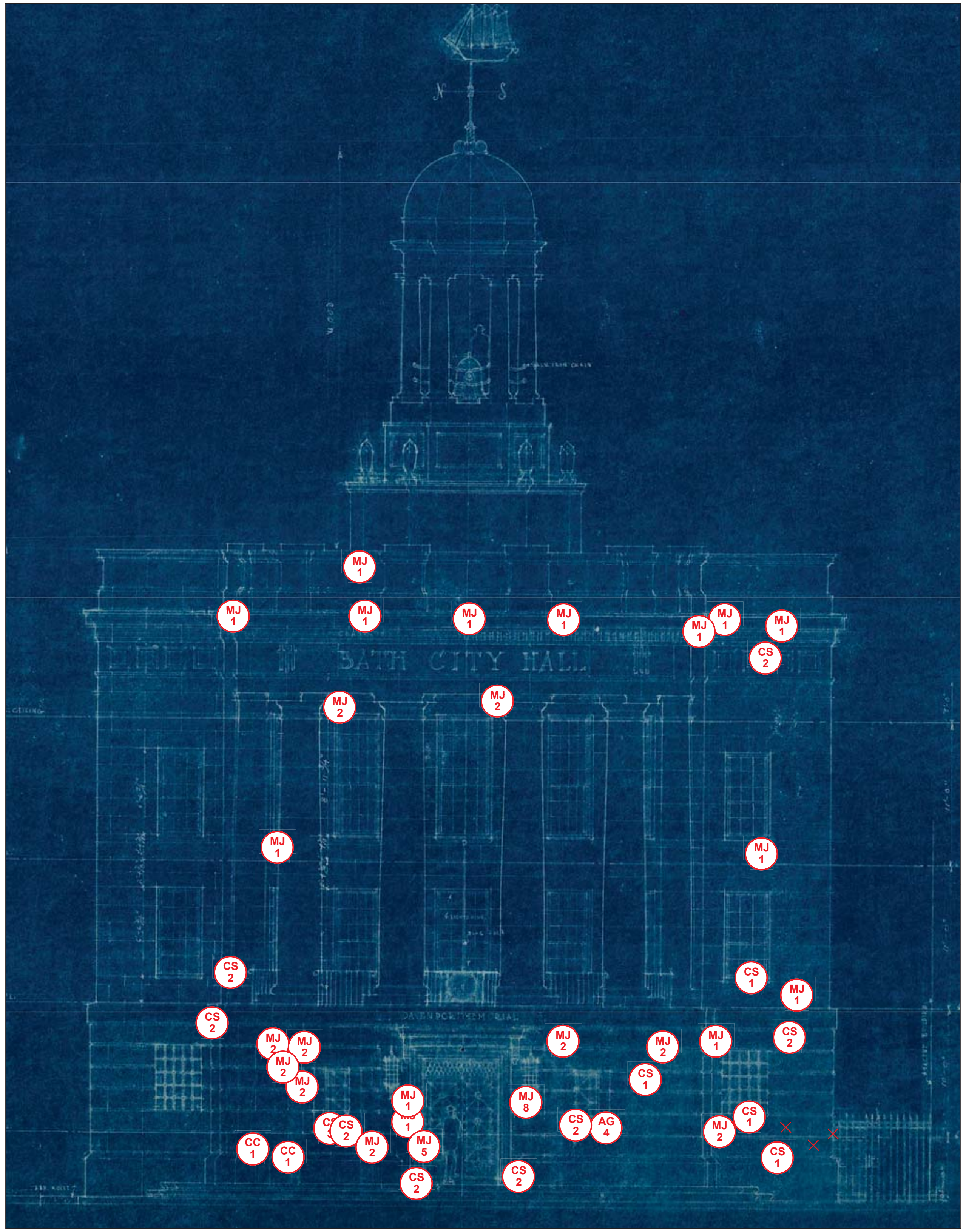
Duct tape repair at top (typical)





Top 3 courses step out





1 A201 **WEST ELEVATION**
SCALE: NOT TO SCALE

GENERAL NOTES

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DEFECT NOTES

NOT ALL ITEMS SHOWN IN LEGEND MAY BE PRESENT ON THIS DRAWING SHEET

1. MISSING AND BLISTERING/ PEELING PAINT AT WOOD WINDOW FRAME, SASH, AND ASSOCIATED COMPONENTS, AS WELL AS, ISOLATED AREAS OF DETERIORATED/ DISPLACED WOOD WINDOW FRAME.
2. RED RUSTED DETERIORATION AND EXFOLIATION AT STEEL COMPONENT.
3. DISPLACED WINDOW GASKET.
4. MISSING AND BLISTERING/ PEELING PAINT AT WINDOW FRAME AND ASSOCIATED COMPONENTS, AS WELL AS, RED RUST DETERIORATION AT EXPOSED STEEL COMPONENTS.
5. DISPLACED AND BROKEN CMU BLOCK EXPOSING ABANDONED WINDOW LEFT WITHIN ROUGH OPENING BEYOND.
6. OLD WOOD FRAME BETWEEN ALUMINUM STOREFRONT DOOR AND MASONRY ROUGH OPENING IS DETERIORATED AND EXHIBITING EVIDENCE OF WOOD ROT.
7. SECURITY BARS DISPLACED AND PARTIALLY DISCONNECTED FROM THE FRAME.

DEFECT LEGEND

NOT ALL ITEMS SHOWN IN LEGEND MAY BE PRESENT ON THIS DRAWING SHEET

MASONRY

AG #	ALGAE; # INDICATES SQUARE FEET
DM #	DETERIORATED MORTAR JOINT; # INDICATES SQUARE FEET
MJ #	DETERIORATED MORTAR JOINT; # INDICATES LINEAR FEET
RL #	RUSTED LINTEL; # INDICATES LINEAR FEET
RMJ #	PREVIOUS REPAIRED MORTAR JOINT; # INDICATES LINEAR FEET
RS #	RUST STAIN; # INDICATES SQUARE FEET
×	EXISTING ANCHOR / METAL STUB
#	STEP CRACK; # INDICATES LINEAR FEET

STONE & CONCRETE

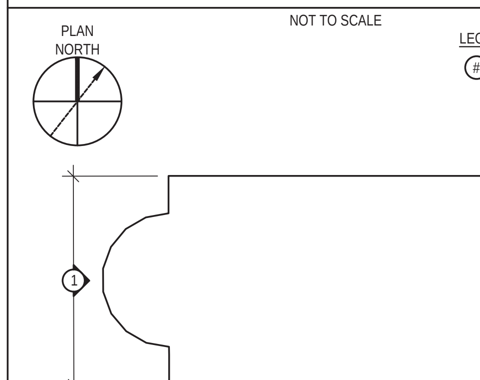
CC #	CRACKED CONCRETE; # INDICATES LINEAR FEET
CS #	CRACKED STONE; # INDICATES LINEAR FEET
SC #	SPALLED CONCRETE; # INDICATES SQUARE FEET

SEALANT & GLAZING

CG #	CRACKED GLAZING; # INDICATES LINEAR FEET
FS #	FAILED SEALANT; # INDICATES LINEAR FEET
MG #	MISSING GLAZING; # INDICATES LINEAR FEET

KEY PLAN

NOT TO SCALE



LEGEND:
ELEVATION SHOWN ON THIS PLAN

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BATH, ME 04530

NO.	DATE	DESCRIPTION	BY

PROJECT NO.	841640
CADD FILE	841640 A200s City Hall
DESIGNED BY	JVL
DRAWN BY	MRS
CHECKED BY	ALS
DATE	10/27/23
DRAWING SCALE	NOT TO SCALE

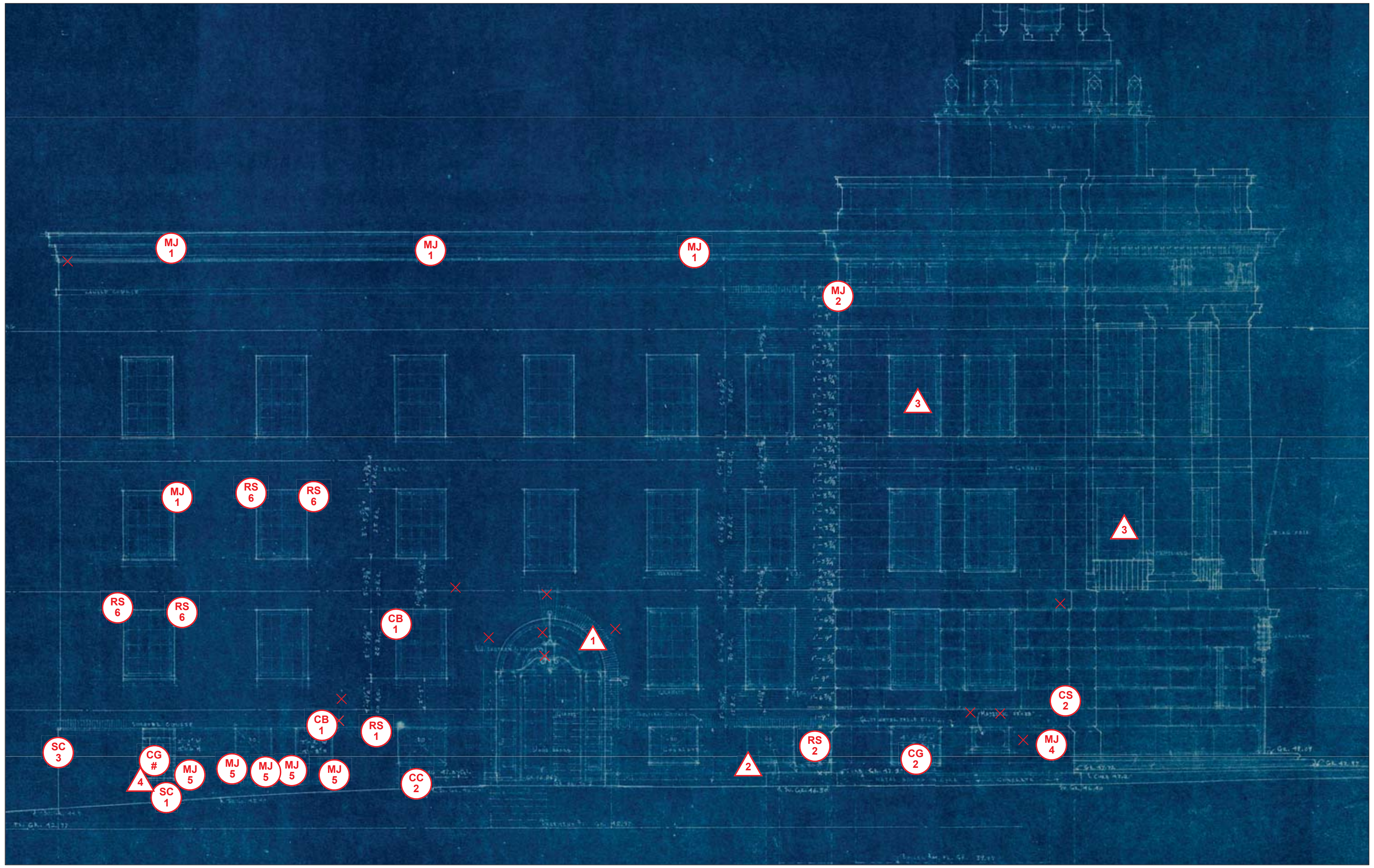
GRAPHIC SCALE

SHEET TITLE

ELEVATIONS

DRAWING NO.

A201



2 A202 NORTH ELEVATION
SCALE: NOT TO SCALE

GENERAL NOTES

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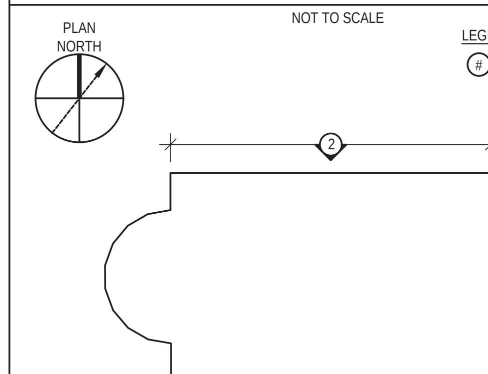
KEY PLAN

NOT TO SCALE



LEGEND:
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FOR THE CITY OF BATH MUNICIPLE FACILITIES PLANNING
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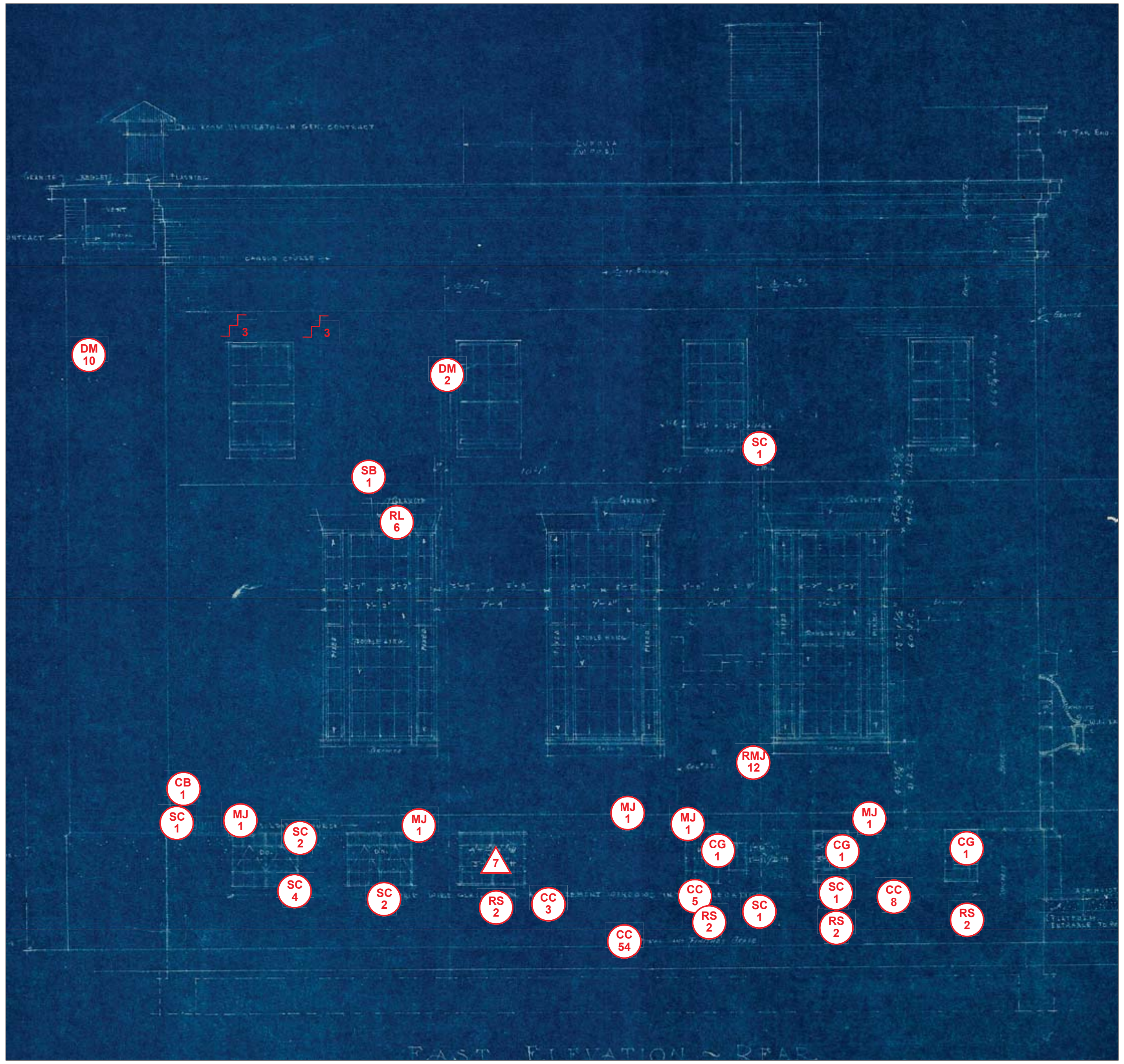
NO.	DATE	DESCRIPTION	BY

PROJECT NO.	841640
CADD FILE	841640 A200s City Hall
DESIGNED BY	JVL
DRAWN BY	MRS
CHECKED BY	ALS
DATE	10/27/23
DRAWING SCALE	NOT TO SCALE

GRAPHIC SCALE

SHEET TITLE
ELEVATIONS

DRAWING NO.
A202



3 / A203 EAST ELEVATION
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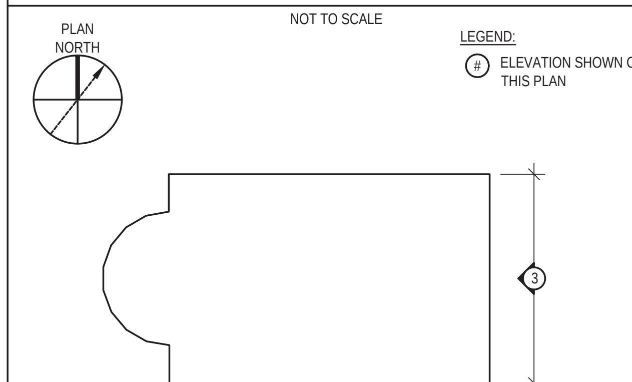

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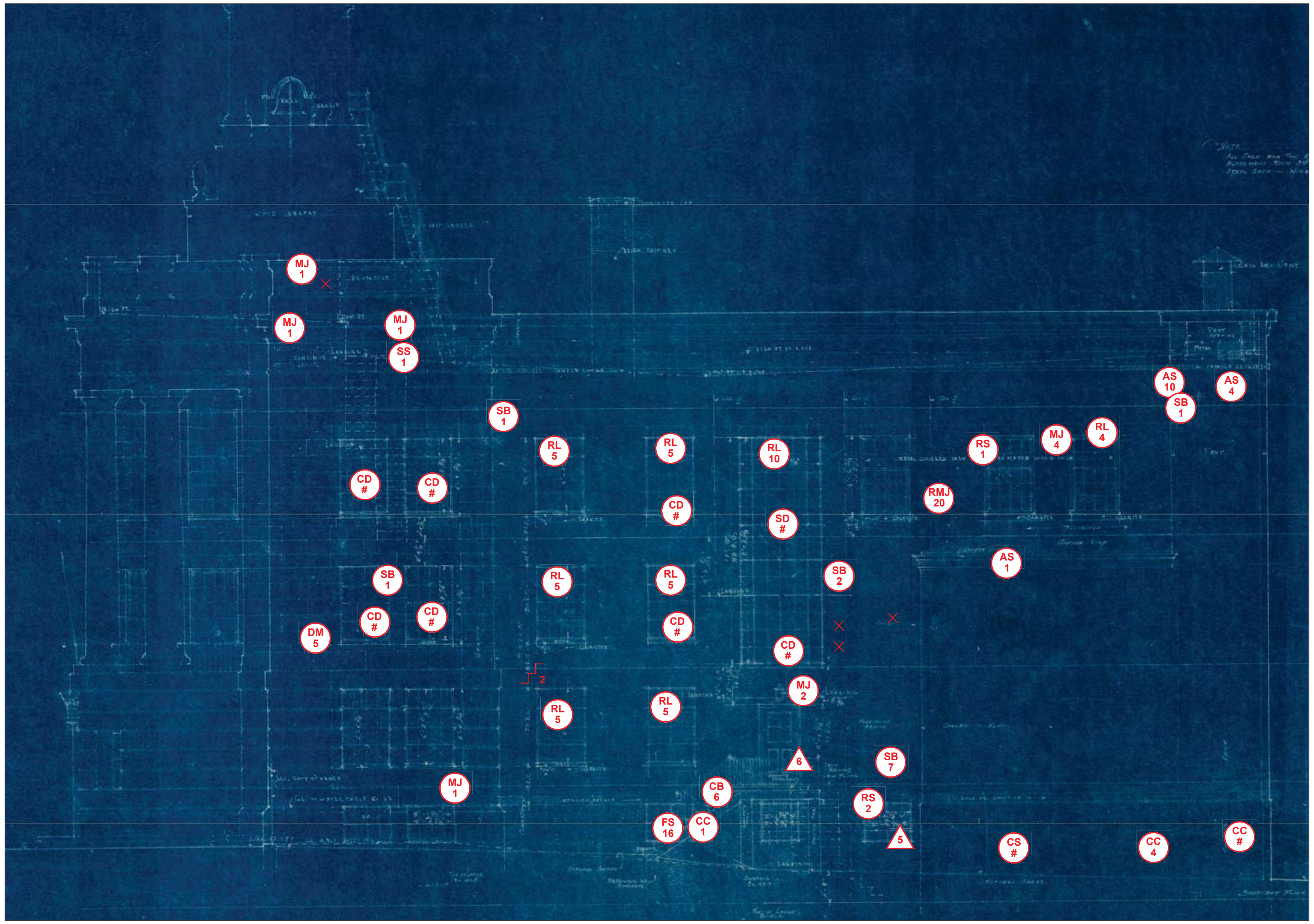
A20



4 / A204 SOUTH ELEVATION

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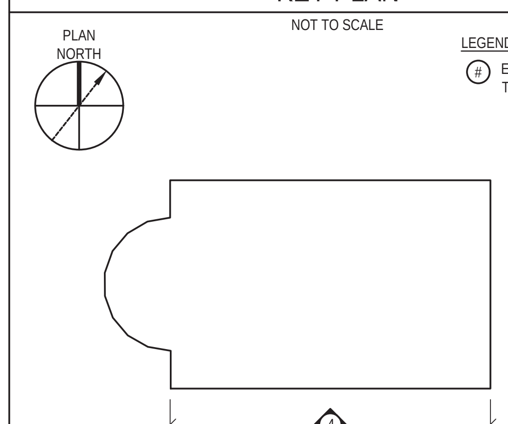

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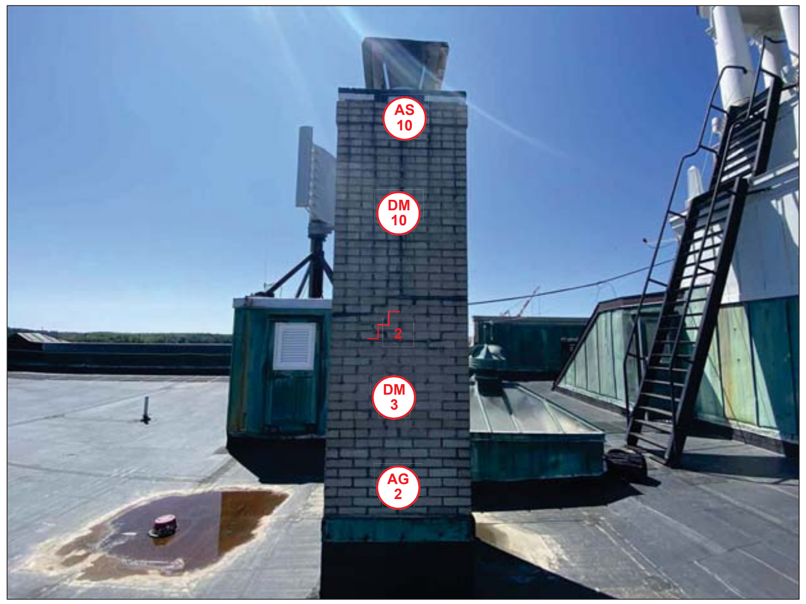
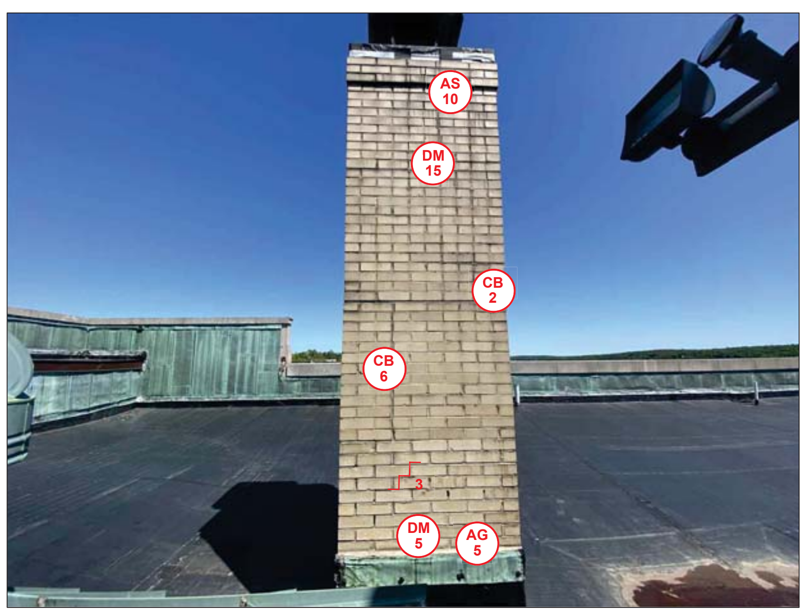


1 A205 CHIMNEY NORTH ELEVATION
SCALE: NOT TO SCALE

2 A205 CHIMNEY EAST ELEVATION
SCALE: NOT TO SCALE



3 A205 CHIMNEY SOUTH ELEVATION
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4 A205 CHIMNEY WEST ELEVATION
SCALE: NOT TO SCALE

KEY PLAN

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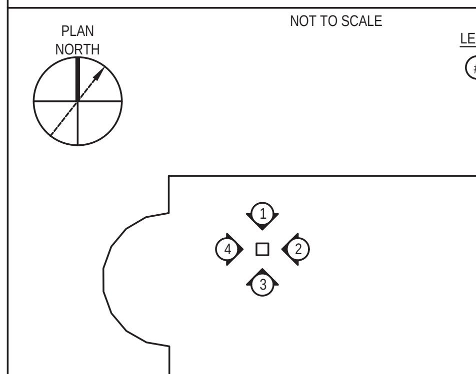

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SHEET TITLE
CHIMNEY ELEVATIONS

DRAWING NO.
A20
51

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CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

CITY HALL

ARCHITECTURAL – BUILDING INTERIOR

Introduction
The purpose of this assessment is to provide a visual interior architectural systems evaluation of the existing City Hall building located at 55 Front Street in Bath, Maine. The building houses municipal offices for the city.

The City Hall building was dedicated on May 29, 1929, and was designed by architect Charles Loring, of Boston, in the Classical-Revival style. The belfry houses a bell cast by Paul Revere.

Architectural systems are analyzed per the following applicable Codes and Standards:

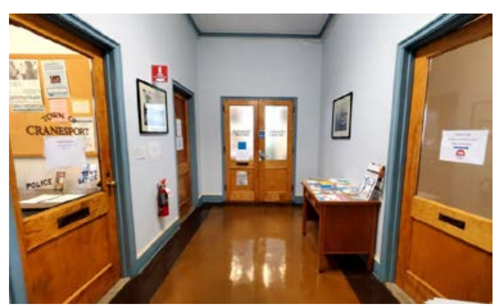
- International Building Code: IBC 2015
- NFPA 101 National Fire Protection Association: Life Safety Code
- Americans with Disabilities Act: 2010 ADA Standards for Accessible Design

Review of Existing Documents
Charles G. Loring, Architect, dated March 17, 1928, full set of architectural, structural, plumbing, mechanical and electrical drawings for the facility.

Existing Conditions Assessment
On July 11, 2023, representatives from Harriman, in collaboration with Gale, performed a visual evaluation of the building and its existing systems to review and document the extent and location of defects and deficiencies. The focus of this assessment is the building's interior architectural systems and accessibility. Observations are limited to visible elements. The assessment is non-destructive in nature. The following is a summary of conditions by category.

Summary Findings by Interior Category
The condition of interior systems ranged from fair to good. No areas in the facility were identified as being in very good condition.

Large Meeting Room



Lobby

Codes and Accessibility: Existing Conditions

Many features of the building are in their original condition and are not up to current code and accessibility requirements due to their age. There have been upgrades to improve conditions, though the building is not sprinklered, and there are still barriers to accessibility.

Legacy construction that does not meet current accessibility and code standards still exists throughout the building. Non-compliant items such as stairways are exempt per section 403.1 of the IEBC (International Existing Building Code) due to existing space limitations that prevent compliant alterations to be made.

The building complies with current code in the following categories:

- Life safety and NFPA: fire alarm, pull stations, fire rated doors, egress hardware and door closers.
- ADA (Americans with Disability Act): some lever-type door hardware, and elevator.

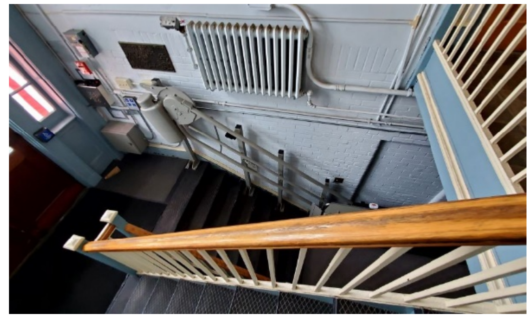
The building is noncompliant in the following categories:

- Some door hardware does not comply.
- Single-user toilet rooms.

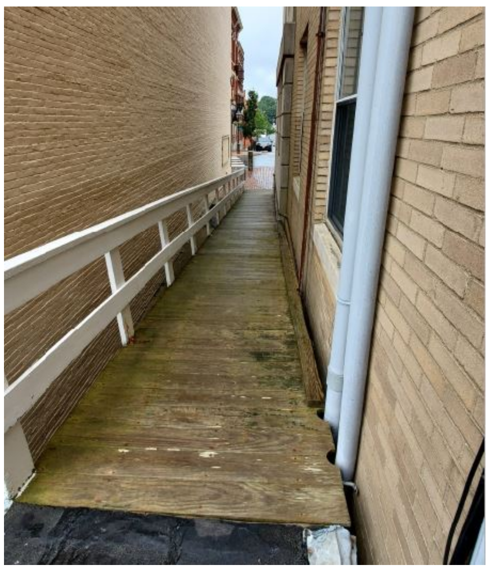
Code Study			
Code Heading	IEBC	NFPA 101	Remarks
	403.1	43	Business occupancy: Hazard Category 3
		7.2.2.1.2	The requirements shall not apply to "existing approved noncomplying stairs"
		7.2.2.2.1.1	Existing stairs shall be permitted to remain in use provided they meet requirements for existing stairs.
		7.2.2.2.1.1 (b)	Existing Stairs
Min width	36"		Actual: 36"+
Max riser height	8"		Actual: 7.5"
Min tread depth	9"		Actual: 10"
Min headroom	6'-8"		Actual: 6'-8"+

The building is lacking in many basic ADA accessibility requirements. Many restrooms lack required clearance for a 5 foot turning radius, lavatories are at incorrect heights and there have been partial accommodations made such as the addition of grab bars at some toilets. An accessible route has been accommodated with a wheelchair lift at the north side entrance that accesses an elevator on the basement level. The elevator does not meet state cab size requirements. A ramp that accesses the large meeting room from the south side does not meet landing and slope requirements or meet handrail requirements. Door approach clearances and door hardware do not meet ADA requirements in many locations.

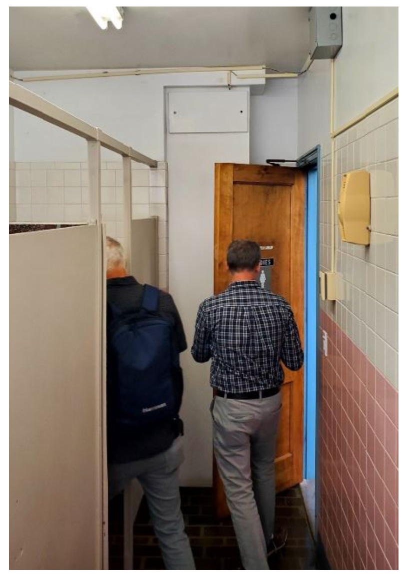
Toilet Room



Wheelchair Lift at North Entrance



South Side Ramp



Toilet Room

Interior Walls, Partitions and Base

Interior plaster walls and partitions are in overall fair condition, ranging from poor to good. There are a few locations where moisture infiltration has caused deterioration of plaster and peeling of paint at walls and ceilings. Basement walls are painted masonry and in satisfactory condition. Some toilet room walls are ceramic and are in good condition. Base is primarily wood, along with some vinyl and tile, and is in mostly satisfactory condition.

Moisture damage

Moisture damage

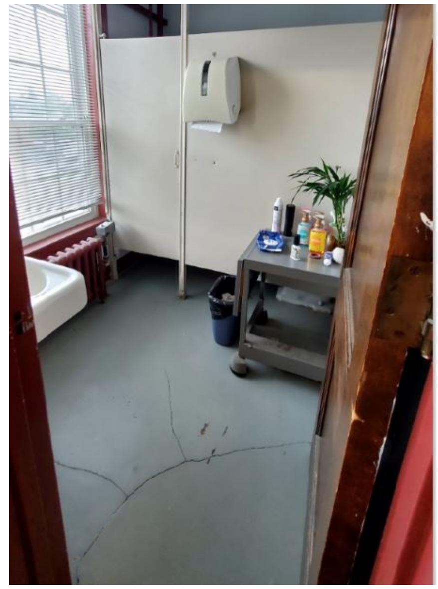
Basement Corridor Walls

Toilet Room Ceramic Tile Walls, Base

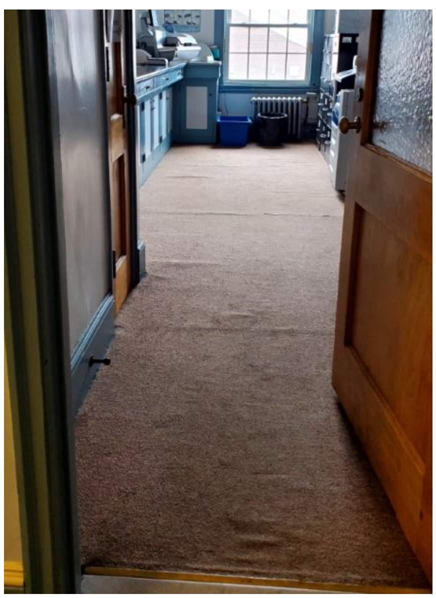
Finish Flooring

Finish flooring materials are in good to poor condition. Finished concrete floors in corridors are in mostly good condition, though chipped at some edges, while many carpeted office and meeting areas are worn and rippling. Poured flooring in some toilet rooms are chipping and cracking. The finish on wooden flooring in the balcony of the large meeting room is worn, and there is worn and separating 9”x9” apparently vinyl asbestos tile in the basement.

Toilet Room Flooring

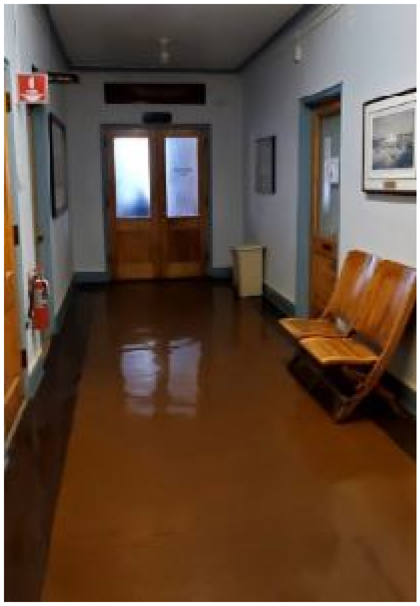


Toilet Room Flooring

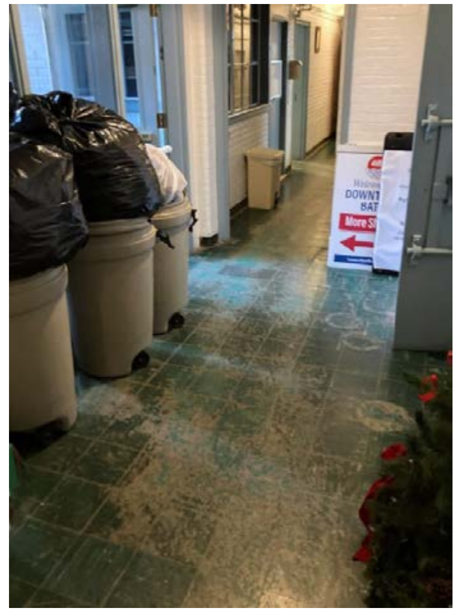


Meeting Room Carpet Rippling

Balcony Wooden Flooring



Corridor Flooring



VAT in Basement

Finish Ceilings

Ceilings vary from good to poor condition, with localized damage from moisture in painted plaster ceilings and sagging 2x4 ceiling tiles in the basement.

Moisture Damage at Ceiling

Sagging 2x4 Ceiling Tiles

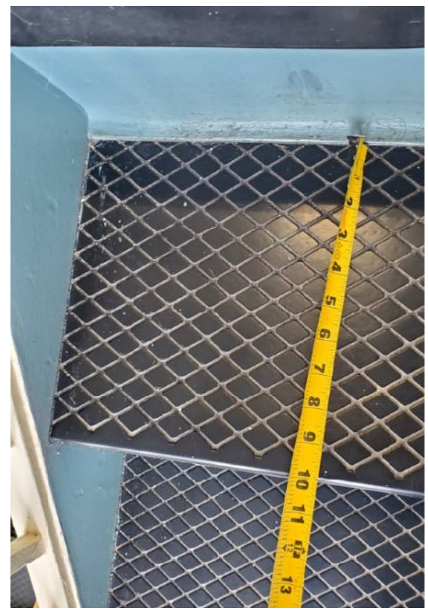
2x4 Ceiling Tiles in Office

12" Acoustical Ceiling Tiles

Stairs, Railings, and Guardrails

Stairs are in fair condition. Handrails and guardrails are in fair condition and do not meet current code requirements for height and railing continuity. Stair risers and tread dimensions do meet current code requirements but do qualify for existing buildings, as noted earlier. A hinged window at the balcony opens to an exterior fire escape. The window and stair do not meet current code egress requirements.

Stair Riser



Stair Tread

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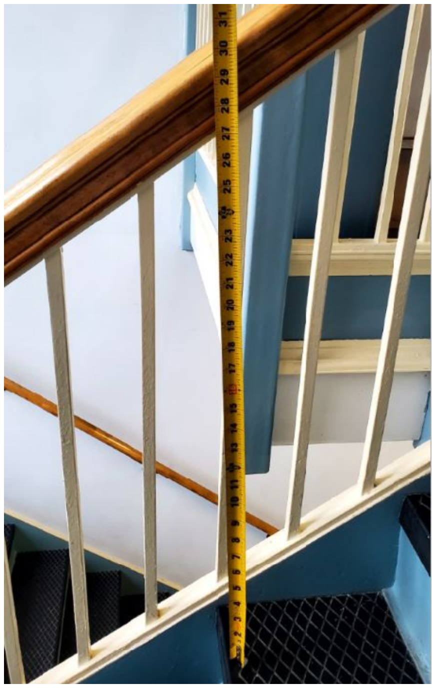
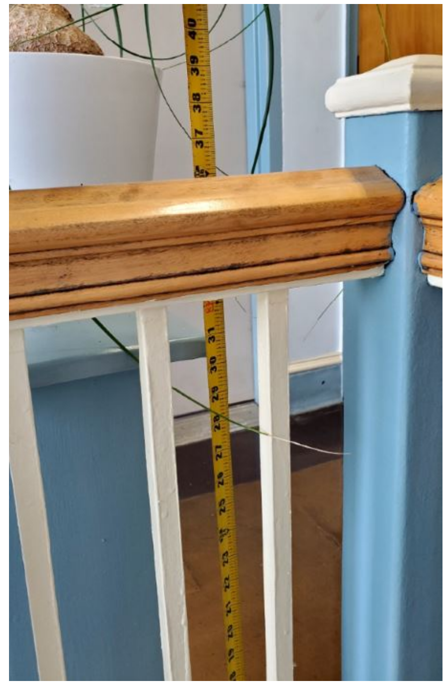
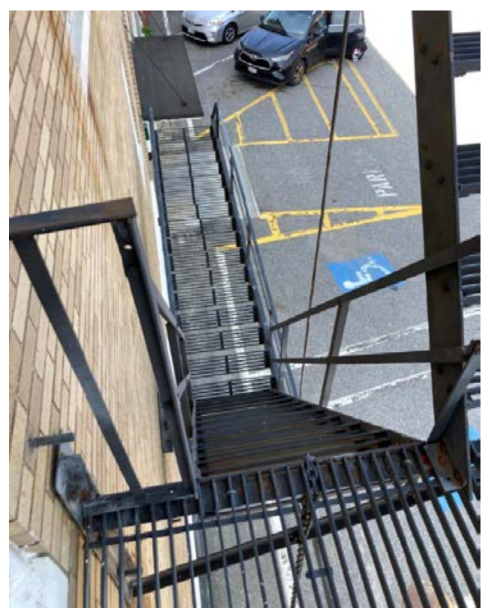


Stair Handrail



Stair Guardrail

Exit at Balcony Window



Fire Escape Stair at Window

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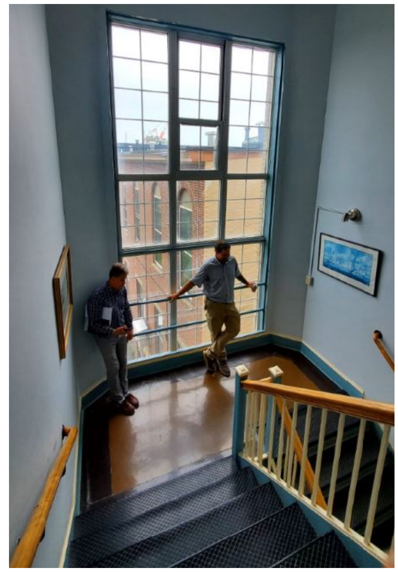
Stairwell Stair



Stairwell Stair

Interior Doors, Frames, and Hardware

Interior doors are in fair condition. Door issues focus mostly on ADA compliance. The majority of hardware is knob-type instead of the ADA required lever-type handles. In several locations, door approach clearances do not meet the minimum ADA requirement, especially at restrooms. Many doors have worn finishes.

Door, Hardware at Meeting Room

Door Opening Restriction

Panic Hardware at Stairwell

Corridor Doors, Hardware

Summary of Opinions

All interior improvements should be done in coordination with remedial work to the building exterior.

Recommendations

1. Renovate interior space to accommodate ADA compliance such as door approach clearances, maneuvering area for wheelchairs, and restrooms.
2. Change remaining knob-type door hardware in public areas to lever-type with locksets that maximize occupant safety and security.
3. Replace or refinish worn finish flooring and abate as necessary. Repair and epoxy seal cracked floor slabs, apply moisture mitigation, and install all new floor finishes as appropriate to various building areas.
4. Repair and refinish ceilings and walls at damaged locations. Address sources of water infiltration prior to repair of water-damaged finishes.
5. Install code-compliant stair railings and guardrails.
6. Refinish doors as necessary.

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

CITY HALL – PLUMBING

Plumbing Systems

Roof Drainage

Only one roof drain on the roof. The overflow scupper is more than 12 inches higher than the inlet to the roof drain and is a concern for the structure if the drain were to clog and the roof pond up to the scupper. Ponding always occurs at the roof drain due to the drain being set above the roof.

A secondary roof drain with a 2-inch-high water dam should be provided next to the existing drain with the discharge out the wall of the building below the scupper.

Single Roof Drain

Roof Drain Set Above Roof

Plumbing Fixtures

The plumbing fixtures within the group men's and women's restrooms are 1920s vintage and are not ADA accessible and are in failing condition. The old fixtures are inefficient and do not meet the current 1.6 gallon per flush law.

It is recommended to rework all of the restrooms and replace all of the plumbing fixtures and connected piping.

The existing gender-neutral restroom may remain with the toilet tank replaced with flush lever on the right side to comply with ADA.

