

Worcester County Administration  
1 West Market Street, Room 1103  
Snow Hill, Maryland 21863



## REQUEST FOR PROPOSAL

PROJECT:

Sale of Surplus Property –  
Economic Development Building

DEPARTMENT:

## VENDOR:

NAME:

ADDRESS:

## PROPOSAL OPENING:

DATE:

Wednesday, March 8, 2023

TIME:

2:00 PM

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## **SECTION 1: PROJECT OVERVIEW**

### 1.1 General Intent

- a. Worcester County, Maryland (“County”) has declared surplus and now offers for sale the following described real property (“Property”), 100 Pearl Street, Snow Hill, Maryland 21863.
- b. All Development Proposals submitted must conform to the Proposal Requirements listed in Section 2.
- c. Entities that submit a proposal for award of this contract are referred to as “proposers” in this document. The firm or individual that is awarded the contract is herein referred to as the “Firm” or “Developer”. The words Bidder, Offeror, Consultant, Proposer, Developer and Contractor may be used interchangeably.

### 1.2 Background Information – Worcester County

- a. Worcester County, Maryland, founded in 1742, was created by the division of Somerset County (pop. 52,460, per v2020 estimates [www.census.gov](http://www.census.gov)).
- b. Stretching from Southern Delaware to Virginia’s Eastern Shore, Worcester is the heart of the Delmarva region and the only Maryland county bordering the Atlantic. Located less than three hours from Baltimore, Washington DC and Philadelphia, Ocean City – the county’s renowned resort – attracts more than 8 million visitors annually. Worcester is also federally designated SBA HUBZone, with three Enterprise Zones and two Arts & Entertainment districts. Worcester’s flagship manufacturing hub is the 175-acre Pocomoke Industrial Park.

### 1.3 Site Description and Zoning

- a. The subject property is a 3-story commercial structure comprised of wood framed roof and floors supported on unreinforced brick masonry walls, foundations and steel/iron columns. The property consists of a 1,518 +/- square foot site presently improved with a 4,554 +/- square foot building.
- b. The County makes no representations, guaranty, or warranty concerning any site conditions. The subject property is being offered in an “AS IS, WHERE IS” condition.

#### 1.4 Summary of Parcel Data

<b>Name:</b>	<b>Economic Development Building</b>
<b>Tax I.D.'s:</b>	Map 0200, Grid 0009, Parcel 0069 (ID #02-016702)
<b>Ownership:</b>	County Commissioners of Worcester County
<b>Location:</b>	Northeast side of Pearl Street
<b>Current Use:</b>	Previously the County's Economic Development Building, the property is currently vacant.
<b>Zoning:</b>	B-1 Downtown Shopping District, CR Community Redevelopment Overlay District, Historic District (see Snow Hill's Zoning Map, <a href="http://www.snowhillmd.gov/snow-hill-zoning-map.html">http://www.snowhillmd.gov/snow-hill-zoning-map.html</a> , for more information)
<b>Gross Square Feet:</b>	1,518 +/-
<b>Appraised Value:</b>	An appraisal has not been completed
<b>Tax Assessment Value:</b>	\$269,300 (as of Phase-In Assessment 01/01/2023)
<b>Special considerations:</b>	N/A

#### 1.5 Development Objectives

- a. The County is interested in receiving proposals that would lead to economic development that would benefit the County. Developers should strive to ensure that the completed use is coordinated and balanced and includes, but is not limited to:
  - i. Highly aesthetic, quality mixed-use project which is harmonious with the objectives of Worcester County;
  - ii. Increases property tax base and develops a lasting revenue stream;
  - iii. Foster intensity of development – efficient use of land, good density and promoting vibrancy;
  - iv. Restore and maintain environmental quality – reduce the amount of runoff pollution, increase the amount of green space, plant trees, utilization of sustainable materials and incorporation of water and energy efficient site design/construction;

**END OF SECTION**

## **SECTION 2: PROPOSAL REQUIREMENTS**

### 2.1 General Submittal Information

- a. Proposers, before submitting a proposal, will become fully informed as to the extent and character of the proposal document and are expected to completely familiarize themselves with the requirements of this solicitation and any and all specifications. Failure to do so will not relieve the Proposer of the responsibility to fully perform in accordance therewith. No consideration will be granted for alleged misunderstanding of the material to be furnished or the work to be performed, it being understood that the submission of a proposal is an agreement with all of the items and condition referred to herein.
- b. All offers and any other documents required as noted in this RFP and any addenda must be submitted to Nicholas Rice, Procurement Officer, 1 West Market Street, Room 1103, Snow Hill, MD 21863, by Wednesday, March 8, 2023 at 2:00 p.m. Under no circumstances will offers delivered after the date and time specified be considered. The County will not be responsible for any offer delayed in the postal or other delivery service nor any late offer, amendment, or request for withdrawal of offer, received after the RFP date. Offers received after the date and time for receipt will be returned unopened.
- c. All submitted documents should be prepared in a professional manner and must provide a clear and concise demonstration of the Proposer's capability to satisfy the requirements and objectives of this RFP.
- d. The County will not be limited solely to the information provided by the Proposer, but may utilize other sources of information useful in evaluating the capabilities of the Proposer. Special or unique capabilities or advantages of the Proposer should be clearly stated in the Developer's Development Proposal Document.
- e. All copies of the Proposal submittal and any other documents required to be submitted with the Proposal will be enclosed in a sealed envelope. The envelope will be identified with the project name and the Proposer's name and address. If the proposal is sent by mail, the sealed envelope will be enclosed in a separate mailing envelope with the notation "**SEALED PROPOSAL ENCLOSED**" on the face thereof.
- f. Proposers or their authorized agents are expected to fully inform themselves as to the conditions, requirements, and specifications before submitting proposals; failure to do so will be at the Proposer's own risk.
- g. Proposals will be valid for a minimum of 180 days from the date of proposal opening.

## 2.2 RFP-specific Submission Requirements

Each submission of proposal documents will be required to provide the following exhibits or materials as part of the proposal package. In order to issue a uniform review process and to obtain the maximum degree of comparability, it is required that the submittal be organized in the manner specified, tabbed, and with a table of contents.

- a. Title Page: Show the name of the development firm, address, telephone number, name of contact person, date, and the subject: **“Sale of Surplus Property – Economic Development Building”**.
- b. Table of Contents: Include a clear identification of the material by section and by page number.
- c. Comprehensive Plan for use of the Site: This should include, but not limited to:
  - Plans for renovation or demolition;
  - Use planned when demolition has been completed;
  - Anticipated neighborhood impact. If applicable address:
    - Traffic
    - Parking
    - Pedestrian traffic
    - Noise
    - Construction
  - Discuss how your proposed use is compatible with the surrounding neighborhood.
  - Anticipated date of project / redevelopment completion.
- d. Letter of Interest: Brief history of firm, a statement of the respondent’s interest in the proposed property, and describe the firm’s strengths that enhance their ability to purchase the properties and carry out any proposed improvements to the properties.
- e. Financial Capacity to Complete Proposed Improvements: In order for proposals to be considered, Proposers must submit with their proposal, a letter from a lending institution evidencing the Proposer possesses the ability to obtain the necessary funds to purchase this property. Evidence will include all information necessary to certify that the Proposer: maintains a permanent place of business; has available the organization and qualified manpower to do the proposed improvements; has adequate financial status to meet the financial obligations incidental to the proposed improvements; has not had just or proper claims pending against him or his company. **Failure to submit this letter with your proposal may result in rejection of your proposal.**

- f. Additional Background: You are invited to include a maximum of five pages of information not included above which you feel may be useful and applicable to this project.
- g. County Forms: Submit the following completed forms provided in the RFP (found in Sections 5, 6, 7 & 8):
  - i. Section 5: Form of Proposal
  - ii. Section 6: Developer's Affidavit of Qualification to Proposal
  - iii. Section 7: Ownership Disclosure Form
  - iv. Section 8: Non-Collusive Affidavit

### 2.3 Completion of Proposal Documents

- a. Use only forms supplied by the County.
- b. Submit one (1) original and three (3) copies of completed Proposal Documents. Each copy of the proposal will be bound in a single volume. All documents submitted with the proposal will be bound in that single volume. All blanks on the form will be filled in.
- c. Where so indicated by the make-up of the proposal form, sums will be expressed in both words and figures, and in the case of a discrepancy between the two, the amount written in words will govern. In event there is a discrepancy between the unit price and the extended totals, the unit prices will govern.
- d. Any interlineation, alteration, or erasure MUST be initialed by the signer of the Proposal.
- e. Each copy of the proposal will be signed by the person or persons legally authorized to bind the Proposer to a contract, using the legal name of the signer. A proposal submitted by an agent will have a current Power of Attorney attached certifying the agent's authority to bind the Proposer.
- f. Proposer will supply all information and submittals required by the documents to constitute a proper and responsible proposal.
- g. Any ambiguity in any proposal as a result of omission, error, lack of clarity or noncompliance by the Proposer with specifications, instructions, and/or all conditions of proposal will be construed in the light most favorable to the County.

### 2.4 Deposit

- a. The Successful Proposer, within fourteen (14) calendar days from the Notice of Award, will be required to provide a deposit in an amount not less than five percent (5%) of the base bid. Certified or cashier's checks are acceptable, made payable to the County.
- b. The deposit will be returned to the Successful Proposer upon execution of a Purchase and Sale Agreement or applied to the sale.

**END OF SECTION**



## **SECTION 3: EVALUATION AND SELECTION PROCESS**

### 3.1 Opening of Proposals

- a. Proposals received on time will be opened publicly and only participant's name will be read aloud for the record.
- b. The contract will be awarded or all proposals will be rejected within 180 days from the date of proposal opening.

### 3.2 Acceptance or Rejection of Proposals

- a. Unless otherwise specified, the contract will be awarded to the most **RESPONSIBLE** and **RESPONSIVE** Proposer complying with the provisions of the proposal documents, provided the proposal price is reasonable and it is in the best interest of the County to accept it. The County reserves the right to reject the proposal of any Proposer who has previously failed to perform properly in any way or complete on time contracts of a similar nature; or a proposal from a Proposer who, investigation shows, is not in a position to perform the contract; or a proposal from any person, firm, or corporation which is in arrears or in default to the County for any debt or contract.
- b. In determining a Proposer's **RESPONSIBILITY**, the County may consider the following qualifications, in addition to price:
  - i. Ability, capacity, and skill to provide the commodities or services required within the specified time, including future maintenance and service, and including current financial statement or other evidence of pecuniary resources and necessary facilities;
  - ii. Character, integrity, reputation, experience and efficiency;
  - iii. Quality of past performance on previous or existing contracts, including a list of current and past contracts and other evidence of performance ability;
  - iv. Previous and existing compliance with laws and ordinances relating to contracts with the County and to the Proposer's employment practices;
  - v. Evidence of adequate insurance to comply with contract terms and conditions;
  - vi. Statement of current work load and capacity;
  - vii. Explanation of methods to be used in fulfilling the contract.
- c. In determining a Proposer's **RESPONSIVENESS**, the County will consider whether the proposal conforms in all material respects to the proposal documents. The County reserves the right to waive any informalities or irregularities that may be in its best interest to do so. Additionally, failure to submit the proposal documents in the manners outlined above may result in the proposal document being rejected as unresponsive.

- d. The County will have the right to reject any and all proposals, where applicable to accept in whole or in part, to add or delete quantities, to reject a proposal not accompanied by required proposal security or other data required by the proposal documents, and to accept or reject any proposal which deviates from specifications when in the best interest of the County. Irrespective of any of the foregoing, the County will have the right to award the Contract in its own best interests.

**END OF SECTION**

## **SECTION 4: GENERAL INFORMATION**

### 4.1 Economy of Proposal

- a. Proposals should be prepared simply and economically, providing straightforward and concise description of the Proposers' capabilities to satisfy the requirements of the RFP. Emphasis should be on completeness and clarity of content. Elaborate brochures and other representations beyond that sufficient to present a complete and effective proposal are neither required nor desired.

### 4.2 Proprietary Information or Trade Secrets

- a. The Proposer may invoke proprietary information or trade secret protection for submission of any data/material by (1) identifying the data/material in a written description, (2) clearly marking the data/material as proprietary, and (3) providing a written statement detailing the reasons why protection is necessary. The County reserves the right to ask for additional clarification prior to establishing protection.

### 4.3 Ownership of Materials

- a. Ownership of all material and documentation originated and prepared pursuant to the RFP will belong exclusively to the County and is subject to public inspection in accordance with the Freedom of Information Act. Trade secrets or proprietary information submitted by a Firm in connection with a procurement transaction will not be subject to disclosure under the Freedom of Information Act. However, the Firm must invoke the protections of this section prior to or upon submission of the data or other materials.

### 4.4 Audit

- a. The Firm agrees to retain all books, records, and other documents relative to this contract for five (5) years after final payment, or until audited. The County, its authorized agents, and/or State auditors will have full access to and the right to examine any of said materials during said period.

### 4.5 Contract Award

- a. A Purchase and Sale Agreement will result from award of this RFP.
- b. Proposals and contracts issued by the County will bind the Firm to applicable conditions and requirements herein set forth, unless otherwise specified in the proposal documents, and are subject to all federal, state, and municipal laws, rules, regulations, and limitations. This contract will be construed and interpreted in accordance with the laws of the State of Maryland and all questions of performance hereunder will be determined in accordance with such laws.
- c. County personal property taxes must be on a current basis; if any such taxes are delinquent, they must be paid before award of contract. Failure to pay will result in the award of proposal to another firm.

- d. The County reserves the right to engage in individual discussions and interviews with those Proposers deemed fully qualified, responsible, suitable and professionally competent to provide the required services should the project size warrant it. Proposers will be encouraged to elaborate on their qualifications, performance data, and staff expertise. Proprietary information from competing Proposers will not be disclosed to the public or to competitors.

#### 4.6 Modification or Withdrawal of Proposal

- a. A proposal may not be modified, withdrawn or cancelled by the Proposer during the stipulated time period following the time and date designated for the receipt of proposals, and each Proposer so agrees in submitting a proposal.

#### 4.7 Collusion/Financial Benefit

- a. The Proposer certifies that his/her proposal is made without any previous understanding, agreement, or connection with any person, firm, or corporation making a proposal for the same project; without prior knowledge of competitive prices; and is in all respects fair, without outside control, collusion, fraud, or otherwise illegal action.
- b. Upon signing the proposal, Proposer certifies that no member of the governing body of the County, or members of his/her immediate family, including spouse, parents or children, or any other officer or employee of the County, or any member or employee of a Commission, Board, or Corporation controlled or appointed by the Executive Officer or Council has received or has been promised, directly or indirectly, any financial benefit, related to this contract.

#### 4.8 Indemnity

- a. The successful Firm agrees to indemnify, defend, and hold harmless the County and its officers, employees, and agents from any and all liability, loss, cost, damage, and expense (including reasonable attorney's fees and court costs) resulting from, arising out of, or incurred by reason of any claims, actions, or suits based upon or alleging bodily injury, including death, or property damage rising out of or resulting from the Firm's operations under this Contract, whether such operations be by himself or by any Subcontractor or by anyone directly or indirectly employed by either of them.
- b. Firm further agrees to furnish adequate protection against damage to all work and to repair damages of any kind, to the building or equipment, due to Firm's own work or to the work of other contractors for which he or his workers are responsible.

#### 4.9 Contract Changes

- a. **NO CLAIMS** may be made by anyone that the scope of the project or that the Firm's services have been changed **UNLESS** such changes or adjustments have been made by an approved **WRITTEN AMENDMENT (Change Order)** to the Contract signed by the Chief Administrative Officer (and the County Commissioners, if required), prior to extra work being initiated. Changes performed without prior, approved, written authority will be considered as unauthorized and at the expense of the Firm. Payment will not be made by the County (Owner) for said changes not approved as aforementioned.
- b. **NO ORAL** conversations, agreements, discussions, or suggestions, which involve changes to the scope of the Contract, made by anyone including any County employee, will be honored or valid. No written agreements or changes to the scope of the Contract made by anyone other than the Chief Administrative Officer (with County Commissioners approval, if required) will be honored or valid.
- c. If any change ordered in the work results in a reduction in the work, the Firm will neither have, nor assert any claim for, nor be entitled to any additional compensation for damages or for loss of anticipated profits on work that is eliminated.
- d. No inspection, or any failure to inspect, at any time or place, will relieve the Firm from his obligation to perform all the work strictly in accordance with the requirements of the specifications. The Firm's Project Representatives are NOT authorized to revoke, alter, enlarge, relax, or release any requirement of these specifications, or to approve or accept any portion of the Contract, or to issue instruction contrary to the drawings and specifications of the Contract.

#### 4.10 Addendum

- a. **No oral statements of any person will modify or otherwise affect or interpret** the meaning of the Contract specifications, or the terms, conditions, or other portions of the Contract. All modifications and every request for any interpretation must be addressed to the Procurement Officer, and to be given consideration, must be received at the above address at least ten (10) days prior to the date fixed for the opening of proposals.
- b. Any and all interpretations, corrections, revisions, and amendments will be issued by the Procurement Officer to all holders of proposal documents in the form of written addenda. Proposers are cautioned that any oral statements made by any Entity's employee that materially change any portion of the proposal documents will not be relied upon unless subsequently ratified by a formal written amendment to the proposal document. All addenda will be issued so as to be received at least five (5) days prior to the time set for receipt of proposals, and will become part of the Contract Documents and will be acknowledged in the proposal form. Failure of any

Proposer to receive any such addenda will not relieve said Proposer from any obligation under his Proposal as submitted.

- c. Proposers are cautioned to refrain from including in their proposal any substitutions which are not confirmed by written addenda. To find out whether the County intends to issue an amendment reflecting an oral statement made by any employee, contact Nicholas Rice, Procurement Officer, at 410-632-1194 during normal business hours.
- d. The Procurement Officer, reserves the right to postpone the proposal opening for any major changes occurring in the 5-day interim which would otherwise necessitate an Addendum.

4.11 Cancellation of the Proposal Document/Rejection of All Proposals

- a. The County may, at its sole discretion, cancel this Proposal Document, in whole or in part, or reject all Proposal Documents submitted when this action is determined to be in the best interest of the County.

4.12 Evaluation Criteria

- a. The following table shows evaluation criteria:

Maximum Possible Points	Criterion
50	The monetary value offered for the Property.
25	Use and redevelopment of Property as defined by the proposer in the proposal documents. Developer’s ability to meet or exceed the development timeline as defined in the solicitation document, including past experience on similar projects and the developer’s ability to meet or exceed deadlines.
20	Balance sheet provides evidence the entity’s liquidity is above industry standards and the Income Statement provides evidence of sustainable cash flows
5	Such other and further factors as the Committee may wish to consider.

Each Developers final score will be the sum of each criterion’s total points.

**END OF SECTION**

## **SECTION 5: REQUIRED FORMS—FORM OF PROPOSAL**

Date: \_\_\_\_\_

To Whom It May Concern:

We hereby submit our proposal for County owned property, described as Prior Economic Development Building as indicated in the Proposal Documents.

Having carefully examined the Proposal Document and having received clarification on all items of conflict or upon which any doubt arose, the undersigned hereby requests consideration of our firm for award of the referenced contract.

Proposal Amount for **100 Pearl Street, Snow Hill, Maryland 21863**. \$ \_\_\_\_\_

\*The Successful Proposer, within fourteen (14) calendar days from the Notice of Award, will be required to provide a deposit in an amount not less than five percent (5%) of the base bid.

Firm Name: \_\_\_\_\_

Firm Address: \_\_\_\_\_

City/State/Zip: \_\_\_\_\_

\_\_\_\_\_ Telephone

\_\_\_\_\_ Fax

\_\_\_\_\_ Email

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Printed Name

**SECTION 6: REQUIRED FORMS–DEVELOPER’S AFFIDAVIT OF QUALIFICATION TO PROPOSE (pg. 1 of 2)**

I hereby affirm that:

I, \_\_\_\_\_ am the \_\_\_\_\_

(Printed Name)

(Title) and

the duly authorized representative of the Developer of:

\_\_\_\_\_  
(Name of Firm) whose

address is:

\_\_\_\_\_  
(Street)

\_\_\_\_\_  
(City/State/Zip)

and that I possess the legal authority to make this affidavit on behalf of myself and the Developer for which I am acting.

Except as described below, neither I nor the above Developer, not to the best of my knowledge and of its officers, directors or partners, or any of its employees directly involved in obtaining contracts with the State or any county, bi-county or multi-county agency, or subdivision of the State have been convicted of, or have pleaded nolo-contendere to a charge of, or have during the course of an official investigation or other proceeding admitted in writing or under oath acts or omissions which constitute bribery, attempted bribery, or conspiracy to bribe under the provisions of Article 27 of the Annotated Code of Maryland or under the laws of any state or federal government (conduct prior to July 1, 1977 is not required to be reported).

(State “none” or, as appropriate, list any conviction, plea or admission described in the paragraph above, with the date, court, official or administrative body, the individuals involved and their position with the Developer, and the sentence or disposition, if any.)

\_\_\_\_\_  
\_\_\_\_\_

I acknowledge that this affidavit is to be furnished to the County, I acknowledge that, if the representations set forth in this affidavit are not true and correct, the County may terminate any Contract awarded and take any other appropriate action. I further acknowledge that I am executing



this affidavit in compliance with section 16D of Article 78A of the Annotated Code of Maryland, which provides that certain persons who have been convicted of or have admitted to

bribery, attempted bribery or conspiracy to bribe may be disqualified, either by operation of law or after a hearing, from entering into contracts with the State or any of its agencies or subdivisions.

I do solemnly declare and affirm under the penalties of perjury that the contents of this affidavit are true and correct.

---

Signature

---

Printed Name

# SECTION 7: REQUIRED FORMS - OWNERSHIP DISCLOSURE FORM

COMPANY NAME: \_\_\_\_\_

TYPE OF COMPANY (circle one):

ADDRESS: \_\_\_\_\_

\*Sole Proprietorship

\_\_\_\_\_

\*Partnership

\_\_\_\_\_

\*Corporation

FEIN#: \_\_\_\_\_

\*Limited Liability Corporation

**INSTRUCTIONS:** Provide below the names, offices held and any ownership interest of all officers of the firm. If additional space is necessary, provide on an attached sheet.

NAME	OFFICE HELD	OWNERSHIP INTEREST (Shares Owned or % of Partnership)
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

**INSTRUCTIONS:** Provide below the names, offices held and ownership interest of all individuals not listed above, and any partnerships, corporations and any other owner having a 10% or greater interest in the firm named above. If a listed owner is a corporation or partnership, provide below the same information for the holders of 10% or more interest in that corporation or partnership. If additional space is necessary, provide that information on an attached sheet. **If there are no owners with 10% or more interest in your firm, enter "None" below.**

NAME	OFFICE HELD	OWNERSHIP INTEREST (Shares Owned or % of Partnership)
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

## OWNERSHIP DISCLOSURE FORM – cont'd

**COMPLETE ALL QUESTIONS BELOW**

	YES	NO
1. Within the past five years, has another company or corporation had a 10% or greater interest in the firm identified above? (If yes, complete and attach a separate disclosure form reflecting previous ownership interests.)	_____	_____
2. Has any person or entity listed in this form or its attachments ever been arrested, charged, indicted or convicted in a criminal or disorderly persons matter within the State of Maryland, any other state or the U.S. Government? (If yes, attach a detailed explanation for each instance.)	_____	_____
3. Has any person or entity listed in this form or its attachments ever been suspended, debarred or otherwise declared ineligible by any agency of government from proposing or contracting to provide services, labor, material or supplies? (If yes, attach a detailed explanation for each instance.)	_____	_____
4. Are there now any criminal matters or debarment proceedings pending in which the firm and/or its officers and or managers are involved? (If yes, attach a detailed explanation for each instance.)	_____	_____
5. Has any federal, state or local license, permit or other similar authorization, necessary to perform the work applied for herein and held or applied for by any person or entity listed in this form, been suspended or revoked, or been the subject of any pending proceedings specifically seeking or litigating the issue of suspension or revocation? (If yes to any part of this question, attached a detailed explanation for each instance.)	_____	_____

**CERTIFICATION:** I, being duly authorized, hereby represent and state that the information supplied above, including all attached pages, is complete and correct to the best of my knowledge. I acknowledge that Worcester County is relying on the information contained herein and thereby acknowledge that I am under a continuing obligation from the date of this certification through the completion of any contracts with Worcester County to notify the County in writing of any changes to the answers or information contained herein. I acknowledge that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I recognize that I am subject to criminal prosecution under the law and that it will also constitute a material breach of my agreement with Worcester County and the County at its option, may declare any contract(s) resulting from this certification void and unenforceable.

**PRINTED NAME:** \_\_\_\_\_

**SIGNATURE:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

**WITNESS:** \_\_\_\_\_

**AFFIX CORPORATE SEAL HERE**

**SECTION 8: REQUIRED FORMS - NON-COLLUSIVE AFFIDAVIT**

\_\_\_\_\_ being first duly sworn, deposes and says that:

1. He/she is the \_\_\_\_\_, (Owner, Partner, Officer, Representative or Agent) of \_\_\_\_\_, the Developer that has submitted the attached Proposal Document;
2. He/she is fully informed respecting the preparation and contents of the attached Proposal Document and of all pertinent circumstances respecting such Proposal Documents;
3. Such Proposal Document is genuine and is not a collusive or sham Proposal Document;
4. Neither the said Developer nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, have in any way colluded, conspired, connived or agreed, directly or indirectly, with any other Developer, firm, or person to submit a collusive or sham Proposal Document in connection with the Services for which the attached Proposal Document has been submitted; or to refrain from proposing in connection with such Services; or have in any manner, directly or indirectly, sought by agreement or collusion, or communication, or conference with any Developer, firm, or person to fix the price or prices in the attached Proposal Document or of any other Developer, or to fix any overhead, profit, or cost elements on the Proposal Document price or the Proposal Document price of any other Developer, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any disadvantage against (Recipient), or any person interested in the Services;
5. The price or prices quoted in the attached Proposal Document are fair and proper and are not tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the Developer or any other of its agents, representatives, owners, employees or parties in interest, including this affiant.
6. Signed, sealed and delivered in the presence of:

_____	By: _____
Witness	Signature
_____	_____
Witness	Printed Name
	_____
	Title

WORCESTER COUNTY MARYLAND  
STANDARD TERMS AND CONDITIONS

The provisions below are applicable to all Worcester County (“County”) contracts. These provisions are not a complete agreement. These provisions must be attached to an executed document that identifies the work to be performed, compensation, term, incorporated attachments, and any special conditions (“Contract”). If the Standard Terms and any other part of the Contract conflict, then the Standard Terms will prevail.