Men's Lavatories

Women's Water Closet

Private Lavatory *Men's Urinal*

The only restroom in good condition is the gender-neutral restroom on the first floor. The flush handle on the toilet must be on the right side of the tank to comply with ADA guidelines.

The lavatory in the gender-neutral restroom is mounted at 34-3/4-inches which exceeds the 34-inch limit per ADA guidelines.

Gender-Neutral Private Restroom

Custodial sinks are cast iron service sinks or plastic sinks on legs which are not user friendly for dumping buckets due to the rim being 26-inches above the finished floor. Mop basins with 12-inch-high rims and 6-inch-high dropped front are recommended.

Custodial Service Sink

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

There is a significant amount of domestic water piping which is brass and steel as well as copper. The piping may leach lead into the water supply.

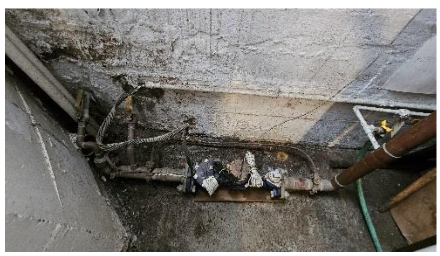
It is recommended that all the domestic water piping is replaced with copper or CPVC.

The sanitary drainage piping is 100 years old. The cast iron piping is at the end of life.
It is recommended that all the drainage piping be replaced, including the interior roof drain leader.

There is no sump pump within the elevator pit. The elevator has fire fighter's operation and a sump pump capable of 50 gpm is required in the pit.

The domestic water service has two water pipes entering with ball valves. The two pipes appear to be 1-1/2" and the other 1-1/4". The water meter is a modern 2" turbine style.

It is recommended to install a reduced pressure zone backflow preventer downstream of the water meter.



Water Service Meter

Two Water Service Pipes

The electric water heater is 50 gallons and was installed in 2016 (7 years ago). The water heater appears to be in good condition.

It is estimated the water heater is set to maintain 120 degrees F.

It is recommended to replace the water heater with a heat pump electric water heater for better efficiency.

There is no thermostatic mixing valve on the hot water piping from the heater.

It is recommended to increase the water heater temperature to 140 degrees f and provide a thermostatic mixing valve set to 120 degrees.

There is no hot water circulation from the fixtures back to the water heater. It is recommended to install a ECM circulating pump to maintain hot water at the fixtures.

Electric Water Heater

Two Water Service Pipes

List of Recommendations

1. Rework all of the restrooms and replace all of the plumbing fixtures and connected piping.
2. Replace the gender-neutral toilet tank with flush lever on the right side to comply with ADA.
3. Replace the water heater with a heat pump electric water heater for better efficiency.
4. Increase the water heater temperature to 140 degrees f and provide a thermostatic mixing valve set to 120 degrees.
5. Install a ECM circulating pump to maintain hot water at the fixtures.

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

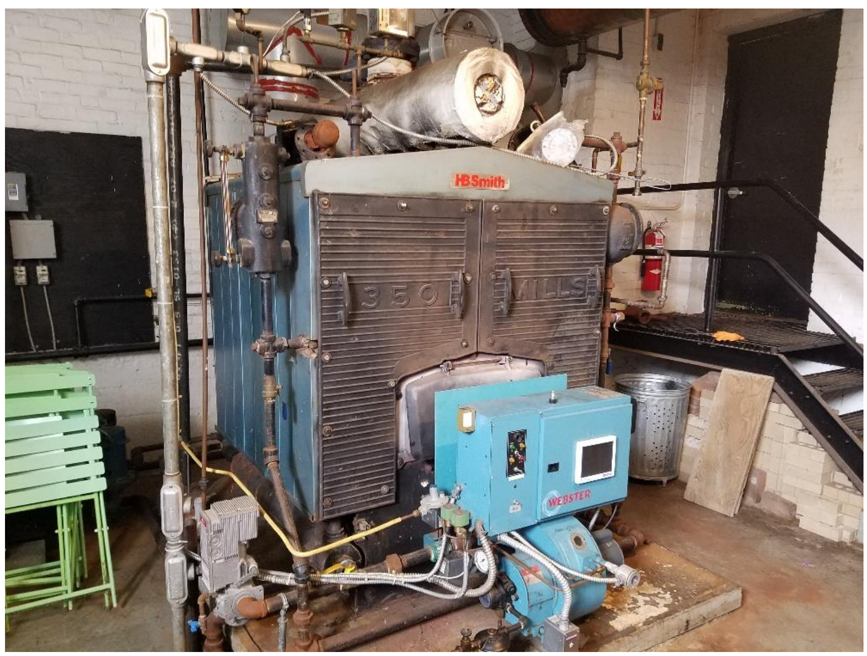
CITY HALL – MECHANICAL

Mechanical Systems

Evaluations

Boiler Plant

The plant consists of a single H. B. Smith 350 Mills steam boiler with eight sections rated for a gross output of 1,790 MBH. The boiler is fired with a Webster JB1C-07 dual-fuel burner that can burn either natural gas or #2 fuel oil. The boiler and burner are in working condition and serve as the primary source of heating for the building. There are signs of leaking on the water side of the boiler, but not to a significant amount. Most of the rust evident around the boiler is due to blowing down the mud drums which is standard maintenance for steam boilers. It appears that the breeching for the boiler was replaced recently, and the joints were fire caulked. According to nameplate data, the burner was manufactured in 2013; the age of the boiler is unknown but believed to be older than the burner.



Overall View of Boiler and Burner

Rust Around Base of Boiler

Leaking on Water Side of Boiler

Dual-Fuel Burner

New Boiler Breeching

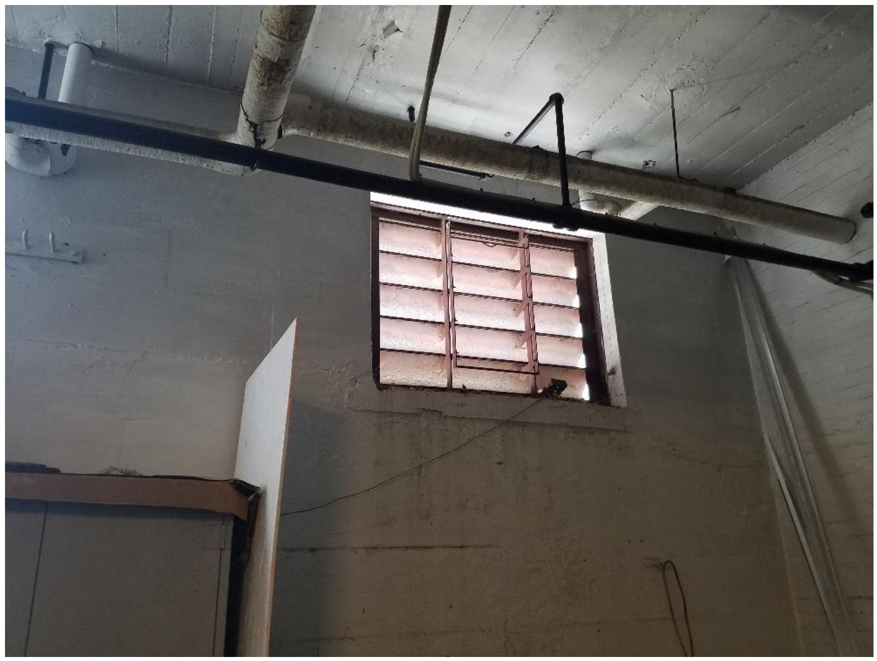
There is an existing condensate receiver with duplex pumps that serves the steam boiler. The tank looks to be the same vintage as the boiler, but the pumps were replaced during the life of the equipment. The pumps are in working condition and it does not appear that they have recently been leaking significantly. There is some rust on the floor near the pumps, but that may have been attributed to prior pumps that were replaced.

Existing Duplex Condensate Pumps

Combustion air is delivered through a single wall opening high above the floor of the boiler room. There is a backdraft damper, within the opening that appears to be propped open with a piece of wood or some other similar material. The 2015 International Mechanical Code (IMC) states that oil-fired appliances shall comply with NFPA 31 regarding combustion air requirements. Paragraph 5.5.1 of the 2024 Edition, states for commercial installations there shall be a permanent opening to the outdoors sized at least 1 square inch per 4,000 Btu of total input rating. Based upon the input rating of the boiler, the opening appears to be adequately sized to meet the code requirements.

As stated previously, the burner is dual fuel, and burns natural gas. The 2015 IMC states that gas fired appliances shall comply with the International Fuel Gas Code. Paragraph 304.6.2 of the 2015 Edition, states for one-permanent-opening method the opening shall start within 12” of top of the enclosure and be sized at least 1 square inch per 3,000 Btu of total input rating. Based upon the input rating of the boiler, the opening appears to be adequately sized to meet the code requirements.

Lastly, the 2015 IMC states that if volume, smoke, or fire dampers are provided with the combustion air opening, they shall be interlocked with the firing cycle of the associated appliances; manual dampers are not allowed. The current installation does not appear to meet this requirement of the code, since there is no actuator on the damper and the block of wood could be easily removed thus preventing the transfer of combustion air from outside.



Boiler Room Combustion Air Opening

Fuel Storage

There are three (3) above ground oil storage tanks that are in very good condition. These tanks appear to have been installed recently, since they are much newer than the boiler and burner that they serve. The tank fill and vent piping appears to have been installed at the same time as the oil tanks since it is in very good condition.

Above Ground Oil Storage Tanks

Oil Tank Fill and Vent Piping

Building Controls

In the boiler room, there are Schneider Electric DDC panels that provide automation to the boiler plant and building heating elements within the occupied spaces. During our site visit, it was noted that the building controls are not fully automated, but that is a goal for the City of Bath.

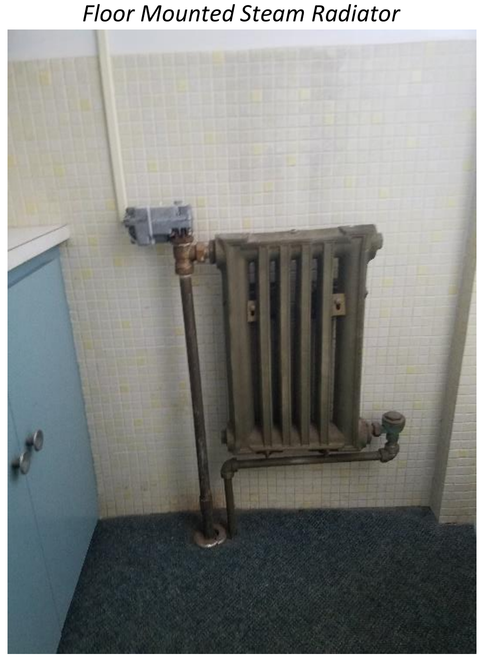
DDC Control Panel

DDC Control Panel

Heating Elements

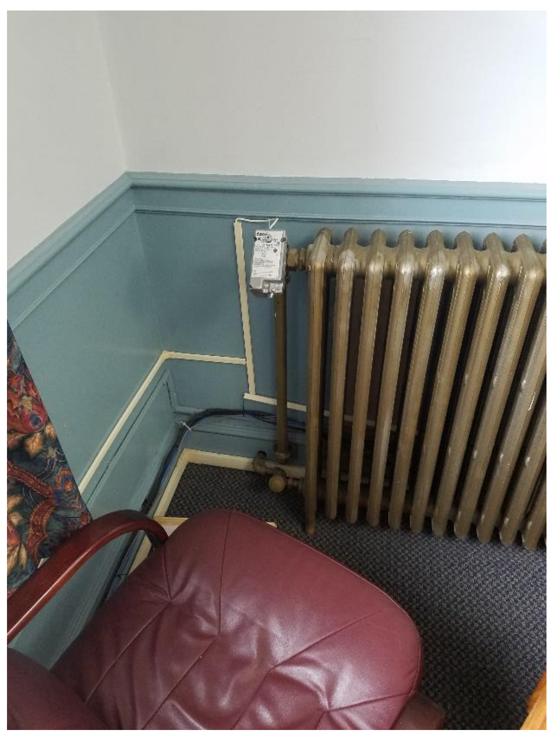
The building receives heat from the boiler plant through steam radiators that are controlled by electronic valves and temperature sensors. Some of the steam radiators are floor mounted, some are wall mounted and others have been enclosed to improve their appearance.

Floor Mounted Steam Radiator



Wall Mounted Steam Radiator

Enclosed Steam Radiator



Electronic Control Valve

Wall Mounted Temperature Sensor

There is also electric baseboard heating at some locations within the building, that is controlled via an electric stand-alone thermostat. This equipment appears to be in working condition and appears to heat spaces where the steam heating is not present. Utilizing local control thermostats will potentially consume more energy since they could be left energized during unoccupied hours and there is no limiting to the temperature setpoint.

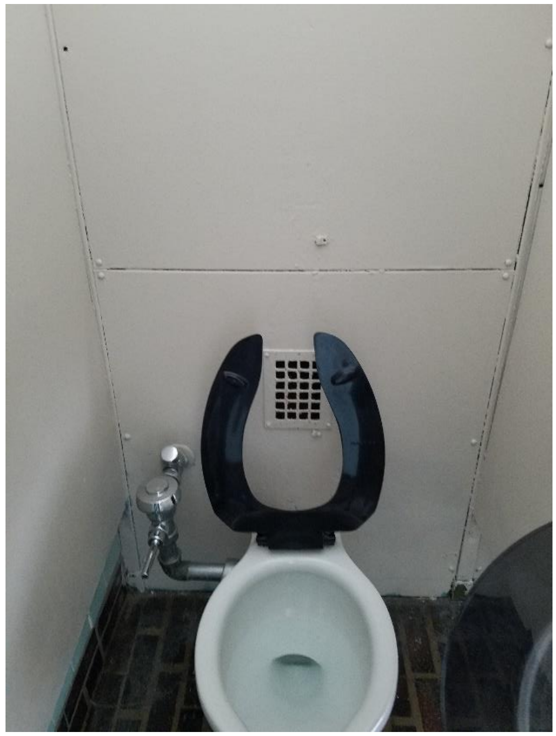
Electric Baseboard Heating Element

Electric Stand-Alone Thermostat

Ventilation

The building utilizes operable windows as the means for providing ventilation air to the occupied spaces. Natural ventilation is a code compliant method for distributing ventilation air to occupied spaces, if there is adequate free window area for the square footage of the space being served. However, during the winter windows remain closed since it is too cold outside and occupant comfort would be compromised.

Toilet rooms and other spaces are exhausted either passively with roof vents or actively with exhaust fans at the roof level. It is unknown if the code required exhaust flow rates are being achieved with the existing system.



Wall Mounted Toilet Exhaust Grille

Roof Mounted Exhaust Vent or Fan

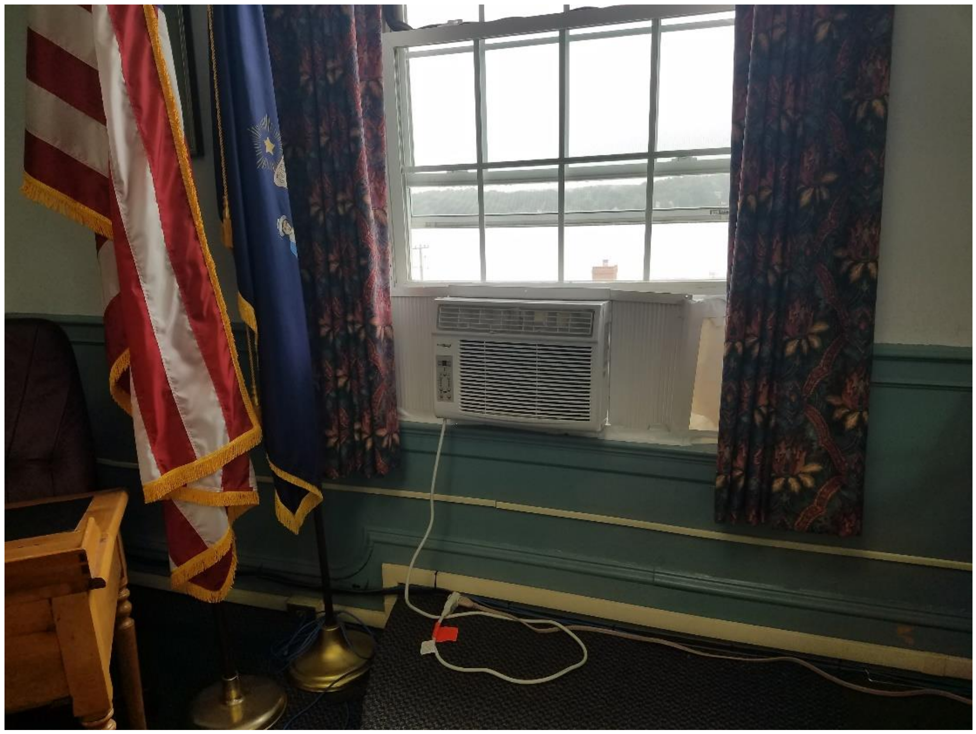
Air Conditioning

Some of the occupied spaces are cooled with split system heat pumps and air conditioners. One of the condensing units is located on the roof, and the others are located under an accessible ramp at the ground level. All this equipment is locally controlled with no communication to the DDC system.

Roof Mounted Condensing Unit

Wall Mounted Evaporator Unit

There are also occupied spaces that are cooled with window air conditioners. This type of equipment is not intended to be a long-term solution and would be discarded at the end of its useful life. There is also a maintenance component associated with this equipment since they need to be physically installed and removed each year by staff.



Window Air Conditioner

Recommendations

1. Provide central VRF system (heat recovery or heat pump) to heat and cool the entire building.
2. Provide energy recovery ventilators to deliver code required quantities of outside air to the occupied spaces.
3. Extend existing building management system to control all of the HVAC equipment serving the building.
4. Remove steam heating system from the building. (This could remain in place and set as backup if the demolition cost is too high.)

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

CITY HALL

ELECTRICAL

Introduction
A review of the existing electrical drawings for the facility was conducted. The drawings available were from the original design plans dated March 17, 1928. Other discipline drawings were available for review and coordination. A field investigation of City Hall was conducted which included visual evaluations of the existing electrical systems.

Existing Conditions

Electrical Service
The building electrical service is a 600A, 208Y/120V, 3 Phase 4 Wire system, fed by an aerial secondary feeder from utility pole #2. This service is fed aerially to the building, transitions to underneath the slab, and then stubs into the electrical room. The room shares space with outdated and non-functional police dispatch equipment. The electrical distribution equipment appears older than 30 years.

The branch circuit feeds to most panels and nearly all devices throughout the building are surfaced mounted conduit that has been painted to match the wall finish. Due to the age and condition of the walls, it is not feasible to perform work to conceal conduit or recess devices within them.

Lighting
The interior light fixtures throughout the building were a combination of incandescent decorative chandeliers and wall sconces, surface mounted fluorescent light fixtures, and some retrofitted LED fixtures with LED screw in lamps.

Fire Alarm
Emergency battery units (EBUs) are 90% non-functional. Self-diagnostic buttons for field testing on most units did not actuate the emergency lights.

Recently, new pull stations and horn strobes were installed to bring the building more in line with current codes and standards with regard to life safety. This system is currently maintained by Johnson Controls. Many of the original exit signs still remaining should be replaced.

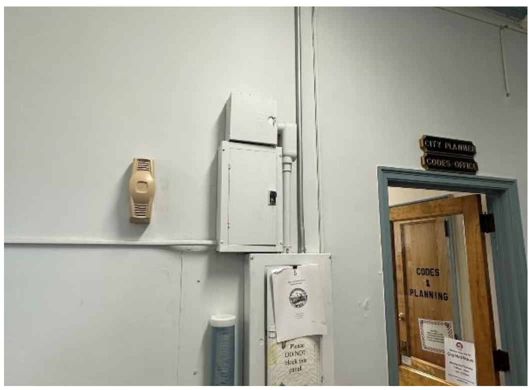
Communications
The main service entrance for communications/IT is located on the third floor. This primarily serves the administration spaces and Council Chambers. There currently is noted harmonic interference with the A/V equipment due to the intermixed runs of power, communications, and A/V cables running so closely together without UL listed shielding on the cables.

It was noted during the site visit that the current UPS is undersized for the IT server room and does not provide adequate backup. A larger UPS is needed to serve the needs of the staff and their functionality.

Wireless internet connectivity (Wi-Fi) is sporadic and not consistent. A stronger mesh network should be provided to ensure seamless Wi-Fi connectivity throughout the building.

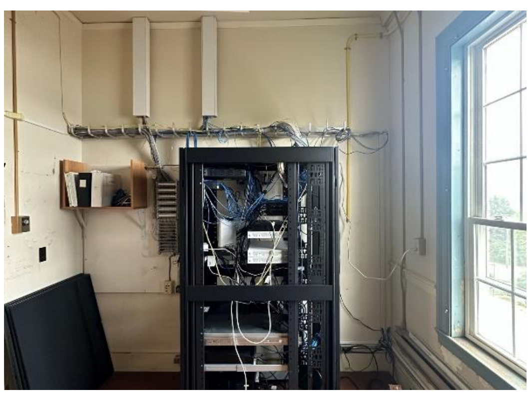
Main electrical room equipment

Aerial Utility Feed



Surface mounted conduit

Non-code compliant egress



IT Equipment on Third Floor

Council Chambers A/V Equipment


Frayed wiring to decorative chandelier


Chandelier with LED screw in lamps

Recommendations

1. The service entrance electrical equipment should be replaced in kind with newer equipment that can be more easily serviced by electricians. Due to the equipment's age, replacement parts may be difficult to procure to maintain UL listing and code requirements for safety.
2. All light fixtures throughout the building should be removed and replaced with LED source fixtures. A lighting control system should concurrently be installed to provide administrative control and maximize energy savings for the facility.
    a. Decorative light fixtures (chandeliers, decorative sconces) that wish to be kept by the City of Bath should be cleaned and rewired to maintain the aesthetic appeal and for safety. Currently, the wiring to decorative light fixtures are frayed and need to be replaced.
3. Remove and replace all existing exit signs and specify with self-testing diagnostics.
4. Branch circuit panels and load centers throughout the facility and branch circuit wiring to devices should be replaced due to age and deterioration of wire insulation.
    a. After 20 years, the insulation on wiring/conductors degrades and eventually becomes a fire hazard. All wiring older than 20 years should be replaced.

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CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

CITY HALL

Space Utilization Assessment

- OPTION 1
  - New Vestibule/Entrance on exterior for ADA Lift access only at the plan north side of the building
  - Two new ADA Restrooms at ground level
  - Emergenc Egress remains through offices on the 3rd floor
  - New Staff area
  - New Accessible restroom on 3rd floor
  - Reconfigured Planning and Code Offices
  - Reconfigured City Manager
  - Added Small Meeting Room
  - Creation of 2 spaces (one for relocation of IT/Server room) above balcony with access to emergency egress window

- OPTION 2
  - Lift located at plan south
  - Eliminates storage for the Treasurer to create a hallway
  - One accessible restroom on ground floor
  - Emergency Egress corridor and modified assessor's office
  - New Staff area on 3rd floor
  - New Accessible restroom on 3rd floor
  - Reconfigured Planning and Code Offices
  - Reconfigured City Manager
  - Added Small Meeting Room
  - Creation of 2 spaces above balcony with access to emergency egress window

City Hall Summary of Options:

Basic renovations to City Hall include adding an accessible ADA lift, either on the north or south side of the building, and accessible restroom(s) on the ground level. Additional renovations involve reconfiguring city offices on upper levels – see floor plan layouts for detailed information on the two options.

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USE / DEPARTMENT

- CIRCULATION / SERVICE
- MISCELLANEOUS
- SERVICE
- STORAGE

1 BASEMENT
SCALE: 1/4" = 1'-0"

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23138 CITY OF BATH - CITY HALL

BASEMENT - EXISTING CONDITIONS

USE / DEPARTMENT

- ASSESSOR
- CIRCULATION / SERVICE
- CITY CLERK
- IT
- MISCELLANEOUS
- SERVICE

1 BASEMENT
SCALE: 1/4" = 1'-0"

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23138 CITY OF BATH - CITY HALL

BASEMENT - OPTION 1

USE / DEPARTMENT

- CIRCULATION / SERVICE
- CITY CLERK
- FINANCE
- MISCELLANEOUS
- SERVICE
- TREASURER
- RADIATOR

1 FIRST FLOOR PLAN
SCALE: 1/4" = 1'-0"

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23138 CITY OF BATH - CITY HALL

FIRST FLOOR - EXISTING CONDITIONS

USE / DEPARTMENT

- ASSESSOR
- CIRCULATION / SERVICE
- CITY CLERK
- COUNCIL CHAMBERS
- FINANCE
- SERVICE
- TREASURER
- RADIATOR

1 FIRST FLOOR PLAN
SCALE: 1/4" = 1'-0"

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23138 CITY OF BATH - CITY HALL

FIRST FLOOR - OPTION 1

USE / DEPARTMENT

- ASSESSOR
- CIRCULATION / SERVICE
- CITY CLERK
- COUNCIL CHAMBERS
- FINANCE
- SERVICE
- TREASURER
- RADIATOR

1 FIRST FLOOR PLAN
SCALE: 1/4" = 1'-0"

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23138 CITY OF BATH - CITY HALL

FIRST FLOOR - OPTION 2

1 SECOND FLOOR PLAN
SCALE: 1/4" = 1'-0"

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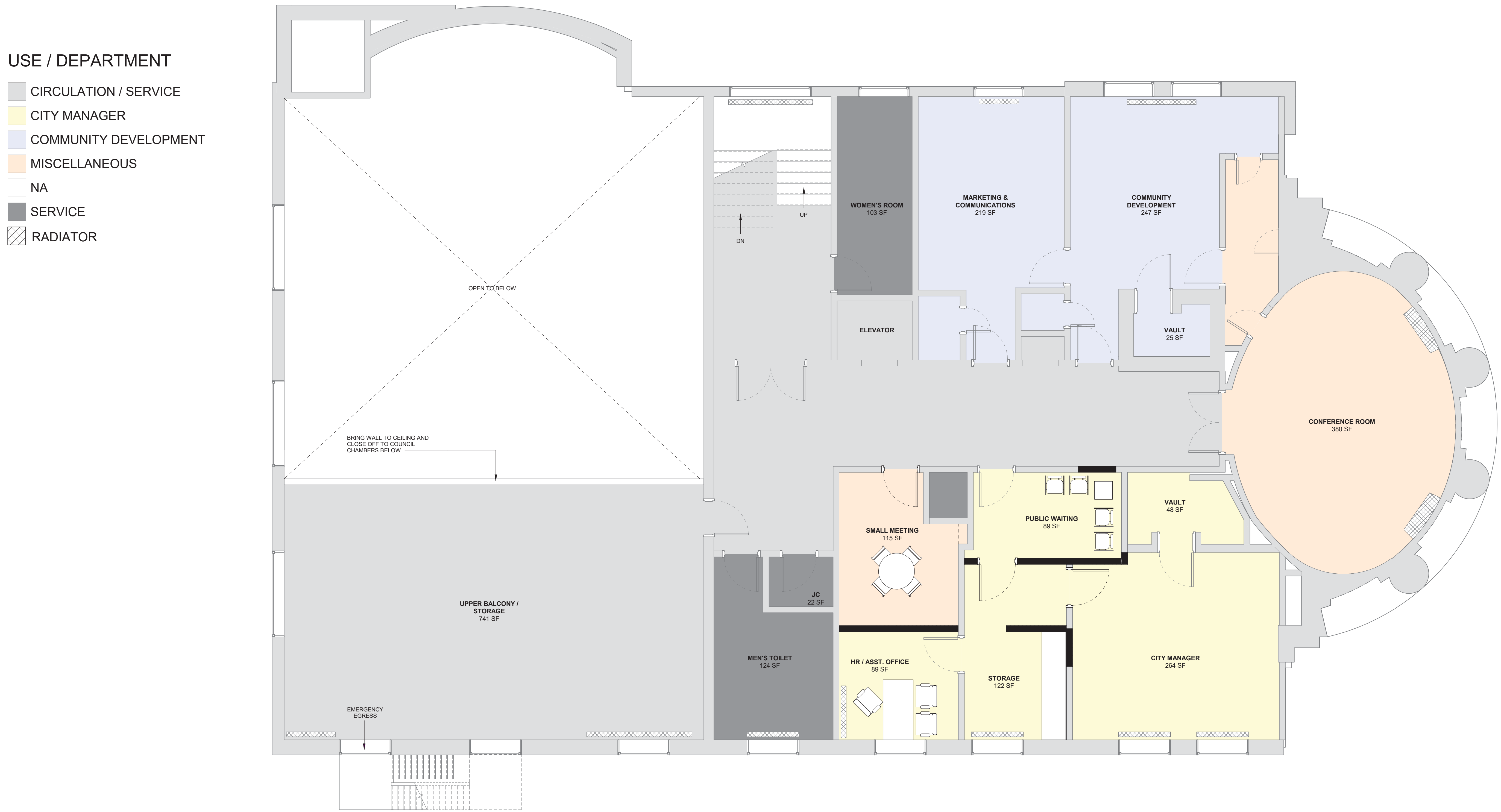
SECOND FLOOR - EXISTING CONDITIONS



1 SECOND FLOOR PLAN
SCALE: 1/4" = 1'-0"

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SECOND FLOOR - OPTION 1

USE / DEPARTMENT

- CIRCULATION / SERVICE
- CITY MANAGER
- COMMUNITY DEVELOPMENT
- IT
- MISCELLANEOUS
- NA
- SERVICE
- RADIATOR

1 SECOND FLOOR PLAN
SCALE: 1/4" = 1'-0"

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SECOND FLOOR - OPTION 2

USE / DEPARTMENT

- ASSESSOR
- CIRCULATION / SERVICE
- CODE
- COUNCIL CHAMBERS
- GA
- IT
- MISCELLANEOUS
- PLANNING
- SERVICE
- SUSTAINABILITY
- RADIATOR

1 THIRD FLOOR PLAN
SCALE: 1/4" = 1'-0"

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23138 CITY OF BATH - CITY HALL

THIRD FLOOR - EXISTING CONDITIONS

USE / DEPARTMENT

- CIRCULATION / SERVICE
- CODE
- FINANCE
- GA
- MISCELLANEOUS
- PLANNING
- SERVICE
- SUSTAINABILITY
- RADIATOR

1 THIRD FLOOR PLAN
SCALE: 1/4" = 1'-0"

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23138 CITY OF BATH - CITY HALL

THIRD FLOOR - OPTION 1

USE / DEPARTMENT

- ASSESSOR
- CIRCULATION / SERVICE
- CODE
- FINANCE
- GA
- IT
- MISCELLANEOUS
- PLANNING
- SERVICE
- SUSTAINABILITY
- RADIATOR

1 THIRD FLOOR PLAN
SCALE: 1/4" = 1'-0"

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23138 CITY OF BATH - CITY HALL

THIRD FLOOR - OPTION 2

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BATH CITY HALL
23138
Harriman Programming Worksheet

OPTION 1												
EXISTING CONDITIONS						PROPOSED OPTION 1			SCOPE			
City Hall	Total Building Area (GSF) By Dept. or Space (NSF)	Building Occupancy	Max. Capacity Per Occupancy Type	Current Total Occupancy	COMMENTS	Proposed Space	Proposed SF	Proposed Occupancy	PRIORITY	ENERGY	ADA	ENVELOPE
		SF/PP										
Basement	**4826 GSF**					**Basement**			**Basement**			
Office	246	100	2									
Facilities Office	285	150	1									
Storage	246		2			IT Storage	246					
Meeting Room	973		8			HD Storage	973					
Store Room	126	200	1									
Restroom	227	-	6		4 stalls / 2 urinals							
Storage Vault	454	150	3.03		Room flooded recently (due to 3rd floor toilet room leak)	City Clerk Storage	454					
Janitors Room	74	-	-		1 mop sink							
Coal	142											
Boiler Room	412	300										
Emergency Room	150	5	30									
Meeting Room Storage	98											
Circulation Total	564				No Elevator							
Basement Total (Net)	**3,997**		**53**									
First Floor					**NO PUBLIC TOILET ON THIS LEVEL	**Level 1**			**Level 1**			
City Clerk	344	150	2		Includes a glass barrier that is desired to remain. Public side is not ADA accessible. 2 Desks							
City Clerk Mail Room	120	150	-		Mail Room	-	125					
Private Restroom	21		-			ADA RR	51				X	
Clerk Vault	32		-		Records stored here. Need to be in a locked/fire resistant room.							
City Clerk Office	178					-	148					
Passage	42					Closet	42					
Treasurer	373	150	2		Similar public zone as city clerk. Waiting happens in hallway due to size constraints.							
Vault 1	34		-		Houses all overnight cash, registration stickers, and plates							
Hall / Storage	157	150	1		Includes closet and photocopier, filing cabinets.	Remove Closet	165					
Storage Vault	93		-		Vault is used for lien storage, sewer and tax liens.	Storage	39					
						ADA RR	45				X	
Private Restroom	47		-									
Finance General	415	150	2		Additional storage for payroll books. Trouble with temperature control.	Public Access	174					
Finance Kitchen	17		-			Break / Meeting	154					
Finance Office	160	150	1			Finance General	286					
Finance Private Office	113	150	1			Private Office	97					
Auditorium	1,046	40	26									
						ADA Vestibule	101				X	
						Council Chamgers	1,034	77			X	
First Floor Total (Net)	**3,192**		**35**									

City Hall	Total Building Area (GSF) By Dept. or Space (NSF)	Building Occupancy	Max. Capacity Per Occupancy Type	Current Total Occupancy	COMMENTS	Proposed Space	Proposed SF	Proposed Occupancy	PRIORITY	ENERGY	ADA	ENVELOPE
EXISTING CONDITIONS						PROPOSED OPTION 1			SCOPE			
Second Floor						**Level 2**			**Level 2**			
Mayors Office (Conference Room)	380	150	2.53		Highly Utilized							
City Manager	296	150	1.97				264					
CM Vault	48				Underutilized							
HR / CM Assistant	157	150	2.00		Need area for private or sensitive personnel conversations.	Private Office	89					
						Small Meeting	115					
Copy Room	134	300	0.45			Waiting / Copy	211					
Men's Toilet	124		4.00		2 Stall / 2 Urinal							
Janitors Closet	22				Not used. Inconvienient location							
Balcony	741	40	18.53		Storage Space							
Womens Toilet	103				2 Stalls / 1 Sink							
Marketing & Communications	219	150	2.00		1 staff + 1 summer intern. Space works well							
Closet	22				1 Sink							
Hallway Closet	9											
Community & Economic Development	247	150	2.00		1 staff + 1 summer intern. Space works well							
Closet	11											
Vault	26											
Circulation	650											
Second Floor Total (Net)	**3,189**		**33.48**									
Third Floor						**Level 3**			**Level 3**			
Davenport Trustees	380	15	25.33									
Codes Dept.	301	150	2.01	2	1 Closet, Vault used as storage. Noise is an issue. Not good for shared space. Separation desired.	Private Office (2)	181	2				
Codes Vault	30											
Planning Dept. Admin	360	150	2.40	1	Filing heavy. Inefficient, need addt'l storage and place for conference / meeting. Both planning and codes	Merged with Code Admin	390	2+				
Planning Department Office	208	150	1.39	1	Add 1 workstation (2 total) for a contract position. Place for plants in window	Relocated	227	1				
						Code / Planning Storage	118					
Council Chambers	918	150	6.12		Includes a small server closet. Overflow to auditorum. Poor accessibilty	Relocated to L1					X	
						Conference Room	479					
						Staff Room	319					
						Public RR	53				X	
Assessor's Office	644			1	Need expanded storage on both side. 6'x3' table for plan reading and +/- Includes workstation for Assistant Assessor							
Private Office	122			0	Former GIS room. Needs a touchdown space							
IT Server Room	124			0		Small Meeting / Supply	124	4				
Janitors Closet	12	150	0.08									
Women's Restroom	98		4.00		3 Urinal / 1 Stall							
Sustainability Director	202	50	4.04	2	1 Closet. 2 Workstations. Not many files. Using all space. Lack of separation is diffuclt.							
GA Office	243	150	1.62	1	Used 2 days / week							
Circulation	653											
Third Floor Total (Net)	**4,295**		46.99									

BATH CITY HALL
23138
Harriman Programming Worksheet

OPTION 2												
EXISTING CONDITIONS						PROPOSED OPTION 2			SCOPE			
City Hall	**Total Building Area (GSF) By Dept. or Space (NSF)**	**Building Occupancy**	**Max. Capacity Per Occupancy Type**	**Current Total Occupancy**	**COMMENTS**	**Proposed Space**	**Proposed SF**	**Proposed Occupancy**	**PRIORITY**	**ENERGY**	**ADA**	**ENVELOPE**
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Basement Total (Net)	**3,997**		**53**									
First Floor					**NO PUBLIC TOILET ON THIS LEVEL	**Level 1**			**Level 1**			
City Clerk	344	150	2		Includes a glass barrier that is desired to remain. Public side is not ADA accessible. 2 Desks							
City Clerk Mail Room	120	150	-		Mail Room	-	125					
Private Restroom	21		-			ADA RR	51				X	
Clerk Vault	32		-		Records stored here. Need to be in a locked/fire resistant room.							
City Clerk Office	178					-	148					
Passage	42					Closet	42					
Treasurer	373	150	2		Similar public zone as city clerk. Waiting happens in hallway due to size constraints.							
Vault 1	34		-		Houses all overnight cash, registration stickers, and plates							
Hall / Storage	157	150	1		Includes closet and photocopier, filing cabinets.	Remove Closet	165					
Storage Vault	93		-		Vault is used for lien storage, sewer and tax liens.	ADA Entry						
Private Restroom	47		-			Removed for Entry						
Finance General	415	150	2		Additional storage for payroll books. Trouble with temperature control.	Public Access	174					
Finance Kitchen	17		-			Break / Meeting	154					
Finance Office	160	150	1			Finance General	286					
Finance Private Office	113	150	1			Private Office	97					
Auditorium	1,046	40	26									
						ADA Vestibule	101				X	
						Council Chamgers	1,034	77			X	
First Floor Total (Net)	**3,192**		**35**									

EXISTING CONDITIONS						PROPOSED OPTION 2			SCOPE			
City Hall	Total Building Area (GSF) By Dept. or Space (NSF)	Building Occupancy	Max. Capacity Per Occupancy Type	Current Total Occupancy	COMMENTS	Proposed Space	Proposed SF	Proposed Occupancy	PRIORITY	ENERGY	ADA	ENVELOPE
Second Floor						**Level 2**			**Level 2**			
Mayors Office (Conference Room)	380	150	2.53		Highly Utilized							
City Manager	296	150	1.97				264					
CM Vault	48				Underutilized							
HR / CM Assistant	157	150	2.00		Need area for private or sensitive personnel conversations.	Private Office	89					
						Small Meeting	115					
Copy Room	134	300	0.45			Waiting / Copy	211					
Men's Toilet	124		4.00		2 Stall / 2 Urinal							
Janitors Closet	22				Not used. Inconvienient location							
Balcony	741	40	18.53		Storage Space							
						2 Offices	232 each	-				
						Egress Corridor						
Womens Toilet	103				2 Stalls / 1 Sink							
Marketing & Communications	219	150	2.00		1 staff + 1 summer intern. Space works well							
Closet	22				1 Sink							
Hallway Closet	9											
Community & Economic Development	247	150	2.00		1 staff + 1 summer intern. Space works well							
Closet	11											
Vault	26											
Circulation	650											
Second Floor Total (Net)	**3,189**		**33.48**									
Third Floor						**Level 3**			**Level 3**			
Davenport Trustees	380	15	25.33									
Codes Dept.	301	150	2.01	2	1 Closet, Vault used as storage. Noise is an issue. Not good for shared space. Separation desired.	Private Office (2)	77 ea	2				
Codes Vault	30											
Planning Dept. Admin	360	150	2.40	1	Filing heavy. Inefficient, need addt'l storage and place for conference / meeting. Both planning and codes	Merged with Code Admin	274	2+				
Planning Department Office	208	150	1.39	1	Add 1 workstation (2 total) for a contract position. Place for plants in window	Relocated	147	1				
						Code / Planning Storage	92					
Council Chambers	918	150	6.12		Includes a small server closet. Overflow to auditorum. Poor accessibilty	Relocated to L1					X	
						Conference Room	479					
						Staff Room	319					
						Public RR	53				X	
Assessor's Office	644			1	Need expanded storage on both side. 6'x3' table for plan reading and +/- Includes workstation for Assistant Assessor		523					
						Egress Corridor						
						Storage Room	93					
Private Office	122			0	Former GIS room. Needs a touchdown space							
IT Server Room	124			0								
Janitors Closet	12	150	0.08									
Women's Restroom	98		4.00		3 Urinal / 1 Stall							
Sustainability Director	202	50	4.04	2	1 Closet. 2 Workstations. Not many files. Using all space. Lack of separation is difficult.							
GA Office	243	150	1.62	1	Used 2 days / week							
Circulation	653											
Third Floor Total (Net)	**4,295**		46.99									

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

CITY HALL

ENERGY ANALYSIS

Analysis
Harriman benchmarked the City Hall using EPA Portfolio Manager based upon the most current year of utility data. Energy consumption for buildings is quantified using the Energy Use Intensity (EUI) number with units of kBtu/sf. The existing building without renovations has an EUI number of 81.8 which is 37% better than the national median of 129.5 for this type of building. Harriman proposes energy saving measures to further improve the City Hall EUI number.

Trane Trace 700 was utilized to model the building for energy analysis. Utility data provided to Harriman was utilized to calibrate the model such that the modeled energy consumption closely matches the actual consumption. The calibrated model is 99.5% accurate which establishes the basis for exploring energy saving measures. Fossil fuels are expressed in terms of therms by Trane Trace, since this is a standard unit that normalizes energy consumption for all fuels; one therm is equivalent to 100,000 BTUs. Harriman is proposing two separate energy saving measures for consideration, which includes improved glazing and incorporating Variable Refrigerant Flow (VRF) heat pump with heat recovery ventilators as the building HVAC system.

Energy Use Intensity (EUI)
Harriman has provided printouts of the calculations for reference which includes a separate analysis for each measure and an analysis for both measures combined. The modeled baseline EUI number is 82.10, which is used as a point of reference for evaluating modeled energy improvements. Improvement of the existing glazing will save 4,375 kWh of electricity and 3,142 therms of heating oil annually; resulting in an EUI number of 62.14. Incorporating VRF heat pump with heat recovery ventilation results in elimination of natural gas consumption and a net increase in electrical consumption of 115,574 kWh annually. Despite the increase in electrical consumption, overall energy consumption is reduced due to improved efficiency resulting in an EUI number of 31.51. Combining both energy improvements is modeled to eliminate the natural gas consumption and increase electrical consumption by 94,170 kWh annually. This energy improvement measure results in the lowest EUI number of 27.08.

According to the provided utility data the Bath City Hall is being charged $0.134647/kWh for electricity and $0.8859/therm for natural gas. For comparison between fuel costs, it is necessary to convert electricity into therms which calculates out to $3.95/therm. Since electricity is more expensive than natural gas, there is a cost increase by utilizing the VRF system despite the significant reduction in energy consumption.

Operating Costs
Harriman has modeled projected operating costs based upon current utility rates that have been provided for electricity and natural gas. The modeled operating cost for the existing building is $0.99/sf including electricity and natural gas consumption. Upgrading the glazing on the existing building will lower the operating costs to $0.78/sf which is a significant improvement. Removal of existing air conditioning systems will yield additional savings in electrical usage. The proposed energy saving measure to incorporate VRF heat pumps as the HVAC system will eliminate consumption of natural gas. The existing heating plant may

remain in place if the demolition costs are high and serve as an emergency heating source if necessary. The operating cost for VRF heat pump alone results in a cost increase to $1.27/sf and incorporation of both energy reduction measures provides a cost increase to $1.10/sf.