1. **Amendment.** Amendments to the Contract must be in writing and signed by the parties.
2. **Bankruptcy.** If a bankruptcy proceeding by or against the Contractor is filed, then:
  - a. The Contractor must notify the County immediately; and
  - b. The County may cancel the Contract or affirm the Contract and hold the Contractor responsible for damages.
3. **Compliance with Law.** Contractor must comply with all applicable federal, state, and local law. Contractor is qualified to do business in the State of Maryland. Contractor must obtain, at its expense, all licenses, permits, insurance, and governmental approvals needed to perform its obligations under the Contract.
4. **Contingent Fee Prohibition.** The Contractor has not directed anyone, other than its employee or agent, to solicit the Contract and it has not promised to pay anyone a commission, percentage, brokerage fee, contingent fee, or other consideration contingent on the making of the Contract.
5. **Counterparts and Signature.** The Contract may be executed in several counterparts, each of which may be an original and all of which will be the same instrument. The Contract may be signed in writing or by electronic signature, including by email. An electronic signature, a facsimile copy, or computer image of the Contract will have the same effect as an original signed copy.
6. **Exclusive Jurisdiction.** All legal proceedings related to this Contract must be exclusively filed, tried, and maintained in either the District Court of Maryland for Worcester County, Maryland or the Circuit Court of Worcester County, Maryland. The parties expressly waive any right to remove the matter to any other state or federal venue and waive any right to a jury trial.
7. **Force Majeure.** The parties are not responsible for delay or default caused by fire, riot, acts of God, County-declaration-of-emergency, or war beyond their reasonable control. The parties must make all reasonable efforts to eliminate a cause of delay or default and must, upon cessation, diligently pursue their obligations under the Contract.
8. **Governing Law.** The Contract is governed by the laws of Maryland and the County.
9. **Indemnification.** The Contractor must indemnify the County and its agents from all liability, penalties, costs, damages, or claims (including attorney’s fees) resulting from personal injury, death, or damage to property that arises from or is connected to the performance of the work or failure to perform its obligations under the Contract. All indemnification provisions will survive the expiration or termination of the Contract.
10. **Independent Contractor.**
  - a. Contractor is an “Independent Contractor”, not an employee. Although the County may determine the delivery schedule for the work and evaluate the quality of the work, the County will not control the means or manner of the Contractor’s performance.

- b. Contractor is responsible for all applicable taxes on any compensation paid under the Contract. Contractor is not eligible for any federal Social Security, unemployment insurance, or workers' compensation benefits under the Contract.
- c. Contractor must immediately provide the County notice of any claim made against Contractor by any third party.

**11. Insurance Requirements.**

- a. Contractor must have Commercial General Liability Insurance in the amounts listed below. The insurance must include coverage for personal injury, discrimination, and civil rights violation claims. All insurance must name County, its employees, and agents as "ADDITIONAL INSURED". A copy of the certificate of insurance must be filed with the County before the Contract is executed, providing coverage in the amount of \$1,000,000 per occurrence, \$2,000,000 general aggregate, and \$500,000 for property damage.
- b. Contractor must have automobile insurance on all vehicles used in the Contract to protect Contractor against claims for damages resulting from bodily injury, including wrongful death, and property damage that may arise from the operations in connection with the Contract. All insurance must name County, its employees, and agents as "ADDITIONAL INSURED".
- c. Contractor must provide the County with a certification of Workers' Compensation Insurance, with employer's liability in the minimum amount required by Maryland law in effect for each year of the Contract.
- d. All insurance policies must have a minimum 30 days' notice of cancellation. The County must be notified immediately upon cancellation.
- e. When insurance coverage is renewed, Contractor must provide new certificates of insurance prior to expiration of current policies.

**12. Nondiscrimination.** Contractor must not discriminate against any worker, employee, or applicant because of religion, race, sex, age, sexual orientation, physical or mental disability, or perceived disability. This provision must be incorporated in all subcontracts related to the Contract.

**13. Ownership of Documents; Intellectual Property.**

- a. All documents prepared under the Contract must be available to the County upon request and will become the exclusive property of the County upon termination or completion of the services. The County may use the documents without restriction or without additional compensation to the Contractor. The County will be the owner of the documents for the purposes of copyright, patent, or trademark registration.
- b. If the Contractor obtains, uses, or subcontracts for any intellectual property, then it must provide an assignment to the County of ownership or use of the property.
- c. The Contractor must indemnify the County from all claims of infringement related to the use of any patented design, device, materials, or process, or any trademark or copyright, and must indemnify the County, its officers, agents, and employees with respect to any claim, action, costs, or infringement, for royalties or user fees, arising out of purchase or use of materials, construction, supplies, equipment, or services covered by the Contract.

**14. Payments.** Payments to the Contractor under the Contract will be within 30 days of the County's receipt of a proper invoice from the Contractor. If an invoice remains unpaid 45 days after the

invoice was received, interest will accrue at 6% per year.

15. **Records.** Contractor must maintain fiscal records relating to the Contract in accordance with generally accepted accounting principles. All other relevant records must be retained by Contractor and kept accessible for at least three years after final payment, termination of the Contract, or until the conclusion of any audit, controversy, or litigation related to the Contract. All subcontracts must comply with these provisions. County may access all records of the Contractor related to the Contract.

16. **Remedies.**

- a. **Corrections of errors and omissions.** Contractor must perform work necessary to correct errors and omissions in the services required under the Contract, without undue delays and cost to the County. The County's acceptance will not relieve the Contractor of the responsibility of subsequent corrections of errors.
- b. **Set-off.** The County may deduct from any amounts payable to the Contractor any back-charges, penalties, or damages sustained by the County, its agents, or employees caused by Contractor's breach. Contractor will not be relieved of liability for any costs caused by a failure to satisfactorily perform the services.
- c. **Cumulative.** These remedies are cumulative and without waiver of any others.

17. **Responsibility of Contractor.**

- a. The Contractor must perform the services with the standard of care, skill, and diligence normally provided by a Contractor in the performance of services similar the services.
- b. Notwithstanding any review, approval, acceptance, or payment for the services by the County, the Contractor will be responsible for the accuracy of any work, design, drawings, specifications, and materials furnished by the Contractor under the Contract.
- c. If the Contractor fails to conform with subparagraph (a) above, then it must, if required by the County, perform at its own expense any service necessary for the correction of any deficiencies or damages resulting from the Contractor's failure. This obligation is in addition to any other remedy available to the County.

18. **Severability/Waiver.** If a court finds any term of the Contract to be invalid, the validity of the remaining terms will not be affected. The failure of either party to enforce any term of the Contract is not a waiver by that party.

19. **Subcontracting or Assignment.** The Contractor may not subcontract or assign any part of the Contract without the prior written consent of the County. The County may withhold consent for any reason the County deems appropriate.

20. **Termination.** If the Contractor violates any provision of the Contract, the County may terminate the Contract by written notice. All finished or unfinished work provided by the Contractor will, at the County's option, become the County's property. The County will pay the Contractor fair compensation for satisfactory performance that occurred before termination less the amount of damages caused by the Contractor's breach. If the damages are more than the compensation payable to the Contractor, the Contractor will remain liable after termination and the County can affirmatively collect damages.

21. **Termination of Contract for Convenience.** Upon written notice, the County may terminate the

Contract when the County determines termination is in the County's best interest. Termination for convenience is effective on the date specified in the County's written notice. The County will pay for reasonable costs allocable to the Contract for costs incurred by the Contractor up to the date of termination. But the Contractor will not be reimbursed for any anticipatory profits that have not been earned before termination.

22. **Termination of Multi-year Contract.** If funds are not available for any fiscal period of the Contract after the first fiscal period, then the Contract will be terminated automatically as of the beginning of unfunded fiscal period. Termination will discharge the Contractor and the County from future performance of the Contract, but not from their rights and obligations existing at the time of termination.
23. **Third Party Beneficiaries.** The County and Contractor are the only parties to the Contract and are the only parties entitled to enforce its terms. Nothing in the Contract gives any benefit or right to third persons unless individually identified by name and expressly described as intended beneficiaries of the Contract.
24. **Use of County Facilities.** Contractor may only County facilities that are needed to perform the Contract. County has no responsibility for the loss or damage to Contractor's personal property which may be stored on County property.
25. **Whole Contract.** The Contract, the Standard Terms, and attachments are the complete agreement between the parties and supersede all earlier agreements, proposals, or other communications between the parties relating to the subject matter of the Contract.



**STRUCTURAL CONDITION ASSESSMENT  
100 PEARL STREET  
SNOW HILL, MARYLAND**

**Prepared For:  
Worcester County Commissioners  
Department of Public Works  
6113 Timmons Road  
Snow Hill, Maryland 21863**

**Prepared By:  
Davis, Bowen & Friedel, Inc.  
601 East Main Street, Suite 100  
Salisbury, Maryland 21804**

**DBF #085B037.A01**

**April, 2018**

## **GENERAL**

On March 21, 2018, Davis, Bowen & Friedel, Inc. and Gipe Associates, Inc. performed a structural condition assessment and HVAC evaluation of the Worcester County Tourism building located at 100 Pearl Street in Snow Hill, Maryland. A separate evaluation of existing heating, ventilation, air conditioning and electrical systems is provided by Gipe Associates, Inc. as an attachment.

The building is a 3-story commercial structure comprised of wood framed roof and floors supported on unreinforced brick masonry walls, foundations and steel/iron columns. The minimum roof snow load is 20 psf and the design live load for offices is 50 psf.

The purpose of our observations and this report is to provide a structural condition assessment of the building and exterior. Photos of structural members and deficiencies are provided. We have also outlined recommendations for corrective action or reinforcement.

## **ROOF**

### **Observations and Conclusions:**

1. The built up bituminous roof covering is in poor condition. Refer to Photos 1 through 3.
2. Parapet wall coping, flashing and termination at joints is in poor condition. Refer to Photos 4 through 8.
3. One of the brick chimneys, apparently not in service, is leaning with an unused antenna attached. Refer to Photo 9.
4. The roof slope is adequate. Refer to Photo 10
5. There is standing water at the low end of the roof. The drip edge is not adequate and is allowing water to drain down the face of the rear brick wall. Refer to Photo 11.

### **Recommendations:**

1. The roofing and wet insulation should be removed to the timber sheathing. Sheathing and structural repairs should be accomplished. **(First Priority)**
2. The unused brick chimney should be removed and capped off. **(First Priority)**
3. New rigid insulation should be installed over the sheathing and a new roof membrane installed. **(First Priority)**
4. New parapet wall coping, drip edge and flashing should be installed. **(First Priority)**
5. A gutter and downspout is recommended for the rear of the building. **(First Priority)**

## **ROOF FRAMING**

### **Observations and Conclusions:**

1. The roof framing and third floor ceiling framing can be observed above the suspended ceiling of the third floor. The roof framing is 2x8 joists spaced at 16 inches, spanning approximately 15 feet. The ceiling joist are also 2x8 spaced at 16 inches, spanning approximately 15 feet. Refer to Photos 12 through 14.

2. The beam supporting the roof and ceiling is a 6x8, spanning approximately 15'-3". The beam is supported on steel/iron columns. The beam is not adequate to support snow loading using current allowable timber stresses. Upgrading the insulation will also increase the snow load on the roof. Refer to Photo 15.
3. There are water stains on the third floor ceiling apparently due to roof leaks. Refer to Photos 16 through 18.

**Recommendations:**

1. The existing beam should be reinforced by installing an additional steel beam, W6x20, below the existing. The steel columns should be replaced. **(First Priority)**

**THIRD FLOOR FRAMING**

**Observations and Conclusions:**

1. The third floor framing can be observed above the suspended ceiling of the second floor. The floor framing is 2x12 joists spaced at 16 inches, spanning approximately 15 feet. Refer to Photo 19.
2. The beam supporting the floor is a 10x12, spanning approximately 15'-3". The beam is not adequate to support office floor loading using current allowable timber stresses. Refer to Photo 20.

**Recommendations:**

1. The existing beam should be reinforced by installing an additional steel beam, W6x20, below the existing and replacing the steel columns. **(Second Priority)**

**SECOND FLOOR FRAMING**

**Observations and Conclusions:**

1. The second floor framing can be observed above the suspended ceiling of the first floor. The floor framing is 2x12 joists spaced at 16 inches, spanning approximately 15 feet. Refer to Photos 21 and 22.
2. The beam supporting the floor is (5) 2x12's, spanning up to 19'-4". The beam is not adequate to support office floor loading using current allowable timber stresses. Refer to Photos 23 and 24.
3. A steel beam and columns have been added to provide supplemental support of the second floor joists. Refer to Photos 25 and 26.

### **Recommendations:**

1. The existing beam should be reinforced by installing an additional steel beam, W8x21, below the existing and replacing the steel columns. **(Second Priority)**

### **FIRST FLOOR FRAMING AND BASEMENT**

#### **Observations and Conclusions:**

1. The first floor framing can be observed from the basement. The floor framing is 2x12 joists spaced at 16 inches, spanning approximately 15 feet. Numerous joists are split, cut and deteriorated due to the presence of water. Refer to Photos 27 and 28.
2. The joists bear directly on exterior masonry walls and interior masonry walls. Refer to Photo 29. There is significant deterioration of the joist ends due to moisture.
3. The ends of numerous joists have been supported with supplemental framing a piers. Refer to Photos 30 through 32.
4. Joists were cut to install a new concrete slab at the Pearl Street entry vestibule. The joists were improperly supported on a beam with masonry piers and no apparent footing. Refer to Photos 33 through 35.
5. Timber joist ends, joist supports and header at Pearl Street basement entry are deteriorated due to moisture. Refer to Photos 36 through 38.
6. Joists in the mechanical at the alley exterior wall are deteriorated due to moisture. Refer to Photo 39. Utility penetrations are allowing water infiltration. Refer to Photos 40 and 41. Some joists have been cut for plumbing installation. Refer to Photo 42.
7. A retaining wall supporting the crawl space area has been cut and is leaning. Refer to Photo 43.
8. The mortar joints in the basement walls are severely eroded due to moisture. Refer to Photos 44.
9. Steel/iron columns above bear on the interior basement wall. Refer to Photos 45 and 46.
10. Columns supporting supplemental framing above are supported on new foundations in the basement. Refer to Photos 47 and 48.