Summary
For minimal additional cost occupant comfort will be significantly increased. The energy consumption of Bath City Hall is already starting from a great place. According to the energy model, the operating cost savings for window replacement calculates out to $3,463 per year. Due to site limitations, off-site renewable energy options will need to be further investigated. Since window replacement is required and imminent, options associated with upgrading the facility HVAC system will factor in the energy and cost savings associated with replacing the windows.

Upgrading HVAC equipment will result in increased occupant comfort which will allow for compliance with ASHRAE Standard 55-Human Environmental Conditions for Human Occupancy. The upgraded HVAC system will eliminate the need to install and remove window air conditioners for space cooling during the summer months. Additionally, productivity has been demonstrated to improve when occupants are working in a comfortable environment.

There are financial incentives that could help lessen the installation cost of the upgraded HVAC system, one of which is through the federal government. The Energy Efficient Commercial Buildings Deduction is part of the Inflation Reduction Act. This incentive focuses on improvements to interior lighting, upgrades to HVAC or domestic hot water systems and building envelope upgrades. The building improvements need to demonstrate that the annual energy consumption and costs will be reduced by 25% based upon the ASHRAE Baseline code minimum building. The incentive is written such that buildings placed in service before January 1, 2023, are capped at $1.80/square foot. There is an optional bonus of five times the incentive amount if local prevailing wages are paid and apprenticeship requirements are met. The gross square footage of Bath City Hall is estimated at 16,492 which could result in a $148,428 incentive.

There are also Efficiency Maine incentives which can be explored. For example, retrofit of an existing HVAC system with a VRF heat pump system could qualify for a $13/square foot incentive. This would turn out to $214,396 for a total potential incentive of $362,824. These proposed financial incentives are not guaranteed and would need to be investigated further if the City of Bath chooses to explore upgrading the facility HVAC equipment to VRF.

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

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ENERGY STAR® Score[1]

Bath City Hall

Primary Property Type: Office
Gross Floor Area (ft²): 16,492
Built: 1929

For Year Ending: November 30, 2023

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

Property & Contact Information

Property Address	Property Owner	Primary Contact
Bath City Hall 55 Front Street Bath, Maine 04530	City of Bath, Maine 55 Front Street Bath, ME 04530 (____)____-______	Jeff LaPierre 46 Harriman Drive Auburn, ME 04210 (207) 784-5100 jlapierre@harriman.com

Property ID: 33405766

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
81.8 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	1,241,729 (92%)
Electric - Grid (kBtu)	107,665 (8%)

Source EUI
97.3 kBtu/ft²

National Median Comparison

National Median Site EUI (kBtu/ft²)	129.5
National Median Source EUI (kBtu/ft²)	154.1
% Diff from National Median Source EUI	-37%

Annual Emissions

Total (Location-Based) GHG Emissions (Metric Tons CO2e/year)	74

Signature & Stamp of Verifying Professional

I ___________________ (Name) verify that the above information is true and correct to the best of my knowledge.

LP Signature: ________________________Date: ____________

Licensed Professional

Jeff LaPierre
46 Harriman Drive
Auburn, ME 04210
(207) 784-5100
jlapierre@harriman.com

Professional Engineer or Registered Architect Stamp (if applicable)

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MONTHLY ENERGY CONSUMPTION

By Harriman

2023
------- Monthly Energy Consumption -------

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative: 1	**Calibrated Existing Building**												
Electric													
On-Pk Cons. (kWh)	3,009	2,708	3,083	2,704	2,969	2,712	3,857	4,214	2,873	2,806	2,875	2,895	36,705
On-Pk Demand (kW)	11	11	11	11	23	25	26	24	26	11	11	11	26
Gas													
On-Pk Cons. (therms)	2,657	2,228	1,563	961	192	81	1	0	38	838	1,423	2,304	12,287
On-Pk Demand (therms/hr)	11	11	11	11	11	11	1	0	11	11	11	11	11

Energy Consumption		
Building	82,100	Btu/(ft2-year)
Source	101,216	Btu/(ft2-year)
Floor Area	16,492	ft2

EUI = 82.1

Environmental Impact Analysis	
CO_2	No Data Available
SO_2	No Data Available
NOX	No Data Available

MONTHLY ENERGY CONSUMPTION

By Harriman

------- Monthly Energy Consumption -------

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative: 2	**Improved Glazing**												
Electric													
On-Pk Cons. (kWh)	2,817	2,553	2,898	2,537	2,662	2,406	2,843	3,156	2,368	2,708	2,684	2,698	32,330
On-Pk Demand (kW)	11	11	11	11	16	19	19	19	18	11	11	11	19
Gas													
On-Pk Cons. (therms)	1,800	1,659	1,182	791	209	97	1	0	39	671	1,078	1,617	9,145
On-Pk Demand (therms/hr)	9	9	9	9	9	9	1	0	9	9	9	9	9

Energy Consumption		
Building	62,142	Btu/(ft2-year)
Source	78,444	Btu/(ft2-year)
Floor Area	16,492	ft2

Environmental Impact Analysis	
CO_2	No Data Available
SO_2	No Data Available
NOX	No Data Available

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative: 3	**VRF HVAC System**												
Electric													
On-Pk Cons. (kWh)	28,026	26,091	16,897	11,191	4,746	3,484	4,948	5,193	3,620	10,251	15,165	22,666	152,279
On-Pk Demand (kW)	277	278	177	156	149	147	35	32	148	155	169	183	278

Energy Consumption		
Building	31,514	Btu/(ft2-year)
Source	94,551	Btu/(ft2-year)
Floor Area	16,492	ft2

Environmental Impact Analysis	
CO_2	No Data Available
SO_2	No Data Available
NOX	No Data Available

MONTHLY ENERGY CONSUMPTION

By Harriman

------- Monthly Energy Consumption -------

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative: 4	**Improved Glazing and VRF Heat Pump**												
Electric													
On-Pk Cons. (kWh)	22,134	22,298	15,012	10,627	4,943	3,424	3,647	3,935	3,067	9,506	13,471	18,811	130,875
On-Pk Demand (kW)	236	238	173	159	153	154	26	23	152	158	167	177	238

Energy Consumption		
Building	27,084	Btu/(ft2-year)
Source	81,261	Btu/(ft2-year)
Floor Area	16,492	ft2

Environmental Impact Analysis	
CO_2	No Data Available
SO_2	No Data Available
NOX	No Data Available

82.1 - 27.1 EUI Delta

Notes:

1. Electric service will need to be replaced and upsized in order to support the proposed VRF system
2. Electric cost reduction strategies:
   - Offset cost by adding solar in other locations.
   - Rates could lower.

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MONTHLY UTILITY COSTS

By Harriman

2023

------- Monthly Utility Costs -------

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative 1 - Existing Building													
Electric													
On-Pk Cons. ($)	445	404	455	404	439	405	559	607	426	418	427	430	5,418
Gas													
On-Pk Cons. ($)	2,354	1,974	1,385	852	170	71	1	0	34	743	1,261	2,041	10,885
Monthly Total ($):	2,799	2,378	1,840	1,255	609	476	560	607	460	1,160	1,688	2,471	16,303

Building Area = 16,492 ft²

Utility Cost Per Area = 0.99 $/ft²

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative 2 - Window Replacement only													
Electric													
On-Pk Cons. ($)	419	383	430	381	398	364	422	465	358	404	401	403	4,829
Gas													
On-Pk Cons. ($)	1,595	1,469	1,047	701	185	86	1	0	35	595	955	1,432	8,102
Monthly Total ($):	2,014	1,853	1,477	1,082	583	450	423	465	393	999	1,356	1,835	12,931

Building Area = 16,492 ft²

Utility Cost Per Area = 0.78 $/ft²

MONTHLY UTILITY COSTS

By Harriman

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
					-------	2023 Monthly Utility Costs		-------					
Alternative 3 - VRF HVAC System only													
Electric													
On-Pk Cons. ($)	3,813	3,553	2,315	1,546	679	509	706	739	527	1,420	2,082	3,092	20,980
Monthly Total ($):	3,813	3,553	2,315	1,546	679	509	706	739	527	1,420	2,082	3,092	20,980

Building Area = 16,492 ft²

Utility Cost Per Area = 1.27 $/ft²

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative 4 - VRF HVAC System & Window Replacement													
Electric													
On-Pk Cons. ($)	3,020	3,042	2,061	1,470	705	501	531	569	453	1,320	1,854	2,572	18,098
Monthly Total ($):	3,020	3,042	2,061	1,470	705	501	531	569	453	1,320	1,854	2,572	18,098

Building Area = 16,492 ft²

Utility Cost Per Area = 1.10 $/ft²

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

CITY HALL

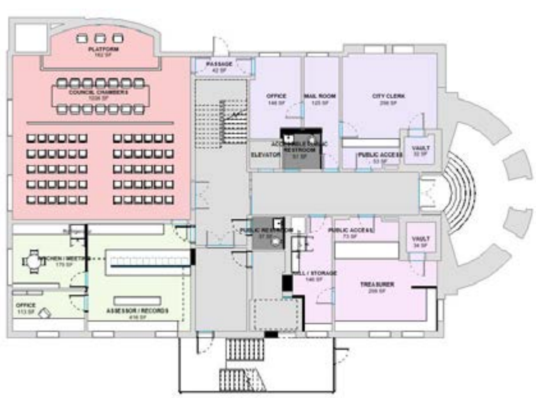
VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES

Introduction
Building vulnerabilities are considered any weakness that can be exploited by an aggressor or, make an asset susceptible to hazard damage via natural factors such as storms. City Hall doesn't fall into the category of a terrorist target, but does have security needs, as well as the need to be protected from potential litigation, along with needing flexibility of energy sources in the event of unforeseen supply circumstances.

Building adaptation encompasses a range of construction activities that improve existing building conditions and extend the effective lives of buildings. The scopes of building adaptation projects vary, and may include rehabilitating failing structures, improving environmental performances, and changing functional uses. Building adaptation also includes appropriate responses to changing climate.

Vulnerability Assessment

Security
Security at City Hall involves the protection of employees as well as documents of value being stored in the building. Currently the Council Chambers are located on the third floor, opening upper levels to increased access by the public and less supervision by staff. Relocating the Council Chambers to the first floor, along with similar layout changes would help better define public and staff spaces as well as improve circulation. Security could be improved as necessary for documents stored in City Hall.



Proposed Layout with Council Chambers on 1st Floor

Documents Stored in Basement

Security can be provided by active measures or by more passive means integrated into the design. One such passive approach, Crime Prevention Through Environmental Design (CPTED), seeks to reduce crime and fear of crime by manipulating the built environment to create a safer space.

Following are basic design principles of CPTED:

- *Natural Surveillance*

The building exterior is highly visible on most sides, with minimal blind spots. The alleyway and ramp are a minor concern, which could be alleviated with good lighting. Windows can be an issue due to views inside from the exterior, though sightlines are not a problem with City Hall as the first floor is several feet above grade.

- *Access Control*
  Another means of passive security is controlling access by physical barriers such as locks, fences, doors, windows, etc. There are two exterior doors that allow access through most of the building during business hours with limited supervision. Added security could be achieved by increased access control.
- *Territorial Enforcement*
  Public and private boundaries inside and outside the facility can be defined through signage. Boundaries can also be reinforced through positive territorial enforcement means including lighting, public art, vegetation, etc.
- *Maintenance and Management*
  Pride of place is reinforced through proper maintenance as well as vandal resistant materials. The City Hall is a generally well-maintained and clean environment and has an atmosphere that discourages graffiti and vandalism.

Good Visibility at Exterior

Alleyway with Limited Visibility

Active Security Features

- *Surveillance*
  Surveillance includes the placement of security cameras at strategic places at the exterior or interior in order to monitor suspicious activity from a location inside the building. Presently there doesn't appear to be a need for active surveillance.
- *Screening*
  Screening of visitors at the building entrance or at points inside the facility would provide an added level of security if the need were to arise. An electronic entry system could allow for remote screening and entry without needing to staff a position for that specific task. Due to the public nature of the building services and necessary level of security, it doesn't appear that screening is required at this time.

Litigation

The Americans with Disabilities Act is a civil rights law that prohibits discrimination based on disability. As such, facilities that do not meet ADA standards are open to litigation from individuals that aren't able to access public areas. Employers are required to make reasonable accommodations to employees with disabilities. Aspects of the City Hall that do not meet ADA guidelines include clearances and fixtures in restrooms, and some door handles.

Also, there is only one means of egress from the main level as currently configured, and accessibility is limited. Creating a second means of egress, with an accessible lift, at the side of the building would address these inadequacies. See the architectural section on City Hall, which describes the accessibility and codes deficiencies in greater detail.

Noncompliant Toilet Room

Energy Supply Systems

The current steam heating system of the building is increasingly susceptible to breaking down as well as becoming more obsolete and less efficient in comparison to newer options. Following are strategies to make City Hall less vulnerable to interruption in service and inefficiency.

- *Power continuity*
  A backup generator would help ensure system continuity in the event of power outages. Additionally, overhead power lines entering the side of the building are vulnerable to power loss during storm events. Burying the lines would also help ensure continuous power.
- *Redundancy of systems*
  Upgrading the system to a central VRF system to heat and cool the entire building along with keeping the existing heating system for backup would provide flexibility to prepare for unforeseen conditions.
- *Ability to Accommodate Future Needs*
  Lack of land is a significant vulnerability for the City Hall. There is limited space for needed vehicular approach as well as parking. There is also less space to expand the building for future needs.

Overhead Power Lines

Adaptation Strategies

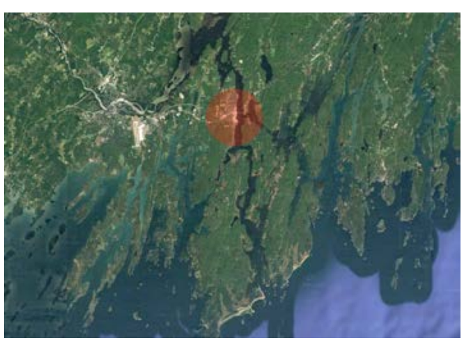
Building Adaptation Strategies

Adapting the building to changing conditions involves many of the recommendations that have been listed in detail in the analyses of the various building systems elsewhere in this report. Following are the general ways that the building can be adaptable to the future.

- *Improve conditions and extend the life of City Hall*
    - Improve accessibility and egress
    - Rehabilitate failing aspects of interior and exterior
- *Improve functionality of the building*
    - Refer to the space utilization recommendations in this report
- *Improve environmental performance with an upgraded energy system*
    - New VRF system with existing system as backup

Adaptation to climate change

Adapting to changing climate includes general categories that apply differently to various parts of the country. Following is a list of typical resilience categories and how they are anticipated to affect to conditions at City Hall.



Location of Bath Relative to Coast *City Hall Location in Downtown Bath*

- *Resilience to heatwaves*
    - Minimal impact from heatwaves is anticipated due to the regional climate that is less impacted than the rest of the United States.
    - Window replacement as recommended with increased insulation and less infiltration would lessen the impact of heat events.
- *Resilience to drought*
    - Minimal impact in the region is anticipated due to the abundance of water compared with other parts of the country.
- *Resilience to coastal flooding/ sea-level rise*
    - The City Hall building would not be directly impacted by a rising sea level or surges due to being situated at about 32’ above sea level.
- *Resilience to strong winds*
    - Due to the elevation being lower than surrounding buildings and also forested areas, westerly and northerly winds would be less of an impact on City Hall. At its location inland from the coast the City Hall does not bear the direct brunt of coastal storms.
- *Resilience to cold*
    - Window replacement to reduce infiltration and improve insulation would help adapt to any increases in colder weather.
    - Improved efficiency and redundancy of energy systems as recommended would help with resilience to extremes in cold.

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Project List	Area (in Square Feet) or Unit Quantity	Scope Description	Cost/SF or Unit Cost	Rough Order of Magnitude (OoM) Cost
Total Building	19,150	*Note: Cost information is in 2024 dollars. Escalation typically ranges from 5% to 7% annually.*		
Civil				
Parking restriping per ADA requirements	2000 sf			$ 3,500
Signage: ADA, directional for parking	(8) pole-mounted signs			$ 4,000
Curbing/ wheel stops along building	10 spaces			$ 3,600
Brick sidewalk repair	200 sf	$28-32/sf - premium for smaller areas		$ 6,000
Upgrade accessible ramp (remove?)		Remove ramp, infill door, relocate condenser		$ 4,500
Lighting at public parking, pedestrian routes	(3) building mounted lights			$ 2,300
		Labor costs applied to construction cost	**Civil Construction Total**	$ 23,900
	30%	Project soft costs applied to construction cost	**Total Civil**	**$ 31,070**
Structural				
Investigate wood rot at bell tower		Allowance: $2,000		$ 2,000
Investigate steel framing at leak locations		Allowance: $2,000		$ 2,000
Investigate cracks in concrete floors		Allowance: $2,000		$ 2,000
		Labor costs applied to construction cost	**Structural Construction Total**	$ 6,000
	30%	Project soft costs applied to construction cost	**Total Structural**	**$ 7,800**
Building Exterior / Envelope				
Remove and replace damaged brick	100	brick replacement, per brick	$ 39	$ 3,850
Repair deteriorated mortar joints	100	square foot of repair area	$ 48	$ 4,800
Scrape, prime, and paint rusted lintels	50	linear foot	$ 75	$ 3,750
Repair cracked/ spalled stone	20	square foot of repair area	$ 250	$ 5,000
Clean areas of staining/ algae growth	300	square foot of cleaning area	$ 17	$ 4,950
Repair cracked/ spalled concrete	20	$250/sf for major repair, or $75/lf for crack repair	$ 250	$ 5,000
Scrape, prime and paint metal railings	200	linear foot of repair	$ 75	$ 15,000
Repair locations of abandoned fasten. holes	10	per location	$ 145	$ 1,450
Remove and replace failed sealant	200	per linear foot of repair	$ 19	$ 3,700
Repoint brick masonry chimney 100%	120	square foot of repair area	$ 45	$ 5,400

Scrape, prime and paint wood window frames	1,000		linear feet		$ 19,500
Remove and replace composite windows	1,100		square feet		$ 126,500
Remove and replace steel and alum wdws	1,000		square feet		$ 115,000
Replace Exterior Doors	2 pairs				$ 5,000
Replace EPDM roof with insulation	4,500		square feet		$ 200,000
Install throughwall flashing, brick wall at roof	30		linear feet		$ 5,000
Replace existing skylight	40		square feet		$ 10,000
Replace copper panels at penthouse with EPDM	200		square feet (note: replace with copper panels = $45,000)		$ 10,000
			Labor costs applied to construction cost	Building Exterior Construction Total	$ 543,900
		30%	Project soft costs applied to construction cost	**Total Building Exterior**	**$ 707,070**
Building Interior					
Accessible Addition, Option 1	130 sf		Demolition, new construction - options		$ 110,000
New accessible toilet rooms on First Floor	2		$38,000/per room		$ 76,000
Update doors with lever-type locksets	12		$840/each, installed	$ 840	$ 10,800
Replace/ refinish/ abate flooring as necess.			$18/sf abatement, $12/sf new LVT installed, $8/sf refinishing wood		$ 120,000
Repair/ refinish damaged ceilings, walls	8		$3000/location	$ 3,000	$ 24,000
Install compliant stair rails, guardrails	120		$155/lf for wall-mtd rails, remove & replace, $260/lf interior rail syst.	$ 208	$ 24,900
Refinish doors	10		$1400/ leaf to refinish		$ 14,000
Additional interior renovations per Option 1	5500 sf		square foot of renovation area (option - not included in total cost)	$ 300	$ 1,650,000
Additional interior renovations per Option 2	4800 sf		square foot of renovation area (option - not included in total cost)	$ 300	$ 1,440,000
			Labor costs applied to construction cost	Building Interior Construction Total	$ 379,700
		30%	Project soft costs applied to construction cost	**Total Building Interior**	**$ 493,610**
Plumbing					
Replace fixtures, piping in restrooms	12		$3550/fixture replacement in-kind		$ 42,600
Replace water htr with heat pump tank	1		$ 8,500		$ 8,500
Increase water heater to 140 F, provide thermostatic mixing valve set to 120 F	1		$1500/ mixing valve		$ 1,500
Install ECM circulating pump	1		$ 3,200		$ 3,200
			Labor costs applied to construction cost	Plumbing Construction Total	$ 55,800
		30%	Project soft costs applied to construction cost	**Total Plumbing**	**$ 72,540**
Mechanical					
Provide central VRF system to heat/cool	19,150		$40/sf for VRF, applied to entire buildling sf	$ 40	$ 766,000

Provide energy recovery ventilators	19,150		$18/sf for ERV	$ 18	$ 344,700
Extend building mgmt system to all HVAC	19,150		$6/sf	$ 6	$ 114,900
Remove radiators	38		$1100/each	$ 1,100	$ 41,800
Remove entire heating system	1		$35000/	$ 35,000	$ 35,000
			Labor costs applied to construction cost	**Mechanical Construction Total**	$ 1,302,400
		30%	Project soft costs applied to construction cost	**Total Mechanical**	**$ 1,693,120**
Electrical					
Replace service entrance with new equip			Replace and upsize as required by new mech	$ 350,000	$ 350,000
Replace all light fixtures with LED fixtures, along with lighting control system	1		$275,000 - higher quality fixture for historic	$ 275,000	$ 275,000
Replace exit signs with self testing			Included in above cost		
Replace branch circuit panels and wiring	19,150		$4/sf	$ 4	$ 76,600
			Labor costs applied to construction cost	**Electrical Construction Total**	$ 701,600
		30%	Project soft costs applied to construction cost	**Total Electrical**	**$ 912,080**
GRAND TOTAL: CITY HALL - TOTAL PROJECT COSTS					**$ 3,917,290**

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PRIORITIZED ACTION AND PHASING PLAN
CITY HALL

Costs shown are construction cost only, in 2024 dollars.
See Opinion of Probable Cost for detailed information, total project costs, and additional layout options.

Priority	*Cost*	*Timeframe*
1. Energy Efficiency		
a. Window replacement: steel and aluminum windows	$115,000	0-5 years
b. Exterior door replacement	5,000	0-2
c. LED light fixture replacement, self-testing exit signs	275,000	5-10
2. Roof Replacement and Repairs		
a. Structural investigations: steel roof framing at leaks, concrete floor cracks, bell tower wood rot	6,000	0-2
b. Replace EPDM roof, insulation	200,000	0-5
c. Replace copper panels at penthouse with EPDM	10,000	0-5
d. Roof flashing replacement	5,000	0-5
e. Skylight replacement	10,000	0-5
3. ADA/ Codes Improvements		
a. First floor restrooms (2)	76,000	0-5
b. Vestibule with Lift	110,000	5-10
c. Site ADA striping	3,500	0-5
d. Code-compliant handrails/ guardrails	24,900	5-10
e. Accessible door handles	10,800	5-10
4. Interior Improvements		
a. Finishes		
i. Flooring replacement/ refinishing, abatement as necessary	120,000	5-10
ii. Water damage repairs at ceilings/ walls	24,000	3-5
iii. Door refinishing	14,000	5-10
b. Plumbing Improvements		
i. Replace fixtures, piping in restrooms	42,600	5-10
ii. Replace water heater with heat pump tank	8,500	5-10
iii. increase temperature, mixing valve	1,500	5-10
iv. Install ECM circulating pump	3,200	10-20
c. Branch circuit panels and wiring replacement	76,600	10-20
5. Exterior Improvements		
a. Building repairs		
i. Masonry, concrete, steel lintel repairs	37,900	10-20
ii. Metal railing refinishing	15,000	10-20
iii. Window frames at composite windows: scrape, prime, paint	19,500	10-20
iv. Replace failed sealant	3,700	5-10
v. Remove and replace composite windows	126,500	10-20
b. Site repairs/ improvements		
i. Curbing/ wheel stops	3,600	5-10
ii. Brick sidewalk repair	6,000	5-10
iii. Upgrade or remove accessible ramp	4,500	0-5
iv. Lighting at public parking, pedestrian routes	2,300	5-10

6. Mechanical Improvements

a. Mechanical system upgrades

i. VRF system	766,000	10-20
ii. Energy recovery ventilators	344,700	10-20
iii. Building Management System	114,900	10-20
b. Electrical service replacement	350,000	10-20

3

RECREATION CENTER

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SUMMARY

Building Name	Donald Small Recreation Building
Address	55 Front Street, Bath Maine
Building Area (GSF)	19,040 sf
Year of Construction	1963
Year of Additions	
Construction type	
Building Use	
Occupancy Class	
Current Zoning	
Total Number of Floors (M=Mezzanine)	Two + 1M
Harriman Project Number	23138

Total Scores

Category	*Average Score*
Exterior	3.7
Life Safety	4.0
Interior	3.6
Civil	3.2
Structure	2.8
Electrical	1.3
Lighting	2.5
Mechanical	2.6
Plumbing	2.7
Fire Protection	N/A

Scoring System

1	Very Poor
2	Poor
3	Fair
4	Good
5	Very Good
N/A	Not Applicable

PRIORITY NOTES:

a. Renovate the first floor for two restrooms.
b. Provide accessible parking spaces and entrances per ADA standards.

ARCHITECTURE			
	Score		Average
Building Exterior			
Exposed Foundation	5	Building Exterior Average Score	3.7
Brick / Masonry	4		
Siding / Cladding	2		
Windows	4		
Doors	4		
Canopies / Overhangs	N/A		
Roof / Flashing	3		
Life Safety			
Fire Alarm / Strobes	4	Life Safety Average Score	4.0
CO / Smoke Detector	4		
Life Safety: Exit Signs	4		
Life Safety: Emergency Lighting	4		
Interior			
Walls and Base	4	Interior Average Score	3.6
Flooring	3		
Ceiling	4		
Stairs	4		
Handrails	3		
Doors	3		
Glazing	4		

CIVIL AND STRUCTURE			
	Score		Average
Civil			
Site Drainage	4	Building Exterior Average Score	3.2
Utilities	3		
ADA Accessibility	3		
Site Features	3		
Pavement conditions	3		
Parking	3		
Structure			
Structural Framing	2	Structure Average Score	2.8
Observable Masonry	3		
Headers / Lintels	3		
Central Stair	3		

MEP SYSTEMS			
	Score		Average
Electrical			
Service Entrance	1	Electrical Average Score	1.3
Panel / Distribution	2		
Standby Power	1		
Lighting	3	Lighting Average Score	2.5
Lighting Controls	2		
Mechanical			
Building Envelope	3	Mechanical Average Score	2.6
Heating Plant	3		
Cooling Plant	N/A		
Heating Distribution	3		
Cooling Distribution	2		
Ventilation	2		
Controls	3		
Specialty Areas	N/A		
Plumbing			
Toilet Rooms	2	Plumbing Average Score	2.7
Kitchen	3		
Domestic Water	3		
Showers	N/A		
Sprinkler Riser	N/A	Fire Protection Average Score	N/A
Sprinkler Distribution	N/A		

NOTES

ARCHITECTURAL EXTERIOR NOTES:

Walls: replace cracked/spalled brick; repair deteriorated mortar joints; repair cracked/spalled stone, concrete; scrape, prime, and paint rusted lintels; clean areas of stain, rust, and algae growth; repair locations of abandoned fastener holes; remove and replace failed sealant; fully repoint brick masonry chimney; remove EIFS panels and replace with aluminum composite panels. Windows: scrape, prime and paint existing wood window frames; remove and replace failed perimeter sealant. Roofs: install stripping membrane at roof field seams.

ARCHITECTURAL INTERIOR NOTES:

Finishes are in satisfactory condition, and the building has been generally well-maintained. Stair handrails and guardrails need to be addressed along with threshold heights.

CIVIL NOTES:

Remove pavement along the east wall, add drip edge, add landscape buffer and curbing. Bring building entrances to ADA standards, define accessible route, providing protection from vehicular traffic. Repave and restripe parking accessible parking, east parking lot. Reset utility manhole covers and catch basin rims. Consider adding pole-mounted site lighting at permieter. Replace deteriorated concrete stairs and handrails. Prune landscaping at walkways.

STRUCTURAL NOTES:

Investigate elevated floors to determine if significant displacement of floors has occurred between steel beams to determine if repairs or reinforcement is required. Investigate cracks in CMU walls to determine cause, repair if required.

ELECTRICAL NOTES:

Replace electrical service entrance in kind; replace light fixtures throughout the building with LED-source fixtures, install lighting control system; remove and replace exit signs with self-testing diagnostics; replace branch circuit panels and load centers throughout.

MECHANICAL NOTES:

Heating plant consists of one cast iron steam boiler that burns #2 oil stored in an underground tank; the boiler is in working condition. Steam baseboard heating is used to distribute heat throughout the building. Self contained steam valves are common to control the heating, with electronic control of main steam valves in the boiler room. The ventilation system consists of operable windows to introduce fresh air, with central exhaust risers and roof vents to relieve the space pressurization. Space cooling is provided by ductless split air conditioning to some areas, and window air conditioners installed during the summer.

PLUMBING NOTES:

Separate storm and sewer piping. Provide backflow preventer. Replace all plumbing fixtures. Replace water heater.

LIFE SAFETY NOTES:

Some door hardware does not comply with ADA regulations, stair handrails are not continuous, and guardrails are not adequate in height.

OPERATIONAL NOTES:
Basic renovations to the Recreation Center include adding restrooms to the floors with program spaces. There is also a desire to relocate offices form the Mezzanine to the second floor – away from the heat of the Boiler Room. Additional renovations include creating additional offices and conference room on the second floor.

ENERGY USE INTENSITY (EUI) NOTES:
The EUI for the Recreation Center is calculated to be 47.5, which is 56% better than the national median of 108.9 for this type of building. Incorporating a VRF heat pump with heat recovery eliminates oil consumption and is modeled to result in an improved EUI of 16.81.

FACILITY VULNERABILITIES NOTES:
Vulnerabilities at the City Hall include litigation, and energy supply systems. Shortcomings in meeting accessibility and codes requirements leaves the City vulnerable to litigation. Energy supply systems are not seen as a vulnerability as the building is not a critical use building to the City. Adapting the building to changing conditions is restricted due to accessibility and egress shortcomings, failing aspects of the building and layout limitations. Minimal impacts appear to be a potential due to climate change.

SUSTAINABLE OPPORTUNITIES NOTES:
The Rec Center is on a small footprint and with little available land around it for sustainable energy installations. There is some land around the center that might be of use for solar panels. The roof of the center would need to be analyzed for added structural loads due to increased snow load to see if panels could be mounted there. Another option would be to achieve energy offsets by providing renewable energy on city property elsewhere in town, similar to City Hall. The increased electrical energy could help offset the increased costs and electrical demands of the proposed VRF mechanical system.

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CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

CITY HALL

Civil

Introduction

The Bath Recreation Department is located in the Donald N. Small School at 4 Sheridan Road

For the purposes of this narrative, the end of Donald N. Small School facing Sheridan Road is north. The side of the building and small parking lot facing St. Mary's Church is east. The end of the building facing the large parking lot is south and the side of the building and service drive facing Kimball Field is west.

Site Context (Source Google Maps)

Topographic Conditions

- The building site and adjacent parking lot generally slope from south to north toward Sheridan Road
- The area in front of the building facing Sheridan Road slopes toward the street. The parking lot on the east side of the building slopes toward the building and toward Sheridan Road The pavement abuts the east wall of the building. The grade at the building slopes down to a low point/ swale about 15-ft. from the building. The swale slopes south to a catch basin near the back corner of the building and slopes north

toward the front of the building. The back of the building slopes south, away from the doorway and to each side of the building east and west. A service drive extends along the west side of building. The pavement slopes gradually near the back of the building but more abruptly nearer Sheridan Road

- Eroded areas include pavement edges that are not curbed. Sand and silt collects at low points in the pavement, and near the sewer manhole cover.

- The site drains quite well. Puddling can be found in low points in the pavement and near the east wall of the building. There is water staining on the west side of the building and puddling from leaking gutters at the roof line. Sand and silt is deposited near catch basin rims and low points at pavement edges.

Overall site slope looking southeasterly

Slope at front of building, Sheridan Road

Puddling at east wall of building

ADA Accessibility

ADA parking spaces and signage

- There is one signed, ADA accessible parking space opposite the side entrance at the north end of the parking lot facing Sheridan Road The parking space is not signed for van parking which is required where only one accessible parking space is provided.
- There is no accessible route marked at the head of the HC parking space. The parking lot extends to the building wall and to the concrete door pad at the side

(main) entrance to the Recreation Department. There is no accessible route, sidewalk or paint striping to the building entrance.

Accessible Parking Space

ADA accessible entrances

- There are 3 major doorways as follows: A ceremonial front entrance facing Sheridan Road; a side entrance used as the main entrance for the Recreation Department, and doorway at the south end of the building providing access to the adjacent school yard and playgrounds and fields.
- The ceremonial front door sill is flush with grade. There is no accessible route to this door as it is accessed via steps from the east parking lot or a different set of steps from the sidewalk on Sheridan Road There is a small, paved pull-in area to the west of the doorway. It is not striped or signed.

Front door (Sheridan Road)

6 Main (Rec Dept) side entry

- The side or main entrance to the Recreation Department doorsill is flush with the concrete door slab.
- The south entrance door sill is not flush with the outside concrete stoop/pad.

Utilities

- The sewer manhole cover needs to be reset. It was partially covered with sand during the site visit.
- Catch basin rims need to be reset due to settlement.
- The site is served with public water and sewer.

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

- The storm drain system appears to be connected to Sheridan Road


Sewer manhole cover


Catch basin rim

Site Infrastructure

Pavements

The following criteria was used in assessing pavement conditions.

(Excellent = new pavement with NO cracks)
(Good = relatively new pavement with very few minor cracks)
(Fair = well-worn pavement with several cracks, but in a serviceable condition)
(Poor = very badly cracked, heaved, much 'alligator-cracking,' must be replaced)


Pavement at east parking lot


Pavement at west driveway

- Parking lot pavements are generally in fair condition except at some low areas where it is in poor condition.
- The driveway along the west side of the building is in fair to good condition.

Site Improvements

- The limited bituminous curbing is in poor condition.
- There were no benches adjacent to the building.
- There are pipe bollards located at the end of the walk to the abutting school and playfields. They are in fair condition. There are no bollards near the Donald Small/ Recreation Dept. building.
- A single dumpster is in the northeast corner of the parking lot at the east side of the building. The dumpster is not screened and is visible from Sheridan Road, St. Mary's Church property and from the Recreation Department site.

- There is no fencing on the Recreation Department parcel.
- Site lighting for the Recreation Department parcel is building-mounted. A wall pack fixture is mounted high on the north wall facing Sheridan Road The north entrance is illuminated with soffit lighting in the canopy. A street light with gooseneck arm is mounted high on the east wall to illuminate the east parking lot. A spot light is mounted high on the south wall and pointed to the paved area south of the doorway. Refer to the Electrical report for more details.

Dumpster at NE of east parking lot

Building mounted site lighting

- There are three sets of concrete stairs. One at the front door facing Sheridan Road, the second stair is to the left of the front door and provides access the side parking lot. The third stair is part of the building in the areaway on the east side of the building. The concrete steps are in poor condition. There is settling of pavement at the top tread of the front steps creating a tripping hazard The black metal handrails are rusting.

Front steps (trip hazard)

Steps left of entrance (trip hazard)

Areaway steps (no handrail)

Landscaping

- The Donald Small School site is paved from property edge to the building except for a green lawn area along Sheridan Road Deciduous trees are located along the boundary of the parcel and may be on the abutting, St. Mary's Church property. Overgrown shrubs flank the north entrance at Sheridan Road
- The lawn is in good condition. The shrubs near the front entrance need to be pruned.

Shrubs at front of building

Miscellaneous/Regulatory

- The site is in an established, residential neighborhood. Primary site access is via a driveway from Lincoln Street across St. Mary's Church property and rear parking lot to the Recreation Department parcel/east parking lot.
  Sight distances at Lincoln Street appeared adequate. A driveway is located along the west wall of the Recreation Department building. It appears to provide egress for the rear parking lot and the parking lot to the west of the site serving the athletic field. The driveway is signed as one-way do not enter at Sheridan Road Sheridan Road is a dead-end street. Any traffic exiting the west driveway would be turning right. Sight distances appeared adequate.
- The existing zoning setbacks have not been field confirmed.

Sight distance at Lincoln Street

"Do not enter" sign at west driveway

Recommendations or Corrective Actions

- Pavement should be removed along the east wall of the building and drip edge and landscape buffer added with curbing.
- The building entrances should be brought to current ADA standards. Pavement should contrast with parking lot pavement to define the building entrance and as needed for a defined accessible route to the HC parking space(s). Protection for pedestrians and the building from vehicle traffic should be provided.
- The accessible parking space should be repaved, re-striped and signed to conform with current ADA regulations.
- The existing construction details of the east parking should be determined (depth of gravels and bituminous pavement) and evaluated by a geotechnical engineer for replacement pavement options.

- The east parking lot should be repaved and restriped and the parking lot narrowed (east to west direction) to eliminate unnecessary pavement/impervious surface.
- Utility manhole covers and catch basin rims and grates should be reset to grade.
- Pole-mounted site lighting could be added along the perimeter of the parking lot. Light fixtures should be full cut off to prevent light trespass. If adequate light coverage can be achieved, the existing wall mounted lights should be removed and replaced with new, wall mounted fixtures directing the light downward Refer to electrical engineer's narrative.
- Deteriorated concrete stairs and handrails should be replaced with new stairs that meet current codes. Adjacent walks should be repaved to meet the grades at the top and bottom of the steps and remove tripping hazards.
- Landscaping should be pruned and areas next to walkways made clear.

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CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

Recreation Building

STRUCTURAL

General/Introduction

A limited review of the existing structure was completed based on information that could be gathered from the available original construction documents and from the visible and accessible structural system components observed during a site visit.

Existing Conditions Description

The original building is a two-story structure with a basement and a mezzanine level at the north portion of the building. The building is generally constructed of load bearing CMU walls and interior steel columns which support the elevated floor and roof framing. The elevated floors are generally constructed of wide flange steel beams spanning between steel columns and CMU walls which support reinforced concrete slabs placed on metal form deck. The roof framing is comprised of wide flange steel beams spanning between steel columns and CMU walls which support open web steel joists with a concrete slab placed on metal form deck.

The building is supported entirely on a concrete foundation system comprised of perimeter foundation walls on continuous strip footings and isolated spread footings at steel column locations. The ground floor is constructed of a concrete slab-on-grade.

That lateral force resisting system was not specifically identified in the available documents but is assumed to be comprised of CMU shear walls.

Based on our limited review of the existing building, the main structural systems appear to be in generally good condition.

List of Concerns

- At several locations on the second-floor level, the floor appears to dip between the beam locations.
- Cracks were observed in the CMU walls at the second-floor level.

CMU wall Cracks

Recreation Building

Recommendations

1. The elevated floors should be investigated further to determine if significant displacement of the floors has occurred between the steel beam locations, and to determine if repairs or reinforcement are required.
2. The cracks in the CMU walls should be investigated further to determine the cause of the cracks and to provide appropriate recommendations for repairs.
3. Any proposed structural renovations and additions to the structure will follow the gravity and lateral (wind and seismic) loading provisions stipulated by the 2015 International Building Code (IBC), the 2015 International Existing Building Code (IEBC) and the American Society of Civil Engineers (ASCE) Standard 7-10 *Minimum Design Loads for Buildings and Other Structures*. These are the applicable building codes currently adopted by the State of Maine. It should be understood that current building codes are more stringent than the codes in place at the time of original construction. If significant structural modifications are required to construct the proposed renovations, the entire existing structure may need to be analyzed and upgraded if found to be deficient.
4. The building code requires that lateral forces (wind and seismic forces) introduced by renovations to an existing structure are considered. These forces are determined through consideration of numerous criteria related to soil type, exposure, height, and type of structural system. The IEBC 2015 does not require structural upgrades to an existing building unless an addition, alteration (such as an increase in roof insulation) or change of use prompts or causes an increase in loads beyond specified thresholds. Depending on the scope of future additions or renovations, further lateral force resisting system analysis and/or upgrades may be necessary.

May 29, 2024

Re: Building Enclosure Evaluation
City of Bath - Municipal Facilities Planning
Recreation Center Building
Bath, ME
Gale JN 841640

Dear Mr. Gatchell:

In accordance with our agreement, Gale Associates Inc. (Gale) performed a visual evaluation of the in-place building enclosure systems including the roof, windows, brick masonry and associated components for the City of Bath, Maine - Municipal Facilities Planning. Gale's evaluation included a review of the City Hall, Recreation Center, and the Department of Public Works (DPW) Buildings. Representatives from Gale visited the project on June 25, 2023 to conduct this evaluation. Access to the roof and building interiors was coordinated and provided by Harriman Associates (HA) and City of Bath (Bath) personnel.

The purpose of the evaluation is to provide HA and Bath with a better understanding of the conditions observed and how they may be contributing to reported moisture related issues. The purpose of this report is to provide our opinions to address the existing conditions that may be associated with interior moisture infiltration.

Background Information

The Recreation Center is a rectangular shaped two-story building constructed circa 1963 as the Saint Mary's School. The building was also previously utilized as the Donald N. Small School before being renamed and used as the Recreation Center. The interior consists of a gymnasium, storage rooms, classrooms, and office space. The construction of the building includes a brick masonry façade, Exterior Insulated Finish System (EIFS) panels, punched window openings, limestone windowsills and entrance surrounds, and a low-sloped roofing system.

Figure 1: *Overall view of the Recreation Center.*

To assist Gale in performing the evaluation of the Recreation Center, representatives from HA provide

- Drawings for the Saint Mary's School - Bat Westman Architects. The set of drawings elevations, floor plans, building cross sectior

Interior Leak Audit

As part of the evaluation, representatives from Gale performed an interior leak audit to evaluate areas of potential moisture infiltration. In general, the interior of the Recreation Center presented limited evidence of moisture infiltration. Please note that during the evaluation, Gale did not observe active moisture infiltration. Please refer to the attached reduced size drawings for the approximate locations of observed leak locations. The following is a summary of Gale's observations.

<u>Leak Location #1</u>: Stained ceiling tiles were observed at a storage room located on the east side of the building [refer to Figure 2]. Please note, this location may be related to HVAC above the drop ceiling.

<u>Leak Location #2</u>: Water staining at the interior finishes adjacent to a window location within the gymnasium [refer to Figure 3]d.

<u>Leak Location #3</u>: Peeling/bubbling paint at the interior concrete masonry unit (CMU) wall below a window location at the gymnasium.

Figure 2: *Stained ceiling tiles at the top floor.*

Figure 3: *Stained interior finishes at the gymnasium adjacent to window locations.*

Existing Conditions and Observations

On June 25, 2023, representatives from Gale performed a visual evaluation of the brick masonry façade, windows, roof, and associated components. The intent of the evaluation was to document the extent and approximate location of deficiencies within the as-built conditions. Visual observations were performed from the ground level with the assistance of binoculars, while access to the roof area was coordinated with HA and Bath. *Please refer to the attached supporting information related to Gale's evaluation including photographic documentation and reduced size drawings with general locations of observed defects.* The following is a summary of Gale's observations:

Facade:

- The typical exterior wall consists of brick masonry cavity wall constructed with a CMU backup wall. Brick masonry units are yellow modular size units with mortar joints at approximately one-quarter of an inch (1/4") in width constructed in the concave profile. The masonry is set in a running bond pattern with a false header every sixth (6^{th}) course.
- In general, the brick masonry and associated mortar joints were observed to be in good condition with isolated locations of step cracks, cracked/spalled brick, deteriorated mortar joints, and step cracks [refer to Figure 4].
- Copper weep tubes were observed to be spaced along the base of the brick masonry wall above the concrete foundation.
- Limestone sills are constructed below window locations and appear to be in good condition with minor atmospheric staining.
- A brick masonry retaining wall with concrete caps is located at the east elevation at an egress door at grade. At the corner of the retaining wall, the mortar joint between the concrete capstones was deteriorated, a brick masonry unit was missing, and the mortar joints are in poor condition [refer to Figure 5].
- Wood fascia trim exists along the roof line and was observed to have typically peeling paint. Intermediate and short sections of gutter are installed to exposed wood blocking directly fastened to the wood fascia.
- EIFS panels appear to have been previously installed to infill the former window openings, and are in poor condition. Several holes, dents, cracks, and algae growth were observed at the panels, with previous sealant repairs. At locations of impact damage/holes, the finish coat was deteriorated and mesh exposed [refer to Figure 6].
- Adhesively and cohesively failed sealant was observed throughout the facility at fenestration openings and applied where previous repairs were made.
- One (1) rusted lintel location was observed above an entry door [refer to Figure 7].

Figure 4: *Typical step crack in the brick masonry.*

Figure 5: *Missing/displaced brick and deteriorated mortar joints at brick masonry retaining wall.*

Figure 6: *Typical deteriorated EIFS panel.*

Figure 7: *Rusted steel lintel above door location.*

Windows:

- The existing window systems appear to consist of replacement aluminum windows with insulated glazing units (IGUs) and appear to be in good condition [refer to Figure 8]. The majority of operable windows are hung units, while the gymnasium windows are projected units. Exterior mounted insect screens are installed at operable units [refer to Figure 9].
- One (1) fixed wood window at the west elevation appears to be original to the building's construction, and includes a four-over-four muntin grid and an exterior storm window [refer to Figure 10].
- Windows are installed at the original wood frames. Peeling paint was typically observed at the wood frames where the wood is painted with a brown color, as well as failed perimeter sealant [refer to Figure 11].

Figure 8: *Typical aluminum hung window at original wood window frame.*

Figure 9: *Typical aluminum projected window at the gymnasium.*

Figure 10: *Original wood window with exterior mounted storm window.*

Figure 11: *Typical peeling paint at original wood window frames.*

<u>Roofing</u>:

- Based on the manufacturer's stamp on the membrane, the existing roof system appears to consist of a single-ply sixty millimeter (60 mil) thick elastomeric (EPDM) fire-rated membrane over an unknown thickness of insulation and a composite roof deck. The roof membrane system appeared to be in fair condition with isolated locations of cupping/buckled insulation, low flashing heights, and evidence of standing water [refer to Figure 12]. Based on the manufacturer's stamp, the membrane appears to have been fabricated circa 2011.
- The insulation below the roof membrane appeared to be mechanically attached, as the fastener plates are visible and typically telegraphing through the membrane.

- Roof access is provided by a roof access hatch which appeared to be in poor condition. The hatch cover is secured by locks on all four (4) sides, and the locking mechanisms were difficult to operate and align.
- The surface of the roof system did not appear to include a slope towards the drain locations, however drains do include approximate four feet by four feet (4’x4’) sumps. Evidence of standing water was observed throughout the roof area [refer to Figure 13].
- A brick masonry chimney appeared to be in poor condition with several cracked/spalled brick, deteriorated mortar, and previous sealant repairs at the existing flashing [refer to Figure 14]. Additionally, the concrete chimney cap was observed to be cracked.
- Small canopy roof areas are located above entrances. Access was not provided to these roofs, however they appeared to consist of the original tar and gravel roofing [refer to Figure 15].

Figure 12: *Overall view of the roof.*

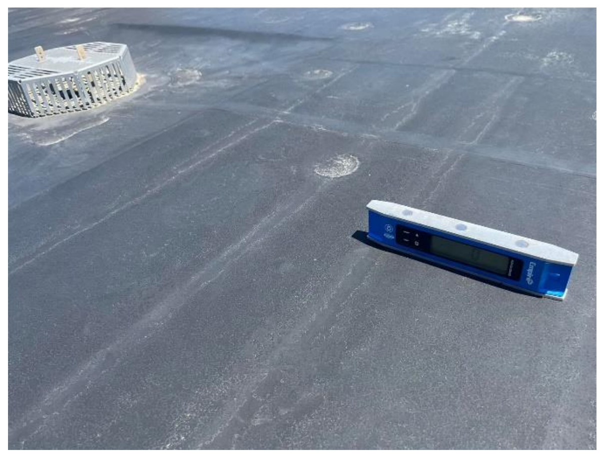

Figure 13: *The roof did not appear to be constructed with a slope towards drain locations.*

Figure 14: *Sealant repairs at the chimney flashing.*

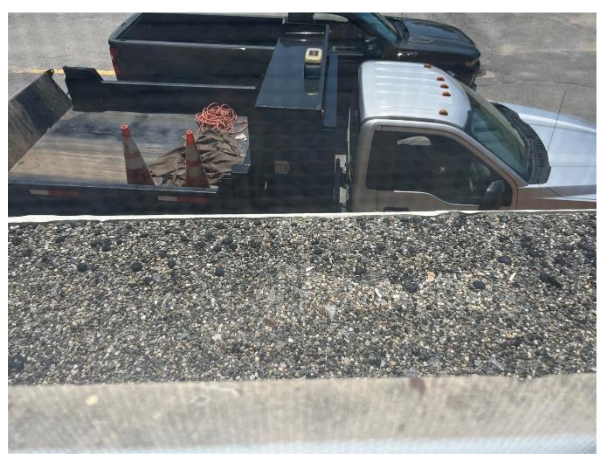

Figure 15: *Gravel surfaced roof area.*

Discussions and Opinions

<u>Exterior Walls:</u>

Based on Gale's visual evaluation, it appears that the existing exterior brick masonry façade is in fair condition. Masonry defects including, but not limited to, isolated locations of deteriorated mortar, cracked/spalled brick, and step cracks presented throughout the building. These defects do not appear to pose a structural concern; however, deterioration within the brick masonry components can result in excess moisture accumulation within the masonry wall and can potentially result in leaks and moisture infiltration on the interior. Defects within the exterior façade can also deteriorate further and at an accelerated rate due to freeze-thaw cycling. It is Gale's opinion that Bath consider remedial repair/replacement work to address the observed defects to maintain and prolong the performance of the building's exterior wall system.

Deteriorated mortar is mortar that has become soft, eroded and washed out, or is brittle, cracked, and delaminated. Deteriorated mortar was observed at locations shown on the drawings and could be sufficiently repaired by spot repointing only the affected areas. However, maintenance of the mortar joints that do not receive repairs should be anticipated and budgeted for future repair work. Mortar repairs appear to have occurred at multiple times throughout the building's history. Please also note that spot pointing of masonry walls will be noticeable from the ground and could affect the aesthetics of the building. While contractors will make an effort to match the colors and material, it is difficult to match them identically because of the weathering on the existing mortar. For the aforementioned reasons, one hundred percent (100%) repointing of mortar joints is often considered.

Deteriorated mortar repointing should be performed in accordance with the Brick Industry of America's (BIA's) Technical Note 7F, which requires the removal of existing mortar to a predetermined depth and replacement with a mortar mix appropriate for the masonry units and the surrounding environment. The proper procedure includes cutting existing joints back to at least three-quarters of an inch (3/4") in depth or deeper until sound mortar is encountered and applying new mortar of an appropriate strength and composition in lifts (thin applications) until the full depth of the cut is solidly packed. It is Gale's opinion that a qualified engineering firm designs, and a qualified masonry contractor performs the masonry repairs so that repairs are performed in accordance with BIA requirements.

The brick masonry chimney was observed to be in poor condition with several cracked/spalled masonry units, deteriorated mortar joints, and a cracked concrete chimney cap. It appears that previous open/deteriorated mortar joints, as well as the existing sheet metal flashing were repaired with sealant. It is Gale's opinion that the chimney be repointed one hundred percent (100%) and the chimney cap be repaired.

Abandoned fasteners and anchors should be removed and disposed of, and all resulting holes should be repaired. Hole repair could either be accomplished by patching the mortar joint or removing and replacing the masonry unit, depending on the method used for attachment and its location.

The EIFS panel infills were observed to be in poor condition and should be replaced. Several holes, dents, cracks, and openings were observed within the EIFS, which appears to be impact damage from adjacent recreation fields and activity. The panels were temporarily repaired with sealant in several locations. Water staining and peeling/bubbling paint was observed adjacent to the windows and the EIFS panel infills at the gymnasium. It is Gale's opinion that the EIFS panels be removed and replaced with a new cladding system. There are several options Bath could consider for the proposed new cladding system, including, but not limited to, EIFS, aluminum composite material (ACM) panels, or brick masonry infill. While each cladding system has its pros and cons, due to the potential of impact damage from the adjacent recreation fields, it is Gale's opinion that Bath considers utilizing a new ACM panel system including rigid insulation, in a color and texture to compliment the aesthetic of the existing brick masonry facade on this building.

Cracked concrete and limestone sills was observed at isolated locations, and should be repaired. Locations of algae growth, atmospheric staining, and rust staining can be removed using various masonry cleaning products.

Windows:

Window systems appear to be replacement aluminum hung windows. Although the age of the windows was not reported to Gale, the windows were observed to be in fair condition, with typical peeling paint at the original wood window frames. The wood frames should be scraped, primed, and painted to protect the existing wood. Please note, if window replacement is considered, an additional window evaluation should be performed to document the extent, type, and quantity of repairs that may be required at the existing wood frames. A rusted lintel was observed above a door location and should be scraped, primed, and painted.

As stated previously, several sections of window openings were infilled with EIFS panels. At the interior, the window openings are infilled with gypsum sheathing, and wood fiber acoustic panels at the gymnasium. It is unknown if the original windows were left in place or removed during panel installation. If Bath elects to replace the existing EIFS panels, test cuts should be performed to determine the construction of the fenestration openings.

Failed perimeter sealants should be removed and replaced. When the perimeter sealant has failed, water has the potential of migrating into the adjacent wall and/or window systems, which may result in interior moisture infiltration.

Roofs:

The roof system at Roof Area A appears to be in fair condition with isolated locations of defects including buckled/cupping insulation, ponding water, and low flashing heights. The observed defects are potential sources for moisture infiltration. As moisture infiltrates the roofing system, it reduces the effectiveness of the insulation in terms of thermal efficiency and R-value, as well as lead to moisture infiltration at the interior spaces below. During Gale's walk through the interior, one (1) location of moisture infiltration appeared to be related to the roof.

Typically, EPDM roof systems can be expected to have a service life of approximately fifteen to twenty years (15-20 yrs.) or beyond, depending on the thickness of the membrane installed, if system details were enhanced, and the type of lap seam technology that was utilized. Bath should consider the future replacement of this roof area, particularly to improve the roof's drainage, thermal efficiency and performance. Although the age of the roof is unknown, based on the manufacturer's stamp, it appears the membrane was manufactured in 2011. It is Gale's experience that the adhered seams of EPDM systems are prone to delamination due to UV exposure, and can lead to moisture infiltration. To extend the service life of the EPDM roof areas that were observed to be in fair condition, stripping membrane can be installed at membrane seams. Please note, some roof areas may still be under manufacturer's warranty, and the installation of stripping membrane should be coordinated with the membrane manufacturer.

The existing roof systems at the canopy roofs appear to be in fair condition, and as they are not located above occupied space, it is Gale's opinion that they do not need to be repaired/replaced at this time.

Summary of Opinions

Exterior Walls:

- Remove and replace cracked/spalled brick masonry units.
- Repair deteriorated mortar joints.
- Scrape, prime, and paint rusted lintels.
- Repair cracked/spalled stone/concrete.
- Clean areas of atmospheric staining, rust staining, algae growth.
- Repair locations of abandoned fastener holes.
- Remove and replace locations of failed sealant.
- Repoint brick masonry chimney 100%.
- Remove existing EIFS panels and replace with aluminum composite material panels.

Windows:

- Scrape, prime, and paint existing wood window frames.
- Remove and replace locations of failed perimeter sealant.

Roofs:

- Install stripping membrane at roof field seams.

We trust this information suits your needs at this time. Please do not hesitate to contact us if you require additional information regarding this matter.

Best regards,

GALE ASSOCIATES, INC.

Jane V. Leven
Jane V. Leven
Senior Designer
Building Enclosure Design and Technology Group

JVL/gmt

Enclosures: Appendix A - Reduced Size Drawings

I:\841640\01 Evaluation\report\841640 Rec Center Evaluation Report 2023 1030.docx

Appendix A

Reduced Drawings

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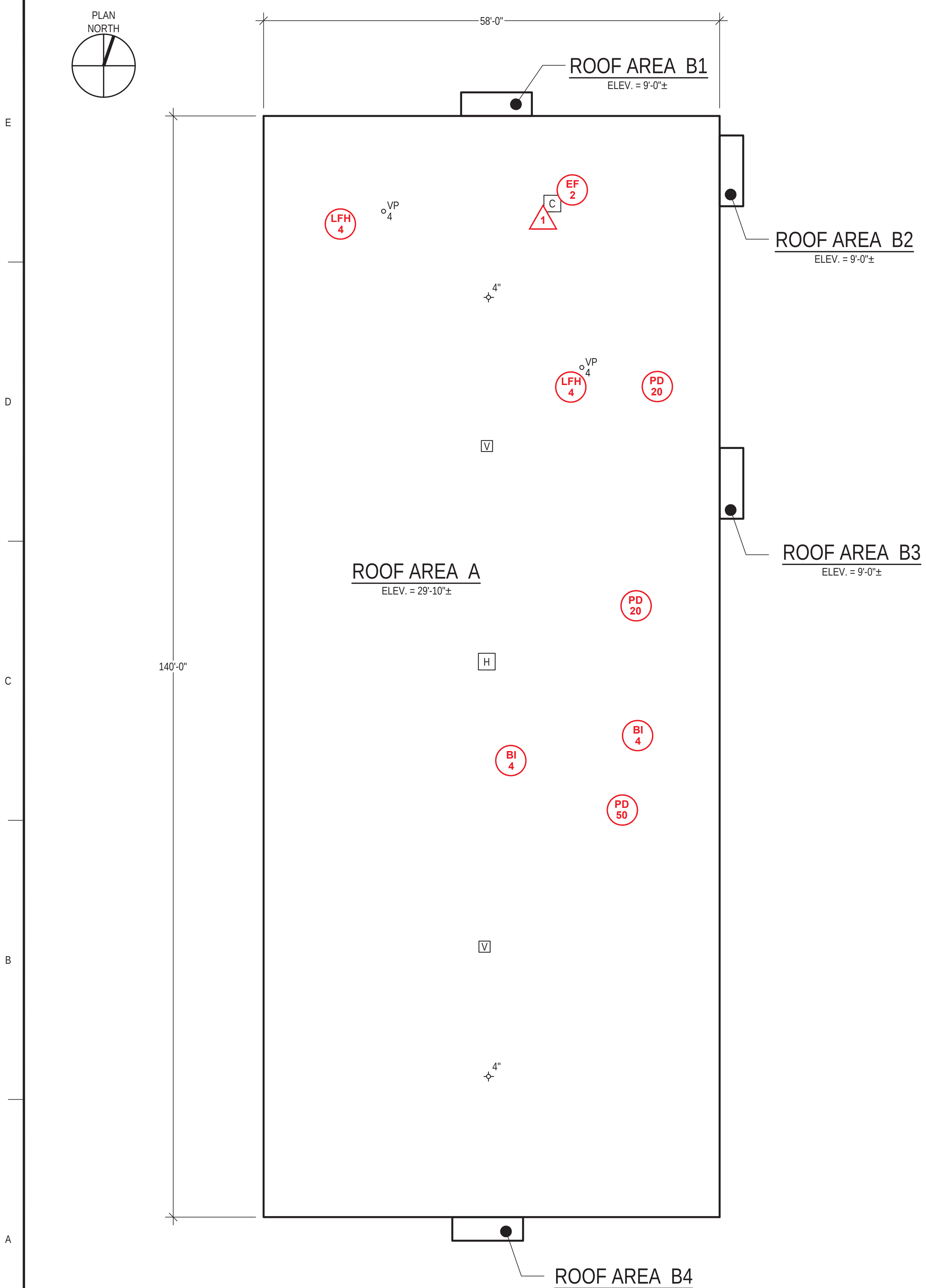

1 A101 ROOF AREA PLAN
SCALE: 1/8"=1'-0"

GENERAL NOTES

1. THE INFORMATION SHOWN ON THIS DRAWING HAS BEEN COMPILED FROM VARIOUS SOURCES AND MAY NOT REFLECT THE ACTUAL CONDITIONS AT THE TIME OF CONSTRUCTION.
2. HATCH PATTERNS ARE FOR REPRESENTATION ONLY AND SHOULD NOT BE USED AS A MEANS FOR QUANTIFYING.
3. THE DEFECTS NOTED INDICATE APPROXIMATE LOCATIONS. THEY ARE NOT INTENDED TO DEFINE LIMITS OF WORK.

LEGEND

	ROOF EDGE	VP #	VENT PIPE
C	CHIMNEY	V	VENT
#	ROOF DRAIN	H	HATCH

DEFECT NOTES

1 HAIRLINE CRACKS WITHIN THE BRICK FINISH ARE TYPICAL AT CHIMNEY AND IT APPEARS SEALANT WAS INSTALLED OVER DETERIORATED MORTAR JOINTS.

ROOFING DEFECT LEGEND

EF #	EFFLORESCENCE; # INDICATES SQUARE FEET
LFH #	LOW FLASHING HEIGHT; # INDICATES INCHES FROM ROOF
PD #	PONDING WATER; # INDICATES SQUARE FEET
BI #	BUCKLED INSULATION # INDICATES SQUARE FEET

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BATH, ME 04530

OWNER
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FOR THE CITY OF BATH MUNICIPLE FACILITIES PLANNING
BATH, ME 04530

NO.	DATE	DESCRIPTION	BY

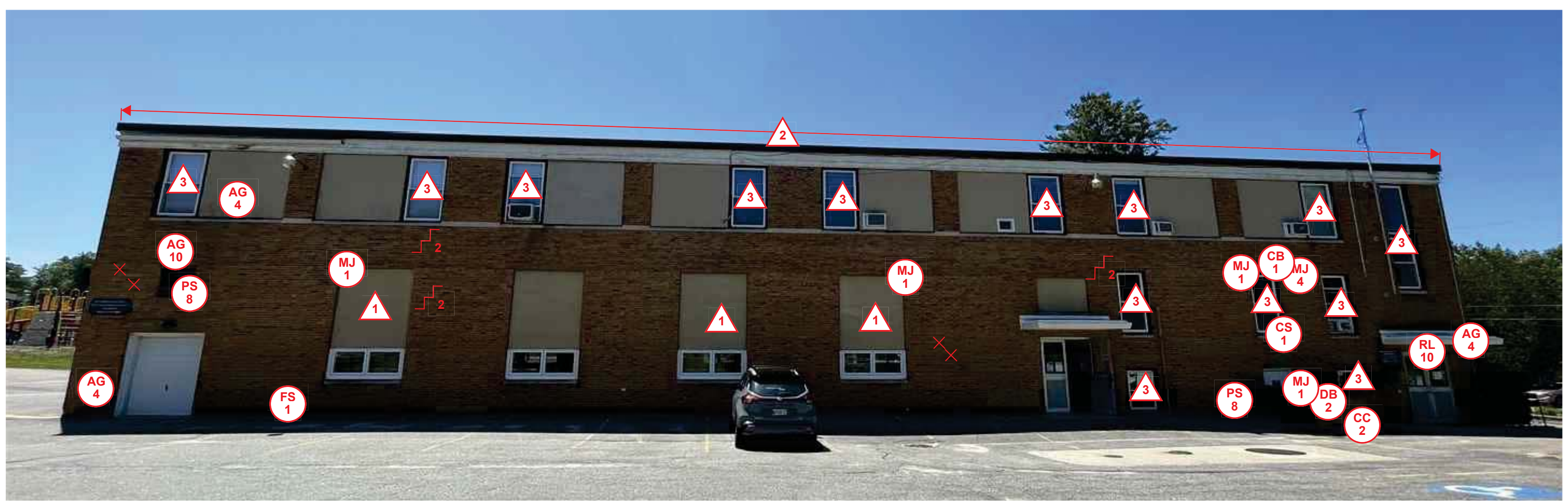
PROJECT NO.	841640 A100s Rec
CADD FILE	Center
DESIGNED BY	JVL
DRAWN BY	MRS
CHECKED BY	ACP
DATE	8/15/23
DRAWING SCALE	1/8"=1'

GRAPHIC SCALE
0 4' 8' 16'

SHEET TITLE
REC CENTER
ROOF PLANS

DRAWING NO.
A101

1 / A201 **WEST ELEVATION**
SCALE: NOT TO SCALE



2 / A201 **EAST ELEVATION**
SCALE: NOT TO SCALE

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DEFECT LEGEND

AG #	ALGAE; # INDICATES SQUARE FEET
AS #	ATMOSPHERIC STAINING; # INDICATES SQUARE FEET
CB #	CRACKED BRICK; # INDICATES UNITS
DB #	DISPLACED BRICK; # INDICATES UNITS
DM #	DETERIORATED MORTAR JOINT; # INDICATES SQUARE FEET
EF #	EFFLORESCENCE; # INDICATES SQUARE FEET
MJ #	DETERIORATED MORTAR JOINT; # INDICATES LINEAR FEET
RL #	RUSTED LINTEL; # INDICATES LINEAR FEET
RS #	RUST STAIN; # INDICATES SQUARE FEET
SB #	SPALLED BRICK; # INDICATES UNITS
X	EXISTING ANCHOR / METAL STUB
#	STEP CRACK; # INDICATES LINEAR FEET
FS #	FAILED SEALANT; # INDICATES LINEAR FEET
PS #	FAILED PERIMETER SEALANT; # INDICATES LINEAR FEET

GENERAL DEFECT NOTES

1. TYPICAL DETERIORATION/ HOLES IN EXTERIOR INSULATED FINISH SYSTEMS (EIFS)
2. PEELING PAINT TYPICAL AT WOOD FASCIA
3. PEELING PAINT TYPICAL AT WOOD WINDOW FRAME

KEY PLAN

NOT TO SCALE

PLAN NORTH

LEGEND:
ELEVATION SHOWN ON THIS PLAN

1 2

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NO.	DATE	DESCRIPTION	BY

PROJECT NO.	841640 A200S Rec Center
CADD FILE	
DESIGNED BY	JVL
DRAWN BY	MRS
CHECKED BY	ACP
DATE	8/15/23
DRAWING SCALE	NOT TO SCALE

GRAPHIC SCALE

SHEET TITLE

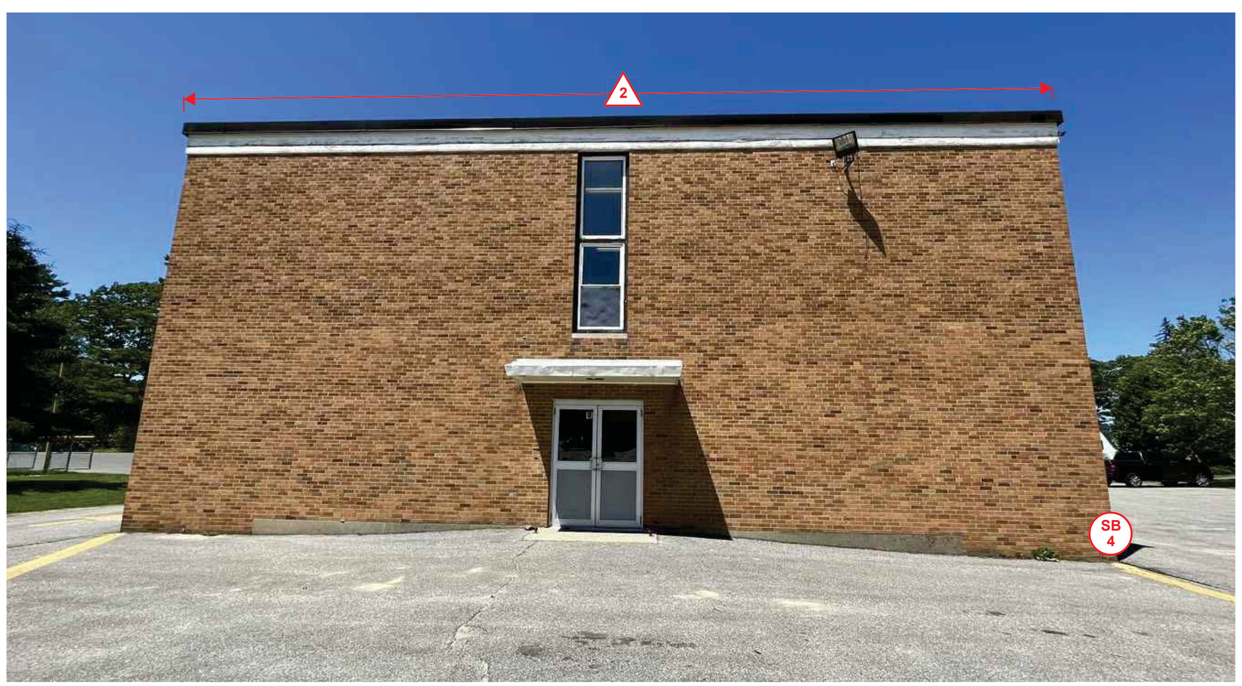
REC CENTER ELEVATIONS

DRAWING NO.

A20

1 2 3 4 5 6

3 / A202 NORTH ELEVATION
SCALE: NOT TO SCALE



4 / A202 SOUTH ELEVATION
SCALE: NOT TO SCALE

GENERAL NOTES

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DEFECT LEGEND

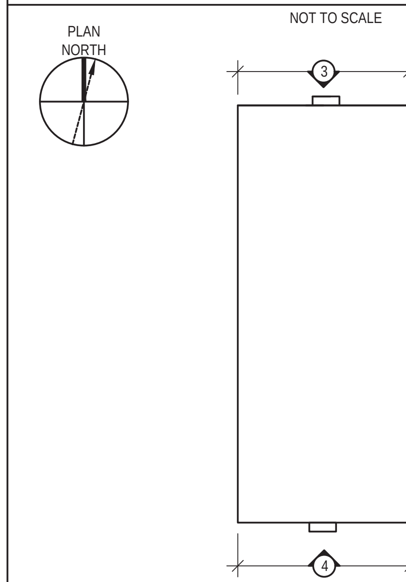
AG #	ALGAE; # INDICATES SQUARE FEET
AS #	ATMOSPHERIC STAINING; # INDICATES SQUARE FEET
CB #	CRACKED BRICK; # INDICATES UNITS
DB #	DISPLACED BRICK; # INDICATES UNITS
DM #	DETERIORATED MORTAR JOINT; # INDICATES SQUARE FEET
EF #	EFFLORESCENCE; # INDICATES SQUARE FEET
MJ #	DETERIORATED MORTAR JOINT; # INDICATES LINEAR FEET
RL #	RUSTED LINTEL; # INDICATES LINEAR FEET
RS #	RUST STAIN; # INDICATES SQUARE FEET
SB #	SPALLED BRICK; # INDICATES UNITS
✕	EXISTING ANCHOR / METAL STUB
#	STEP CRACK; # INDICATES LINEAR FEET
FS #	FAILED SEALANT; # INDICATES LINEAR FEET
PS #	FAILED PERIMETER SEALANT; # INDICATES LINEAR FEET

GENERAL DEFECT NOTES

1. TYPICAL DETERIORATION/ HOLES IN EXTERIOR INSULATED FINISH SYSTEMS (EIFS)
2. PEELING PAINT TYPICAL AT WOOD FASCIA
3. PEELING PAINT TYPICAL AT WOOD WINDOW FRAME

KEY PLAN

NOT TO SCALE



LEGEND:
ELEVATION SHOWN ON THIS PLAN

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DRAWING SCALE	NOT TO SCALE

GRAPHIC SCALE

SHEET TITLE

REC CENTER ELEVATIONS

DRAWING NO.

A20

157

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CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

RECREATION DEPARTMENT

ARCHITECTURAL – BUILDING INTERIOR

Introduction
The purpose of this assessment is to provide a visual interior architectural systems evaluation of the existing Recreation Department building located at 4 Sheridan Road in Bath, Maine. The building houses recreation department offices and a gymnasium.

Architectural systems are analyzed per the following applicable Codes and Standards:

- International Building Code: IBC 2015
- NFPA 101 National Fire Protection Association: Life Safety Code
- Americans with Disabilities Act: 2010 ADA Standards for Accessible Design

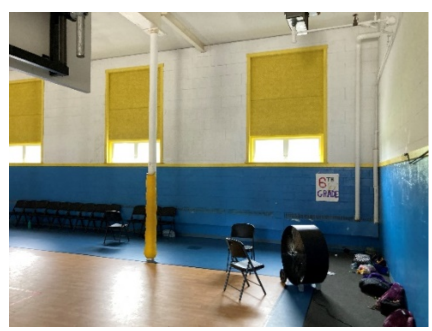
Review of Existing Documents
Whelan and Westman Architects, dated February 21, 1963, architectural drawings only for the facility. The building was originally designed as Saint Marys School.

Existing Conditions Assessment

On July 11th, 2023, representatives from Harriman, in collaboration with Gale, performed a visual evaluation of the building and its existing systems to review and document the extent and location of defects and deficiencies. The focus of this assessment is the building's interior architectural systems and accessibility. Observations are limited to visible elements. The assessment is non-destructive in nature. The following is a summary of conditions by category.

Summary Findings by Interior Category
The condition of interior systems ranged from fair to good. No areas in the facility were identified as being in very good condition.

Street Entrance



Gymnasium

Codes and Accessibility: Existing Conditions
Some features of the building are in their original condition and are not up to current code and accessibility requirements due to their age. Legacy construction that does not meet current accessibility and code standards still exists throughout the building. Non-compliant items such as stairways are exempt per section 403.1 of the IEBC (International Existing

Building Code) due to existing space limitations that prevent compliant alterations to be made.

The building complies with current code in the following categories:

- Life safety and NFPA: fire alarm, pull stations, fire rated doors, egress hardware and door closers.
- ADA (Americans with Disability Act): some lever-type door hardware, and elevator.

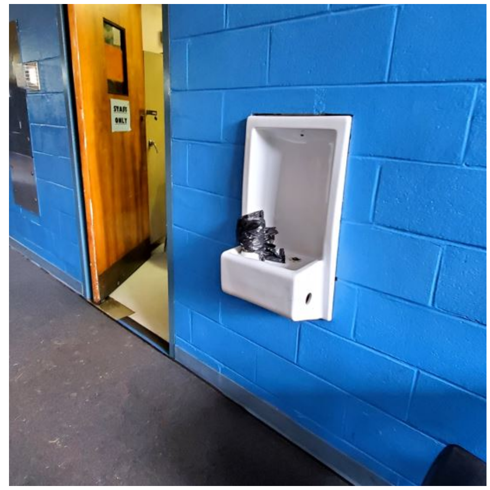
The building is noncompliant in the following categories:

- Some door hardware does not comply.
- Stair handrails are not continuous, and guardrails are not adequate in height. Handrails do not meet grasping requirements by being less than 2-inch in cross-section.

Code Study			
Code Heading	IEBC	NFPA 101	Remarks
	403.1	43	Business occupancy: Hazard Category 3
		7.2.2.1.2	The requirements shall not apply to “existing approved noncomplying stairs”
		7.2.2.2.1.1	Existing stairs shall be permitted to remain in use provided they meet requirements for existing stairs.
		7.2.2.2.1.1 (b)	Existing Stairs
Min width	36”		Actual: 36”+
Max riser height	8”		Actual: 7.125”
Min tread depth	9”		Actual: 10”
Min headroom			Actual: 6’-8”+

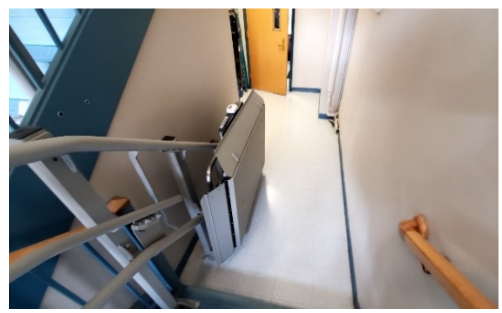
The building is made accessible by the installation of a wheelchair lift in the side stairwell which enters the building at a landing and accesses the building’s main levels. Restrooms have required clearances, fixture mounting heights, and accessible features. Drinking fountains that do not meet ADA requirements are blocked off from usage, and thresholds at restrooms are higher than the allowable ¾” for existing thresholds. Most doors do not have lever-type accessible handles.

Toilet Room Threshold



Inaccessible Drinking Fountain

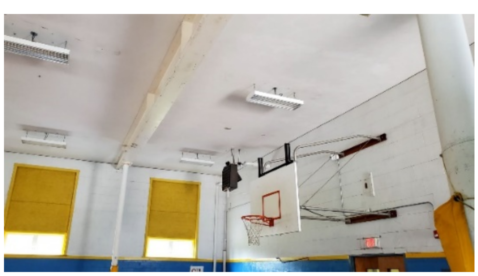
Accessible Toilet



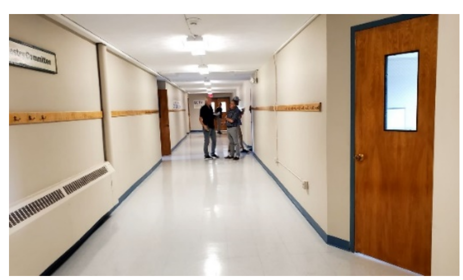
Wheelchair Lift

Interior Walls, Partitions and Base

Interior walls and partitions are on overall good condition. Most walls are gypsum drywall, some walls on the basement level and in the gymnasium are painted CMU, and there are some classroom walls with finished plywood paneling. Toilet room walls have ceramic tile wainscots. No visible signs of deterioration were observed, and finishes are in overall good condition.



Gymnasium Walls



Corridor Walls

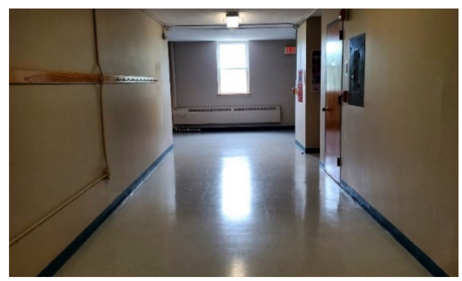
Video Studio

Wood Paneling

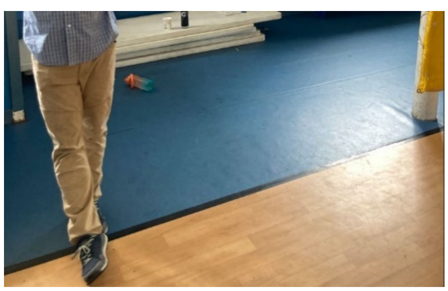
Finish Flooring

Finish flooring materials are in good condition. Flooring is predominantly vinyl composition tile (VCT) throughout corridors and classrooms, along with mosaic tile flooring in restrooms and rubber/vinyl plank flooring in the gymnasium. VCT is adequately maintained.

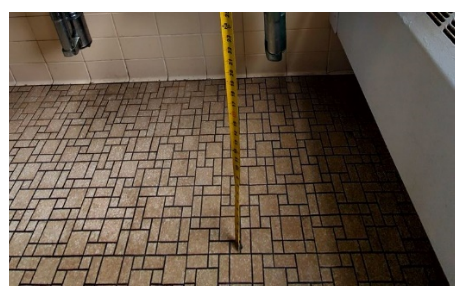
VCT Classroom Flooring



VCT Corridor Flooring



Gymnasium Flooring



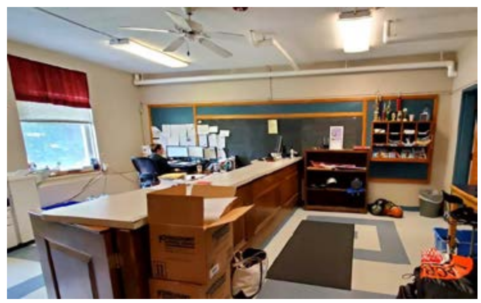
Toilet Room Mosaic Tile Flooring

Finish Ceilings

Ceilings are painted drywall ceilings throughout. Ceilings are well-maintained and in good condition.


Gym Ceiling


Corridor GPDW Ceiling


Classroom GPDW Ceiling

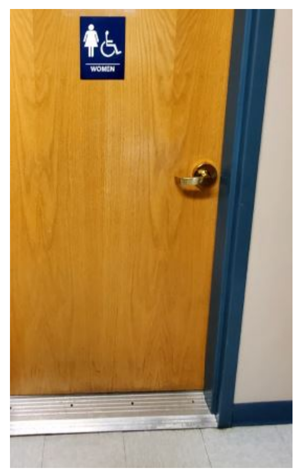
Stairs, Railings, and Guardrails
Stairs are in good condition. Handrails and guardrails are in good condition although they do not meet current code requirements for guardrail height and rail type and continuity. Stair risers and tread dimensions do not meet code requirements for new construction but comply for existing buildings as noted previously.


Figure 20 – Stair Tread


Figure 21 – Stair Riser


Stair Handrail Stair Guardrail

Interior Doors, Frames, and Hardware
Interior doors are in good condition. The majority of hardware is knob-type instead of the ADA required lever-type handles. Some doors have worn finishes.

Door Knob Hardware Door Lever Handle Hardware

Summary of Opinions
All interior improvements should be done in coordination with remedial work to the building exterior.

Recommendations
1. Change remaining knob-type door hardware in public areas to lever-type with locksets that maximize occupant safety and security.
2. Install code-compliant stair railings and guardrails.
3. Address thresholds at restrooms that are greater than ¾” in height.

BATH PARKS AND RECREATION – PLUMBING

Plumbing Systems

Evaluations

The building was constructed in 1963 and is currently 60 years old.

The plumbing piping systems are generally original to the building.

Water Service
There is a 4-inch water service with a 1-inch water meter.

There is no backflow preventer downstream of the water meter.

It is recommended to install a reduced pressure zone backflow preventer.

Water Service Entrance

3-inch Water Service Pipe

Roof Drainage
There are two roof drains on the building.

The roof is almost completely flat with little to no slope to the roof drains.

Standing water is a regular occurrence due to the lack of slope.

The roof edge appears to be only 4 inches above the inlets to the roof drains. The roof can easily overflow the edge if the drains or piping become clogged.

Roof Drain (at left) with Roof Ponding

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

Sanitary Drainage
According to the original design drawings, the 8-inch roof drainage piping connects to the 6-inch sanitary piping below the boiler room floor.

The 8-inch combined storm and sewer exits the building to the left of the basement entrance stair. There have been several reports of the boiler room flooding during heavy periods of rain. A floor cleanout has been opened in the boiler room and there appears to be substantial metallic buildup in the cast iron pipe.

Boiler Room Drainage Piping

Interior of Pipe in Floor Cleanout

Combined Storm/Sewer Access Cover in Sheridan Road

Typical Cast Iron Piping in Break Room

Restrooms
The main restrooms and fixtures are original to the building. Modifications have been made to provide at least one ADA compliant fixture in each restroom. The flush valve on the ADA toilets do not point toward the wide side of the stall. The traps below the ADA lavatories are not compliant due to interference with the foot space.

There should be a multi-height drinking station with bottle filler on each floor.

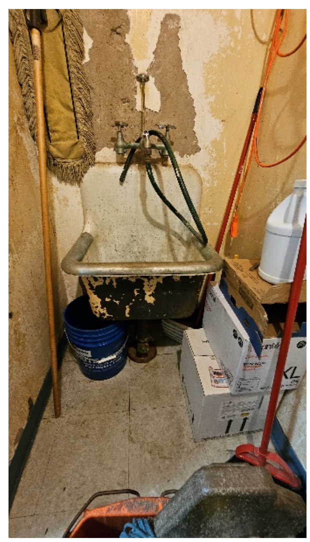
Typical Lavatories

Non-Compliant Trap below ADA Lav

Typical ADA Stall (non-compliant)

Urinals (one lowered for ADA)

Typical Drinking Fountain



Custodial Service Sink

Water Heating

The 40-gallon electric water is in good condition and is 8 years old installed in 2015.

There is no thermostatic mixing valve on the hot water outlet. It is recommended to install a thermostatic mixing valve.

Based on the replacement dates written on the tank, it is time to replace it.

It is recommended to replace it with an 80-gallon heat pump water heater for better efficiency. It is recommended the water heater be set to maintain 140 degrees F and the mixing valve set to deliver 120 degree F hot water to the building.

Electric Water Heater

Recommendations

1. Test the domestic water in the building for traces of lead. The test should be completed first thing in the morning below any water is flowed in the building.
2. It is recommended to install a reduced pressure zone backflow preventer.
3. Install a multi-height drinking station with bottle filler on each floor.
4. The combination Storm/Sewer should be separated in the boiler room. A separate 6-inch sewer and 8-inch storm should be piped to Sheridan Street. The piping should be replaced with PVC.
5. Replace the water heater with a heat pump water heater.
6. Install a thermostatic mixing valve and set to deliver 120 degrees F.
7. Replace custodial service sinks and replace with mop basins.
8. Provide fully compliant ADA restrooms on each floor.

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

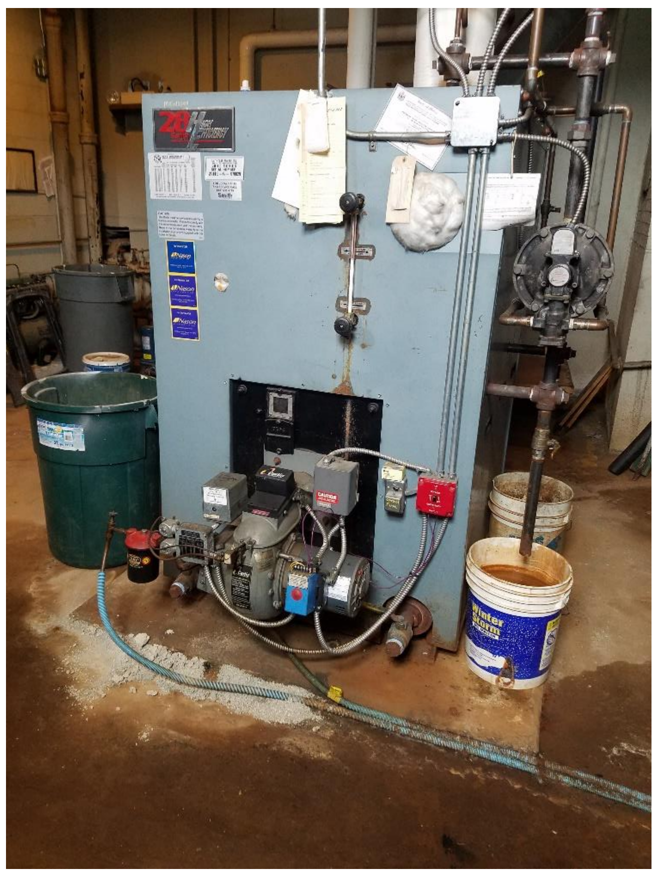
BATH PARKS AND RECREATION – MECHANICAL

Mechanical Systems

Evaluations

Boiler Plant

The plant consists of a single H. B. Smith 28 Series High Efficiency steam boiler with six sections rated for a gross output of 1,110 MBH. The boiler is fired with a Carlin 801CRD oil burner that burns #2 fuel oil. The boiler and burner are in working condition and serve as the sole source of heating for the building. There does not appear to be significant signs of leaking on the water or fire side of the boiler, and it appears to be in good condition. In the photo below, there is evidence of past water leakage from the sight glass. There is rust evident at the side of the boiler where blow down occurs, which is standard maintenance for steam boilers. The breeching for the boiler looks original and is in working condition. Joints do not appear to be sealed with fire caulk like the boiler at City Hall.