#### **Recommendations:**

1. All first floor joists should be reinforced by scabbing on additional treated 2x12. **(Second Priority)**
2. Joist bearing should be enhanced by installing a continuous treated ledger bolted to the masonry wall. **(Second Priority)**
3. Supplemental framing at joist ends should be replaced with proper foundation. **(Second Priority)**
4. Supplemental framing at joist ends should be replaced with proper foundation. **(Second Priority)**
5. Supplemental framing at joist ends should be replaced with proper connections to the masonry wall. **(Second Priority)**
6. Utility penetrations should be properly enclosed and sealed. **(Third Priority)**

7. The retaining wall should be reinforced by installing a return wall to act as a buttress. **(Third Priority)**
8. Mortar joints in the basement walls should be cleaned out and re-pointed. **(Third Priority)**

## **STAIRS**

### **Observations and Conclusions:**

1. Supports for stair leading to the third floor have deflected leaving them out of level by as much as 1 inch. Supplemental hangers have been installed to mitigate future deflection. Refer to Photos 49 through 52.

### **Recommendations:**

1. Stairs should be leveled and re-supported. **(Third Priority)**

## **EXTERIOR**

### **Observations and Conclusions:**

1. The exterior of the building is in fair condition. Refer to Photos 53 through 56.
2. However, there are areas allowing water infiltration. Refer to Photos 57 and 58.
3. Vines are growing on one corner. Sanitary vent stack is loose. Water is allowing organic growth and softening the mortar. Refer to Photos 59 through 61.
4. The water and moisture is infiltrating the wall and affecting finishes. Refer to Photos 62 and 64.

### **Recommendations:**

1. Sealant around windows and doors should be replaced. **(First Priority)**
2. Vines and other organic growth should be removed. **(First Priority)**
3. The sanitary vent stack should be re-connected. **(First Priority)**

## **PROBABLE CONSTRUCTION COST ESTIMATES**

### **First Priority:**

**\$35,000.**

1. Roofing and wet insulation shall be removed to the timber sheathing. Sheathing and structural repairs should be accomplished.
2. The unused brick chimney shall be removed and capped off.
3. New rigid insulation shall be installed over the sheathing and a new roof membrane installed.

4. New parapet wall coping, drip edge and flashing shall be installed.
5. A gutter and downspout is recommended for the rear of the building.
6. Sealant around windows and doors shall be replaced.
7. Vines and other organic growth shall be removed.
8. The sanitary vent stack shall be re-connected.

**Second Priority:**

**\$42,000.**

1. The existing beam shall be reinforced by installing an additional steel beam, W6x20, below the existing and replace the steel columns. Reconstruct ceiling as required.
2. The existing beam should be reinforced by installing an additional steel beam, W8x21, below the existing and replacing the steel columns. Reconstruct ceiling as required.
3. All first floor joists shall be reinforced by scabbing on additional treated 2x12.
4. Joist bearing shall be enhanced by installing a continuous treated ledger bolted to the masonry wall.
5. Supplemental framing at joist ends shall be replaced with proper foundation. Supplemental framing at joist ends shall be replaced with proper foundation.
6. Supplemental framing at joist ends shall be replaced with proper connections to the masonry wall.

**Third Priority:**

**\$11,000.**

1. Utility penetrations shall be properly enclosed and sealed.
2. The retaining wall shall be reinforced by installing a return wall to act as a buttress.
3. Mortar joints in the basement walls should be cleaned out and re-pointed.
4. Stairs shall be leveled and re-supported.

**DISCLAIMER**

Our evaluation is limited to a condition assessment of the areas that were easily accessible on the day of the inspection. Davis, Bowen & Friedel, Inc. takes no responsibility for any damage or deterioration not detectable by visual inspection. Neither our evaluation nor this report should be construed as a warranty of the building either in part or in whole.



Photo 1 - Built up roof poor condition



Photo 2 - Built up roof poor condition

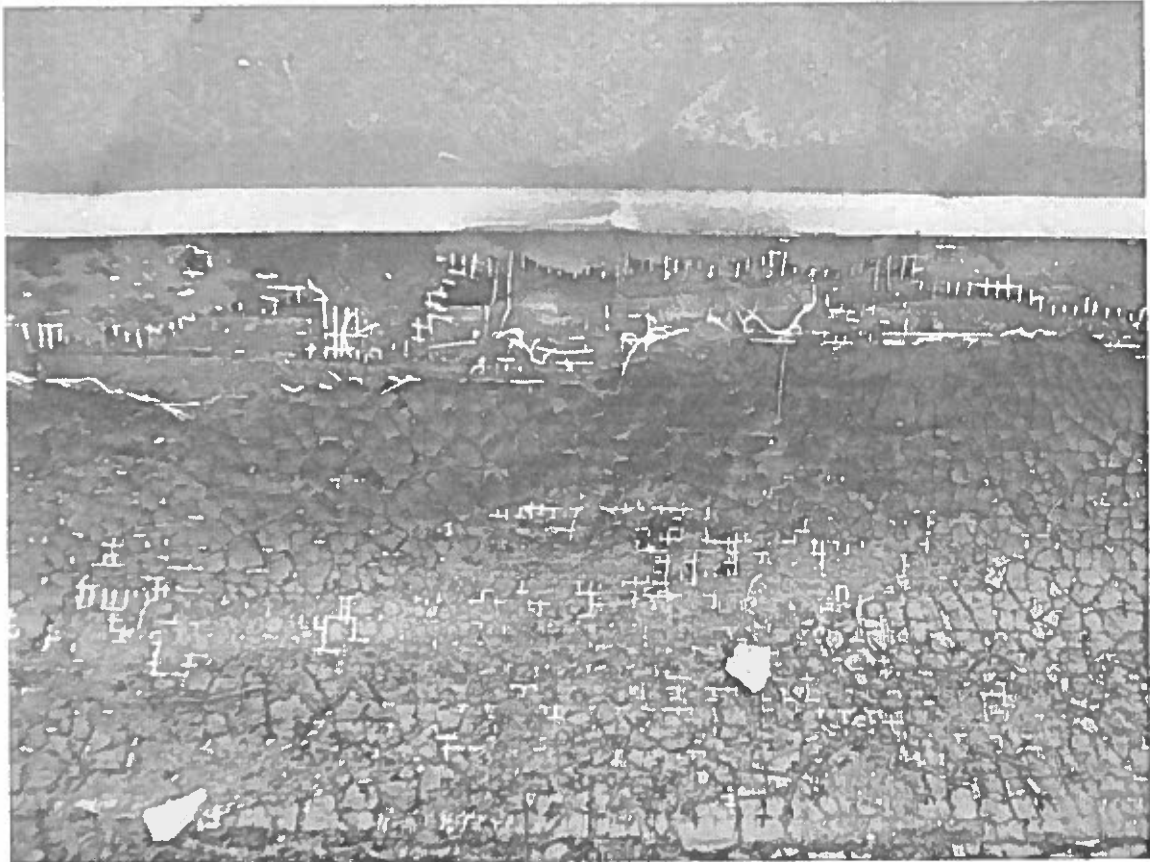


Photo 3 - Built up roof poor condition



Photo 4 - Parapet wall coping open joints





Photo 5 - Parapet wall coping open joints



Photo 6 - Parapet wall coping open joints



Photo 7 - Flashing and coping ends in poor condition



Photo 8 - Flashing and coping ends in poor condition



Photo 9 - Leaning brick chimney



Photo 10 - Roof slope is adequate



Photo 11 - Water ponding at drip edge



Photo 12 - Roof joists and ceiling joists 2 x 8 @ 16"



Photo 13 - Roof joists and ceiling joists 2 x 8 @ 16"

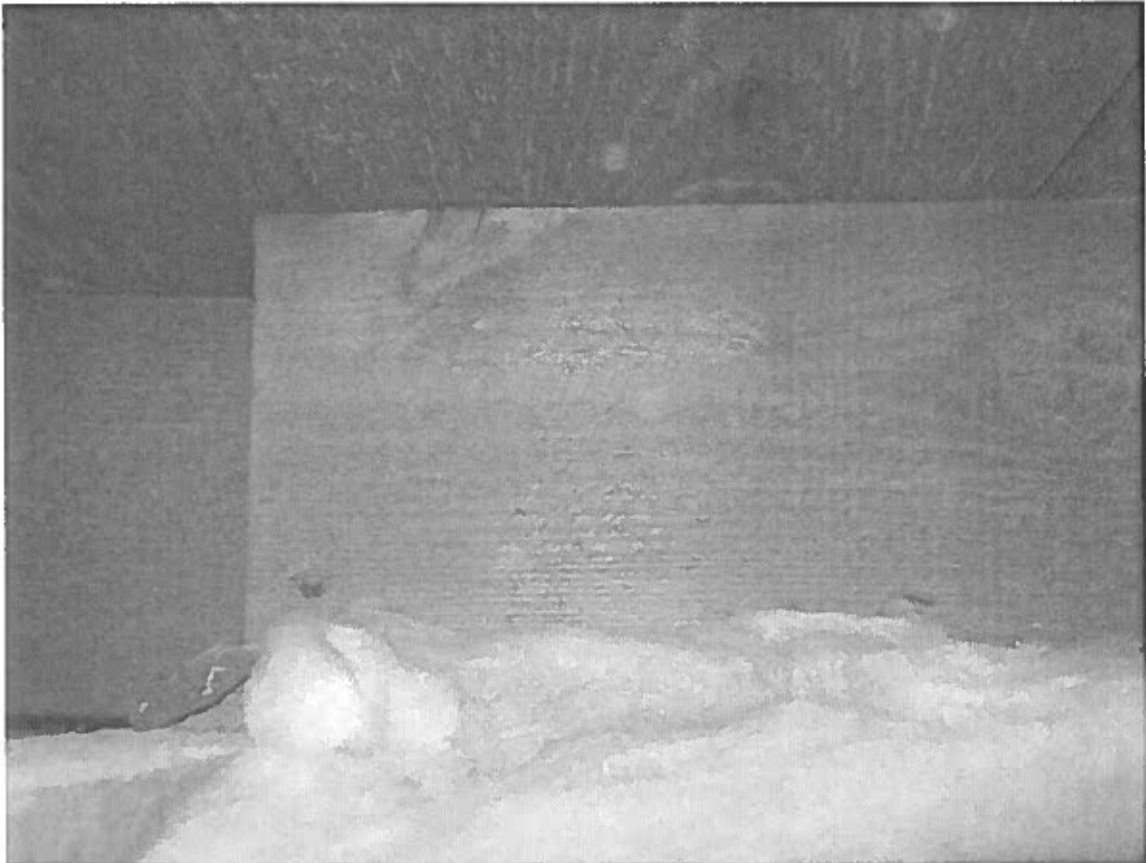


Photo 14 - Roof joists and ceiling joists 2 x 8 @ 16"