Overall View of Boiler and Burner

Rust from Boiler Blow Down

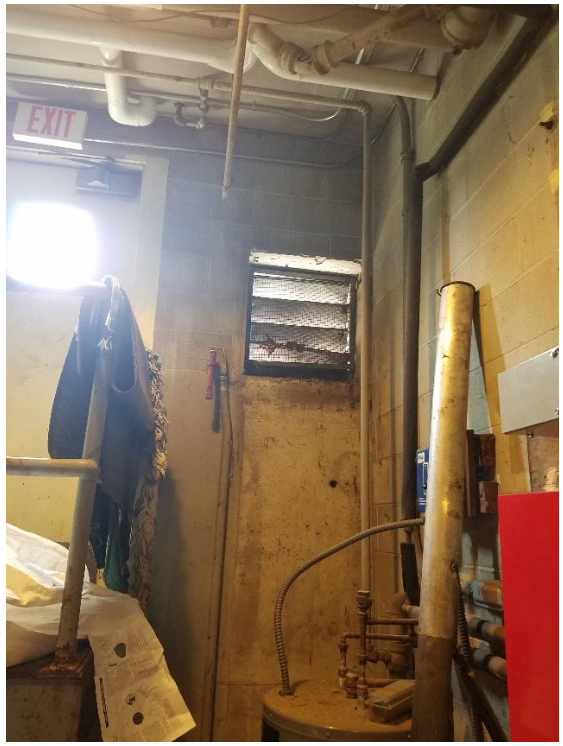
#2 Fuel Oil Burner

There is an existing condensate receiver with a single pump that serves the steam boiler. This equipment looks to be in excellent condition and appears to have been replaced recently. You can tell that the piping connected to the receiver and pump is much newer than the rest of the piping.

Existing Simplex Condensate Pump

Combustion air is delivered through a single wall opening high above the floor of the boiler room. There is a backdraft damper, within the opening that appears to be propped open with a piece of wood or some other similar material. The 2015 International Mechanical Code (IMC) states that oil-fired appliances shall comply with NFPA 31 regarding combustion air requirements. Paragraph 5.5.1 of the 2024 Edition, states for commercial installations there shall be a permanent opening to the outdoors sized at least 1 square inch per 4,000 Btu of total input rating. Based upon the input rating of the boiler, the opening appears to be adequately sized to meet the code requirements.

The 2015 IMC also states that if volume, smoke, or fire dampers are provided with the combustion air opening, they shall be interlocked with the firing cycle of the associated appliances; manual dampers are not allowed. The current installation does not have any dampers which does meet the intent of the code.



Boiler Room Combustion Air Opening

Fuel Storage

There is a single underground fuel storage tank in the parking lot adjacent to the boiler room. It is unknown when the tank was installed, or what condition the tank is in. There is a Veeder-Root underground tank monitoring system which appears to be in working condition.

Veeder-Root Underground Tank Monitoring System

Underground #2 Fuel Oil Storage Tank

Building Controls

In the boiler room, there is a pneumatic air compressor that serves two steam zone valves for the entire building. Individual heating elements have had their pneumatic controls replaced with self-contained radiator valves. These valves do not require power or pneumatic air to operate.

Pneumatic Air Compressor

Pneumatic Steam Control Valves

Air handling equipment within the building is enabled/disabled and controlled with motor rated manual switches inside the boiler room. There are also electric time clocks associated with the exterior lighting and the day/night setback of building ventilation systems.

Motor Rated Manual Switches

Electric Time Clock

Heating Elements

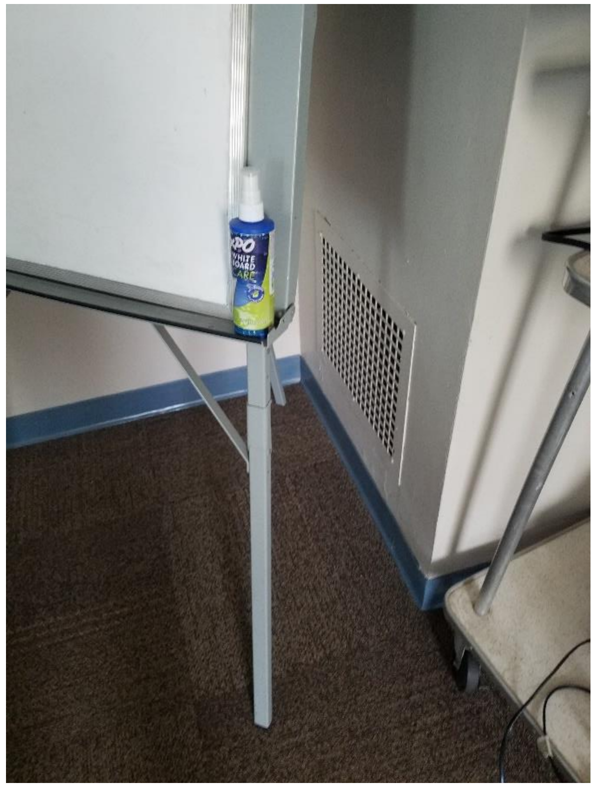
The building receives heat from the boiler plant through steam baseboard heaters installed at the perimeter. The baseboard heating is wall mounted and in working condition.


Wall Mounted Steam Baseboard Heater


Self-Contained Steam Radiator Valve

Ventilation
The building utilizes operable windows as the means for providing ventilation air to the occupied spaces. Natural ventilation is a code compliant method for distributing ventilation air to occupied spaces, if there is adequate free window area for the square footage of the space being served. However, during the winter windows remain closed since it is too cold outside and occupant comfort would be compromised.

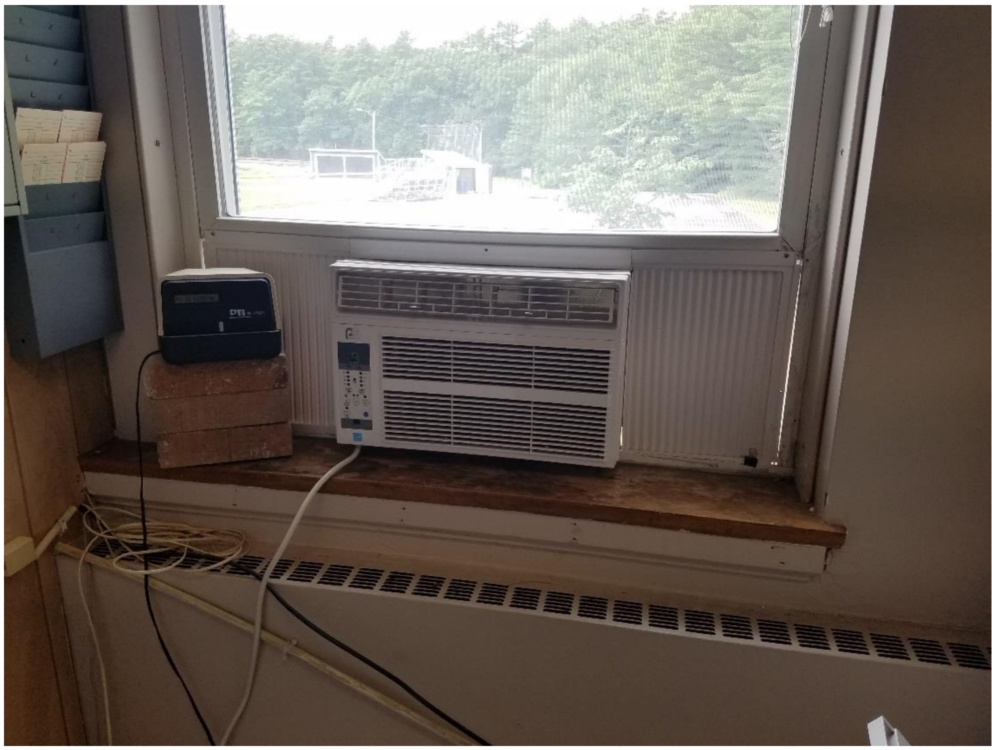
Toilet rooms and spaces that were previously used as classrooms, are exhausted passively with roof vents at the roof level. It is unknown if the code required exhaust flow rates are being achieved with the existing system.



Wall Mounted Exhaust Grille

Roof Mounted Exhaust Vent

Air Conditioning
Some of the occupied spaces are cooled with window air conditioners. This type of equipment is not intended to be a long-term solution and would be discarded at the end of its useful life. There is also a maintenance component associated with this equipment since they need to be physically installed and removed each year by staff.



Window Air Conditioner

Recommendations

1. Provide central VRF system (heat recovery or heat pump) to heat and cool the entire building.
2. Provide energy recovery ventilators to deliver code required quantities of outside air to the occupied spaces.
3. Extend existing building management system to control all of the HVAC equipment serving the building.
4. Remove steam heating system from the building. (This could remain in place and set as backup if the demolition cost is too high.)

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

RECREATION DEPARTMENT

ELECTRICAL

Introduction

A review of the existing electrical drawings for the facility was conducted. The drawings available were from the design plans dated February 21, 1963. Other discipline drawings were available for review and coordination. A field investigation of the Bath Recreation Department was conducted which included visual evaluations of the existing electrical systems.

Existing Conditions

Electrical Service
The building electrical service is a 600A, 208Y/120V, 3 Phase 4 Wire system, fed by an aerial secondary feeder from utility pole #3 on Sheridan Road. This service is fed aerially to the building, transitions to underneath the slab, and then stubs into the electrical room. The electrical distribution equipment appears to the building, 40-50 years old.

The branch circuit feeds to most panels and nearly all devices throughout the building are surfaced mounted conduit. Most ceilings are hard ceilings with necessitates surface mounted conduit runs to devices and light fixtures.

Lighting
The interior light fixtures throughout the building consist predominantly of surface mounted fluorescent light fixtures, with some retrofitted LED fixtures having LED screw in lamps.

Exit signage is present, some exit signs are visually obstructed due to HVAC/plumbing piping near exterior doors.

On the second floor in the classroom across from the BCTV studio space there are some light switches that have failed and need to be replaced.

Fire Alarm
Emergency battery units (EBUs) are present, units are a mix of functional and non-functional when self-diagnostics are performed.

Newer pull stations and horn strobes are installed throughout the building that are more in line with current codes and standards with regard to life safety.

Communications
There is an A/V center on the second floor of the building that is conditioned and contains equipment to facilitate local access television – Bath Community Television (BCTV). The communications service entrance is located in the basement of the Recreation Department building.

It was noted during the site visit that separate LED TV lights would be desired in the BCTV studio for improved production of BCTV services.

Wireless internet connectivity (WiFi) was not observed. Due to the hardened walls in older construction, a strong mesh network is recommended to provide seamless WiFi connectivity throughout the building.

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

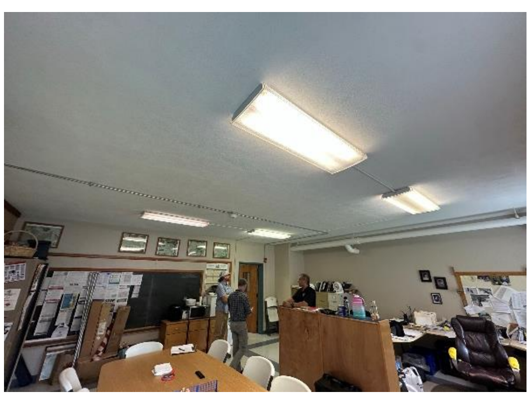
RECREATION DEPARTMENT

Utility Pole #3 on Sheridan Road

Main Distribution Panelboard Nameplate


Outdated distribution circuit breakers


NEC 110.34(A) Clearance Violation


Surface mounted conduit for branch feeds


Typical surface mounted panel

RECREATION DEPARTMENT

Surface mounted light fixtures

Exit sign obstruction

Recommendations

- The service entrance electrical equipment should be replaced in kind with newer equipment that can be more easily serviced by electricians. Due to the equipment's age, replacement parts may be difficult to procure to maintain UL listing and code requirements for safety.
- All light fixtures throughout the building should be removed and replaced with LED source fixtures. A lighting control system should concurrently be installed to provide administrative control and maximize energy savings for the facility.
- Remove and replace all existing exit signs and specify with self-testing diagnostics.
- Branch circuit panels and load centers throughout the facility and branch circuit wiring to devices should be replaced due to age and deterioration of wire insulation.
    - After 20 years, the insulation on wiring/conductors degrades and eventually becomes a fire hazard. All wiring older than 20 years should be replaced. Some electrical systems in the building are much older (40+ years).

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CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

RECREATION DEPARTMENT

SPACE UTILIZATION ASSESSMENT

- OPTION 1 – MINOR RENOVATION
  - Create two single user restrooms on Level 1
  - Move offices from Mezzanine to 2nd floor
  - Replace Mezzanine office with Classroom
  - Move shared office spaces to second floor.
  - Create larger restroom on second floor.
  - Convert second floor storage room to multi-purpose room.

- OPTION 2 – INTERMEDIATE RENOVATION
  - Replace existing kitchen with restrooms with greater capacity to support programming.
  - Convert portion of existing boiler to Pantry/Break Area.
  - Create individual offices and conference room.
  - Create larger staff and public restrooms and relocate Abrorist and Forestry Committee Office to existing Storage Room.

- OPTION 3 – MAJOR RENOVATION
  - Fit up existing unexcavated space to create a new kitchen and elevator to serve all levels.
  - Replace existing kitchen with restrooms with greater capacity to support programming. Create individual offices and conference room.

Recreation Center Summary of Options:
Basic renovations to the Recreation Center include adding restrooms to the floors with program spaces – the first and second floors. On the first floor, restrooms can be added by displacing the current kitchen area, taking part of the Boiler Room in the event of the installation of a VRF mechanical system, or using space in the unexcavated area across the corridor. There is also a desire to relocate offices form the Mezzanine to the second floor – away from the heat of the Boiler Room. Additional renovations include creating additional offices and conference room on the second floor.

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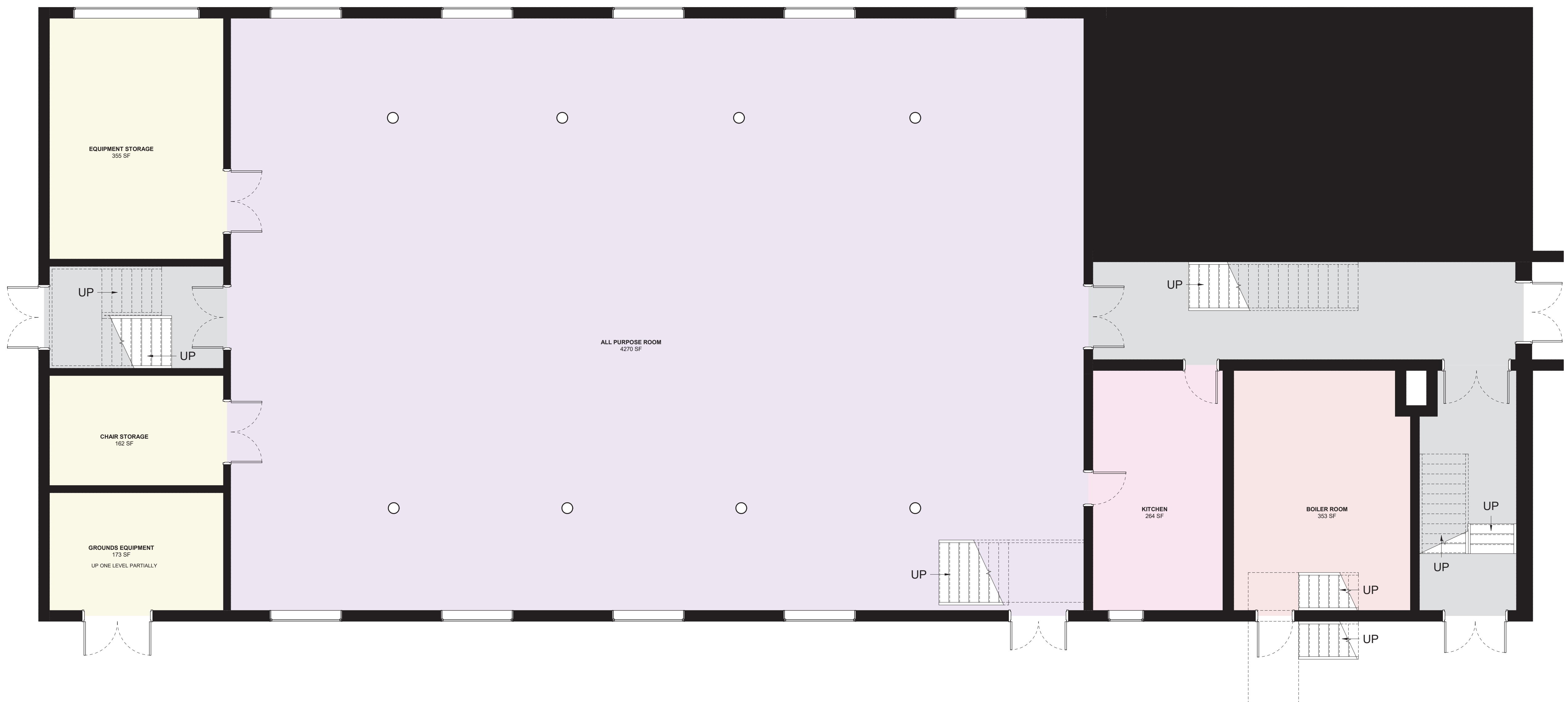
Department Legend

- CIRCULATION
- GYM
- KITCHEN
- SERVICE
- STORAGE



1 FIRST FLOOR ORIGINAL
SCALE: 1/4" = 1'-0"

Harriman

23138 - CITY OF BATH - REC CENTER

FIRST FLOOR - EXISTING CONDITION

Department Legend

- CIRCULATION
- GYM
- KITCHEN
- SERVICE
- STORAGE
- TOILET

1 FIRST FLOOR - Option 1 - MINOR
SCALE: 1/4" = 1'-0"

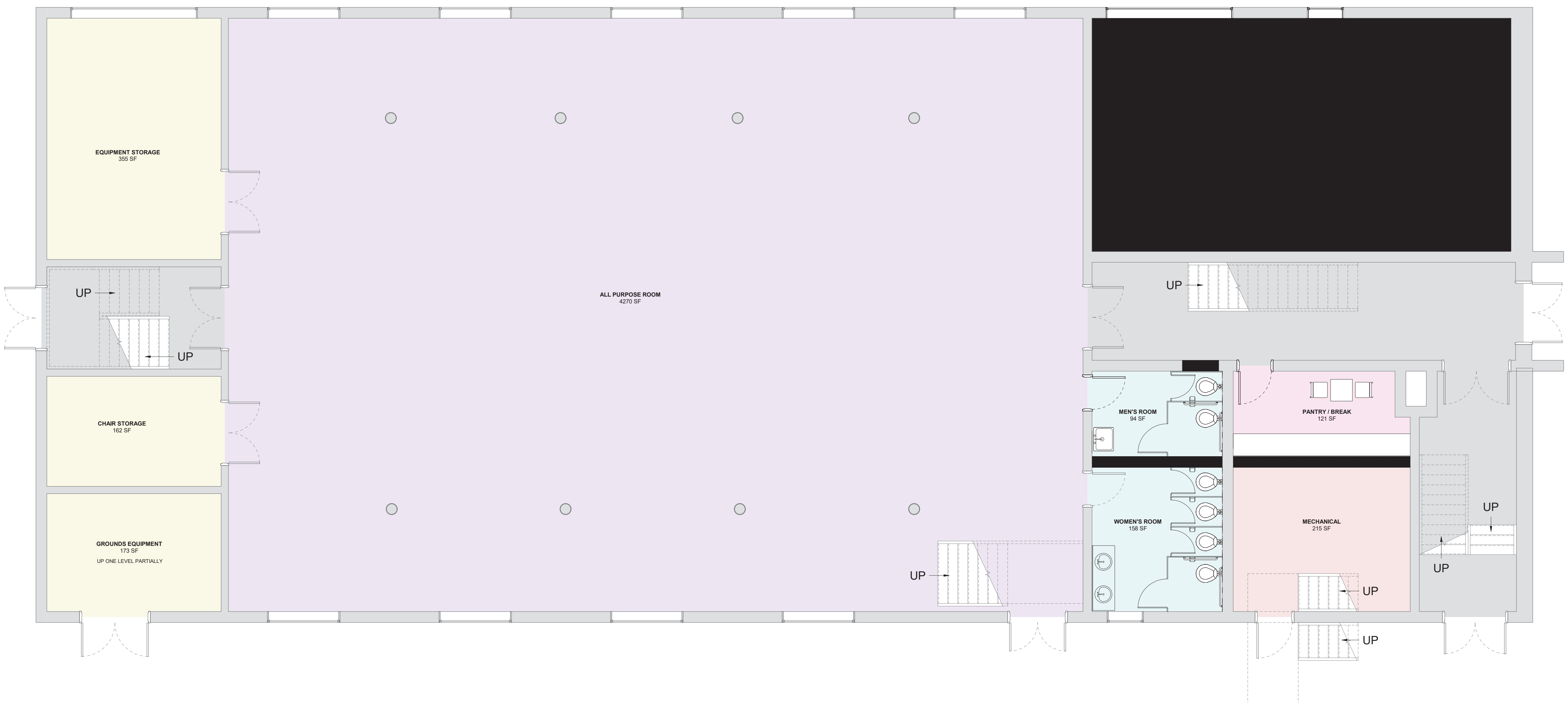
Harriman

23138 - CITY OF BATH - REC CENTER

FIRST FLOOR - OPTION 1

Department Legend

- CIRCULATION
- GYM
- KITCHEN
- SERVICE
- STORAGE
- TOILET



1 FIRST FLOOR - Option 2 - INT.
SCALE: 1/4" = 1'-0"

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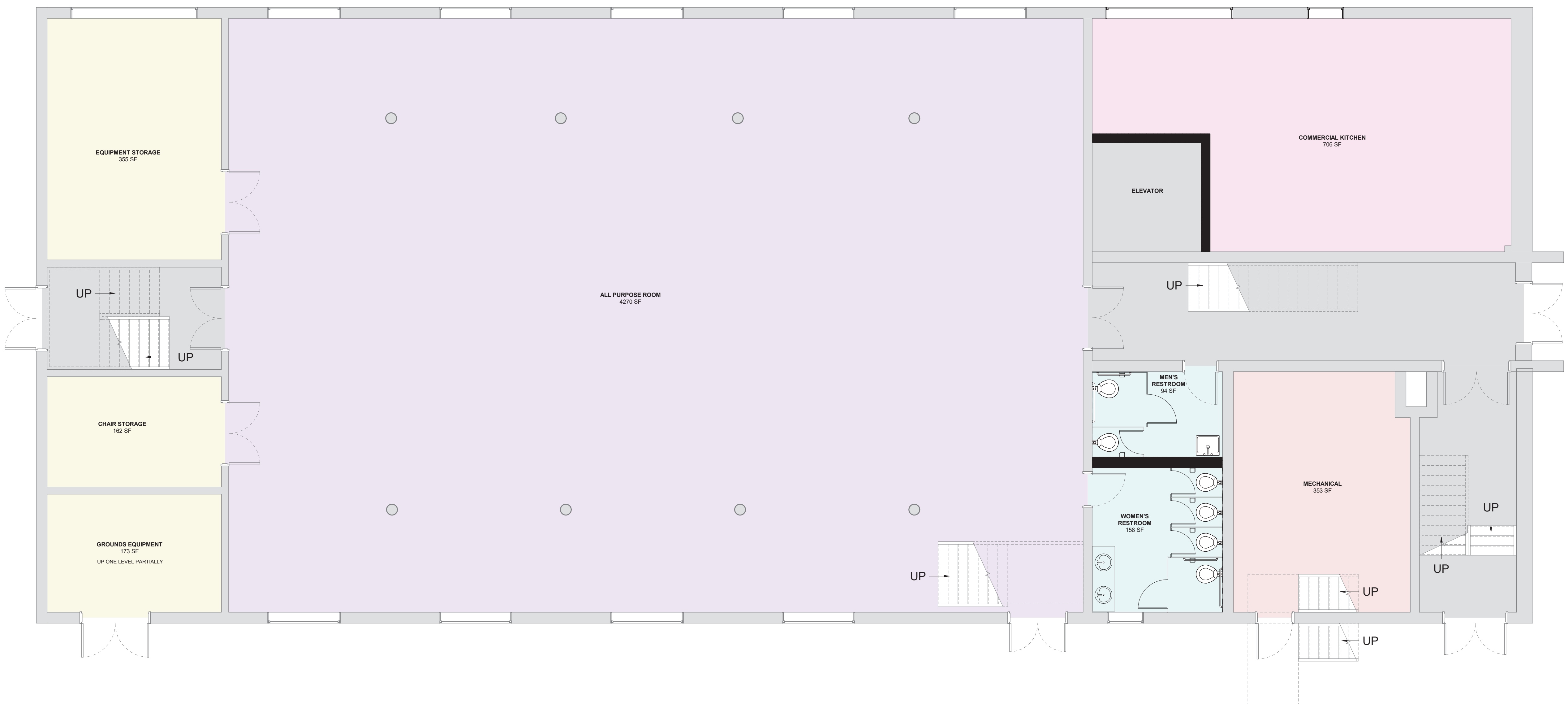
23138 - CITY OF BATH - REC CENTER

FIRST FLOOR - OPTION 2

Department Legend

- CIRCULATION
- GYM
- KITCHEN
- SERVICE
- STORAGE
- TOILET



1 FIRST FLOOR - Option 3 - MAJOR
SCALE: 1/4" = 1'-0"

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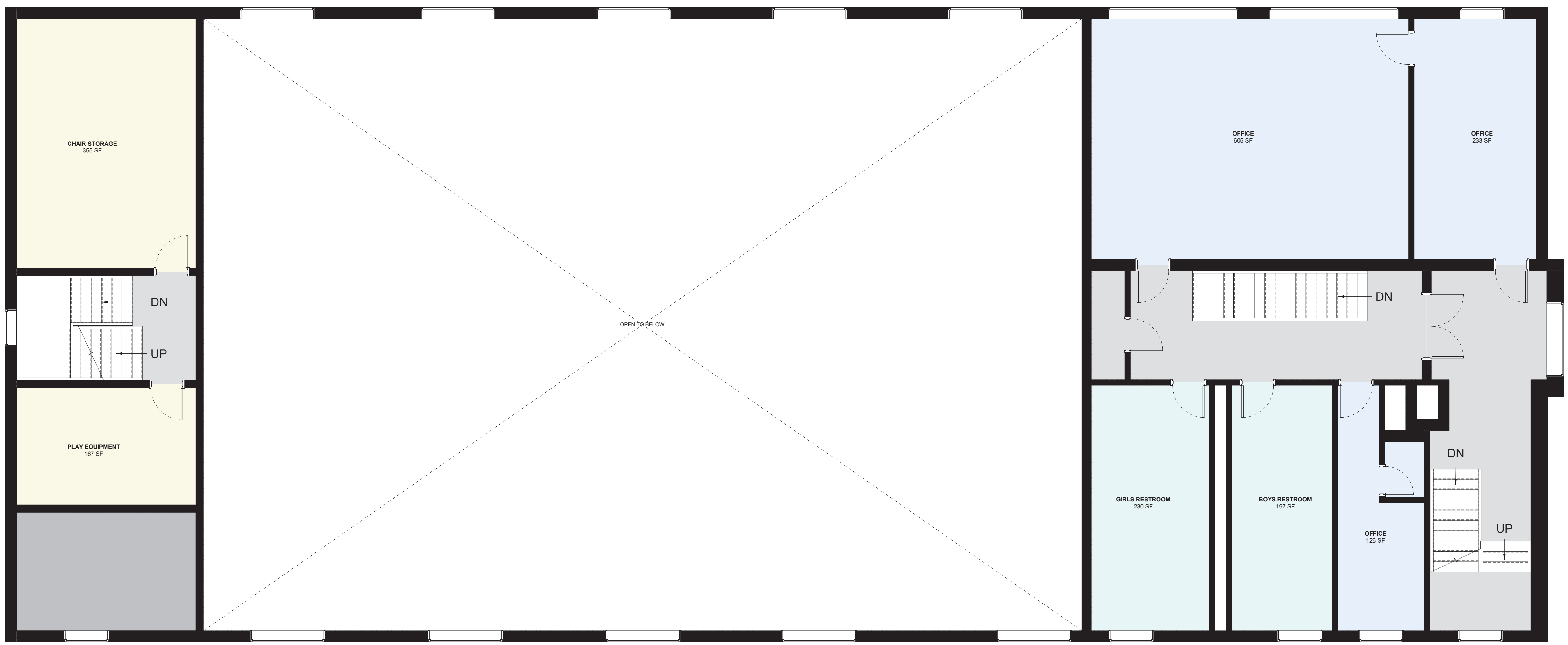
23138 - CITY OF BATH - REC CENTER

FIRST FLOOR - OPTION 3

Department Legend

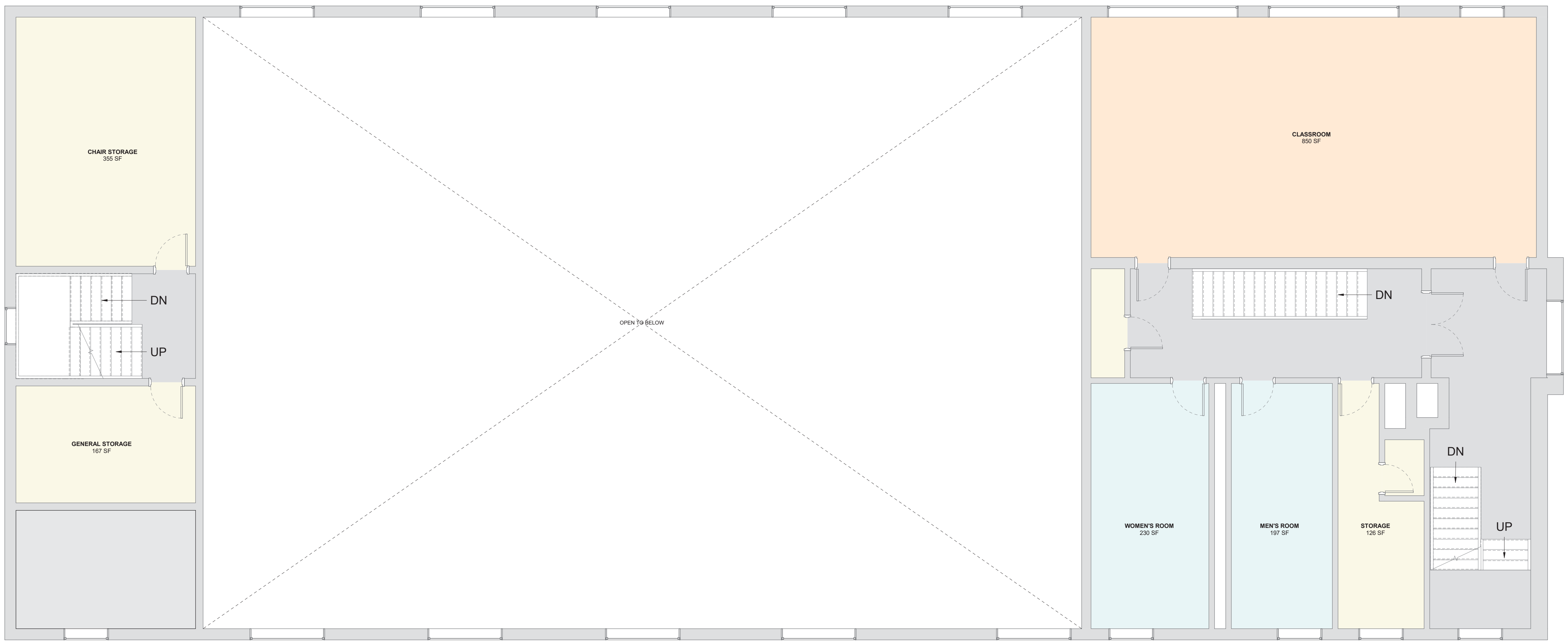
- CIRCULATION
- OFFICE
- STORAGE
- TOILET



1 MEZZANINE
SCALE: 1/4" = 1'-0"

Department Legend

- CIRCULATION
- CLASSROOM
- STORAGE
- TOILET



1 MEZZANINE
SCALE: 1/4" = 1'-0"

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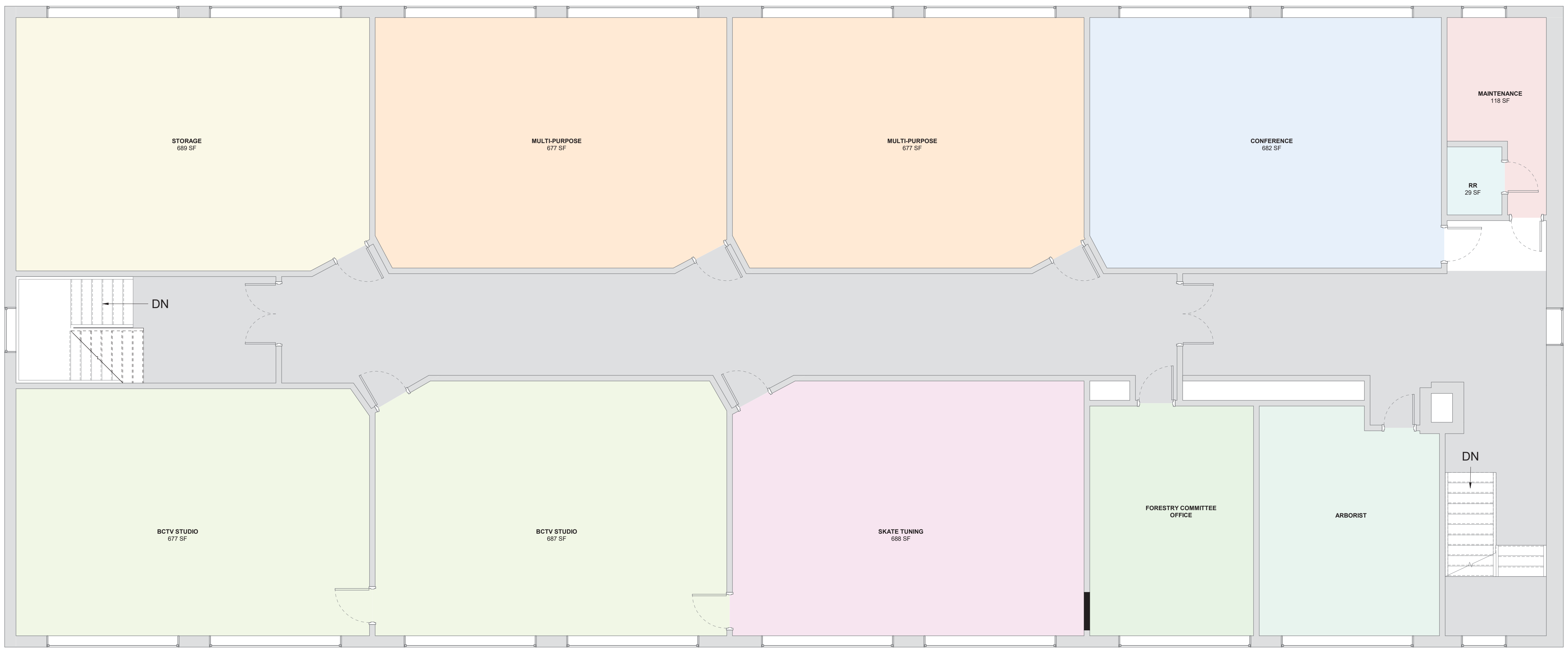
23138 - CITY OF BATH - REC CENTER

MEZZANINE - OPTION 1

Department Legend

- ARBORIST
- BCTV
- CIRCULATION
- CLASSROOM
- FORESTRY COMMITTEE
- OFFICE
- SERVICE
- SKATE ROOM
- STORAGE
- TOILET



1 SECOND FLOOR PLAN
SCALE: 1/4" = 1'-0"

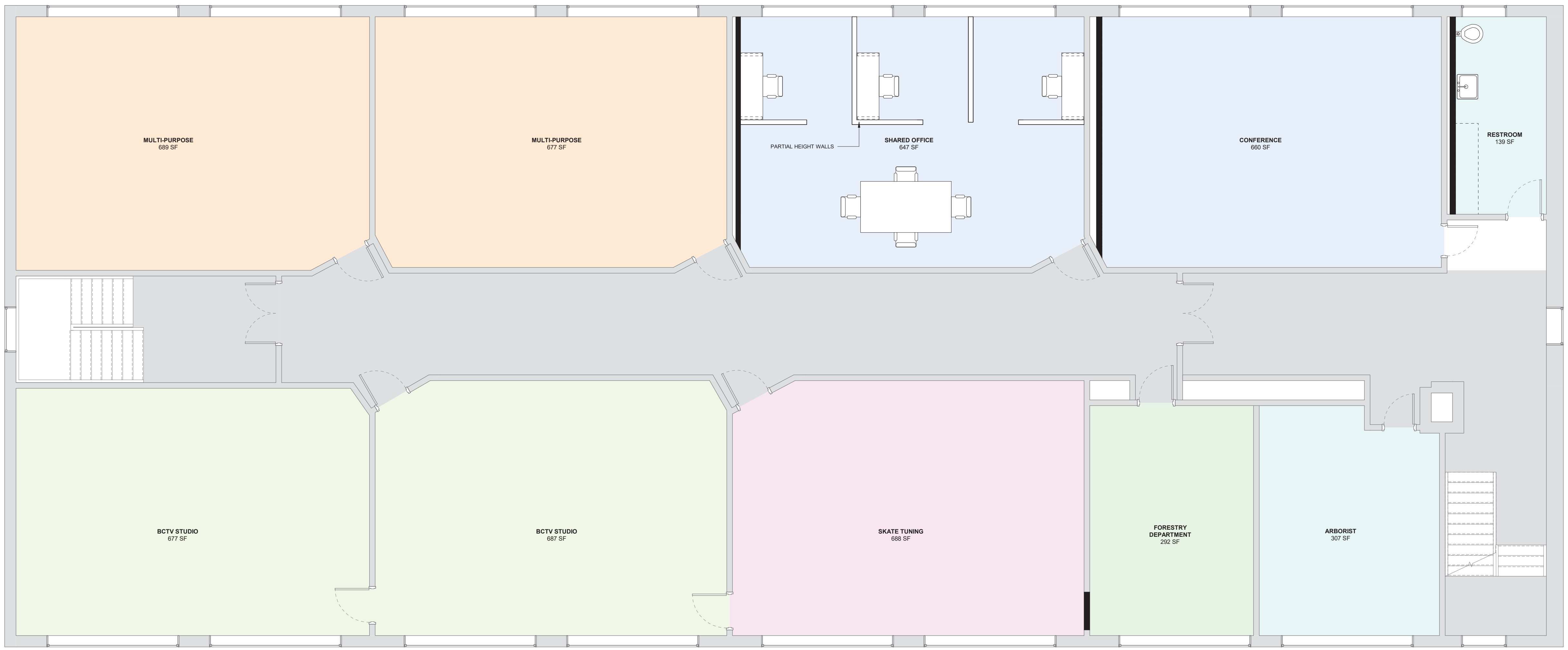
Harriman

23138 - CITY OF BATH - REC CENTER

SECOND FLOOR - EXISTING CONDITIONS

Department Legend

- BCTV
- CIRCULATION
- CLASSROOM
- FORESTRY COMMITTEE
- OFFICE
- SKATE ROOM
- TOILET



1 SECOND FLOOR PLAN
SCALE: 1/4" = 1'-0"

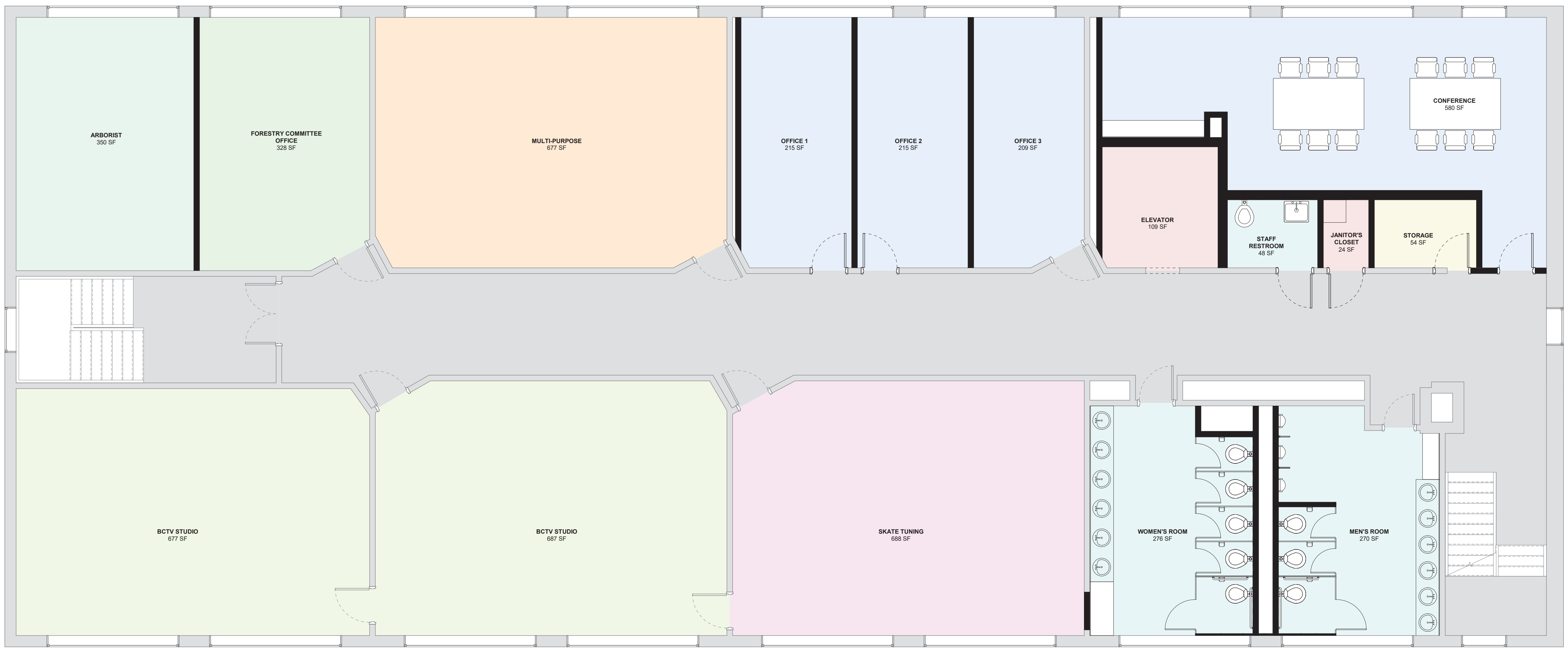
Harriman

23138 - CITY OF BATH - REC CENTER

SECOND FLOOR - OPTION 1

Department Legend

- ARBORIST
- BCTV
- CIRCULATION
- CLASSROOM
- FORESTRY COMMITTEE
- OFFICE
- SERVICE
- SKATE ROOM
- STORAGE
- TOILET



1 SECOND FLOOR PLAN
SCALE: 1/4" = 1'-0"

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23138 - CITY OF BATH - REC CENTER

SECOND FLOOR - OPTION 2

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BATH REC CENTER
23138
Harriman Programming Worksheet