Photo 15 - Beam & column supporting roof and ceiling

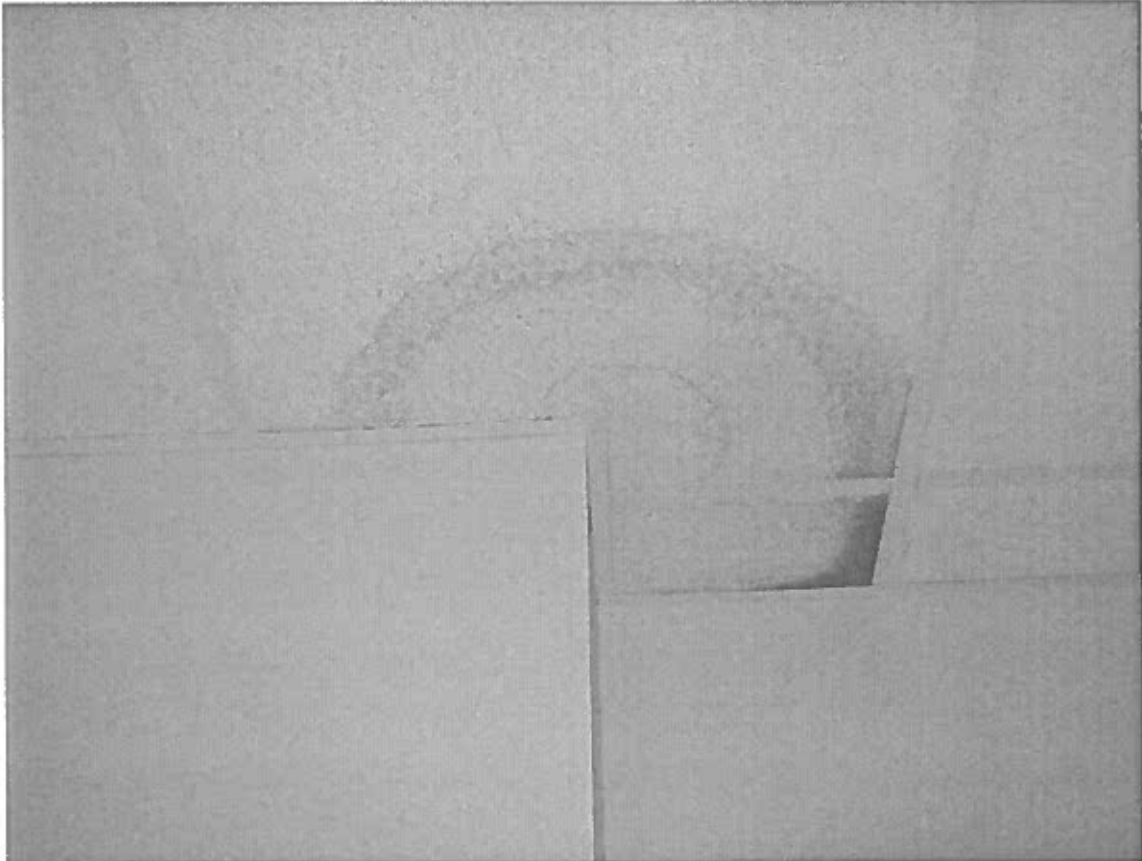


Photo 16 - Numerous water stains above third floor



Photo 17 - Numerous water stains above third floor

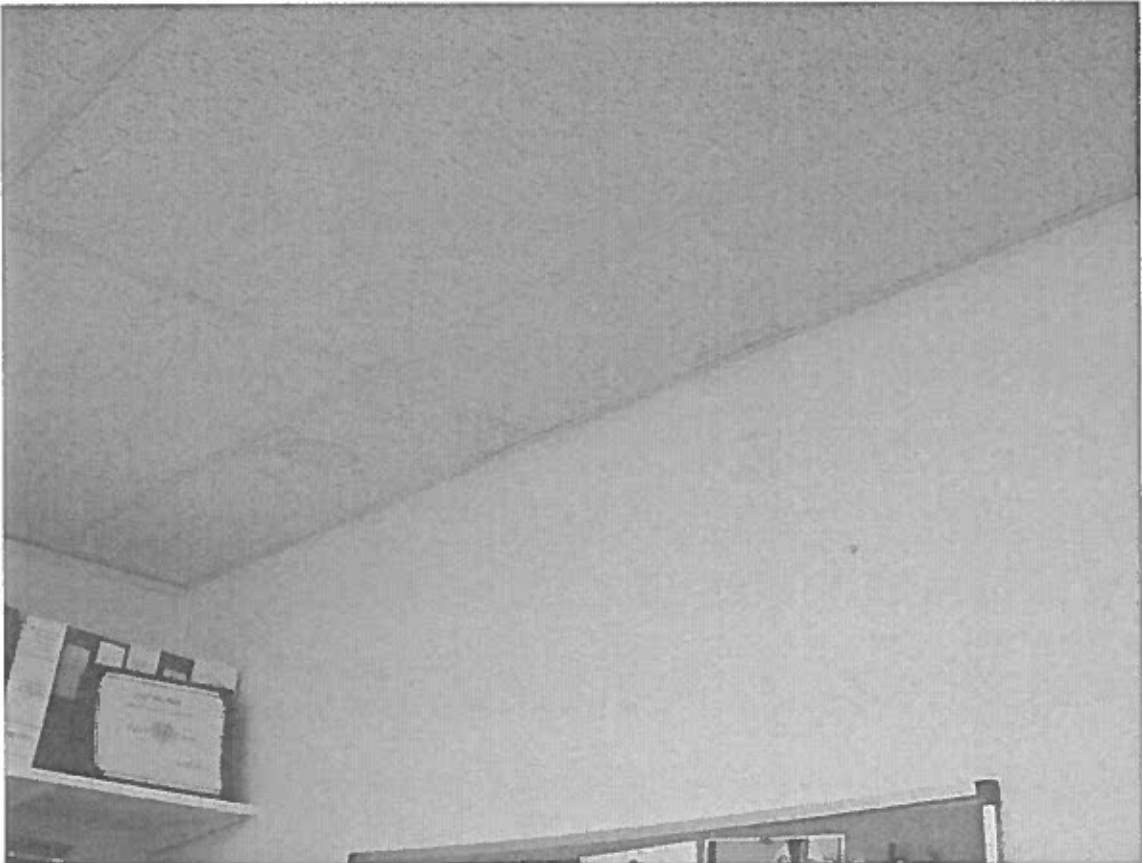


Photo 18 - Numerous water stains above third floor



Photo 19 - Third floor framing 2 x 12 @ 16"

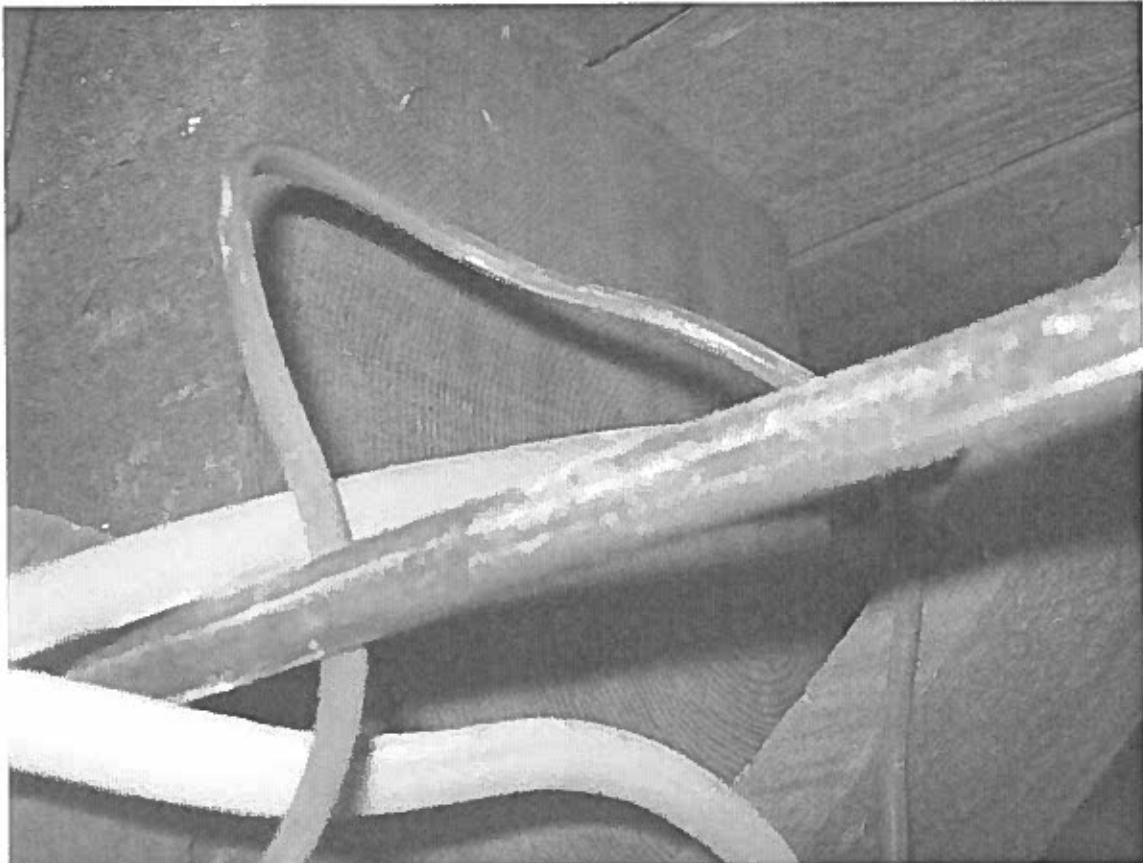


Photo 20 - Beam supporting third floor



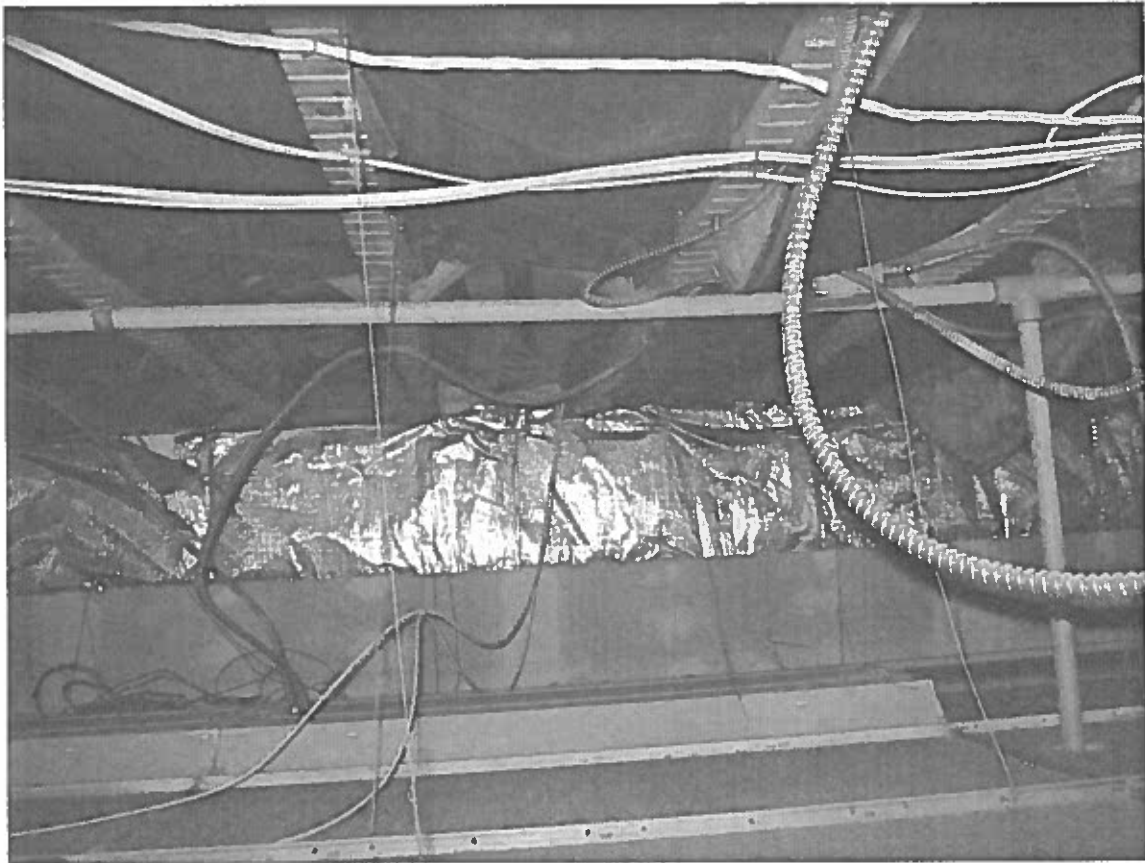


Photo 21 - Second floor framing 2 x 12 @ 16"



Photo 22 - Second floor framing 2 x 12 @ 16"