OPTION 1												
EXISTING CONDITIONS						PROPOSED OPTION 1			SCOPE			
Rec Center (Donald Small School)	Total Building Area (GSF) By Dept. or Space (NSF)	Building Occupancy	Max. Capacity Per Occupancy Type	Current Total Occupancy	Adjaceny and Comments	Proposed Use	Proposed SF	Proposed Occupancy	PRIORITY	ENERGY	ADA	ENVELOPE
	7,769	SF/PP										
Level 1						**Level 1**			**Level 1**			
All Purpose Room	3,990	15	266	80-120	Toilet added adjacent to Oil Tank (2-5000k gallon)							
Kitchen	264	200	1	5+	Increasing part of Rec Programming. Staff break room during summer camp							
Boiler Room	335	300	1	-		2 Single User RR	133	2			X	
						Mechanical	202					
Equipment Storage	355	300	1	-								
Chair Storage	162	300	1	-								
Grounds Equipment	173	300	1	-								
Unexcavated	805	-	-	-								
Level One Total (Net)	**6,084**		**268**									
Mezzanine						**Mezzanine**			**Mezzanine**			
Office	126	150	0	1	Includes small restroom and Closet. Thermal concerns (above Boiler)	Storage	126	-				
Women's Restroom	230	-	7	-	7 Stalls / 3 Lavatories							
Men's Restroom	197	-	7	-	4 Stalls / 3 Urinals / 3 Lavatories							
Janitor's Closet	25	-	-	-								
Chair Storage	355	300	1	-								
General Storage	162	300	0	-								
Steve Office	605	150	4	1		Classroom	730	5				
Ann Office	235	150	1	1	Noise and privacy concerns	Classroom	See Above	See Above				
Mezzanine Total	**1,935**		20	3								
Level 3						**Level 3**			**Level 3**			
Storage Room	689	300	-	-		Multi-Purpose	689	34				
MultiPurpose Classroom (1)	677	20	33	Up to 50	Sound Transmission Concerns							
Multi-Purpose Classroom (2)	677	20	33	Up to 50		Shared Office	647	3				
Conference	682	150	4									
Maintenance Foreman	118	7	16		Office for Maintenance Foreman - will be moved to the new Athletic Complex when it's a full year round building.	ADA Restroom	139	1	X		X	
Restroom	29	-	1	1	Staff and Students / Utility (in lieu of JC)							
BCTV Studio	677	150	4									
BCTV Office	687	150	4									
Skate Room	688	150	4									
Forestry Committee Office	292	150	1									
Arborist Office	307	150	2									
Level 3 Totals	**5,523**											

BATH REC CENTER
23138
Harriman Programming Worksheet

OPTION 2												
EXISTING CONDITIONS						PROPOSED OPTION 2			SCOPE			
Rec Center (Donald Small School)	**Total Building Area (GSF) By Dept. or Space (NSF)**	**Building Occupancy**	**Max. Capacity Per Occupancy Type**	**Current Total Occupancy**	**Adjaceny and Comments**	**Proposed Use**	**Proposed SF**	**Proposed Occupancy**	**PRIORITY**	**ENERGY**	**ADA**	**ENVELOPE**
	7,769	SF/PP										
Level 1						**Level 1**			**Level 1**			
All Purpose Room	3,990	7	570	80-120	Toilet added adjacent to Oil Tank (2-5000k gallon)							
Kitchen	264	200	1	5+	Increasing part of Rec Programming. Staff break room during summer camp	Restrooms	240	4 Stalls / 1 ADA				
Boiler Room	335	300	1	-		Mechanical	215			X		
						Pantry / Break	121				X	
Equipment Storage	355	300	1	-								
Chair Storage	162	300	1	-								
Grounds Equipment	173	300	1	-								
Unexcavated	805	-	-	-								
Level One Total (Net)	**6,084**		**572**									
Mezzanine						**Mezzanine**			**Mezzanine**			
Office	126	150	0	1	Includes small restroom and Closet. Thermal concerns (above Boiler)	Storage	126	-				
Women's Restroom	230	-	7	-	7 Stalls / 3 Lavatories							
Men's Restroom	197	-	7	-	4 Stalls / 3 Urinals / 3 Lavatories							
Janitor's Closet	25	-	-	-								
Chair Storage	355	300	1	-								
General Storage	162	300	0	-								
Steve Office	605	150	4	1		Classroom	730	5				
Ann Office	235	150	1	1	Noise and privacy concerns	Classroom	See Above	See Above				
Mezzanine Total	1,935		20	3								
Level 3						**Level 3**			**Level 3**			
Storage Room	689	300	-	-		Arborist	350	-				
						Forestry Committee	328	-				
MultiPurpose Classroom (1)	677	20	33	Up to 50	Sound Transmission Concerns							
Multi-Purpose Classroom (2)	677	20	33	Up to 50		3 Offices	215 ea	3				
Conference	682	150	4			Conference	580	12+				
						ADA Restroom	48				X	
Maintenance Foreman	118	7	16		Office for Maintenance Foreman - will be moved to the new Athletic Complex when it's a full year round building.	JC Closet	24					
						Storage	54					
Restroom	29	-	1	1	Staff and Students / Utility (in lieu of JC)							
BCTV Studio	677	150	4									
BCTV Office	687	150	4									
Skate Room	688	150	4									
Forestry Committee Office	292	150	1			Women's RR	276	5			X	
Arborist Office	307	150	2			Men's RR	270	6			X	
Level 3 Totals	**5,523**											

BATH REC CENTER
23138
Harriman Programming Worksheet

OPTION 3 (LEVEL 1 ONLY)												
EXISTING CONDITIONS						PROPOSED OPTION 3			SCOPE			
Rec Center (Donald Small School)	**Total Building Area (GSF) By Dept. or Space (NSF)**	**Building Occupancy**	**Max. Capacity Per Occupancy Type**	**Current Total Occupancy**	**Adjaceny and Comments**	**Proposed Use**	**Proposed SF**	**Proposed Occupancy**	**PRIORITY**	**ENERGY**	**ADA**	**ENVELOPE**
	7,769	SF/PP										
Level 1						**Level 1**			**Level 1**			
All Purpose Room	3,990	7	570	80-120	Toilet added adjacent to Oil Tank (2-5000k gallon)							
Kitchen	264	200	1	5+	Increasing part of Rec Programming. Staff break room during summer camp	Restrooms	252	4 Stalls / 1 ADA			X	
Boiler Room	335	300	1	-		Mechanical	215			X		
Equipment Storage	355	300	1	-								
Chair Storage	162	300	1	-								
Grounds Equipment	173	300	1	-								
Unexcavated	805	-	-	-		Elevator	100					
Unexcavated		-	-	-		Kitchen	706	4				
Level One Total (Net)	**6,084**		**572**									
Mezzanine						**Mezzanine**			**Mezzanine**			
Office	126	150	0	1	Includes small restroom and Closet. Thermal concerns (above Boiler)	Storage	126	-				
Women's Restroom	230	-	7	-	7 Stalls / 3 Lavatories							
Men's Restroom	197	-	7	-	4 Stalls / 3 Urinals / 3 Lavatories							
Janitor's Closet	25	-	-	-								
Chair Storage	355	300	1	-								
General Storage	162	300	0	-								
Steve Office	605	150	4	1		Classroom	730	5				
Ann Office	235	150	1	1	Noise and privacy concerns	Classroom	See Above	See Above				
Mezzanine Total	1,935		20	3								
Level 3						**Level 3**			**Level 3**			
Storage Room	689	300	-	-		Arborist	350	-				
						Forestry Committee	328	-				
MultiPurpose Classroom (1)	677	20	33	Up to 50	Sound Transmission Concerns							
Multi-Purpose Classroom (2)	677	20	33	Up to 50		3 Offices	215 ea	3				
Conference	682	150	4			Conference	580	12+				
						ADA Restroom	48				X	
Maintenance Foreman	118	7	16		Office for Maintenance Foreman - will be moved to the new Athletic Complex when it's a full year round building.	JC Closet	24					
						Storage	54					
Restroom	29	-	1	1	Staff and Students / Utility (in lieu of JC)							
BCTV Studio	677	150	4									
BCTV Office	687	150	4									
Skate Room	688	150	4									
Forestry Committee Office	292	150	1			Women's RR	276	5			X	
Arborist Office	307	150	2			Men's RR	270	6			X	
Level 3 Totals	**5,523**											

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CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

RECREATION DEPARTMENT

ENERGY ANALYSIS

Analysis
Harriman benchmarked the Recreation Center using EPA Portfolio Manager based upon the most current year of utility data. Energy consumption for buildings is quantified using the Energy Use Intensity (EUI) number with units of kBtu/sf. The existing building without renovations has an EUI number of 47.5 which is 56% better than the national median of 108.9 for this type of building. Harriman proposed energy saving measures to further improve the Recreation Center EUI number.

Trane Trace 700 was utilized to model the building for energy analysis. Utility data provided to Harriman was utilized to calibrate the model such that the modeled energy consumption closely matches the actual consumption. The calibrated model is 99.8% accurate which establishes the basis for exploring energy saving measures. Fossil fuels are expressed in terms of therms by Trane Trace, since this is a standard unit that normalizes energy consumption for all fuels; one therm is equivalent to 100,000 BTUs. Harriman is proposing one energy saving measure for consideration, which includes incorporating Variable Refrigerant Flow (VRF) heat pump with heat recovery ventilators as the building HVAC system.

Energy Use Intensity (EUI)
Harriman has provided printouts of the calculations for reference which includes an analysis for the measure to be considered. The modeled baseline EUI number is 48.23, which is used as a point of reference for evaluating modeled energy improvements. Incorporating VRF heat pump with heat recovery results in elimination of oil consumption and a net increase in electrical consumption of 70,406 kWh annually. Despite the increase in electrical consumption, overall energy consumption is reduced due to improved efficiency resulting in an EUI number of 16.81.

According to the provided utility data, the Bath Recreation Center is being charged $0.134647/kWh for electricity and $3.109/gallon for heating oil. For comparison between fuel costs, it is necessary to convert both electricity and heating oil costs into therms. Conversion of the electricity cost calculates out to $3.95/therm and conversion of the heating oil cost equates to $2.22/therm. Since heating oil is more expensive than natural gas, there is a cost reduction to incorporate VRF heat pumps even though electricity is 1.8 times more expensive than heating oil.

Operating Costs
Harriman has modeled projected operating costs based upon current utility rates that have been provided for electricity and heating oil. The model operating cost for the existing building is $1.19/sf including electricity and heating oil consumption. The proposed energy saving measure incorporates VRF heat pumps as the HVAC system will eliminate consumption of heating oil. The existing heating plant may remain in place if the demolition costs are high and serve as an emergency heating source if necessary. The operating cost for VRF heat pump alone results in a cost reduction to $0.69/sf.

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

Summary

For minimal additional cost occupant comfort will be significantly increased. The energy consumption of Bath Recreation Center is already very good and has been even better than the City Hall. Incorporating a VRF heat pump system with heat recovery does improve the EUI and provides operating cost savings. Our calculations project annual operating cost savings of $9,520 per year.

There are benefits to upgrading the facility HVAC equipment beyond energy savings. There will be a significant improvement to occupant comfort which will allow for compliance with ASHRAE Standard 55-Human Environmental Conditions for Human Occupancy. The upgraded HVAC system will eliminate the need to install and remove window air conditioners for space cooling during the summer months. Additionally, productivity has been demonstrated to improve when occupants are working in a comfortable environment.

There are financial incentives that could help lessen the installation cost of the upgraded HVAC system, including one through the federal government. The Energy Efficient Commercial Buildings Deduction is part of the Inflation Reduction Act. This incentive focuses on improvements to interior lighting, upgrades to HVAC or domestic hot water systems and building envelope upgrades. The building improvements need to demonstrate that the annual energy consumption and costs will be reduced by 25% based upon the ASHRAE Baseline code minimum building. The incentive is written such that buildings placed in service before January 1, 2023, are capped at $1.80/square foot. There is an optional bonus of five times the incentive amount if local prevailing wages are paid and apprenticeship requirements are met. The gross square footage of Bath Recreation Center is estimated at 19,040 which could result in a $171,360 incentive.

There are also Efficiency Maine incentives which can be explored. For example, retrofit of an existing HVAC system with a VRF heat pump system could qualify for a $13/square foot incentive. This would turn out to $247,520 for a total potential incentive of $418,880. These proposed financial incentives are not guaranteed and would need to be investigated further if the City of Bath chooses to explore upgrading the facility HVAC equipment to VRF.

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

N/A

ENERGY STAR® Score[1]

Bath Recreation Center

Primary Property Type: Pre-school/Daycare
Gross Floor Area (ft²): 19,040
Built: 1963

For Year Ending: November 30, 2023

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

Property & Contact Information

Property Address	Property Owner	Primary Contact
Bath Recreation Center 4 Sheridan Road Bath, Maine 04530	City of Bath, Maine 55 Front Street Bath, ME 04530 (____)____-______	Jeff LaPierre 46 Harriman Drive Auburn, ME 04210 (207) 784-5100 jlapierre@harriman.com

Property ID: 33515296

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
47.5 kBtu/ft²

Source EUI
57.4 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	99,990 (11%)
Fuel Oil (No. 2) (kBtu)	804,719 (89%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	108.9
National Median Source EUI (kBtu/ft²)	131.5
% Diff from National Median Source EUI	-56%

Annual Emissions

Total (Location-Based) GHG Emissions (Metric Tons CO2e/year)	67

Signature & Stamp of Verifying Professional

I __________________ (Name) verify that the above information is true and correct to the best of my knowledge.

LP Signature: ________________________Date: ___________

Licensed Professional

Jeff LaPierre
46 Harriman Drive
Auburn, ME 04210
(207) 784-5100
jlapierre@harriman.com

Professional Engineer or Registered Architect Stamp (if applicable)

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MONTHLY ENERGY CONSUMPTION

By Harriman

	------- Monthly Energy Consumption -------												
Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative: 1	**Calibrated Existing Building**												
Electric													
On-Pk Cons. (kWh)	1,376	1,235	1,470	1,289	2,873	2,831	5,545	5,676	3,032	1,384	1,338	1,303	29,354
On-Pk Demand (kW)	6	6	8	11	33	34	38	35	35	6	6	6	38
Oil													
Cons. (therms)	1,954	1,488	1,014	522	33	5	0	0	11	537	979	1,639	8,182

Energy Consumption		
Building	48,233	Btu/(ft2-year)
Source	61,020	Btu/(ft2-year)
Floor Area	19,040	ft2

Environmental Impact Analysis	
CO_2	No Data Available
SO_2	No Data Available
NOX	No Data Available

Alternative: 2	**Improved Glazing**												
Electric													
On-Pk Cons. (kWh)	1,346	1,216	1,451	1,257	1,787	1,827	3,019	3,230	1,999	1,381	1,326	1,279	21,117
On-Pk Demand (kW)	6	6	6	6	15	16	20	20	19	6	6	6	20
Oil													
Cons. (therms)	1,016	858	599	349	48	15	0	0	6	328	565	874	4,659

Energy Consumption		
Building	28,254	Btu/(ft2-year)
Source	37,114	Btu/(ft2-year)
Floor Area	19,040	ft2

Environmental Impact Analysis	
CO_2	No Data Available
SO_2	No Data Available
NOX	No Data Available

MONTHLY ENERGY CONSUMPTION

By Harriman

------- Monthly Energy Consumption -------

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative: 3	**VRF HVAC System**												
Electric													
On-Pk Cons. (kWh)	18,325	15,543	9,401	5,417	2,737	2,529	4,373	4,552	2,701	5,357	8,773	14,051	93,760
On-Pk Demand (kW)	134	134	64	52	43	25	28	27	39	51	58	68	134

Energy Consumption		
Building	16,807	Btu/(ft2-year)
Source	50,425	Btu/(ft2-year)
Floor Area	19,040	ft2

Environmental Impact Analysis	
CO_2	No Data Available
SO_2	No Data Available
NOX	No Data Available

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative: 4	**Improved Glazing and VRF Heat Pump**												
Electric													
On-Pk Cons. (kWh)	11,995	10,871	7,341	4,659	2,229	2,025	2,881	3,091	2,098	4,444	6,801	9,765	68,200
On-Pk Demand (kW)	93	94	56	51	22	23	18	18	17	49	53	59	94

Energy Consumption		
Building	12,225	Btu/(ft2-year)
Source	36,679	Btu/(ft2-year)
Floor Area	19,040	ft2

Environmental Impact Analysis	
CO_2	No Data Available
SO_2	No Data Available
NOX	No Data Available

MONTHLY UTILITY COSTS

By Harriman

2023

------- Monthly Utility Costs -------

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative 1													
Electric													
On-Pk Cons. ($)	225	206	238	213	427	421	786	804	448	226	220	215	4,428
Oil													
On-Pk Cons. ($)	4,339	3,304	2,250	1,159	74	10	0	0	24	1,191	2,173	3,637	18,163
Monthly Total ($):	4,564	3,510	2,488	1,373	501	431	786	804	472	1,417	2,393	3,853	22,592

Building Area = 19,040 ft²

Utility Cost Per Area = 1.19 $/ft²

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative 2													
Electric													
On-Pk Cons. ($)	221	203	235	209	280	286	446	475	309	226	218	212	3,319
Oil													
On-Pk Cons. ($)	2,255	1,905	1,331	776	107	34	0	0	14	728	1,254	1,939	10,343
Monthly Total ($):	2,476	2,108	1,566	985	387	320	446	475	322	954	1,472	2,151	13,662

Building Area = 19,040 ft²

Utility Cost Per Area = 0.72 $/ft²

MONTHLY UTILITY COSTS

By Harriman

2023

------- Monthly Utility Costs -------

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative 3													
Electric													
On-Pk Cons. ($)	2,507	2,132	1,306	769	408	380	629	653	403	761	1,221	1,932	13,100
Monthly Total ($):	2,507	2,132	1,306	769	408	380	629	653	403	761	1,221	1,932	13,100

Building Area = 19,040 ft²

Utility Cost Per Area = 0.69 $/ft²

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative 4													
Electric													
On-Pk Cons. ($)	1,655	1,503	1,028	667	340	312	428	456	322	638	955	1,354	9,659
Monthly Total ($):	1,655	1,503	1,028	667	340	312	428	456	322	638	955	1,354	9,659

Building Area = 19,040 ft²

Utility Cost Per Area = 0.51 $/ft²

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

RECREATION DEPARTMENT

VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES

Introduction
Building vulnerabilities are considered any weakness that can be exploited by an aggressor or, make an asset susceptible to hazard damage via natural factors such as storms. The Recreation Center doesn't fall into the category of a terrorist target, but does have security needs, as well as the need to be protected from potential litigation, along with needing flexibility of energy sources in the event of unforeseen supply circumstances.

Building adaptation encompasses a range of construction activities that improve existing building conditions and extend the effective lives of buildings. The scopes of building adaptation projects vary, and may include rehabilitating failing structures, improving environmental performances, and changing functional uses. Building adaptation also includes appropriate responses to changing climate.

Vulnerability Assessment

Security
Security at the Recreation Center involves primarily protection of visitors and staff, along with equipment and supplies such as athletic equipment along with the items in the second floor broadcast studio. The level of security required appears to be at a moderate level due to the perceived threat and lack of being a target.

Recreation Center from Southeast

Recreation Center from Northwest

Security can be provided by active measures or by more passive means integrated into the design. Crime Prevention Through Environmental Design (CPTED), is a passive approach that seeks to reduce crime and fear of crime by manipulating the built environment to create a safer space.

Following are basic design principles of CPTED:

- *Natural Surveillance*
  The building exterior is highly visible on all sides, with minimal blind spots, other than vegetation against the building at the north entrance on Sheridan Street.
- *Access Control*
  Another means of passive security is controlling access by physical barriers such as locks, fences, doors, windows, etc. There are four exterior entrances that

allow access through most of the building during business hours with limited supervision. Added security could be achieved by increased access control.

- *Territorial Enforcement*
  Public and private boundaries inside and outside the facility can be defined through signage. Boundaries can also be reinforced through positive territorial enforcement means including lighting, public art, vegetation, etc. Public and private areas inside the building are straightforward, and wayfinding is fairly simple.
- *Maintenance and Management*
  Pride of place is reinforced through proper maintenance as well as vandal resistant materials. The Recreation Center is a generally well-maintained and clean environment and has an atmosphere that discourages graffiti and vandalism.

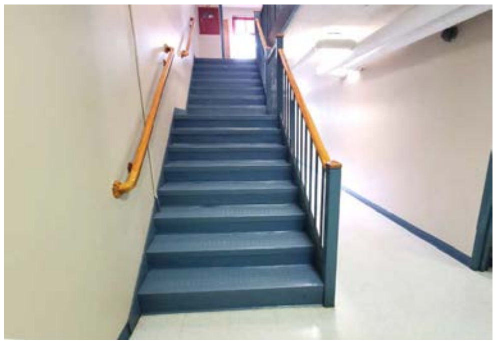
Vegetation at North Entrance

Active Security Features

- *Surveillance*
  Surveillance includes the placement of security cameras at strategic places at the exterior or interior in order to monitor suspicious activity from a location inside the building. Presently there doesn't appear to be a need for active surveillance.
- *Screening*
  Screening of visitors at the building entrance or at points inside the facility would provide an added level of security if the need were to arise. An electronic entry system could allow for remote screening and entry without needing to staff a position for that specific task. Due to the public nature of the building services and necessary level of security, it doesn't appear that screening is required at this time.

Litigation

The Americans with Disabilities Act is a civil rights law that prohibits discrimination based on disability. As such, facilities that do not meet ADA standards are open to litigation from individuals that aren't able to access public areas. Employers are required to make reasonable accommodations to employees with disabilities. Aspects of the Recreation Center that do not meet ADA guidelines include stair handrails and guardrails, and some door handles.



Noncontinuous, oversized handrails

Noncompliant door handles

Energy Supply Systems

The current steam heating system of the building is increasingly susceptible to breaking down as well as becoming more obsolete and less efficient in comparison to newer options. Following are strategies to make the Recreation Center less vulnerable to interruption in service and inefficiency.

- *Redundancy of Systems*
  Upgrading the system to a central VRF system to efficiently heat and cool the entire building along with keeping the existing heating system for backup would provide flexibility to prepare for unforeseen conditions.
- *Power Continuity*
  Power continuity is not seen as a priority for the Recreation Center since it isn't of critical use to the City.
- *Ability to Accommodate Future Needs*
  Lack of land is a vulnerability for the Recreation Center with regard to expansion, although the unexcavated area in the building does allow for minimal expansion.

Adaptation Strategies

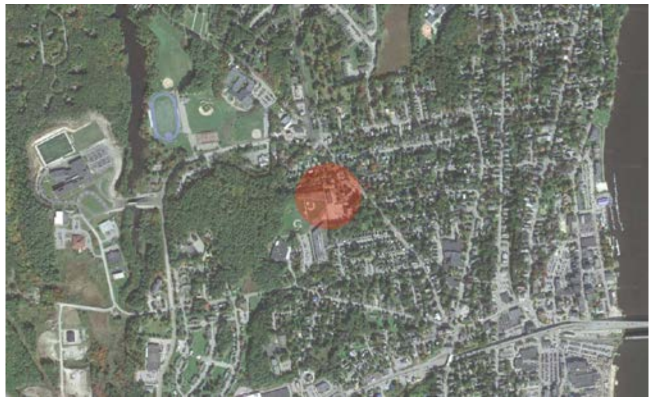
Building Adaptation Strategies

Adapting the building to changing conditions involves many of the recommendations that have been listed in detail in the analyses of the various building systems elsewhere in this report. Following are the general ways that the building can be adaptable to the future.

- *Improve conditions and extend the life of the Recreation Center*
  - Improve accessibility
  - Rehabilitate failing aspects of interior and exterior
- *Improve environmental performance with an upgraded energy system*
  - New VRF system with existing system as backup

Adaptation to climate change

Adapting to changing climate includes general categories that apply differently to various parts of the country. Following is a list of typical resilience categories and how they are anticipated to affect to conditions at the Recreation Center.



Recreation Center Location in Bath

- *Resilience to heatwaves*
  - Minimal impact from heatwaves is anticipated due to the regional climate that is less impacted than the rest of the United States.
- *Resilience to drought*
  - Minimal impact in the region is anticipated due to the abundance of water compared with other parts of the country.
- *Resilience to coastal flooding/ sea-level rise*
  - The Recreation Center would not be directly impacted by a rising sea level or surges due to being situated at about 65’ above sea level.
- *Resilience to strong winds*
  - Due to the elevation being lower than surrounding buildings and also forested areas, westerly and northerly winds would be less of an impact on the Recreation Center. At its location inland from the coast it does not bear the direct brunt of coastal storms.
- *Resilience to cold*
  - Improved efficiency and redundancy of energy systems as recommended would help with resilience to extremes in cold.

Project List	Area (in Square Feet) or Unit Quantity	Scope Description	Cost/SF or Unit Cost	Rough Order of Magnitude (OoM) Cost
Total Building	19,040	Note: Cost information is in 2024 dollars. Escalation typically ranges from 5% to 7% annually.		
Civil				
Remove pavement at east, landscape buffer, curbing		Allowance		$ 75,000
Building entrances to current ADA standards, contrast pavement, pedestrian protection		Allowance		$ 10,000
Repave and restripe accessible parking space per ADA	300 sf	Allowance		$ 5,000
Evaluate east parking details		Allowance		$ 7,000
Reset manhole covers, rims, grates to grade		Allowance		$ 10,000
Consider pole-mounted lighting at perimeter		Allowance		
Replace concrete stairs, repave adjacent		Allowance		
Prune landscaping to clear walkways		Allowance		$ 1,000
		Labor costs applied to construction cost	**Civil Construction Total**	$ 108,000
	30%	Project soft costs applied to construction cost	**Total Civil**	**$ 140,400**
Structural				
Investigate uneven elevated floors		Allowance		$ 5,000
Investigate cracks in CMU walls		Allowance		$ 5,000
		Labor costs applied to construction cost	**Structural Construction Total**	$ 10,000
	30%	Project soft costs applied to construction cost	**Total Structural**	**$ 13,000**
Building Exterior / Envelope				
Remove and replace cracked/ spalled brick	50	brick replacement, per brick	$ 39	$ 1,925
Repair mortar joints	50	square foot of repair area	$ 48	$ 2,400
Scrape, prime, and paint rusted lintels	20	linear foot	$ 75	$ 1,875
Repair cracked/ spalled stone/ concrete	10	square foot of repair area	$ 250	$ 2,500
Clean areas of stain, rust, algae growth	100	square foot of cleaning area	$ 17	$ 1,700
Repair locations of abandoned fastener holes	5	per location	$ 145	$ 725
Replace failed sealant	200	per linear foot of repair	$ 19	$ 3,700
Repoint brick masonry chimney 100%	50	square foot of repair area	$ 45	$ 2,250

	Remove and replace failed sealant	200	per linear foot of repair	$ 19	$ 3,700
	Scrape, prime and paint wood window frames	830	linear feet		$ 16,200
	Install stripping membrane at roof field seams	1,600	linear feet	$ 5	$ 8,000
	Remove EIFS panels and replace with aluminum composite material panels	1,368	85/sf for demolition and new construction	$ 85	$ 116,280
			Labor costs applied to construction cost	**Building Exterior Construction Total**	$ 161,255
		30%	Project soft costs applied to construction cost	**Total Building Exterior**	**$ 209,632**
Building Interior					
	Update doors with lever-type locksets	10	$840/each, installed	$ 840	$ 8,400
	Install compliant stair rails, guardrails	200	$155/lf for wall-mtd rails, remove & replace, $260/lf interior rail syst.	$ 208	$ 42,550
	Reduce restroom threshold heights	2	Allowance	**$ 1,000**	$ 2,000
	First floor toilet rooms per Option 3	264 sf	square foot of renovation area	$ 400	$ 106,500
	Renovate unfinished area for elevator	total cost	(option - not included in total cost)	**$ 430,000**	$ 430,000
	Renovate unfinished area for kitchen	500 sf	square foot of renovation area (option - not included in total cost)	**$ 350**	$ 175,000
	Second floor renovations per Option 1	1100 sf	square foot of renovation area (option - not included in total cost)	**$ 200**	$ 220,000
	Second floor toilet rooms per Option 2	550 sf	square foot of renovation area (option - not included in total cost)	**$ 400**	$ 220,000
	Second floor office reno. per Option 2	1380 sf	square foot of renovation area (option - not included in total cost)	**$ 200**	$ 276,000
			Labor costs applied to construction cost	**Building Interior Construction Total**	$ 159,450
		30%	Project soft costs applied to construction cost	**Total Building Interior**	**$ 207,285**
Plumbing					
	Test domestic water for traces of lead		Allowance		$ 2,000
	Install reduced-pressure backflow preventer	1	per fixture	$ 3,200	$ 3,200
	filler on each floor	3	$3550/fixture		$ 10,650
	separate 6" sewer and 8" storm PVC lines	1	$	$ 7,500	$ 7,500
	Replace water htr with heat pump tank	1	$ 8,500		$ 8,500
	Install thermostatic mixing valve, set to 120 F	1	per fixture	$ 1,500	$ 1,500
	Replace custodial sinks with mop basins	2	$3550/fixture		$ 7,100
			Labor costs applied to construction cost	**Plumbing Construction Total**	$ 40,450
		30%	Project soft costs applied to construction cost	**Total Plumbing**	**$ 52,585**
Mechanical					

Provide central VRF system to heat/cool	19,040	$40/sf for VRF, applied to entire buildling sf	$ 40	$ 761,600
Provide energy recovery ventilators	19,040	$18/sf for ERV	$ 18	$ 342,720
Extend building mgmt system to all HVAC	19,040	$6/sf	$ 6	$ 114,240
Remove steam heating system				$ 75,000
		Labor costs applied to construction cost	**Mechanical Construction Total**	$ 1,293,560
	30%	Project soft costs applied to construction cost	**Total Mechanical**	**$ 1,681,628**
Electrical				
Replace service entrance with new equip		Replace and upsize as required by new mech	$ 350,000	$ 350,000
with lighting control system		Allowance	$ 200,000	$ 200,000
Replace exit signs with self-testing		Included with light fixture cost		
Replace branch circuit panels and wiring	19,040	$4/sf	$ 4	$ 76,160
		Labor costs applied to construction cost	**Electrical Construction Total**	$ 626,160
	30%	Project soft costs applied to construction cost	**Total Electrical**	**$ 814,008**
TOTAL PROJECT COST GRAND TOTAL: ALL PROJECTS				**$ 2,911,253**

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PRIORITIZED ACTION AND PHASING PLAN
RECREATION CENTER

Costs shown are construction cost only, in 2024 dollars.
See Opinion of Probable Cost for detailed information, total project costs, and additional layout options.

II. RECREATION CENTER

Priority	*Cost*	*Timeframe*
1. Restrooms at Floors with Programs		
a. Renovate 1st floor for two restrooms	$80,000	3-5 years
b. Renovate classroom spaces on 2nd floor for restrooms	240,000	5-10
2. ADA/ Codes Improvements		
a. Site Improvements		
i. Repave and restripe accessible parking space per ADA	5,000	0-5
ii. Building entrances to ADA standards, contrast pavement, pedestrian protection	10,000	0-5
b. Code-compliant handrails/ guardrails	42,550	5-10
c. Accessible door handles	8,400	5-10
d. Reduce restroom threshold heights	2,000	5-10
3. Exterior Improvements		
a. Building repairs		
i. Masonry, concrete, steel lintel repairs	13,375	10-20
ii. Replace failed sealant	3,700	5-10
iii. Window frames: scrape, prime, paint	16,200	5-10
iv. Install stripping membrane at roof field seams	8,000	5-10
b. Site Improvements		
i. Remove pavement at east side, add landscape buffer, curbing	75,000	10-20
ii. Evaluate east parking details	7,000	10-20
iii. Reset manhole covers, rims, grates to grade	10,000	10-20
iv. Prune landscaping	1,000	5-10
4. Structural/ Plumbing/ Mechanical/ Electrical Improvements		
c. Structural		
i. Investigate uneven elevated floors	5,000	5-10
ii. Investigate cracks in CMU walls	5,000	5-10
d. Plumbing		
i. Test water for lead	2,000	0-5
ii. Backflow preventer, thermostatic mixing valve	4,700	10-20
iii. Plumbing fixtures: drinking stations, replace custodial sinks with mop basins	18,750	10-20
iv. Separate storm/ sewer at boiler room	7,500	5-10
v. Replace water heater with heat pump tank	8,500	5-10
e. Mechanical		
i. Remove steam heating system (?)	75,000	10-20
f. Electrical		
i. Branch circuit panels and wiring replacement	76,160	10-20
5. Energy Efficiency		
a. Mechanical system upgrades		
i. VRF system	$761,600	10-20
ii. Energy recovery ventilators	342,720	10-20
iii. Building Management System	114,240	10-20
b. Electrical service replacement	350,000	10-20
c. LED light fixture replacement, self-testing exit signs	200,000	5-10

d.	Replace EIFS panels with insulated composite panels	116,280	5-10

6. Commercial Kitchen, Elevator

g.	Install commercial kitchen in unexcavated area	175,000	10-20
h.	Install elevator in unexcavated area	430,000	10-20

4

DEPARTMENT OF PUBLIC WORKS

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SUMMARY	
Building Name	Department of Public Works
Address	450 Oak Grove Avenue
Building Area (GSF)	15,240
Year of Construction	1962 (main building)
Year of Additions	
Construction type	
Building Use	
Occupancy Class	
Current Zoning	
Total Number of Floors (M=Mezzanine)	1 + M
Harriman Project Number	23138

Total Scores	
Category	*Average Score*
Exterior	2.3
Life Safety	3.0
Interior	1.7
Civil	1.7
Structure	3.0
Electrical	2.7
Lighting	2.0
Mechanical	2.8
Plumbing	2.7
Fire Protection	N/A

Scoring System	
1	Very Poor
2	Poor
3	Fair
4	Good
5	Very Good
N/A	Not Applicable

PRIORITY NOTES:

a. Provide accessible parking spaces and entrances per ADA standards.
b. Insulate inside exterior walls.
c. Replace stair to mezzanine.
d. Refinish exterior wall panels.
e. Install backflow preventer, relocate air compressor.
f. Replace exit signs with self-testing, provide conditioning and explosion protection to flammable cabinet.
g. Repair roof anchors, column bases, deformed column at Salt Barn.
h. Paint exterior wood surfaces of storage building.

ARCHITECTURE			
	Score		Average
Building Exterior			
Exposed Foundation	N/A	Building Exterior Average Score	2.3
Brick / Masonry	N/A		
Siding / Cladding	1		
Windows	3		
Doors	2		
Canopies / Overhangs	N/A		
Roof / Flashing	3		
Life Safety			
Fire Alarm / Strobes	3	Life Safety Average Score	3.0
CO / Smoke Detector	3		
Life Safety: Exit Signs	3		
Life Safety: Emergency Lighting	3		
Interior			
Walls and Base	2	Interior Average Score	1.7
Flooring	2		
Ceiling	2		
Stairs	1		
Handrails	1		
Doors	2		
Glazing	2		

CIVIL AND STRUCTURE			
	Score		Average
Civil			
Site Drainage	2	Building Exterior Average Score	1.7
Utilities	2		
ADA Accessibility	1		
Site Features	2		
Pavement conditions	1		
Parking	2		
Structure			
Structural Framing	3	Structure Average Score	3.0
Observable Masonry	3		
Headers / Lintels	N/A		
Central Stair	N/A		

MEP SYSTEMS			
	Score		Average
Electrical			
Service Entrance	2	Electrical Average Score	2.7
Panel / Distribution	2		
Standby Power	4		
Lighting	2	Lighting Average Score	2.0
Lighting Controls	2		
Mechanical			
Building Envelope	1	Mechanical Average Score	2.8
Heating Plant	4		
Cooling Plant	N/A		
Heating Distribution	3		
Cooling Distribution	3		
Ventilation	2		
Controls	3		
Specialty Areas	2		
Plumbing			
Toilet Rooms	3	Plumbing Average Score	2.7
Kitchen	3		
Domestic Water	2		
Showers	N/A		
Sprinkler Riser	N/A	Fire Protection Average Score	N/A
Sprinkler Distribution	N/A		

NOTES

ARCHITECTURAL EXTERIOR NOTES:

Walls: remove and replace rusted, corroded and deformed metal wall panels (or replace with new insulated metal wall panels); scrape, prime and paint metal wall panels. Windows: remove and replace existing windows with new, thermally broken aluminum windows. Roofs: Install EPDM stripping membrance at roof field seams, repair loose asphalt shingles, secure loose edge metal, scrape, prime and paint corrugated metal panel roof - per notes.

ARCHITECTURAL INTERIOR NOTES:

The pre-engineered building is sixty years old, and is worn in many aspects. Damaged insulation facing is in need of repair, and the stair to the mezzanine needs handrails and adequate guardrail. Provide an accessible restroom.

CIVIL NOTES:

Pavement is very poor in part due to proper drainage; geotechnical report needed with test pits to confirm soil and groundwater conditions. Public entrances, parking need to be constructed to meet ADA requirements. Site lighting needs to be improved.

STRUCTURAL NOTES:

Repair corroded steel column bases and broken steel kicker braces in main building. Repair corroded steel roof anchors, column bases, and deformed column at Salt Barn.

ELECTRICAL NOTES:

Replace electrical service entrance in kind; replace light fixtures throughout the building with LED-source fixtures, install lighting control system; remove and replace exit signs with self-testing diagnostics; replace branch circuit panels and load centers throughout; provide conditioned flammable cabinet space, including explosion proof or other rated enclosures around electrical devices near flammable cabinets; upgrade site lighting with LED fixtures with a building lighting control system.

MECHANICAL NOTES:

Heating plant consists of one triple pass cast iron hot water boiler, burning #2 oil and in good condition. Hot water is distributed to baseboard radiation in the office portion of the building using Taco circulator pumps that appear to be in good condition. The vehicle bays are heated by oil fired furnaces with local control that appear to be in working condition. Operable windows are used for ventilation in the office portion of the building, and exhaust snorkels tied to an exhaust fan are used for local exhaust and vehicle exhaust. Space cooling in the office portion of the building is provided by a split air conditioning system.

PLUMBING NOTES:

Provide one restroom with ADA compliant fixtures. Replace water heater, provide hot water recirculation and thermostatic mixing valve.

LIFE SAFETY NOTES:

None of the facility's toilet rooms are accessible, and the shower doesn't meet ADA standards. The stair doesn't meet OSHA standards for handrails or guardrail height.

OPERATIONAL NOTES:

Minor renovations involve enlarging the front entrance vestibule and possibly adding a publicly accessible restroom, allowing for additional open office space for reconfiguration of office systems furniture or additional meeting space. Also, a renovation of the currnet Locker/ Wash room to two individual restrooms with showers allows for privacy and multiple users. Additional proposed renovations include adding either one or two bays to the far side of the garage with fully-enclosed bays or roof covering only.

ENERGY USE INTENSITY (EUI) NOTES:

The existing heat pump system used in the office areas cannot be significantly improved upon, and the unit heaters used in the vehicle bays are similarly adequate for the current usage. An energy recovery ventilator is proposed for the director's office to create positive pressure in order to keep out migrating odors from the work bays.

FACILITY VULNERABILITIES NOTES:

Vulnerabilities due to security, energy, and litigation are less critical than at the other facilities, especially due to the limited intended lifespan of the current building. Adaptability is an issue that should be further explored upon the planning of a new facility to replace the current one.

SUSTAINABLE OPPORTUNITIES NOTES:

Exploring geothermal is suggested as a renewable energy resource when considering a new facility.

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CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

DEPARTMENT OF PUBLIC WORKS

CIVIL

Introduction
The Department of Public works is located at 450 Oak Grove Avenue. For the purposes of this narrative, the front of the building is facing south as viewed from the street.

Site context (source Google Maps)

Topographic Conditions
- The site is generally flat; at the back of the sand/salt shed, the topography rises beyond the usable portion of the site at the ledge face and hill behind.
- Slopes around the building are very shallow with runoff directed to drainage swales along the perimeter of the site including a roadside swale at Oak Grove Avenue.
- Erosion is occurring where there is no curbing at the edge of the paved areas; particularly at the driveway intersections; at the gravel drive at the west end of the site, and along the edge of the pavement at the east end of the site including an area for vehicular parking.
- There is puddling/standing water along the front of the site where the paved area abuts the lawn area. There is pudding at low points in the pavement in front of the garage bays, particularly at the west end of the building where the pavement is in very poor condition.

Erosion at pavement edges

Ledge at back of site

Puddling in paved area – poor pavement conditions

ADA Accessibility

Accessible Parking and Signage

- There was no ADA signage seen at the visitor parking spaces along the right front of the building. Spaces were signed for visitors, and areas in front of the doorways striped for no parking.
- There is no designated accessible route to the front door.
- The asphalt pavement around the building extends up to the building line at the front and at the ends of the building including at the main (office) entrance located at the east end of the building.

Parking at main building entrance

Accessibility from Exteriors

- The main (office) entrance is not HC accessible as the door sill is greater the 1/2" above the pavement.
- There are two man-doors on the front of the building at the easterly (right hand) end. Like the office entrances, the bituminous pavement extends up to these doors but the sills do not meet ADA requirements. The overhead doors at the garage bays are flush with the outside pavement.

Entrances at front of building

Utilities

- There were no catch basins noted. The site drains by sheet flow from the building to a perimeter trench/swale.
- The site is served by a private septic system. It was replaced in the mid-1990s. Its present condition and capacity is unknown.
- The two driveways at Oak Grove Avenue have culverts. The drainage swale and culvert on the east side of the westerly driveway has been cleared. In addition to the driveway culvert, there is also a culvert under Oak Grove Avenue discharging runoff into the swale from the opposite (south) side of the roadway. The drainage swale farther to the west is overgrown with weeds and wetland plants.

Drainage swale at road

West driveway culvert

Typical drainage at edge of pavement

Storage area at rear of building

Bituminous pavement at service bays

Site Infrastructure

- Pavements on the front and ends of the building are in poor to very poor condition.
- There are few curbs on-site. The curb along the south side of the sand shed is in poor condition.
- There are few bollards. Building entrances, vestibules, and service bays (overhead doors) are not protected with bollards. The building metal siding has been damaged near a service bay overhead door. Yellow pipe bollards are located at the ends of the fueling island.
- Dumpsters are located behind the building near the office entrance. There are several dumpsters to allow for trash and recycling including metals.
- There is limited fencing. A gate is located behind the building to separate the general paved area access to the sand/ salt shed area. The gate is in poor condition sagging badly due to lack of proper support.
- Site lighting consists of spotlights mounted at the top of the wood utility poles. The poles are located at the outer edge of the paved service areas and spotlights are pointed toward the building. The fueling island is lit from the overhead canopy protecting the fueling area. Refer to the electrical engineer’s narrative.

Gate at northeast corner

Landscaping

- Landscaping consists of a broad lawn across the front of the site with a mixed stand of mature pines and deciduous trees. Deciduous trees are also located to the west of the easterly entrance drive.
- The perimeter of the site is wooded in places and overgrown with weeds along the drainage swale.

- The lawn is in good condition and recently mowed. Some deciduous trees show stress perhaps due in part to the high groundwater.

Street view of landscaping

Miscellaneous/ Regulatory

- Sight distances are good at both driveways.
- The building setback has not been confirmed for zoning compliance.

Sight distance to west

Recommendations or Corrective Actions

- Site circulation generally works satisfactorily. However, the site is too small and lacks space for storage of heavy equipment, plows and attachments, and other implements used by the town.
- The pavement is in very poor condition in many areas and particularly at the service bays. Although the poor condition may be attributed in part to the heavy truck usage and age of the pavement, the over-arching issue with the site appears to be a lack of proper drainage. The site is very flat with a high water table (the perimeter drainage swale was full of water). The building floor elevation may need to be raised to improve surface drainage away from the building and to provide sufficient cover for pavement, gravel base and subbase; drainage structures and piping to have an adequate freeboard for discharge of stormwater into the drainage swale(s).
- Bituminous pavement: A geotechnical report should be provided with test pits and/ or borings to confirm existing soil and groundwater conditions, depths and to confirm pavement thicknesses in heavy load areas and near the office. Base gravel depths and gradation should also be confirmed. The reconstruction of the paved

areas - which may include geotextile; improved gravel base, a system of underdrains, storm drains, and proper bituminous pavement- should follow the recommendations of geotechnical and civil engineers.

- All public entrances should be constructed to current ADA standards. Parking spaces for both staff and visitors should comply with ADA standards.
- Site lighting should be modified to provide adequate light levels in the service yards, parking areas and building entrances. Light fixtures should include full cutoff for glare and light trespass. (Refer to electrical engineer's assessment).
- The existing septic system should be assessed for condition, capacity, and replacement if necessary.
- Stormwater from paved areas should be detained or intercepted to provide adequate treatment from the possible impact of oils, road salts and sediments.
- Additional covered storage areas should be provided to replace areas near the building where roofs have collapsed.
- New fencing and gates should be provided for security and to cordon areas as needed.

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

DPW – Main Building

STRUCTURAL

General/Introduction
A limited review of the existing structure was completed based on information that could be gathered from the available original construction documents and from the visible and accessible structural system components observed during a site visit.

Existing Conditions Description
The original building is a one-story pre-engineered metal building which is generally constructed of structural steel frames comprised of wide flange columns and sloped wide flange beams which support steel purlins.

The building is supported entirely on a concrete foundation system comprised of perimeter foundation walls on continuous strip footings and isolated spread footings at steel column locations. The ground floor is constructed of a concrete slab-on-grade.

That lateral force resisting system was not specifically identified in the available documents but is assumed to be comprised of structural steel diagonal brace frames and structural steel moment frames.

Based on our limited review of the existing building, the main structural systems appear to be in generally good condition.

List of Concerns
- The column bases, anchor bolts, and baseplates appear to be significantly corroded.
- Steel kicker braces at the roof appear broken at several locations.

Corroded steel column base.

Broken steel kicker angle.

Recommendations
1. The corroded steel column bases and broken steel kicker braces should be repaired.
2. Any proposed structural renovations and additions to the structure will follow the gravity and lateral (wind and seismic) loading provisions stipulated by the 2015 International Building Code (IBC), the 2015 International Existing Building Code (IEBC) and the American Society of Civil Engineers (ASCE) Standard 7-10 *Minimum Design Loads for Buildings and Other Structures*. These are the applicable building codes currently adopted by the State of Maine. It should be understood that current building codes are more stringent than the codes in place at the time of original construction. If significant structural modifications are required to construct the proposed

renovations, the entire existing structure may need to be analyzed and upgraded if found to be deficient.

3. The building code requires that lateral forces (wind and seismic forces) introduced by renovations to an existing structure are considered. These forces are determined through consideration of numerous criteria related to soil type, exposure, height, and type of structural system. The IEBC 2015 does not require structural upgrades to an existing building unless an addition, alteration (such as an increase in roof insulation) or change of use prompts or causes an increase in loads beyond specified thresholds. Depending on the scope of future additions or renovations, further lateral force resisting system analysis and/or upgrades may be necessary.

DPW – Salt Barn

STRUCTURAL

General/Introduction
A limited review of the existing structure was completed based on information that could be gathered from the available original construction documents and from the visible and accessible structural system components observed during a site visit.

Existing Conditions Description
The original building is a one-story pre-engineered metal building which is generally constructed of open web steel joist arches with a textile roof. The roof fabric is attached to exposed bent rebar anchors embedded in concrete.

The building is supported entirely on a concrete foundation system comprised of perimeter foundation walls on continuous strip footings and isolated spread footings at steel column locations. The ground floor is constructed of a concrete slab-on-grade.

Based on our limited review of the existing building, the main structural systems appear to be in generally good condition.

List of Concerns
- The roof fabric anchors, column bases, anchor bolts, and baseplates appear to be significantly corroded.
- One column that forms the vehicle door opening appears to have been struck by a vehicle and has been deformed.


Corroded steel column base.


Deformed column.

Recommendations
1. The corroded steel roof anchors, column bases, and deformed column should be repaired.
2. Any proposed structural renovations and additions to the structure will follow the gravity and lateral (wind and seismic) loading provisions stipulated by the 2015 International Building Code (IBC), the 2015 International Existing Building Code (IEBC) and the American Society of Civil Engineers (ASCE) Standard 7-10 *Minimum Design Loads for Buildings and Other Structures*. These are the applicable building codes currently adopted by the State of Maine. It should be understood that current building codes are more stringent than the codes in place at the time of original construction. If significant structural modifications are required to construct the proposed

renovations, the entire existing structure may need to be analyzed and upgraded if found to be deficient.

3. The building code requires that lateral forces (wind and seismic forces) introduced by renovations to an existing structure are considered. These forces are determined through consideration of numerous criteria related to soil type, exposure, height, and type of structural system. The IEBC 2015 does not require structural upgrades to an existing building unless an addition, alteration (such as an increase in roof insulation) or change of use prompts or causes an increase in loads beyond specified thresholds. Depending on the scope of future additions or renovations, further lateral force resisting system analysis and/or upgrades may be necessary.

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

DPW – Storage Shed

STRUCTURAL

General/Introduction
A limited review of the existing structure was completed based on information that could be gathered from the available original construction documents and from the visible and accessible structural system components observed during a site visit.

Existing Conditions Description
The original building is a one-story non-engineered metal building which is generally constructed of a corrugated metal arch. The end walls are constructed of wood studs with board sheathing on one end and corrugated metal sheathing on the other. The building is supported entirely on a concrete slab-on-grade.

Based on our limited review of the existing building, the main structural systems appear to be in generally good condition.

List of Concerns
- Based on a discussion with the DPW it appears this building has been moved to this site from a former government works project and it is unclear whether the building has been engineered for gravity and lateral loads as prescribed by the International Building Code.

Storage shed interior.

Recommendations
1. Any proposed structural renovations and additions to the structure will follow the gravity and lateral (wind and seismic) loading provisions stipulated by the 2015 International Building Code (IBC), the 2015 International Existing Building Code (IEBC) and the American Society of Civil Engineers (ASCE) Standard 7-10 *Minimum Design Loads for Buildings and Other Structures*. These are the applicable building codes currently adopted by the State of Maine. It should be understood that current building codes are more stringent than the codes in place at the time of original construction. If significant structural modifications are required to construct the proposed

renovations, the entire existing structure may need to be analyzed and upgraded if found to be deficient.

2. The building code requires that lateral forces (wind and seismic forces) introduced by renovations to an existing structure are considered. These forces are determined through consideration of numerous criteria related to soil type, exposure, height, and type of structural system. The IEBC 2015 does not require structural upgrades to an existing building unless an addition, alteration (such as an increase in roof insulation) or change of use prompts or causes an increase in loads beyond specified thresholds. Depending on the scope of future additions or renovations, further lateral force resisting system analysis and/or upgrades may be necessary.

May 29, 2024

Re: Building Evaluation
City of Bath - Municipal Facilities Planning
Department of Public Works Building
Bath, ME
Gale JN 841640

Dear Mr. Gatchell:

In accordance with our agreement, Gale Associates Inc. (Gale) performed a visual evaluation of the in-place roof, window, and building enclosure systems components for the City of Bath, Maine - Municipal Facilities Planning. Gale's evaluation included a review of the City Hall, Recreation Center, and Department of Public Works (DPW) Buildings. Representatives from Gale visited the project on June 25, 2023 to conduct this evaluation. Access to the roof and building interiors was coordinated and provided by Harriman Associates (HA) and City of Bath (Bath) personnel.

The purpose of the evaluation is to provide HA with a better understanding of the conditions observed and how they may be contributing to reported moisture related issues. The purpose of this report is to provide our opinions to address the existing conditions that may be associated with interior moisture infiltration.

Background Information

The Public Works Department is a single story, maintenance structure located at 450 Oak Grove Avenue in Bath, ME. The façade of the building consists of corrugated metal wall panels with limited punched window openings and numerous overhead garage doors. The roof system consists of a steep-sloped roof with dome style skylights.

Figure 1: *Overall view of the Public Works Department.*

To assist Gale in performing the evaluation of the Recreation Center, representatives from HA provided Gale with the following documents:

- Drawings for the Public Works Garage - Bath, ME dated October, 1962 by the Office of the City Engineer. The set of drav ,
and landscaping plans.

Interior Leak Audit

As part of the evaluation, representatives from Gale performed an interior leak audit to evaluate areas of potential moisture infiltration. In general, the interior of the Recreation Center presented limited evidence of moisture infiltration including water staining and rust deterioration at isolated locations. Please note that during the evaluation, Gale did not observe active moisture infiltration. *Please refer to the attached reduced size drawings for the approximate locations of observed leak locations.* The following is a summary of Gale's observations:

DPW personnel reported that during heavy rain events, water typically pools at the interior along the base of the metal panel wall at the west elevation. Daylighting was observed at the interior where a portion of the panel was rusted away [refer to Figure 2].

Isolated locations of water staining were observed on the insulation at the underside of the roof deck, however it is unclear if this is due to a leak or from interior moisture from the vehicles and equipment. No active roof leaks were reported by DPW personnel.

Figure 2: *Daylighting at the base of the metal wall panels were water was reported to pool.*

Figure 3: *Moisture staining at ceiling adjacent to roof skylight.*

Existing Conditions and Observations

Gale's visual evaluation of the brick masonry façade, windows, roof, and associated components was performed from the ground level with the assistance of binoculars, while asses to the roof area was brigaded by BGS personnel. To visually review the higher elevations, Gale utilized our DJI Phantom 4 UAV drone to provide video and photographs of the associated building enclosure components. The following observations are based on Gale's field evaluation performed at the DPW Building. *Please refer to the attached supporting information related to Gale's evaluation including photographic documentation and reduced size drawings with general locations of observed defects.* The following is a summary of Gale's observations:

Exterior Walls:

- Exterior walls consist of corrugated steel metal wall panels supported by steel framing, with batt insulation installed at the interior of the panels. The steel panels are painted at the exterior with variations in their application, color, and condition.
- The metal panels were observed to be dented and/or punctured in several locations throughout the facility with exposed insulation, especially at the east elevation between garage bays [refer to Figures 4 and 5]. Additionally, scratches, fastener holes, rusted fasteners, failed sealant at penetrations, and open sheet metal seams were typically observed.
- Rust corrosion was typically observed along the base of the panels at varying levels of severity. Portions of the panels were observed to be missing at areas of severe rust [refer to Figure 6].
- The existing paint finish was observed to be in fair to poor condition. Peeling/bubbling paint was typically located at the metal panels on the east elevation, as well as at isolated locations throughout the facility.
- An additional at the west elevation as well as entry vestibules are constructed with wood siding which appeared to be in fair condition with typical peeling paint at the base of the wall [refer to Figure 7].
- Isolated portions of metal wall panels appear to have been previously replaced.
- Vegetative growth was observed at the base of the walls at isolated locations.

Figure 4: *Open/torn sheet metal panel.*

Figure 5: *Dented metal wall panel and exposed insulation, with typical peeling paint.*

Figure 6: *Rust staining and deterioration at the base of the metal wall panels.*

Figure 7: *Wood siding at entry vestibule.*

<u>Windows:</u>

- Window systems appear to vary throughout the facility and appear to be a variety of steel, aluminum, and vinyl composite windows.
- The majority of window locations appear to be replacement composite hung windows with insulated glazing units and exterior mounted insect screens at operable units [refer to Figure 8]. The windows appear to be installed within wood framing with sheet metal panning at the exterior. Paint was observed to be typically peeling at wood frames and trim [refer to Figure 9].
- One (1) window location was observed to include obscured glass.
- Algae and moss growth was observed at the window sash and sill at isolated locations [refer to Figure 10].
- One (1) steel window is located on the west elevation and appears to be original to the building. The steel window includes single pane glass and true divided lites and appears to be an operable projected unit. One (1) lite of glass is cracked, and the steel frame is rusted [refer to Figure 11].

Figure 8: *Typical existing window at wood frame.*

Figure 9: *Peeling paint at deteriorated wood framing at window.*

Figure 10: *Algae and vegetative growth at windowsill.*

Figure 11: *Steel window with cracked glass.*

Roofing:

- The existing roof system appears to consist of a single-ply elastomeric (EPDM) membrane over an unknown type and thickness of insulation and roof deck [refer to Figure 12]. There appears to be batt insulation with an unknown vapor barrier facer installed below the deck. Stripping membrane was not observed at EPDM field seams. Please note, access was not provided to the steep-slope roofs. In general, the roof area appears to be in serviceable condition as there were no reported leaks or noticeable deficiencies viewed from the aerial drone survey.
- Acrylic dome skylights are located throughout the roof and appear to be in good condition.
- At the west elevation, a one-story addition appears to be constructed with a steep-slope corrugated metal roof which appeared to be in fair condition with isolated rust staining below

an adjacent vent pipe [refer to Figure 13]. Edge metal at the roof eave was observed to be loose with fasteners backing out of the wood fascia [refer to Figure 14].

- The roof areas above the entry vestibules appear to consist of an asphalt shingle roof system, which appears to be in fair condition. At the transition between the asphalt shingle roof and the metal wall panels, it is unknown if there is step flashing and counterflashing installed as layers of asphalt roof cement have been applied along the transition joint [refer to Figure 15]. The roof cement appears to be deteriorating and in poor condition.

Figure 12: *EPDM roofing system with dome skylights.*

Figure 13: *Corrugated metal roof deck with rust staining.*

Figure 14: *Loose edge metal trim with fasteners backing out.*

Figure 15: *Asphalt shingle roof with asphalt roof cement at the metal panel wall transition.*

Summary/Opinions

Based on Gale's visual evaluation, it appears that the existing exterior façade is in poor condition with defects in the metal wall panels including, but not limited to, rust, corrosion, deformations, damage, open seams, and loose fasteners. Portions of the metal panels appeared to have been previously replaced or recoated. Sections of metal wall panels which are dented, rusted, or damaged should be removed and replaced in kind. At the east elevation, the paint coating was observed to be typically bubbling/peeling, and did not appear to be compatible with the galvanized steel panels. For both overall performance and aesthetic consistency, the metal panels should be scraped, primed, and painted with a compatible paint coating system. In lieu of painting and if funding is available, Bath may also consider the replacement of the existing metal panels with a new insulated metal wall panel system, which could improve the thermal performance of the facility. Metal panel replacement may be considered as a holistic approach for building envelope improvements if combined with replacing the existing windows as discussed further in this report.

Window systems at the facility appear to consist of a variety of types and configurations. Although the date of window installation is unknown, the windows appear to be replacement units that are typically aged. The one (1) location of original steel window was typically rusted with one (1) cracked glass lite.

Typical window systems have a service life of between twenty to thirty years (20-30 yrs.) depending on the type of system, frequency of use, and exposure to weather. Depending on the quality, vinyl windows can experience deterioration due to loss of chemical plasticizers where the vinyl components become brittle, resulting in splits, cracks, and failure of the window unit. Window units that see frequent sun/UV exposure tend to experience accelerated deterioration of the weather-stripping, glazing gaskets, and finishes. The steel window appears to be original to the construction of the building which would make it approximately 61-years-old. It is Gale's opinion that existing windows be removed and replaced with new, thermally broken aluminum windows with insulated glazing units.

Although the installation date of the roof system at Roof Area A is unknown, roof appears to be in serviceable condition, considering there were not reported leaks or noticeable deficiencies as viewed from the aerial drone survey. Access was not provided to the steep-slope roof area, and therefore observations were made from photographs taken during Gale's drone survey. It is Gale's experience that the adhered seams of EPDM systems are prone to delamination due to UV exposure, and can lead to moisture infiltration. To extend the service life of the EPDM roof areas, stripping membrane can be installed at membrane lap seams. Please note, some roof areas may still be under manufacturer's warranty, and the installation of stripping membrane should be coordinated with the membrane manufacturer. It is Gale's opinion that stripping membrane be installed at membrane seams at Roof Area A.

The asphalt shingle roof areas were also observed to be in good condition and remedial repairs should be performed to refasten loose shingles. Roof Area B consists of a steep-sloped corrugated metal panel roof which appears to be exhibiting rust staining from an adjacent vent stack above. The panels should be scraped, primed, and painted, and loose edge metal should be refastened to the fascia board.

Summary of Opinions

Exterior Walls:

- Remove and replace rusted, corroded, and deformed metal wall panels.
- Scrape, prime, and paint metal wall panels.

Alternate Option:

- Remove and replaced rusted, corroded, and deformed metal panels with new insulated pre-finished metal wall panels.

Windows:

- Remove and replace existing windows with new, thermally broken aluminum windows.

Roofs:

- Install nine-inch (9") EPDM stripping membrane at roof field seams at Roof Area A.
- Repair loose asphalt shingles.
- Secure loose edge metal at Roof Area B.
- Scrape, prime, and paint corrugated metal panel roof at Roof Area B.

We trust this information suits your needs at this time. Please do not hesitate to contact us if you require additional information regarding this matter.

Best regards,

GALE ASSOCIATES, INC.

Jane V. Leven

Jane V. Leven
Senior Designer
Building Enclosure Design and Technology Group

JVL/gmt

Enclosures: Appendix A - Reduced Size Drawings

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Appendix A

Reduced Drawings

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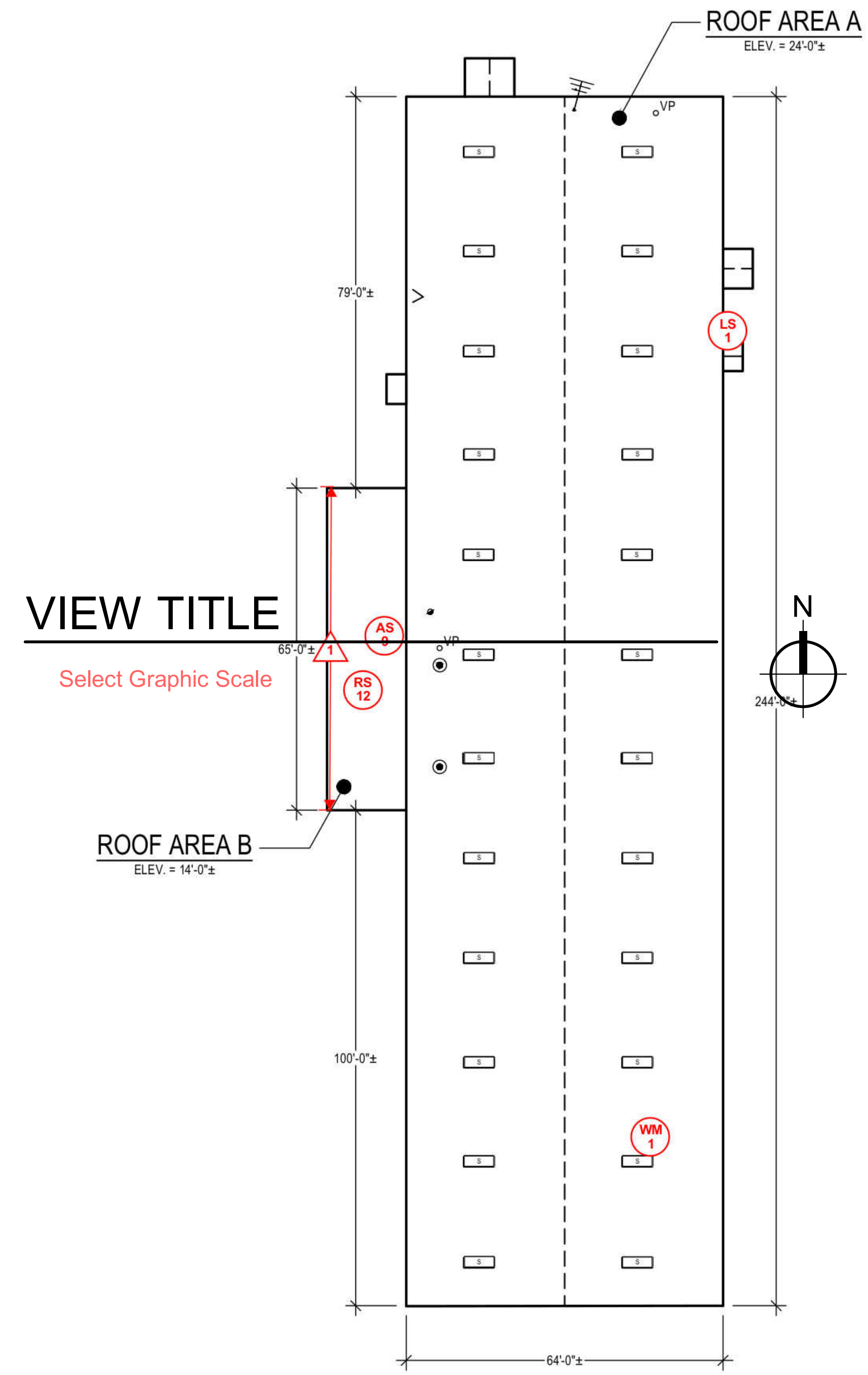

1 A100 ROOF AREA PLAN
SCALE: 1/16"=1'-0"

GENERAL NOTES

1. THE INFORMATION SHOWN ON THIS DRAWING HAS BEEN COMPILED FROM VARIOUS SOURCES AND MAY NOT REFLECT THE ACTUAL CONDITIONS AT THE TIME OF CONSTRUCTION.
2. HATCH PATTERNS ARE FOR REPRESENTATION ONLY AND SHOULD NOT BE USED AS A MEANS FOR QUANTIFYING.
3. THE DEFECTS NOTED INDICATE APPROXIMATE LOCATIONS. THEY ARE NOT INTENDED TO DEFINE LIMITS OF WORK.

LEGEND

NOTE: ALL ITEMS ARE EXISTING

ROOF EDGE
RIDGE/HIP LINE
VENT PIPE
ROOF ANTENNA
SKYLIGHT
STACK
GUY WIRE ANCHOR
RAIN DIVERTER

ROOFING DEFECT LEGEND

AS # — ATMOSPHERIC STAINING; # INDICATES SQUARE FEET
LS # — LOOSE SHINGLE; # INDICATES SQUARE FEET
RS # — RUST STAINING; # INDICATES SQUARE FEET
WM # — WRINKLED MEMBRANE; # INDICATES SQUARE FEET

DEFECT NOTES

1. APPROXIMATELY SIXTEEN (16) LOOSE SHEET METAL FASCIA FASTENERS.

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OWNER
PREPARED FOR HARRIMAN ASSOCIATES
FOR THE CITY OF BATH MUNICIPLE FACILITIES PLANNING
BATH, ME 04530

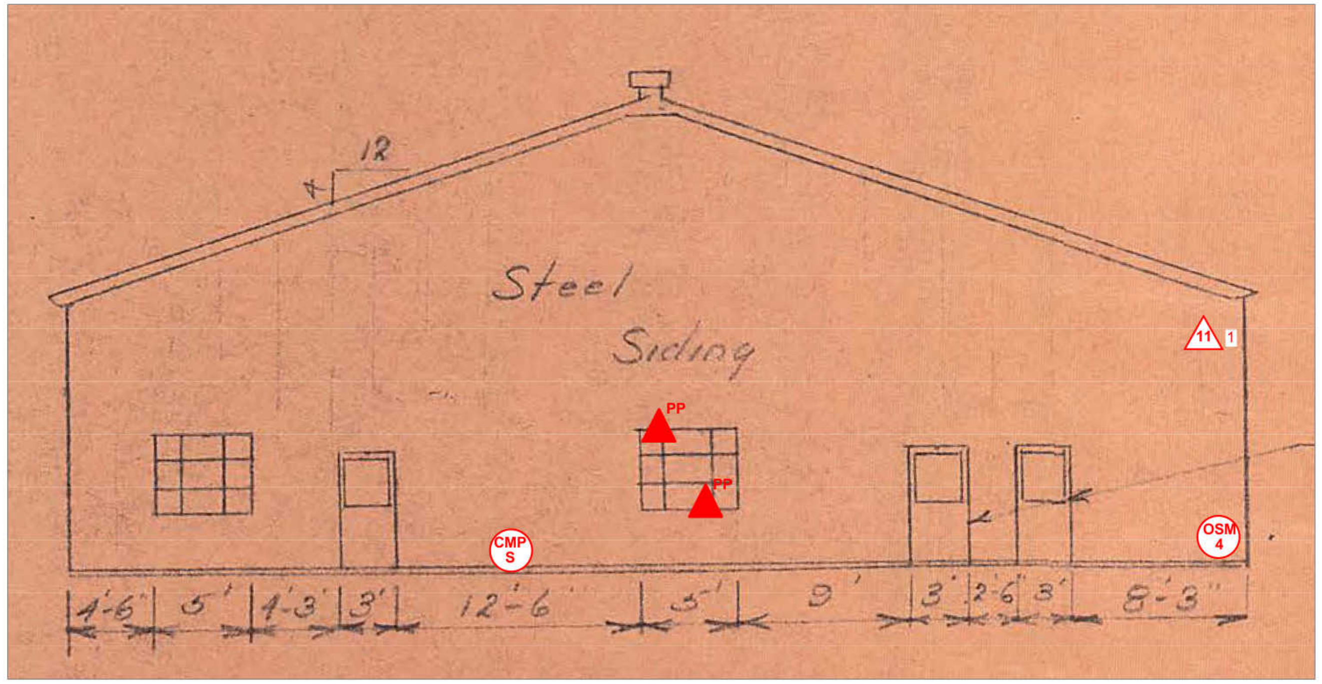
NO.	DATE	DESCRIPTION	BY

PROJECT NO.	841640
CADD FILE	841640 A100s DPW
DESIGNED BY	JVL
DRAWN BY	MRS
CHECKED BY	ACP
DATE	8/15/23
DRAWING SCALE	1/16"=1'-0"

GRAPHIC SCALE
0 8' 16' 32

SHEET TITLE
ROOF AREA PLAN

DRAWING NO.
A100

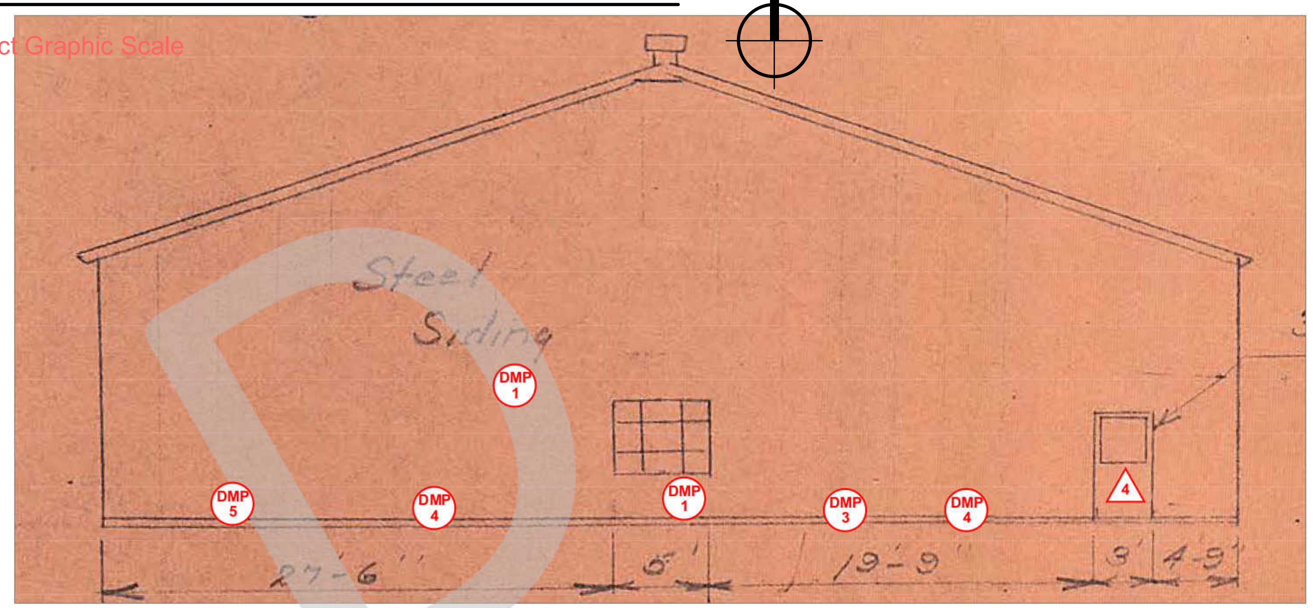


1 A202 NORTH ELEVATION
SCALE: NOT TO SCALE

VIEW TITLE

Select Graphic Scale

N



2 A202 SOUTH ELEVATION
SCALE: NOT TO SCALE

GENERAL NOTES

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2. HATCH PATTERNS ARE FOR REPRESENTATION ONLY AND SHOULD NOT BE USED AS A MEANS FOR QUANTIFYING.
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DEFECT NOTES

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- 1 # FASTENER HOLE IN METAL WALL PANEL OR INTERIOR FASTENER PENETRATING STANDING SEAM METAL WALL CLADDING; # INDICATES QUANTITY.
- 2 REPLACED SECTION OF STANDING SEAM METAL WALL CLADDING.
- 3 METAL CLADDING PAINT DETERIORATION.
- 4 DEFORMED OR DAMAGED/DETERIORATED EXTERIOR METAL DOOR.
- 5 WINDOW REMOVED AND REPLACED WITH VENT.
- 6 DAMAGED WINDOW SILL PAN FLASHING.
- 7 ABANDONED WALL PENETRATION.
- 8 ALGAE GROWTH AND/OR VEGETATIVE GROWTH, TYPICAL.
- 9 APPROXIMATE LOCATION OF BEEHIVE.
- 10 # MISSING STANDING SEAM METAL WALL CLADDING FASTENER; # INDICATES QUANTITY
- 11 # DAMAGED METAL PANEL (HOLE); # INDICATES SQUARE FEET

DEFECT LEGEND

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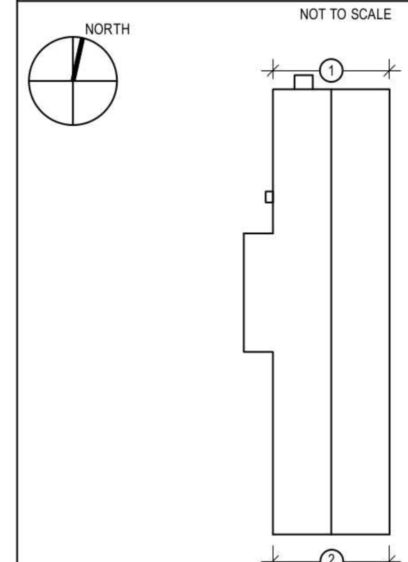
- DMP # — DEFORMED METAL PANEL # INDICATES SQUARE FEET
- CMP S — CORRODED METAL PANEL (SEVERE)
- OSM # — OPEN METAL PANEL SEAM; # INDICATES LINEAR FEET
- RS # — RUST STAINING # INDICATES SQUARE FEET
- PP — PEELING PAINT
- × — ABANDONED FASTENER

KEY PLAN

NOT TO SCALE



LEGEND:
\# ELEVATION SHOWN ON THIS PLAN

GALE
Gale Associates, Inc.
Engineers and Planners
5 MOULTON STREET | PORTLAND, ME 04101
P 207.536.1092
www.gainc.com
Boston Baltimore Orlando Hartford Manchester Portland

PROJECT
BATH MULTIPLE BUILDING EVAL PROJECT
4 SHERIDAN RD
BATH, ME 04530

OWNER
PREPARED FOR HARRIMAN ASSOCIATES
FOR THE CITY OF BATH MUNICIPLE FACILITIES PLANNING
BATH, ME 04530

NO.	DATE	DESCRIPTION	BY

PROJECT NO.	841640
CADD FILE	841640 A200s DPW
DESIGNED BY	JVL
DRAWN BY	MRS/ERS
CHECKED BY	ACP
DATE	8/15/23
DRAWING SCALE	NOT TO SCALE

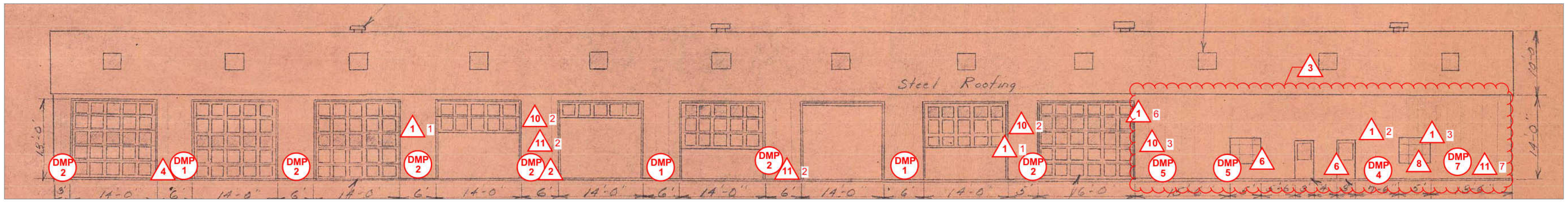
GRAPHIC SCALE

SHEET TITLE

DPW ELEVATIONS

DRAWING NO.

A202



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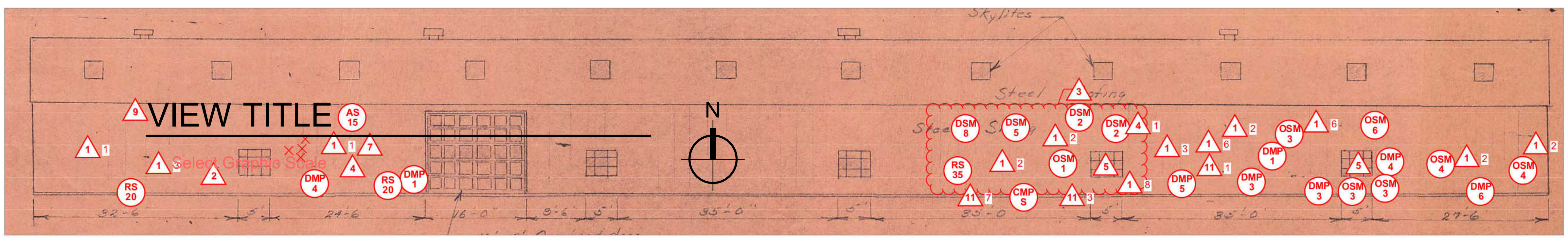

2 A201 WEST ELEVATION
SCALE: NOT TO SCALE

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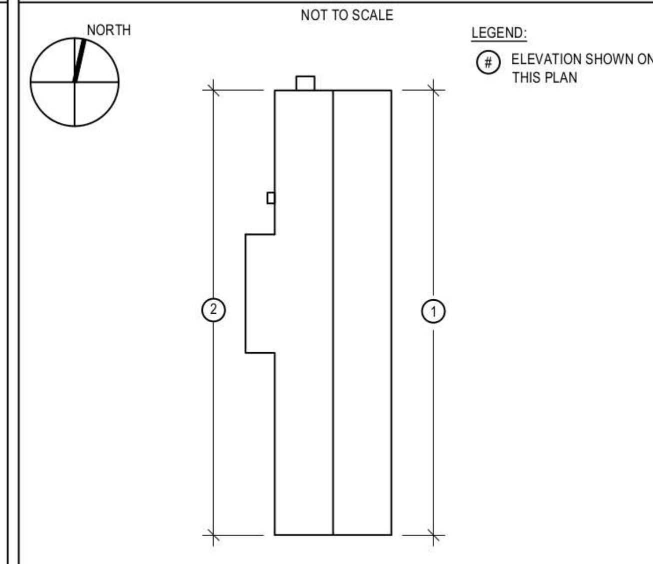

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CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

DEPARTMENT OF PUBLIC WORKS

ARCHITECTURAL – BUILDING INTERIOR

Aerial view of Public Works

Introduction
The purpose of this assessment is to provide a visual interior architectural systems evaluation of the existing Department of Public Works building located at 450 Oak Grove Avenue in Bath, Maine. The building houses the main offices as well as serves as a garage for the city's fleet of maintenance vehicles.

Architectural systems are analyzed per the following applicable Codes and Standards:

- International Building Code: IBC 2015
- NFPA 101 National Fire Protection Association: Life Safety Code
- Americans with Disabilities Act: 2010 ADA Standards for Accessible Design

Review of Existing Documents
Drawings from the City Engineer's Office are dated October, 1962.

Existing Conditions Assessment
On July 11, 2023, representatives from Harriman, in collaboration with Gale, performed a visual evaluation of the building and its existing systems to review and document the extent and location of defects and deficiencies. The focus of this assessment is the building's interior architectural systems and accessibility. Observations are limited to visible elements. The assessment is non-destructive in nature. The following is a summary of conditions by category.

Main Office – Shop – Garage Building

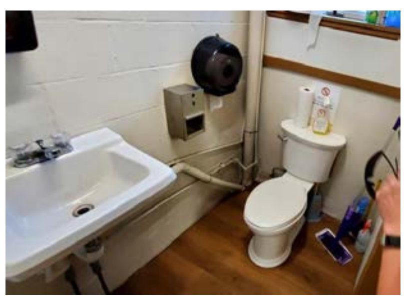
The condition of interior systems ranged from poor to good.

Building Exterior

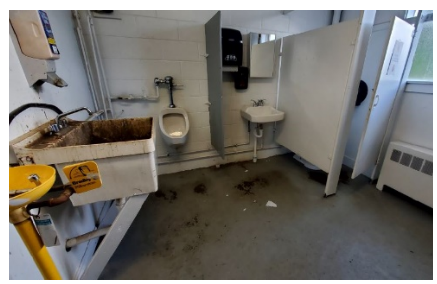
Garage

Accessibility and ADA

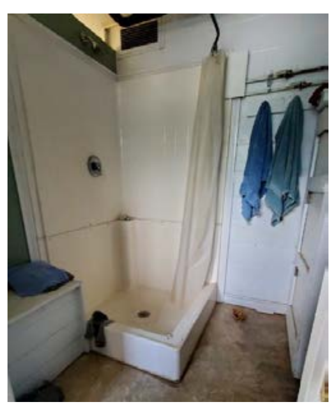
All of the building's facilities are accessible from grade except for a storage mezzanine. None of the facility's toilet rooms are accessible; a single-user restroom near the entrance doesn't have accessible fixtures, grab bars for the toilet, or adequate turning radius. Another multi-user restroom doesn't have accessible fixtures or an accessible toilet stall, and a shower doesn't meet ADA standards.



Inaccessible Toilet Room



Inaccessible Toilet Room Fixtures



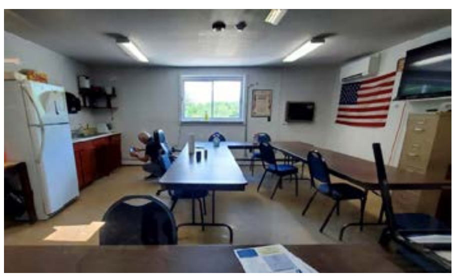
Inaccessible Shower Stall

Interior Walls, Partitions and Base

Interior walls and partitions in the office and parts areas are in fair to good condition. Finishes are generally worn, dated, and utilitarian, including wood paneling and drywall. Walls separating the shop area from office and garage spaces are painted CMU, and in satisfactory condition. A break area in the mezzanine is finished in drywall. Most interior sides of exterior walls are exposed vinyl-faced insulation which is unprotected and torn in many areas.

Office Area

Exposed Insulation in Shop Area



Mezzanine Break Area

Parts Area

Finish Flooring

Finish flooring materials are in fair to good condition. The office area flooring is fairly new vinyl plank-type flooring, along with older carpet, and painted concrete, and the mezzanine has unfinished or painted plywood. Most flooring in service and shop areas are unsealed concrete.

VCT Classroom Flooring

VCT Corridor Flooring

Finish Ceilings

Ceilings in the office area are 2x4 lay-in acoustical ceiling tiles, and are in good condition.

Ceilings in the break area, parts, and corridor and painted sheetrock and in good condition. Ceilings in shop, garage, and service areas are mostly faced insulation, which is worn and separating in some locations.

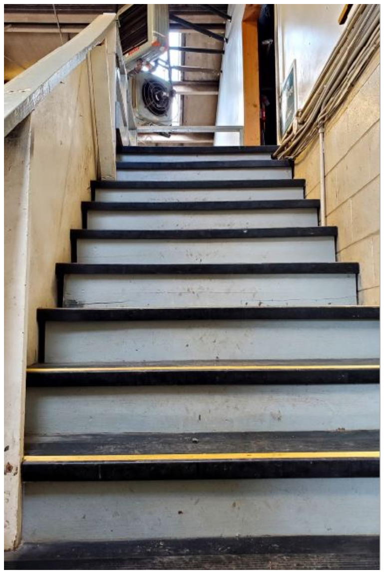
Office Ceiling

Parts Ceiling

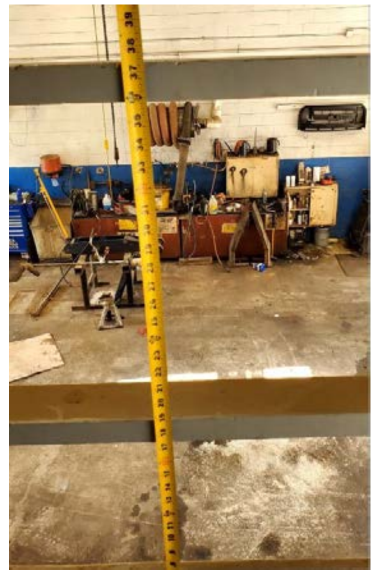
Faced Insulation Ceiling in Garage

Stairs, Railings, and Guardrails

The stair to the mezzanine is wooden with rubber treads and risers. The guardrail at the top of the stair is under the OSHA requirement of 42 inches.



Stair to Mezzanine



Stair Guardrail

Interior Doors, Frames, and Hardware

Interior doors are in fair to good condition. The majority of hardware is knob-type, but egress doors generally have lever-type handles required by ADA. Many doors are well worn.

Door in Shop Area

Doorknob hardware

Salt Barn Building

The Salt Barn is a steel-framed structure with a tensile fabric skin braced to a concrete foundation, which is open at each end, for salt storage in one half, and sand storage in the other half. The structure and fabric are in good condition, though exhibiting some rust at connections, especially near the salt storage entrance.

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

Salt Barn Exterior

Salt Barn Interior

Entrance at Salt Barn

Storage Building

The Storage Building is a Quonset hut metal structure with a wood-framed entrance wall, with large sliding doors and metal swing door. The galvanized metal structure and rear wall are in good condition and showing no signs of damage. The wood entrance wall and sliding doors are weathered and have worn paint surfaces.

Storage Building Exterior

Storage Building Interior

Storage Building Interior

Recommendations

Main Building

1. Address areas of worn and compromised finishes, including damaged insulation facing.
2. Provide handrails and adequate guardrail at the stair to the mezzanine.
3. Provide an accessible restroom.

Salt Barn

1. Address rusting connections at base.

Main Building

1. Paint exterior wood surfaces to prolong useful life.

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CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

DPW MAIN OFFICE-GARAGE – PLUMBING

Plumbing Systems

EVALUATIONS

Water Service
The water service has a water meter between the street and building in a pit near the street. There is a testable reduce pressure zone backflow preventer in the far-left bay of garage to serve the building.

There is some galvanized steel pipe downstream of the backflow preventer serving a 1 ½ -inch hose reel.