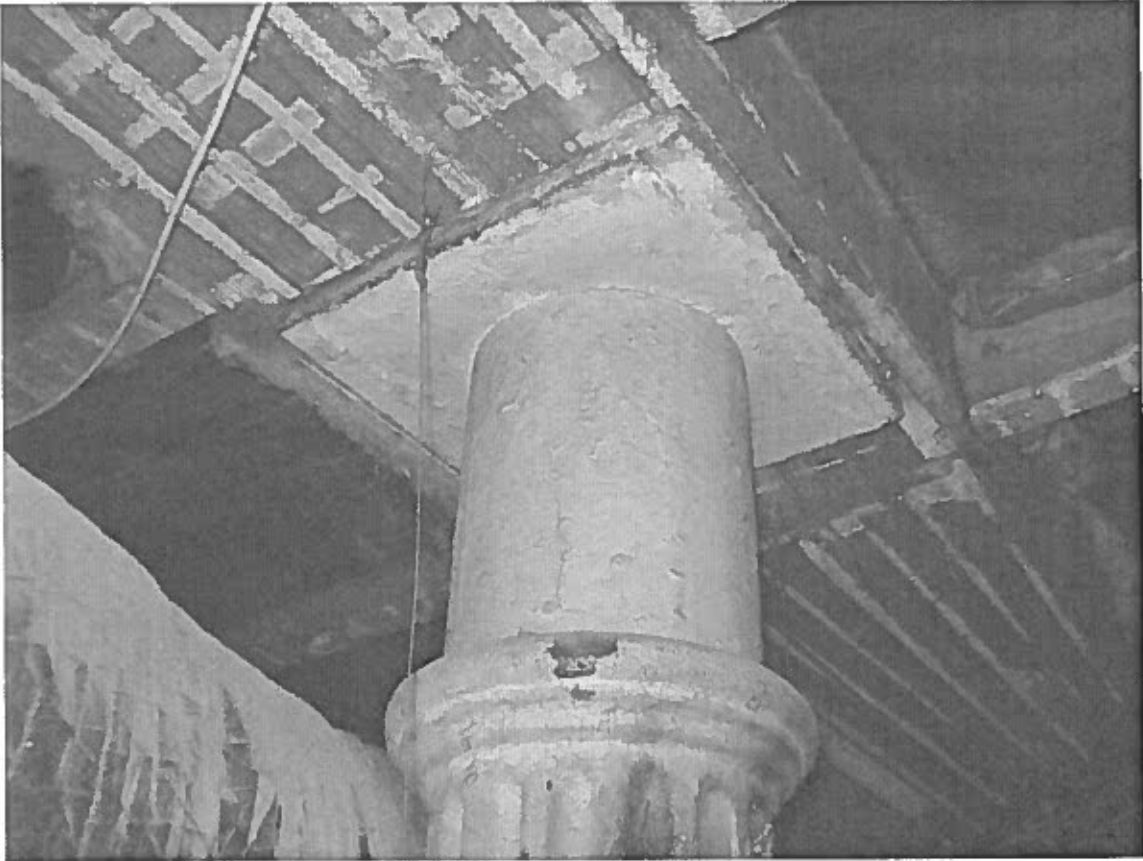


Photo 23 - Beam & column supporting second floor

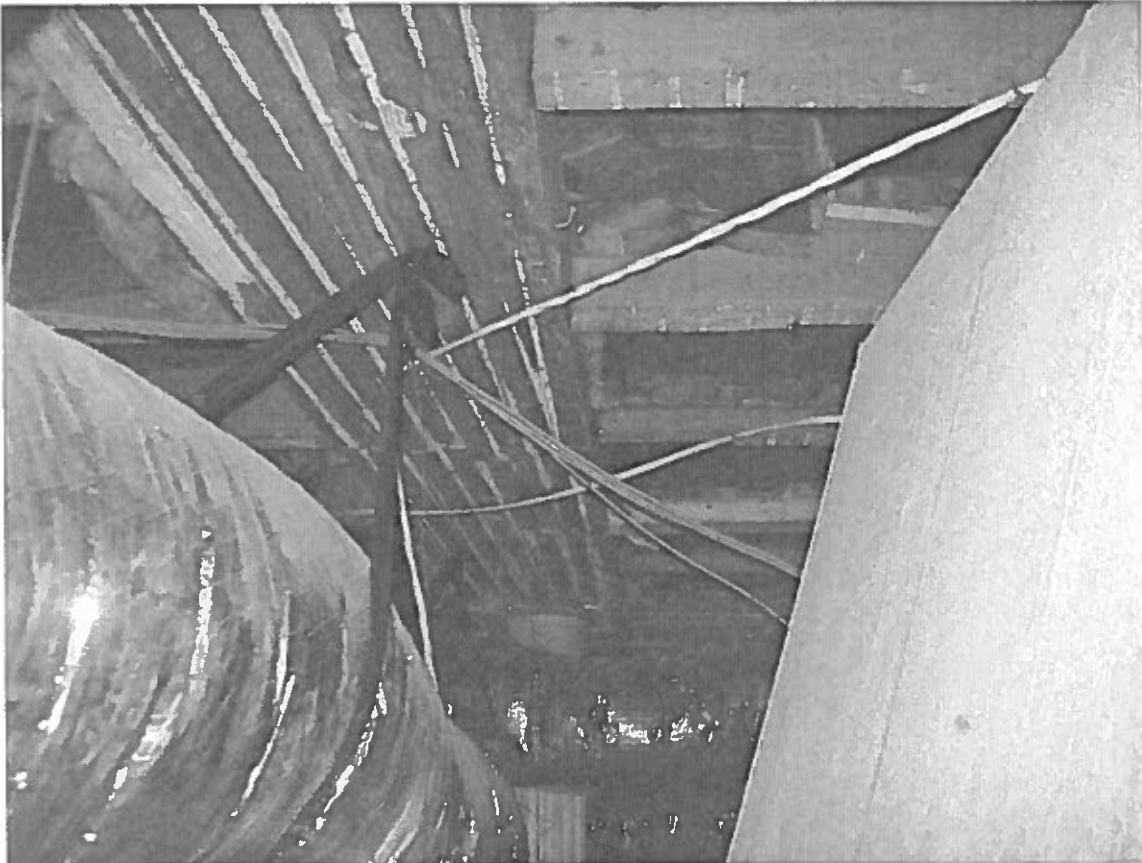


Photo 24 - Beam & column supporting second floor

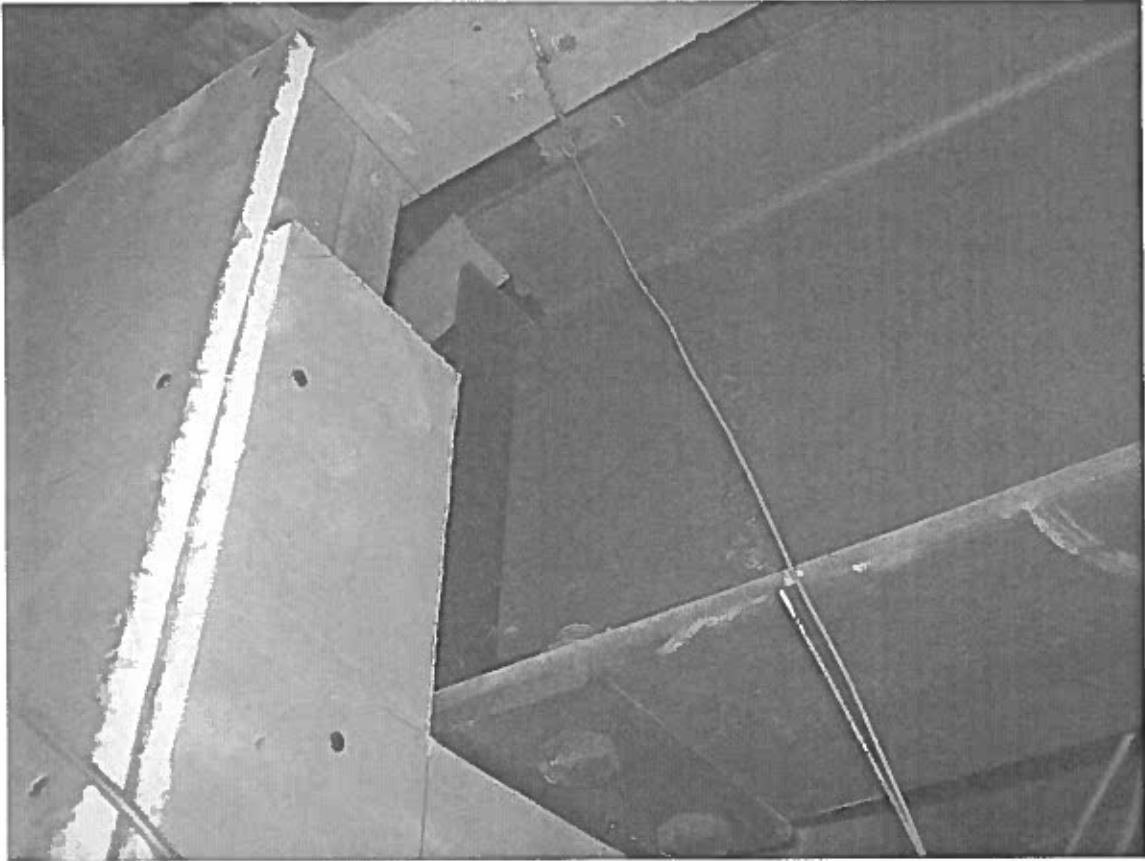


Photo 25 - Supplemental support of second floor joists



Photo 26- Supplemental support of second floor joists

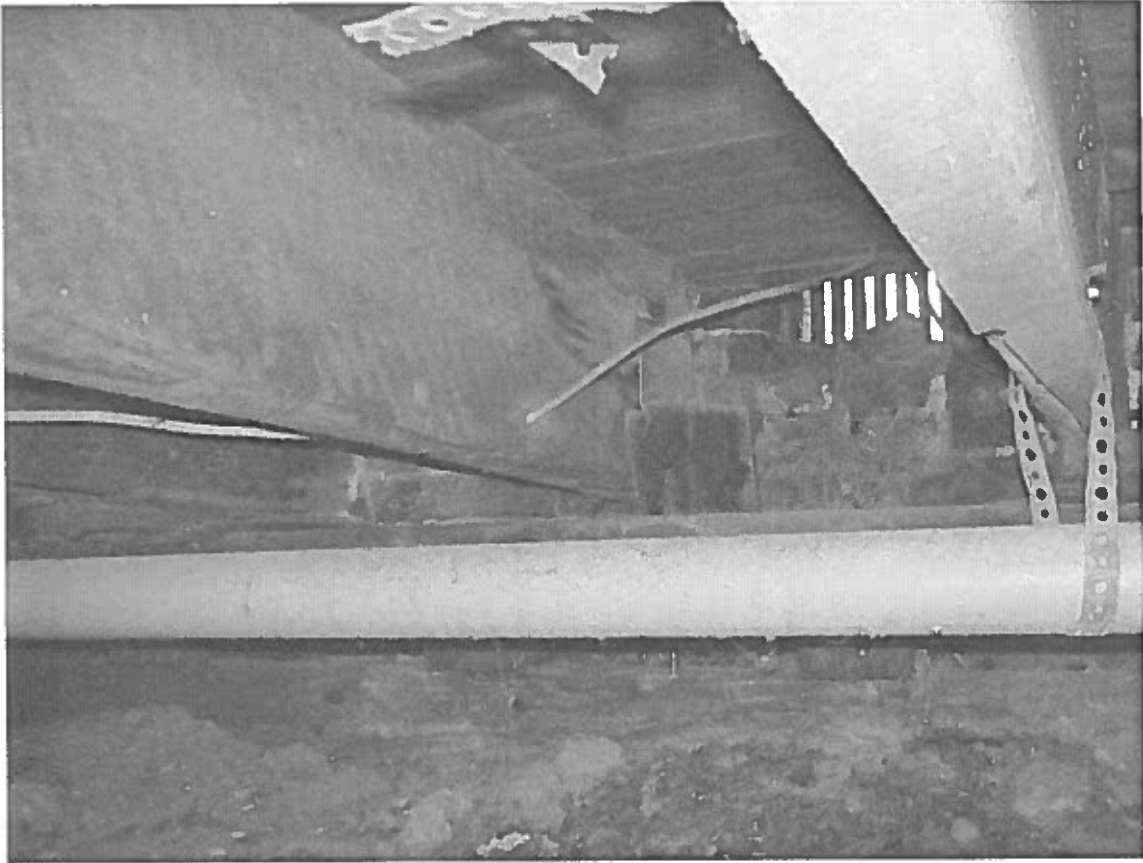


Photo 27 - First floor framing 2 x 12 @ 16"

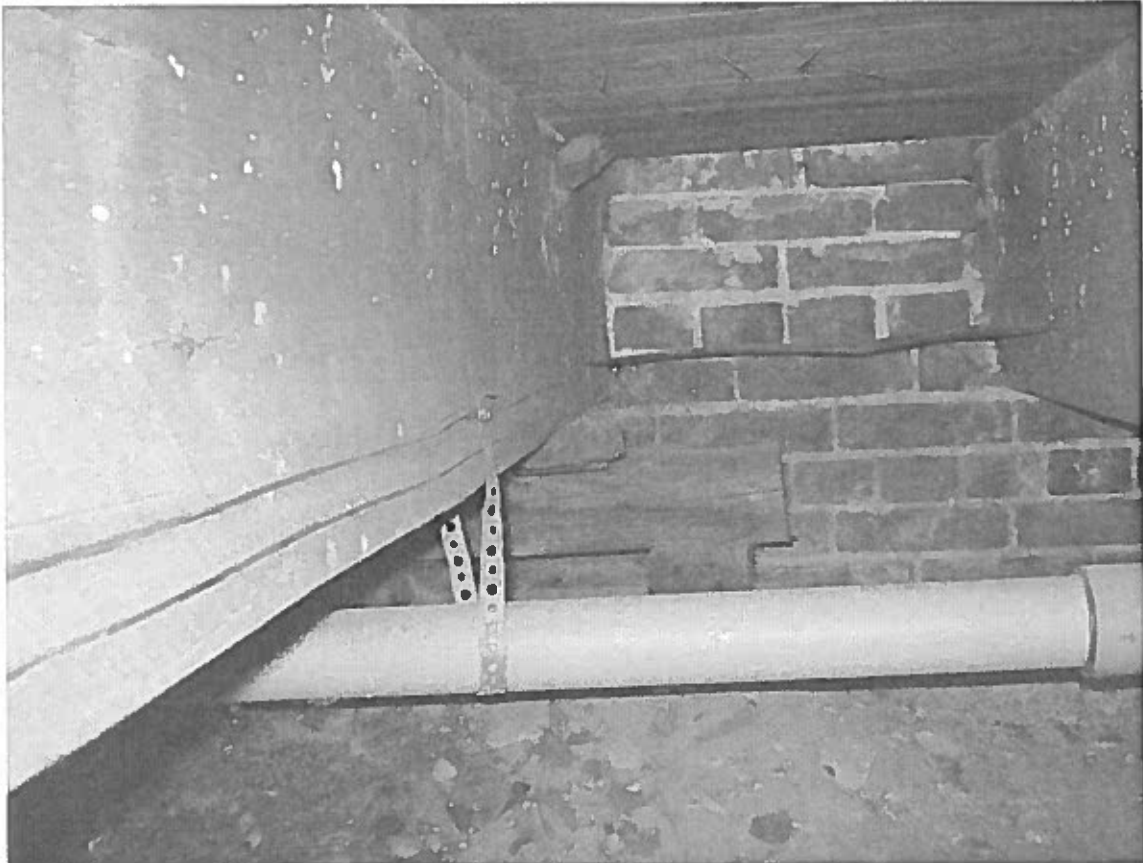


Photo 28 - First floor framing 2 x 12 @ 16"

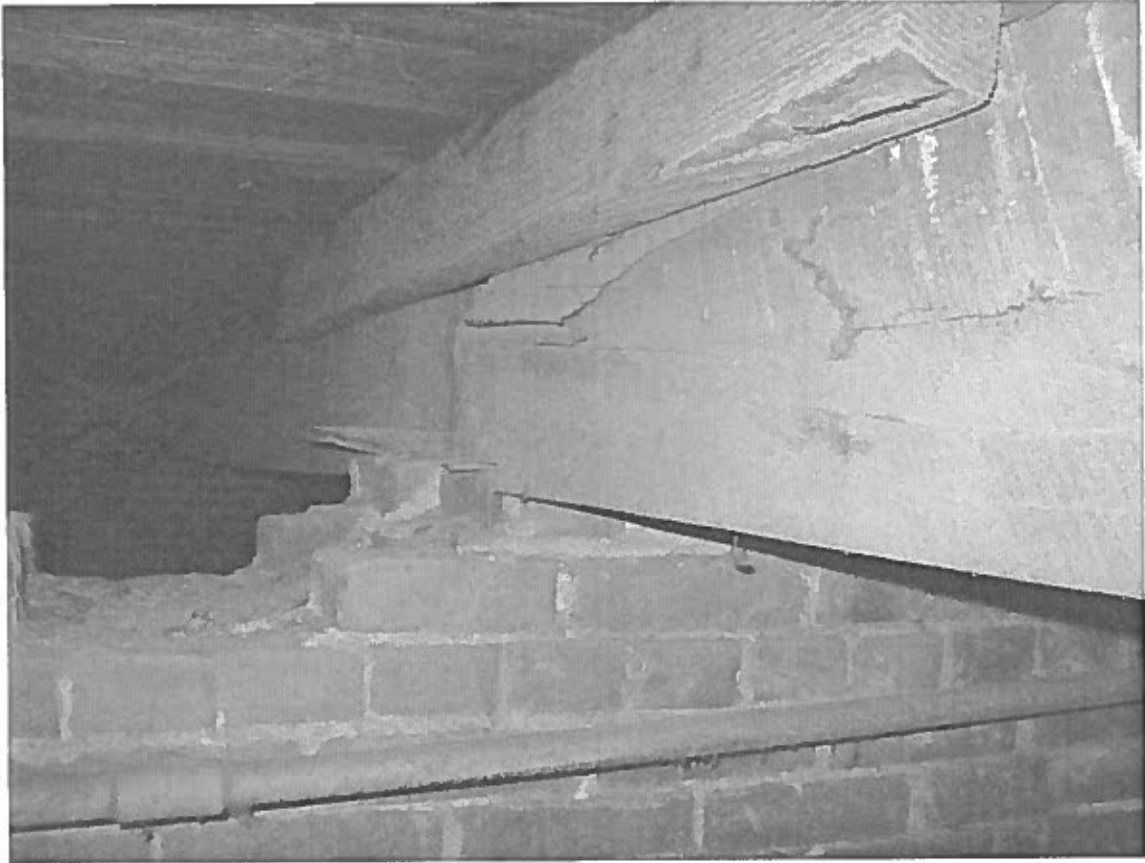


Photo 29 - Joists bear directly on brick walls

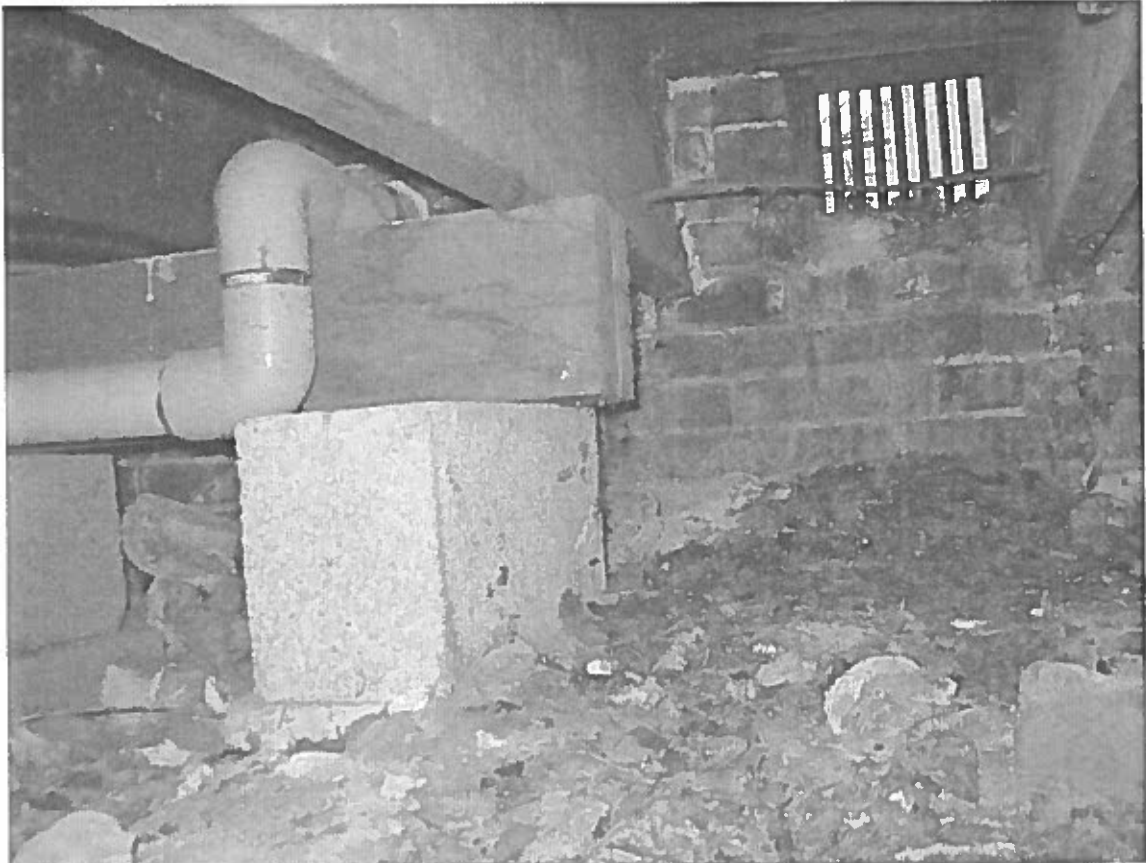


Photo 30 - Supplemental supports at joist ends



Photo 31 - - Supplemental supports at joist ends



Photo 32 - Supplemental supports at joist ends



Photo 33 - Joist cut and improperly supported



Photo 34 - Joist cut and improperly supported



Photo 35 - Pearl street entry



Photo 36 - Timber joist ends deteriorated





Photo 37 - Timber joist ends deteriorated



Photo 38 - Timber joist ends deteriorated



Photo 39 - Joist end deterioration due to moisture

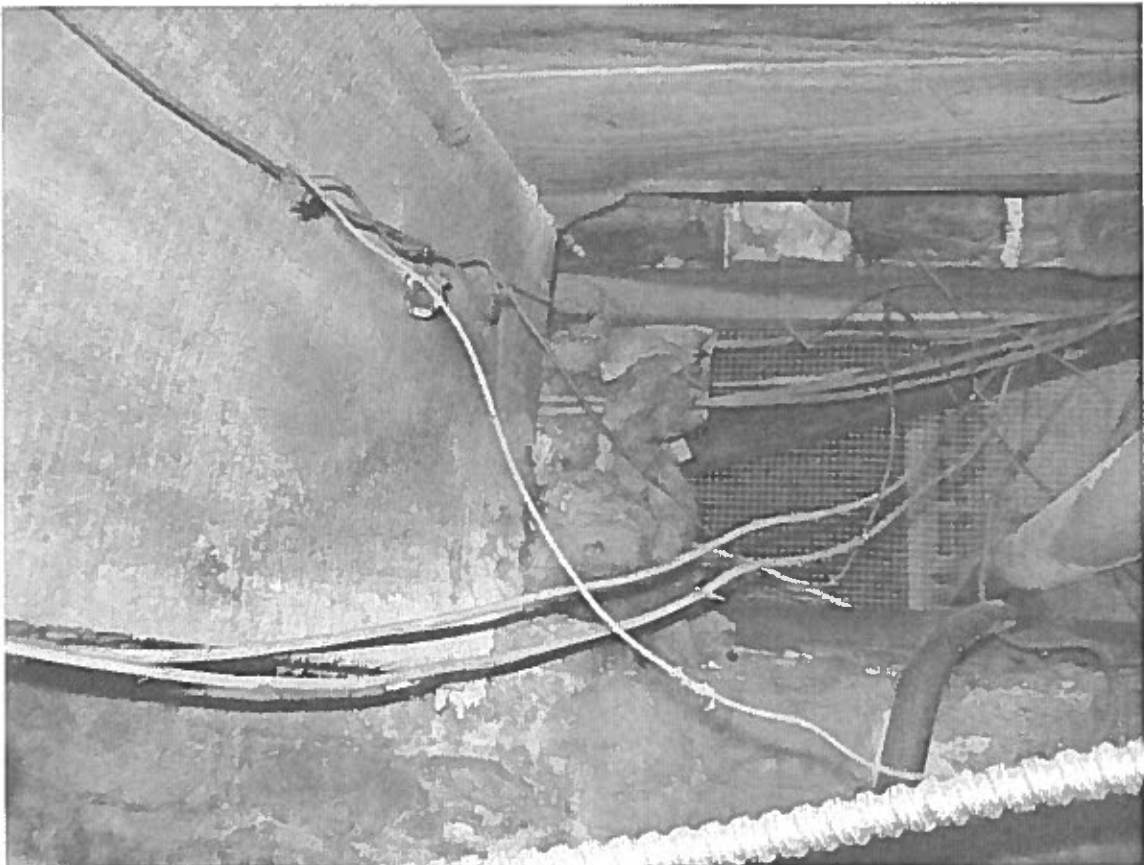


Photo 40 - Openings in mechanical room allowing water infiltration



Photo 41 - Openings in mechanical room allowing water infiltration



Photo 42 - Joists cut for plumbing



Photo 43 - Basement retaining wall leaning



Photo 44 - Mortar joints in basement eroded

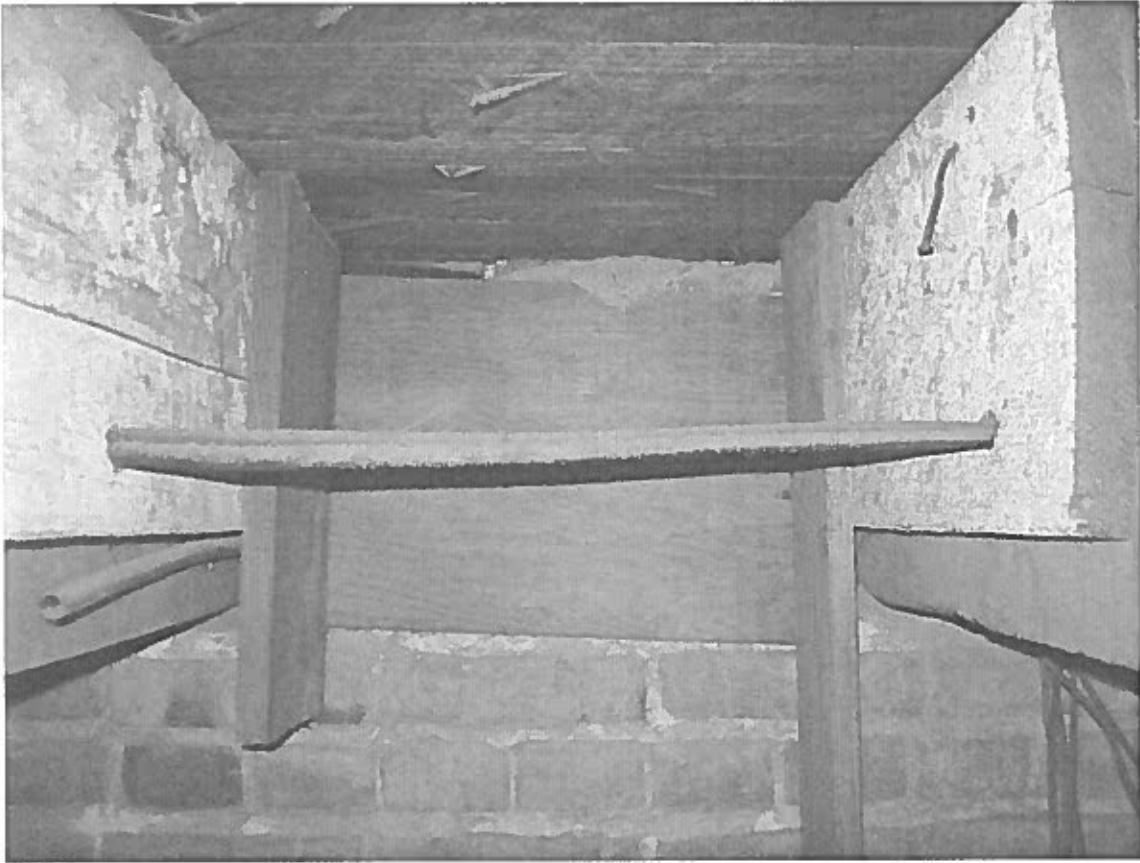


Photo 45 - Steel columns above bear on interior wall

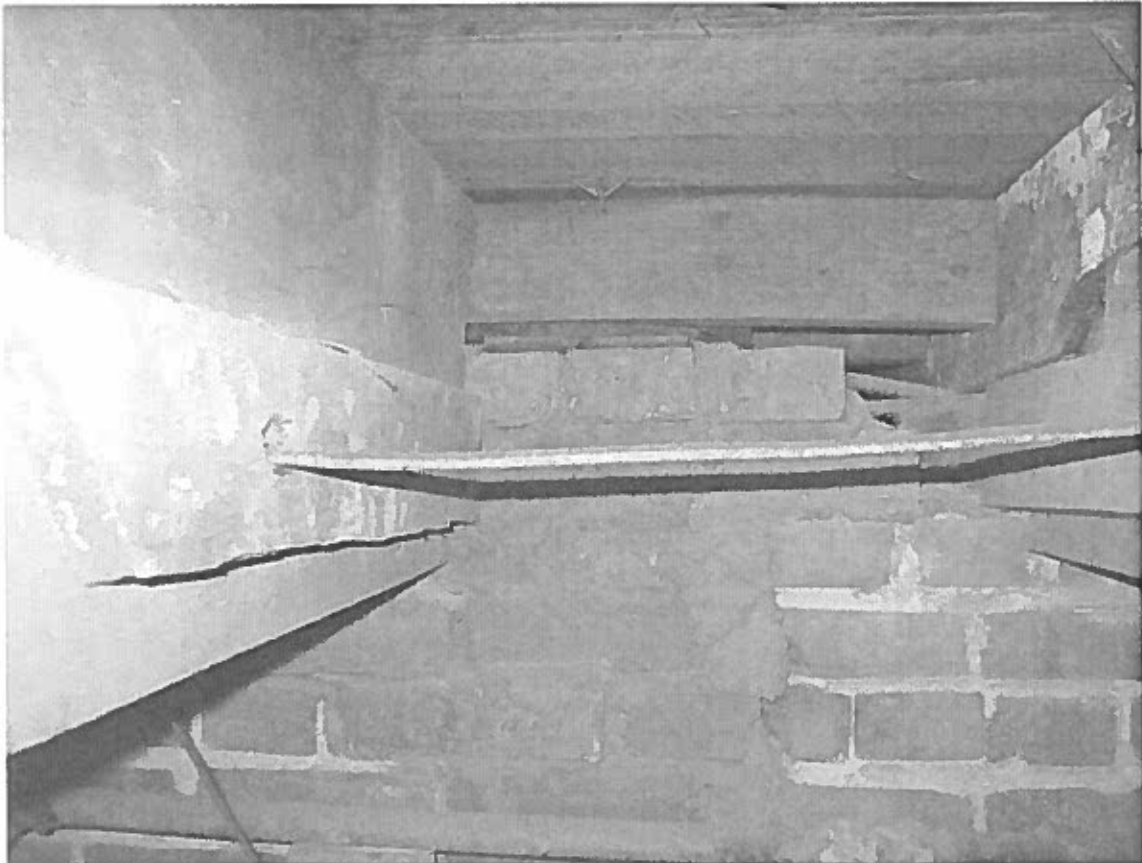


Photo 46 - Steel columns above bear on interior wall

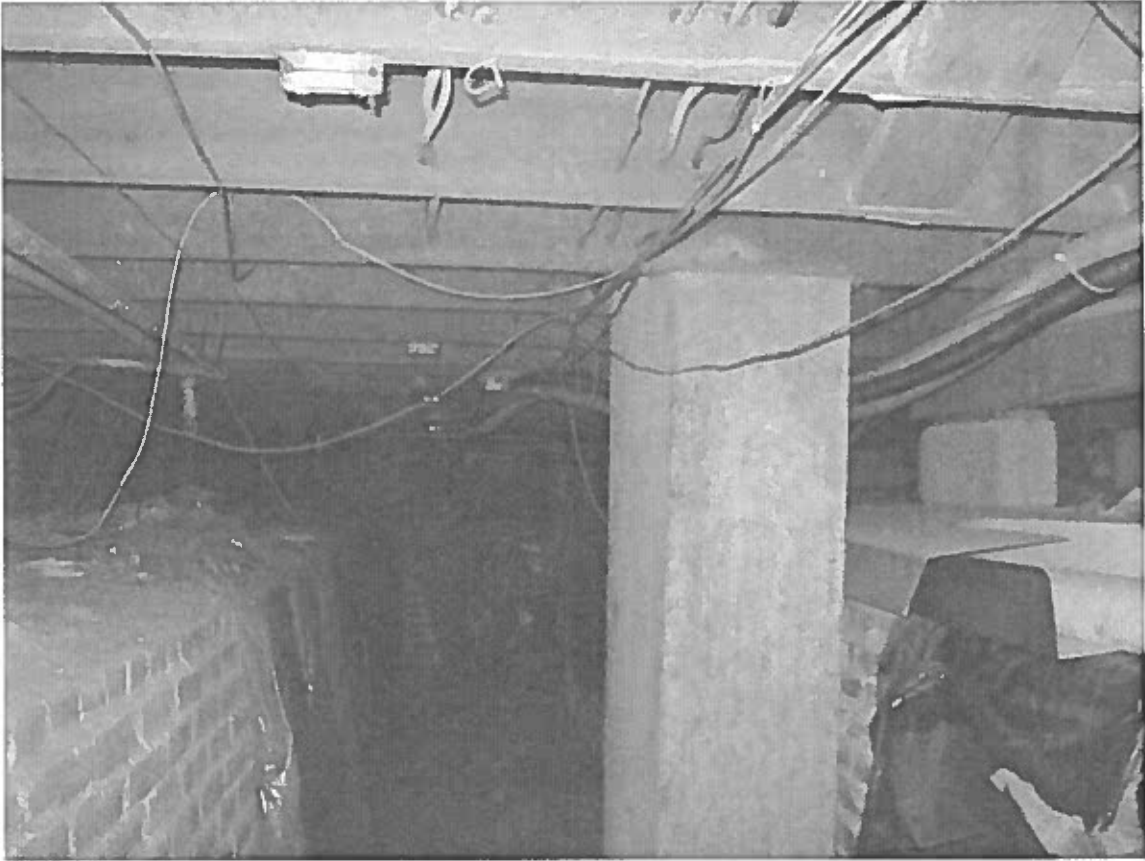


Photo 47 - Supports for supplemental framing above

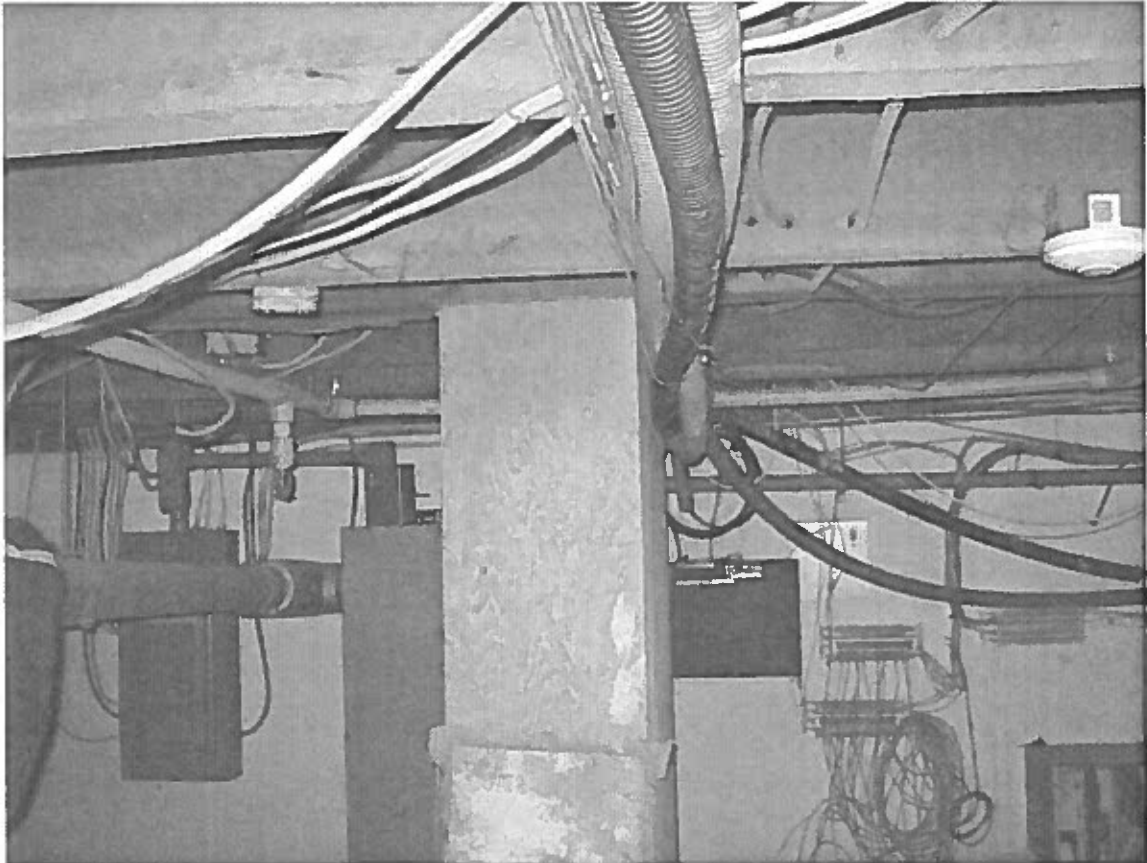


Photo 48 - Supports for supplemental framing above



Photo 49 - Supplemental hangers for stair out of level



Photo 50 - Supplemental hangers for stair out of level



Photo 51 - Supplemental hangers for stair out of level



Photo 52 - Supplemental hangers for stair out of level





Photo 53 - Building exterior in fair condition



Photo 54 - Building exterior in fair condition



Photo 55 - Building exterior in fair condition



Photo 56 - Building exterior in fair condition



Photo 57 - Areas of water infiltration



Photo 58 - Areas of water infiltration



Photo 59 - Vines at building corner and loose vent stack



Photo 60 - Vines at building corner and loose vent stack

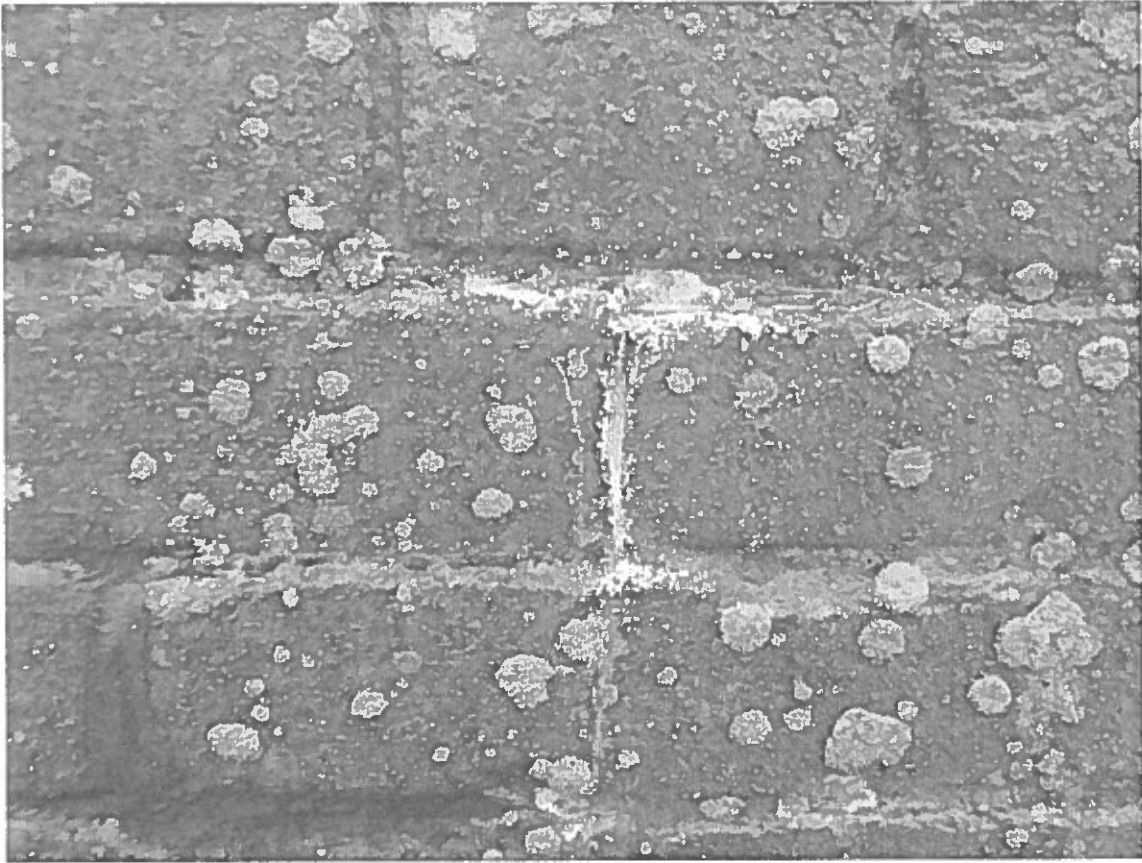


Photo 61 - Organic growth on brick and soft mortar



Photo 62 - Water and moisture infiltration affecting finishes



Photo 63 - Water and moisture infiltration affecting finishes



Photo 64 - Water and moisture infiltration affecting finishes



**Worcester County,  
Maryland**

[www.co.worcester.md.us](http://www.co.worcester.md.us)



# WORCESTER COUNTY TOURISM BUILDING

*HVAC and Electrical Systems  
Feasibility Study*

April 23, 2018  
W.O.#18015