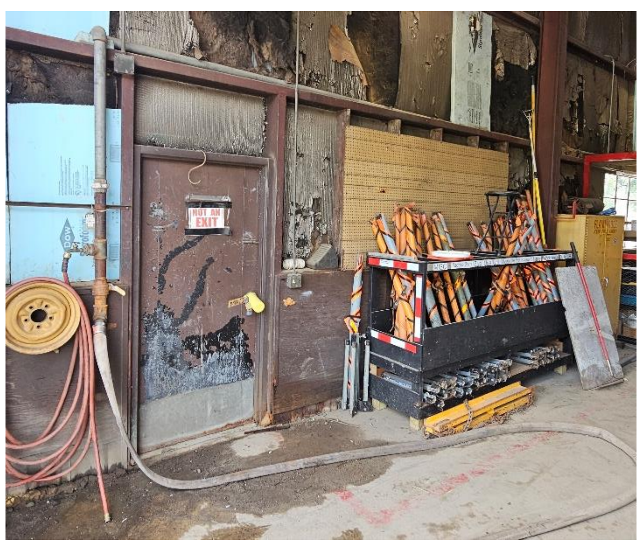
It is recommended to replace the galvanized pipe with copper.

The ¾-inch copper supply pipe to the building should have a separate testable backflow preventor.

It is recommended to install a reduced pressure backflow preventer.

Backflow Preventer for Hose Station

Copper Supply Pipe to Building

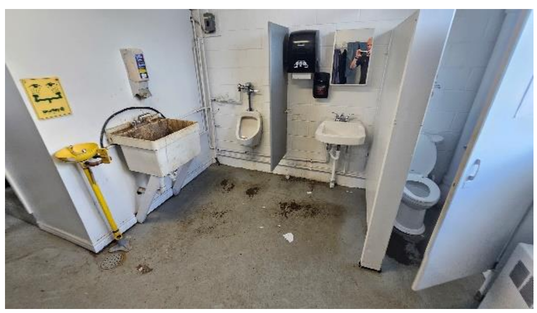


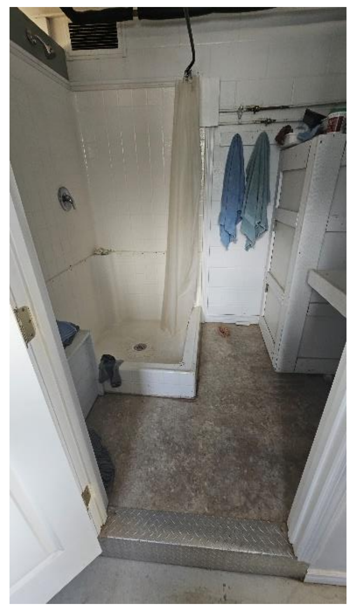
Galvanized Pipe to Hose Fill Station

Plumbing Fixtures
None of the plumbing fixtures are ADA compliant.

The fixtures are in good condition.

Single Private Restroom





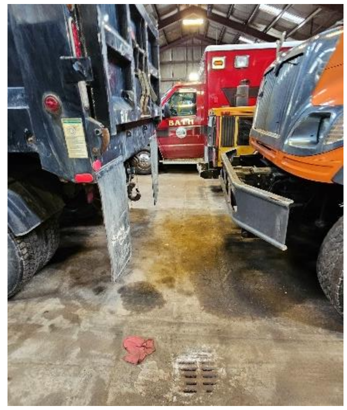
Garage Restroom *Garage Shower*

Mezzanine Break Room Sink

Drainage

There is no piped roof drainage from the sloping roof.

A buried oil/sand separator is located outside the left side of the garage.



Typical Garage Floor Drain

Water Heating

The 10 gallon electric water heater is in good condition. It was installed 8 years ago in 2015. It is recommended to replace the water heater with a 50 gallon heat pump water heater.

There is no thermostatic mixing valve on the hot water outlet.

It is recommended the water heater be set to maintain 140 degrees F and the mixing valve set to deliver 120 degree F hot water to the building. Increasing the water temperature eliminated the risk of Legionella bacteria in the storage tank.

There is no hot water circulation piping to maintain hot water at the fixtures to reduce wasting water.

Electric Water Heater

Compressed Air

The existing air compressor is relatively new (estimated at 8 years old). It is connected to the existing abandoned compressor with an air dryer mounted to the tank. The compressor is in good condition. The staff reports the compressor is loud where it is located on the wood floor mezzanine. Relocating the air compressor to the concrete slab in a separate room would reduce noise and vibration.

Air Compressor on Mezzanine

Propane Fuel

The three vertical propane tanks against the back wall of the building are not protected by concrete barrier or bollards. It is recommended to provide a concrete barrier.

Propane Tanks

Recommendations

- Replace the galvanized pipe with copper.
- Install a 1" reduced pressure backflow preventer on the copper domestic water supply to the building.
- Provide one ADA compliant restroom with toilet, lavatory and shower.
- Relocate the air compressor from the mezzanine down to the concrete floor and place within a room to insulate the sound.
- Replace the water heater with a 50 gallon heat pump water heater.
- Set the water heater to maintain 140 degrees f.
- Install a thermostatic mixing valve on the hot water pipe at the water heater and set to deliver 120 degree f hot water to the building.
- Install a recirculation pump on the hot water piping to the furthest plumbing fixture to maintain hot water at the fixtures.
- Install hot water return piping from the furthest plumbing fixture back to the water heater.
- Provide a concrete barrier in front of the propane tanks.

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

DPW MAIN OFFICE-GARAGE – MECHANICAL

Mechanical Systems

Evaluations

Boiler Plant
The plant consists of a single Buderus hot water boiler rated for a gross output of 294 MBH. The boiler is fired with a Riello model 40 gas burner that burns propane. The boiler and burner are in very good condition and provide heat to the DPW Main Office. The boiler is vented through the side wall of the building, to a vertical stack that terminates above the roof. The breeching and stack look to be in good condition.

Overall View of Boiler and Burner

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

Hot water is distributed throughout the main office and maintenance work bay using Taco circulator pumps. These pumps appear to be in good condition, and do not show signs of leaking.

Taco Circulator Pumps

Combustion air is delivered via a wall mounted fan connected to a wall cap at the exterior of the building. It is unclear what the quantity of combustion air is, but based upon the firing rate of the boiler, it appears that the combustion air system meets the code requirements for an engineered system.

Boiler Room Combustion Air System

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

Inside the work bay, there are hot water unit heaters to provide heating for any staff working in that area. There are also destratification fans up high to prevent hot air from accumulating at the peak of the ceiling.

Hot Water Unit Heaters

Destratification Fan

Inside the vehicle storage garage, there is a pair of oil-fired furnaces to provide heating for any staff working in that area.

Oil-Fired Furnace

Fuel Storage

Propane tanks store fuel for the Buderus boiler and are described within the plumbing section of the report. The oil-fired furnaces are served from an above ground oil tank within the building with fill and vent piping outside. There is a day tank up high in the mezzanine which directly supplies the furnaces.

Oil Tank Fill and Vent Lines

#2 Fuel Oil Day Tank

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

Building Controls

The DPW Main Office uses programmable thermostats to control heat for each zone. The hot water unit heaters each have a well mounted aquastat that turns on the associated fan if the water temperature is above setpoint. The oil-fired furnaces are each controlled with a local thermostat.

Heating System Thermostat and Heat Pump Thermostat

Heating Elements

The DPW Main Office receives heat from the boiler plant through hot water baseboard heaters installed at the perimeter. The baseboard heating is wall mounted and in working condition.

Wall Mounted Hot Water Baseboard Heater

Ventilation

The building utilizes operable windows as the means for providing ventilation air to the DPW Main Office. There is ductwork visible within some of the rooms, but the air handling system associated with that ductwork has been removed. The toilet room has a wall mounted exhaust fan as required by code. Natural ventilation is a code compliant method for distributing ventilation air to occupied spaces, if there is adequate free window area for the square footage of the space being served. However, during the winter windows remain closed since it is too cold outside and occupant comfort would be compromised.

Wall Mounted Exhaust Fan

The garage portion of the building utilizes a snorkel exhaust system for local capture. There is a hose reel mounted to a wall, which is served by a utility set fan that vents to the outside.

Wall Mounted Hose Reel

Utility Set Fan

Air Conditioning

The DPW Main Office is air conditioned with a ductless split heat pump. The indoor evaporator units are wall mounted, with stand alone electronic thermostats for control. The outdoor condensing unit is wall mounted up high over a window on the exterior of the building.

Wall Mounted Indoor Evaporator

Wall Mounted Outdoor Condenser

Recommendations

1. Consider geothermal since there is land available for drilling wells (for future building).
2. Provide energy recovery ventilators to deliver code required quantities of outside air to the occupied spaces and provide active vehicle exhaust systems as a package.
3. Provide building management system to control all of the HVAC equipment serving the building.
4. Remove hot water heating system from the building. (This could remain in place and set as backup if the demolition cost is too high.)

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CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

DPW – DEPARTMENT OF PUBLIC WORKS

ELECTRICAL

Introduction

A review of the existing electrical drawings for the Department of Public Works facility was conducted. The drawings available were from the original design plans dated October 1962. Other discipline drawings were available for review and coordination. A field investigation of the DPW building was performed which included visual evaluations of the existing electrical systems.

Existing Conditions

Electrical Service

The building electrical service is a 400A, 208Y/120V, 3 Phase 4 Wire system, fed by an aerial secondary feeder from utility poles that are routed from the main road to behind the DPW building. This service is fed aerially to the building via a building mounted utility meter, then pokes into the main electrical panel. There is no enclosed electrical room, and the equipment appears original to the building (40-50 years or older).

The branch circuit feeds to most panels and nearly all devices throughout the building are surfaced mounted conduit. Receptacles are a combination of GFCI and non-GFCI, and a mix of receptacles that are rated to be indoors only and exposed to water/hazardous material.

On the mezzanine there are flammable storage cabinets that are nearby open lamp fluorescent industrial fixtures and non-protected receptacles. It is recommended to have added ventilation in this space to avoid the buildup of flammable gas/vapors. Any light fixture or device located near the flammable cabinets should be sealed/gasketed against penetration of flammable gas/vapors.

A new generator was being installed outdoors to replace a non-code compliant generator inside of the building. It was noted that the new generator has not been bolted down to the slab. This was noted to the building owner on site that this connection should be made to secure the generator in place prior to operation.

Lighting

The interior light fixtures throughout the building are fluorescent lamped. 2x4 surface mounted fluorescent fixtures are located throughout the admin space and areas where there is a ceiling. In open areas, 6-lamp fluorescent high bay fixtures are present to provide area lighting.

Fire Alarm

New smoke detectors and fire alarm system has been installed within the past five years by the City of Bath.

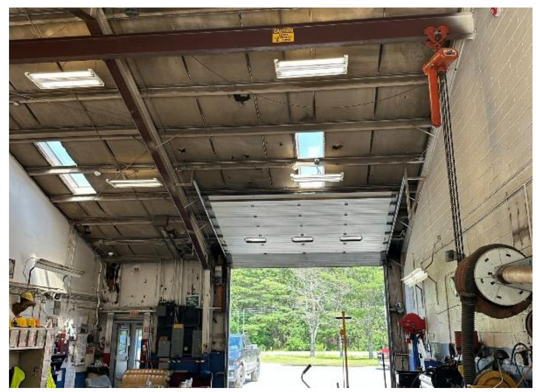
Communications

The main service entrance for communications/IT is located on the ground level and feeds into a custom wooden IT cabinet that was constructed in the admin space. The IT cabinet is not a conditioned space.

IT equipment in non-approved enclosure

Aerial Utility feed behind DPW building

Building mounted utility meter



High bay fluorescent light fixtures

Flammable Cabinets in Mezzanine

Distribution Panels

New generator being installed

Lack of bolted anchor connections to slab for generator

Recommendations

1. The service entrance electrical equipment should be replaced in kind with newer equipment that can be more easily serviced by electricians. Due to the equipment's age, replacement parts may be difficult to procure to maintain UL listing and code requirements for safety.
2. All light fixtures throughout the building should be removed and replaced with LED source fixtures. A lighting control system should concurrently be installed to provide administrative control and maximize energy savings for the facility.
3. Remove and replace all existing exit signs and specify with self-testing diagnostics.
4. Branch circuit panels and load centers throughout the DPW building and branch circuit wiring to devices should be replaced due to age and deterioration of wire insulation.
5. Provide conditioned to flammable cabinet space
    a. Provide explosion proof or other rated enclosures around electrical devices and lights in proximity to the flammable cabinets
6. Existing site lighting should be upgraded to newer LED fixtures with a building lighting control system to help facilitate easier configurations of exterior and interior building lighting control.

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CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

DEPARTMENT OF PUBLIC WORKS

SPACE UTILIZATION ASSESSMENT

- OPTION 1 – MINOR RENOVATION
    - New Vestibule / Entrance on exterior
    - Remove current vestibule for additional space in offices
    - New locker room and restroom
    - One or more additional bay/carports added

- OPTION 2 – ADDITION
    - New Vestibule and public restroom
    - New locker rooms and restrooms
    - Create individual offices and conference room
    - Two or more additional bay/carports added

Department of Public Works Summary of Options:
Minor renovation to DPW includes enhancing the front entrance vestibule, either with or without a publicly accessible restroom to free up additional open office space for either individual offices or reconfiguration of office furniture systems. This reconfiguration allows for additional meeting space. A renovation of current Locker/Wash room to two individual restrooms with showers with small closet for uniforms will allow for privacy, and multiple users. With the current limitations to the garage, we propose to add either one or two bays to the garage side. This could be done as a one-sided enclosed carport with roof, or a more robust enclosure with roof, walls, and garage door for access.

Additional interventions include options to add sound masking to Director's Office, relocation of the hallway door for sound and smell mitigation, and the possibility of adding a door to the current meeting room accessed only through the director's office.

Given the age of the facility, The City should consider building a replacement facility in the next 10-20 years.

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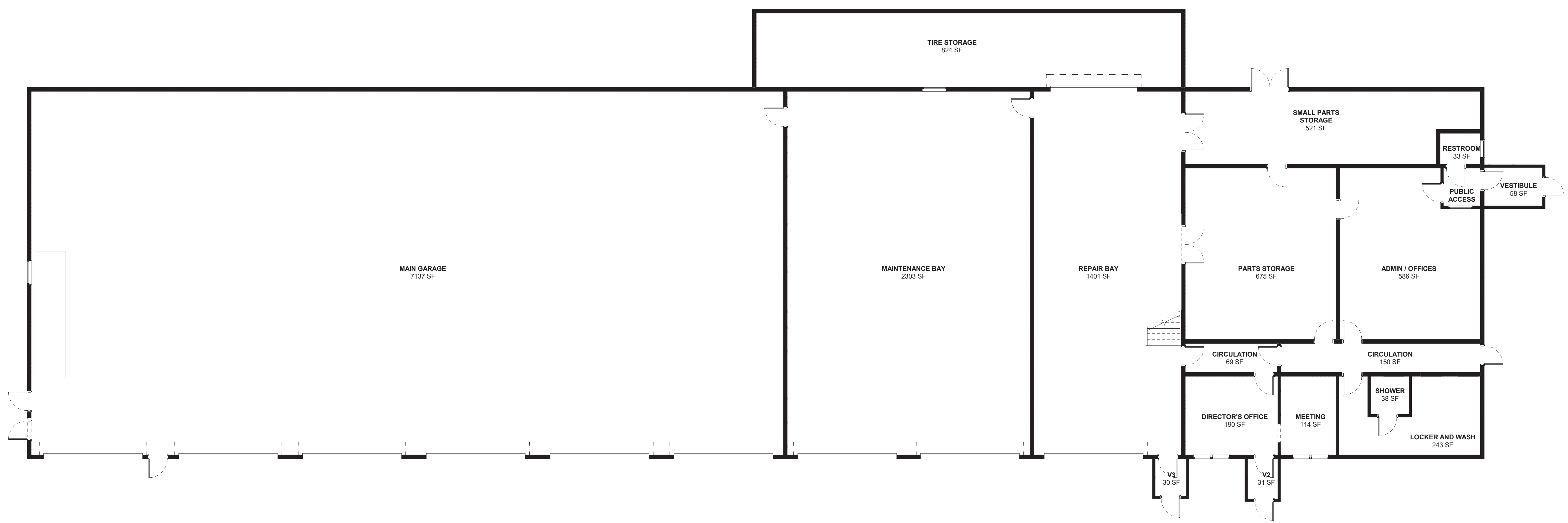
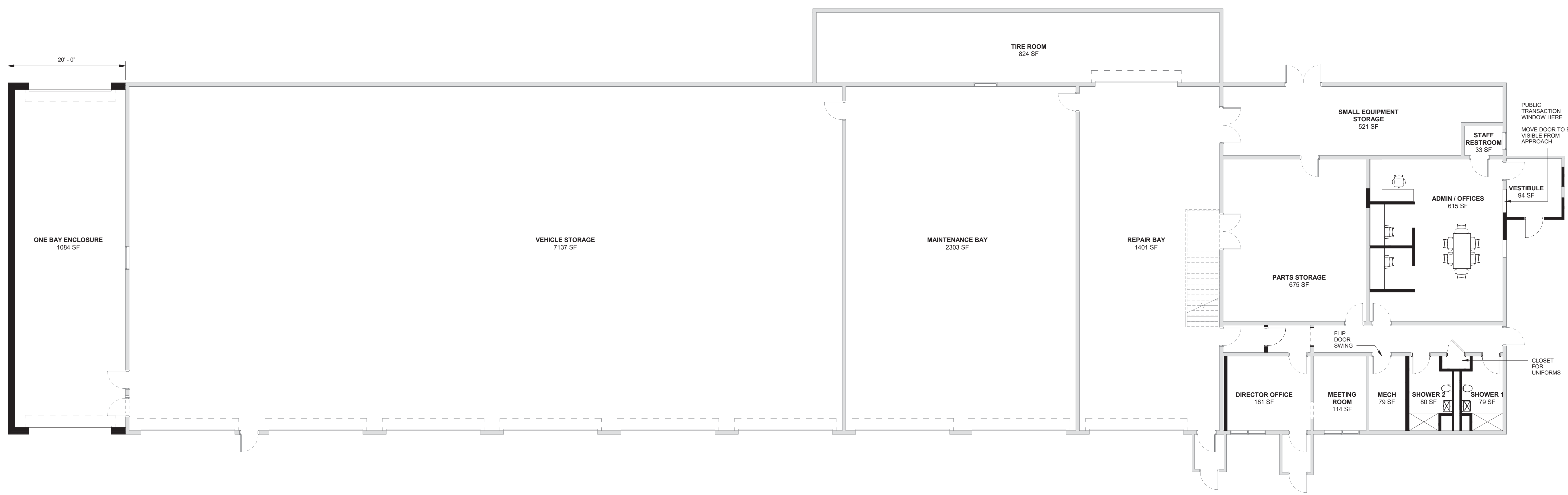


1 FIRST FLOOR PLAN
SCALE: 1/8" = 1'-0"

Harriman

23138 - CITY OF BATH - DPW

FIRST FLOOR - EXISTING CONDITIONS

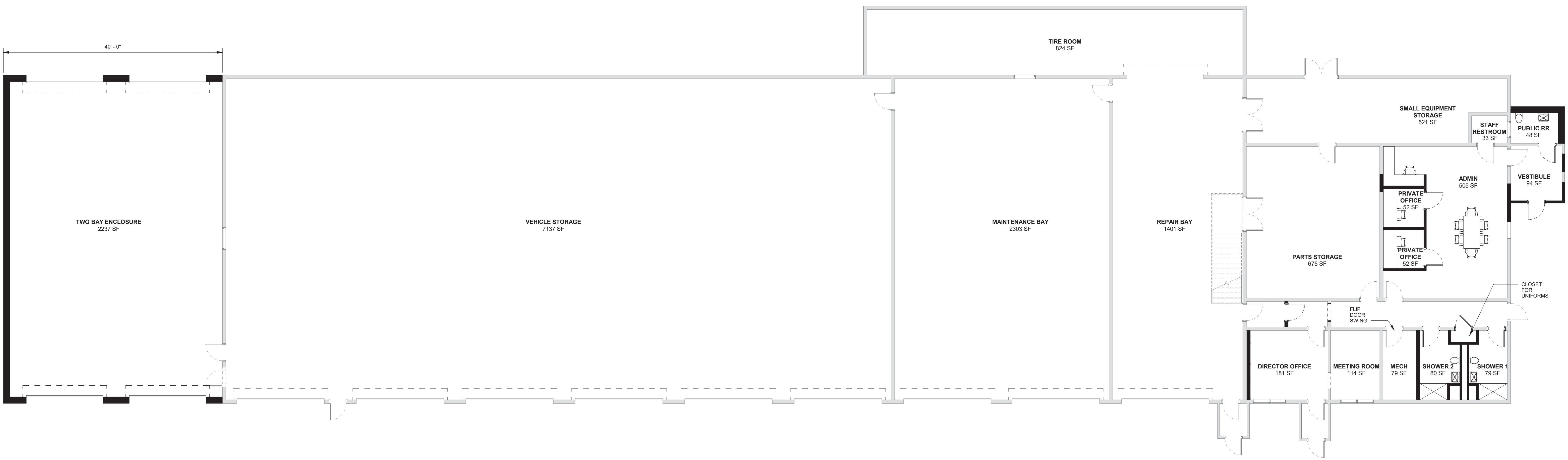


1 FIRST FLOOR PLAN
SCALE: 1/8" = 1'-0"

Harriman

23138 - CITY OF BATH - DPW

FIRST FLOOR - OPTION 1



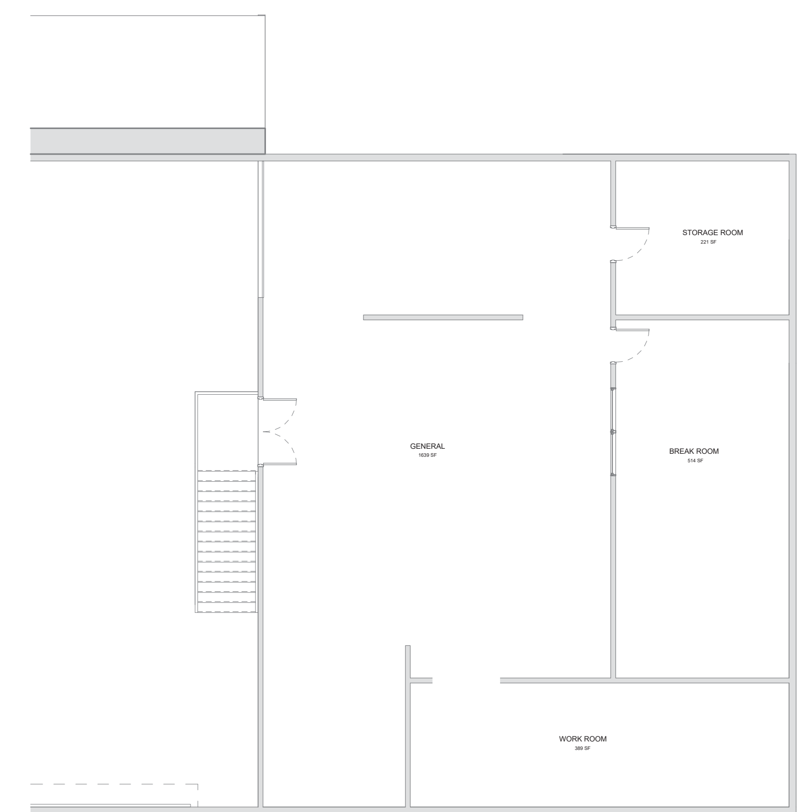
1 FIRST FLOOR PLAN
SCALE: 1/8" = 1'-0"

Harriman

23138 - CITY OF BATH - DPW

FIRST FLOOR - OPTION 2

11/16/23



1 SECOND FLOOR PLAN
SCALE: 1/8" = 1'-0"

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23138 - CITY OF BATH - DPW

SECOND FLOOR - EXISTING CONDITIONS

BATH DPW
23138
Harriman Programming Worksheet

OPTION 1												
EXISTING CONDITIONS						PROPOSED OPTION 1			SCOPE			
DPW	Total Building Area (GSF) By Dept. or Space (NSF)	Building Occupancy	Max. Capacity Per Occupancy Type	Current Total Occupancy	Adjaceny and Comments	Proposed Use	Proposed SF	Proposed Occupancy	PRIORITY	ENERGY	ADA	ENVELOPE
		SF/PP										
Public Works Garage						**Level 1**			**Level 1**			
Small Parts Storage	521	300	1	-								
Offices	586	150	3	3	Admin Asst. / PW Foreman / PW Deputy Director. Need meeting space for 6	Open Office w/ conference	615					
Parts Storage	675	100	6	1	Includes Lead Mechanics workstation. Visibilty to maintenance bays required							
Locker & Wash Room	281	50	5	5	Includes sink, urinal, toilet, homemade shower, uniforms storage	2 Singler User	159	2			X	
						Mechanical	79	-		X		
Director Office	190	150	1	1	Need space for 2 person meeting. Increased STC	Add Sound Masking	181					
Meeting	114											
Repair Bay	1,401	100	14	-	Drive through access at this bay only							
Maintainence Bay	2,303	100	23	17	Heavy Equipment Work. Portable 4-Post Vehicle Lift. Floor mounted JIB Crane							
Main Garage	7,137	300	23	-	Water infilatration at back of building. Trucks with plows on do not fit. Difficullt to maneuer between bays.							
Tire Storage	824	300	2	-	Used for tire storage, vehicle exhaust blower. SF Approximate.							
Vestibule	94		-			Modify Vestibule to Exterior	94				x	
Restroom	33		1									
						One Bay Addition	1,084					
Level One Total (Net)	**14,159**		**78**	27								
Mezzanine						**Mezzanine**			**Mezzanine**			
General	1,639	150	10	1			-					
Storage Room	221	-	-	-								
Break Room	514	-	-	-								
Work Room	389	-	-	-								
Mezzanine Total	**2,763**		10	1								

BATH DPW
23138
Harriman Programming Worksheet

OPTION 2												
EXISTING CONDITIONS						PROPOSED OPTION 2			SCOPE			
DPW	**Total Building Area (GSF) By Dept. or Space (NSF)**	**Building Occupancy**	**Max. Capacity Per Occupancy Type**	**Current Total Occupancy**	**Adjaceny and Comments**	**Proposed Use**	**Proposed SF**	**Proposed Occupancy**	**PRIORITY**	**ENERGY**	**ADA**	**ENVELOPE**
		SF/PP										
Public Works Garage									Level 1			
Small Parts Storage	521	300	1	-								
Offices	586	150	3	3	Admin Asst. / PW Foreman / PW Deputy Director. Need meeting space for 6	Open Office	505					
						Private Offices (2)	104					
Parts Storage	675	100	6	1	Includes Lead Mechanics workstation. Visibilty to maintenance bays required							
Locker & Wash Room	281	50	5	5		2 Singler User	159	2			X	
						Mechanical	79	-		X		
Director Office	190	150	1	1	Need space for 2 person meeting. Increased STC	Add Sound Masking	181					
Meeting	114											
Repair Bay	1,401	100	14	-	Drive through access at this bay only							
Maintainence Bay	2,303	100	23	17	Heavy Equipment Work. Portable 4-Post Vehicle Lift. Floor mounted JIB Crane							
Main Garage	7,137	300	23	-	Water infilatration at back of building. Trucks with plows on do not fit. Difficullt to maneuer between bays.							
Tire Storage	824	300	2	-	Used for tire storage, vehicle exhaust blower.							
Vestibule	94		-			Modify Vestibule to Exterior	94	-			X	
						Public Restroom Attached to Vestibule	48	1			X	
Restroom	33		1									
						Two Bay Addition	2,237					
Level One Total (Net)	**14,159**		**78**	27								
Mezzanine						**Mezzanine**			**Mezzanine**			
General	1,639	150	10	1			-					
Storage Room	221	-	-	-								
Break Room	514	-	-	-								
Work Room	389	-	-	-								
Mezzanine Total	**2,763**		10	1								

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

DEPARTMENT OF PUBLIC WORKS

ENERGY ANALYSIS

Analysis
Harriman benchmarked the Department of Public Works using EPA Portfolio Manager based upon the most current year of utility data. Energy consumption for buildings is quantified using the Energy Use Intensity (EUI) number with units of kBtu/sf. The existing building has an EUI number of 39.2 which is 55% better than the national median of 87.6 for this type of building.

Efficiency improvements are not being considered for this building, since the hot water boiler is already very efficient, and the maintenance bays are not intended to receive air conditioning. However, it would be beneficial to provide a heat recovery ventilator for the office space to prohibit the exhaust fumes from entering. The outside air will be drawn from the side of the building that is furthest away from vehicle exhaust.

Summary
It is recommended to provide a heat recovery ventilator for the office space which will provide code required ventilation air and prohibit the exhaust fumes from entering. The existing boiler is energy efficient and in very good condition; it is recommended to maintain the existing boiler plant for the office spaces. The oil fired furnaces are not particularly efficient in the maintenance bays, however these spaces are not insulated and it would not be cost effective to replace that equipment.

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ENERGY STAR® Statement of Energy Performance

N/A

ENERGY STAR®
Score[1]

Bath Public Works

Primary Property Type: Other - Public Services
Gross Floor Area (ft²): 18,300
Built: 1962

For Year Ending: December 31, 2023
Date Generated: April 07, 2024

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

Property & Contact Information

Property Address	Property Owner	Primary Contact
Bath Public Works 450 Oak Grove Avenue Bath, Maine 04530	City of Bath, Maine 55 Front Street Bath, ME 04530 (____)____-______	Jeff LaPierre 46 Harriman Drive Auburn, ME 04210 (207) 784-5100 jlapierre@harriman.com

Property ID: 33634647

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
39.2 kBtu/ft²

Source EUI
40 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	3,614 (0%)
Fuel Oil (No. 2) (kBtu)	531,383 (74%)
Propane (kBtu)	182,841 (26%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	87.6
National Median Source EUI (kBtu/ft²)	89.3
% Diff from National Median Source EUI	-55%

Annual Emissions

Total (Location-Based) GHG Emissions (Metric Tons CO2e/year)	51

Signature & Stamp of Verifying Professional

I ___________________ (Name) verify that the above information is true and correct to the best of my knowledge.

LP Signature: _________________________Date: ____________

Licensed Professional

Jeff LaPierre
46 Harriman Drive
Auburn, ME 04210
(207) 784-5100
jlapierre@harriman.com

Professional Engineer or Registered Architect Stamp
(if applicable)

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CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT

DEPARTMENT OF PUBLIC WORKS

VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES

Introduction
Building vulnerabilities are considered any weakness that can be exploited by an aggressor or, make an asset susceptible to hazard damage via natural factors such as storms. The Department of Public Works doesn't fall into the category of a terrorist target, but supports vital services to the City of Bath and needs protection from potential litigation, as well as flexibility of energy sources in the event of unforeseen supply circumstances.

Building adaptation encompasses a range of construction activities that improve existing building conditions and extend the effective lives of buildings. The scopes of building adaptation projects vary, and may include rehabilitating failing structures, improving environmental performances, and changing functional uses. Building adaptation also includes appropriate responses to changing climate.

Vulnerability Assessment

Security
Security at Public Works involves the protection of vital services and equipment. There is limited public access within the building, so security throughout the building isn't a critical need.

Building Exterior Condition

Security can be provided by active measures or by more passive means integrated into the design. One such passive approach, Crime Prevention Through Environmental Design (CPTED), seeks to reduce crime and fear of crime by manipulating the built environment to create a safer space.

Following are basic design principles of CPTED:

- *Natural Surveillance*
  The exterior of each of the buildings is visible on all sides, with no blind spots.
- *Access Control*
  Another means of passive security is controlling access by physical barriers such as locks, fences, doors, windows, etc. Added security could be achieved by

increased access control. A perimeter fence with gates could provide better controlled security if necessary.

- *Territorial Enforcement*
  Public and private boundaries inside and outside the facility can be defined through signage. Boundaries can also be reinforced through positive territorial enforcement means including lighting, public art, vegetation, etc.
- *Maintenance and Management*
  Pride of place is reinforced through proper maintenance as well as vandal resistant materials. The main building of the Department of Public Works is in a dilapidated state, though it is not in a heavily trafficked public area.

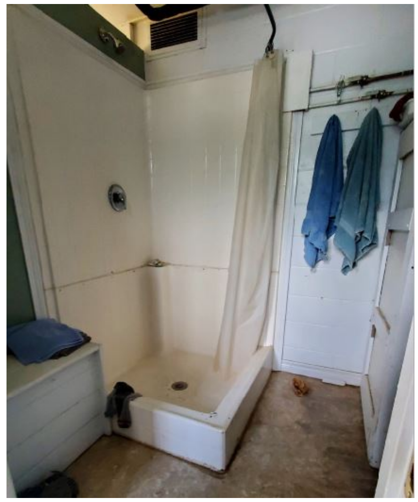
Visibility at Building Perimeter

Active Security Features

- *Surveillance*
  Surveillance includes the placement of security cameras at strategic places at the exterior or interior in order to monitor suspicious activity from a location inside the building. Surveillance is a simple option to implement if conditions warranted.
- *Screening*
  Screening of visitors at the building entrance or at points inside the facility would provide an added level of security if the need were to arise. An electronic entry system could allow for remote screening and entry without needing to staff a position for that specific task, though it doesn't appear that screening is required at this time.

Litigation

The Americans with Disabilities Act is a civil rights law that prohibits discrimination based on disability. As such, facilities that do not meet ADA standards are open to litigation from individuals that aren't able to access public areas. Gender-neutral restrooms aren't required by current codes, though the single-user toilet rooms shown in the proposed renovation options qualify as gender-neutral. Employers are required to make reasonable accommodations to employees with disabilities. Aspects of the City Hall that do not meet ADA guidelines include accessible toilet and showers in the office area. Also, the stair to the mezzanine doesn't meet OSHA requirements for handrails and dimensions.



Noncompliant Shower

Energy Supply Systems
The current steam heating system is adequate and it is not recommended to perform major alterations to a building that is deteriorating and considered for replacement.

- *Power continuity*
  The backup generator helps ensure system continuity in the event of power outages.

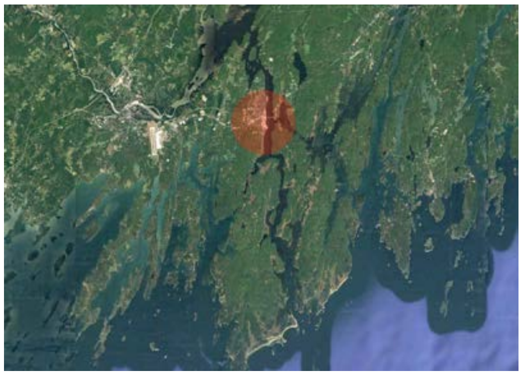
Adaptation Strategies

Building Adaptation Strategies
Adapting the building to changing conditions involves many of the recommendations that have been listed in detail in the analyses of the various building systems elsewhere in this report. Following are the general ways that the building can be adaptable to the future.

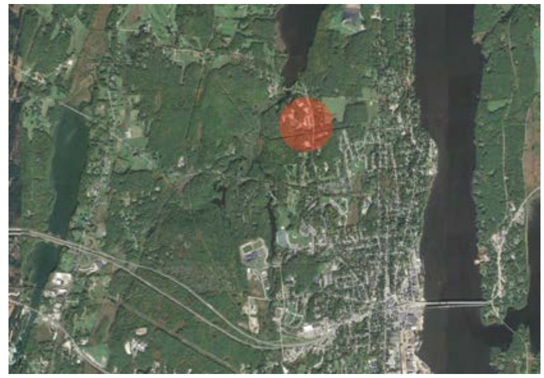
- *Improve conditions and extend the life of the Department of Public Works*
  - Improve accessibility and egress
  - Perform remedial modifications until building replacement is feasible
- *Improve functionality of the building*
  - Refer to the minimal space utilization recommendations in this report
- *Consider replacement of the building*
  - Due to building condition, anticipate replacement with a building that meets current needs and resolves the continuous deterioration

Adaptation to climate change
Adapting to changing climate includes general categories that apply differently to various parts of the country. Following is a list of typical resilience categories and how they are anticipated to affect to conditions at the Department of Public Works.

CITY OF BATH, VULNERABILITY ASSESSMENT AND ADAPTATION STRATEGIES – FINAL REPORT



Location of Bath Relative to Coast



DPW Location near Downtown Bath

- *Resilience to heatwaves*
  - Minimal impact from heatwaves is anticipated due to the regional climate that is less impacted than the rest of the United States.
  - Window replacement as recommended with increased insulation and less infiltration would lessen the impact of heat events.
- *Resilience to drought*
  - Minimal impact in the region is anticipated due to the abundance of water compared with other parts of the country.
- *Resilience to coastal flooding/ sea-level rise*
  - The Public Works building would not be directly impacted by a rising sea level or surges due to being situated at about 32' above sea level.
- *Resilience to strong winds*
  - Due to the elevation being lower than surrounding buildings and also forested areas, westerly and northerly winds would be less of an impact on Public Works. At its location inland from the coast Public Works does not bear the direct brunt of coastal storms.
- *Resilience to cold*
  - Improved efficiency and redundancy of energy systems as recommended would help with resilience to extremes in cold.
  - Window replacement to reduce infiltration and improve insulation would help adapt to any increases in colder weather.

Project List	Area (in Square Feet) or Unit Quantity	Scope Description	Cost/SF or Unit Cost	Rough Order of Magnitude (OoM) Cost
Total Building	15,240	Note: Cost information is in 2024 dollars. Escalation typically ranges from 5% to 7% annually.		
Civil				
		Abatement (future): $125,000 Site contamination clean-up (future): $500,000 Demolition: $60,000		
Pavement in poor condition - could be addressed by raising building floor elevation		(Not included in remedial scope)		
Provide geotech report to confirm soil and groundwater conditions, pavement		(Not included in remedial scope)		
Construct public entrances, stripe parking per ADA		7,000 sf		$ 5,000
Change site lighting to full cutoff fixtures		(Not included in remedial scope)		
Assess septic system		(Not included in remedial scope)		
Lighting at public parking, pedestrian routes		(Not included in remedial scope)		
Detain or intercept stormwater from paved areas for treatment		(Not included in remedial scope)		
Consider providing add'l covered storage		(Not included in remedial scope)		
Provide new fencing and gates for security		1600 lsf, 8' high - $185,000 total		
		Labor costs applied to construction cost	**Civil Construction Total**	$ 5,000
	30%	Project soft costs applied to construction cost	**Total Civil**	**$ 6,500**
Structural				
Repair corroded steel column bases, kicker braces of main building		(Not included in remedial scope)		$ -
Repair corroded roof anchors, column bases, deformed column of salt barn				$ 10,500
		Labor costs applied to construction cost	**Structural Construction Total**	$ 10,500
	30%	Project soft costs applied to construction cost	**Total Structural**	**$ 13,650**
Building Exterior / Envelope				
Replace rusted/deformed metal panels		(Not included in remedial scope)		$ -

Scrape, prime, paint metal wall panels. Option: replace with insulated metal wall panels			6000 sf		$ 45,000
Paint exterior wood surfaces of storage building			700 sf		$ 4,000
Paint exterior wood surfaces of storage building			700 sf		$ 4,000
				Building Exterior Construction Total	$ 53,000
		30%	Project soft costs applied to construction cost	**Total Building Exterior**	**$ 68,900**
Building Interior					
Install 2" rockwool panels inside exterior walls, non-office areas	3600 sf		Remove faced blanket insulation install on inside face of exterior walls.		$ 48,000
Replace wooden stair to Mezzanine with regulation steel stair and guardrail					$ 25,000
Provide ADA compliant restroom with toilet, lavatory, shower	200 sf		Fully gut & reno 200 sf space for (2) 100 sf single toilet rooms, showers, doors w/ lintels		$ 140,000
Entry vestibule addition w/ public RR	100 sf		square foot of renovation area (option - not included in total cost)	$ 400	$ 40,000
Office renovations	200 sf		square foot of renovation area (option - not included in total cost)	$ 200	$ 40,000
One bay Garage expansion	1200 sf		square foot of renovation area (option - not included in total cost)	$ 200	$ 240,000
Two bay Garage expansion	2400 sf		square foot of renovation area (option - not included in total cost)	$ 200	$ 480,000
				Building Interior Construction Total	$ 213,000
		30%	Project soft costs applied to construction cost	**Total Building Interior**	**$ 276,900**
Plumbing					
Replace galvanized pipe with copper			(Not included in remedial scope)		$ -
Install backflow preventer					$ 1,200
Relocate air compressor from mezzanine to first floor in insulated room			(Including build-out of room)		$ 18,500
Replace water heater with heat pump water heater			(Not included in remedial scope)		
Install thermostatic mixing valve at WH			(Not included in remedial scope)		
Install recirculation pump at hot water			(Not included in remedial scope)		
Install hot water return piping			(Not included in remedial scope)		
Provide conc barrier at propane tanks			(By owner)		
				Plumbing Construction Total	$ 19,700
		30%	Project soft costs applied to construction cost	**Total Plumbing**	**$ 25,610**
Mechanical					
Consider geothermal			(Not included in remedial scope)		$ -

Provide energy recovery ventilators for occupied spaces and vehicle exhaust		(Not included in remedial scope)		
Provide building management system		(Not included in remedial scope)		
Remove hot water heating system		(Not included in remedial scope)		
			Mechanical Construction Total	$ -
	30%	Project soft costs applied to construction cost	**Total Mechanical**	**$ -**
Electrical				
Replace service entrance		(Not included in remedial scope)		$ -
Replace light fixtures with LED, with lighting control system		(Not included in remedial scope)		
Replace exit signs with self-testing				$ 7,500
Replace branch circuit panels and wiring		(Not included in remedial scope)		
Provide conditioning to flammable cabinet space, explosion protection at nearby devices				$ 10,000
Upgrade site lighting to LED fixtures with lighting control systems		(Not included in remedial scope)		
			Electrical Construction Total	$ 17,500
	30%	Project soft costs applied to construction cost	**Total Electrical**	**$ 22,750**
Grand Total: DPW				**$ 414,310**
CONSTRUCTION COST GRAND TOTAL: NEW BUILDING	**25,000 @ $320/SF**			**$ 8,000,000**

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PRIORITIZED ACTION AND PHASING PLAN
DEPARTMENT OF PUBLIC WORKS

Costs shown are construction cost only, in 2024 dollars.
See Opinion of Probable Cost for detailed information, total project costs, and additional layout options.

Priority	*Cost*	*Timeframe*
1. Remedial Measures for Maintaining Existing Building		
a. Civil		
i. Public entrances, stripe parking per ADA	$5,000	0-5 years
b. Building Interior		
i. Rockwool panels inside exterior walls	$50,000	0-5
ii. New steel stair to mezzanine	10,000	0-5
iii. (2) Accessible restrooms with showers	140,000	0-5
iv. Additional renovation options	Varies	5-10
c. Building Exterior		
i. Refinish metal wall panels	45,000	0-5
d. Plumbing		
i. Install backflow preventer	1,200	0-5
ii. Relocate air compressor	18,500	0-5
e. Electrical		
i. Replace exit signs with self-testing	7,500	0-5
ii. Conditioning to flam. cabinet, explosion protection	10,000	0-5
2. Salt Barn		
a. Structural		
i. Repair roof anchors, column bases, deformed column	10,500	0-5
3. Storage Building		
a. Building Exterior		
i. Paint exterior wood surfaces of storage building	4,000	0-5
4. Future Building Replacement		
a. Abatement	125,000	10-20
b. Site contamination clean-up	500,000	10-20
c. Demolition	60,000	10-20
d. New Building	8,000,000	10-20

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