**Gipe Associates, Inc.**  
CONSULTING ENGINEERS

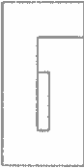
Mechanical | Electrical | Plumbing

8719 Brooks Drive  
Post Office Box 1147  
Easton, Maryland 21601  
(410) 822-8688

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**Gipe Associates, Inc.**  
CONSULTING ENGINEERS

W.O. #: 18015

April 23, 2018

Mr. Ken Whited  
Worcester County Dept. of Public Works  
6113 Timmons Road  
Snow Hill, MD 21863

Project: Worcester County Tourism Building Assessment  
Reference: Heating, Ventilating, Air Conditioning and Supporting Electrical Feasibility Analysis

Dear Ken:

The following summarizes our observations and recommendations related to the heating, ventilating and air conditioning systems and supporting electrical systems at the Worcester County Tourism Building.

**MECHANICAL SYSTEMS INTRODUCTION**

On March 21, 2018 Gipe Associates, Inc. performed field observations and investigations of the existing HVAC (Heating, Ventilating, and Air Conditioning) system at the Worcester County Tourism Building located in Snow Hill, Maryland. We met with yourself and Mr. Andrew Welch of Davis Bowen and Friedel (DBF). DBF will be providing a separate structural analysis for the existing building. The gross building square footage is approximately 5,300 square feet (including accessible basement/crawlspace). The purpose of this report is to evaluate the different replacement HVAC system options based on a life cycle cost analysis. Our report is based on existing drawings, and field observations. The majority of the system components are greater than twenty (20) years old and are at the end of their useful service life. The following are our evaluations relating to the replacement of the HVAC system and supporting electrical systems. The first portion of our report will review the existing mechanical systems serving the facility.

**EXISTING MECHANICAL SYSTEMS**

The existing Tourism Building can be seen in Photograph #1.

The Worcester County Tourism building consists of three floors above street level and a basement/crawlspace. The building is utilized by three different departments serving Worcester County:

1<sup>st</sup> Floor = Worcester County Tourism

2<sup>nd</sup> Floor = Worcester County Economic Development

3<sup>rd</sup> Floor – Worcester County Sheriff's Office

Space usage within the building includes office space, storage rooms, lobby areas, restrooms and break rooms.

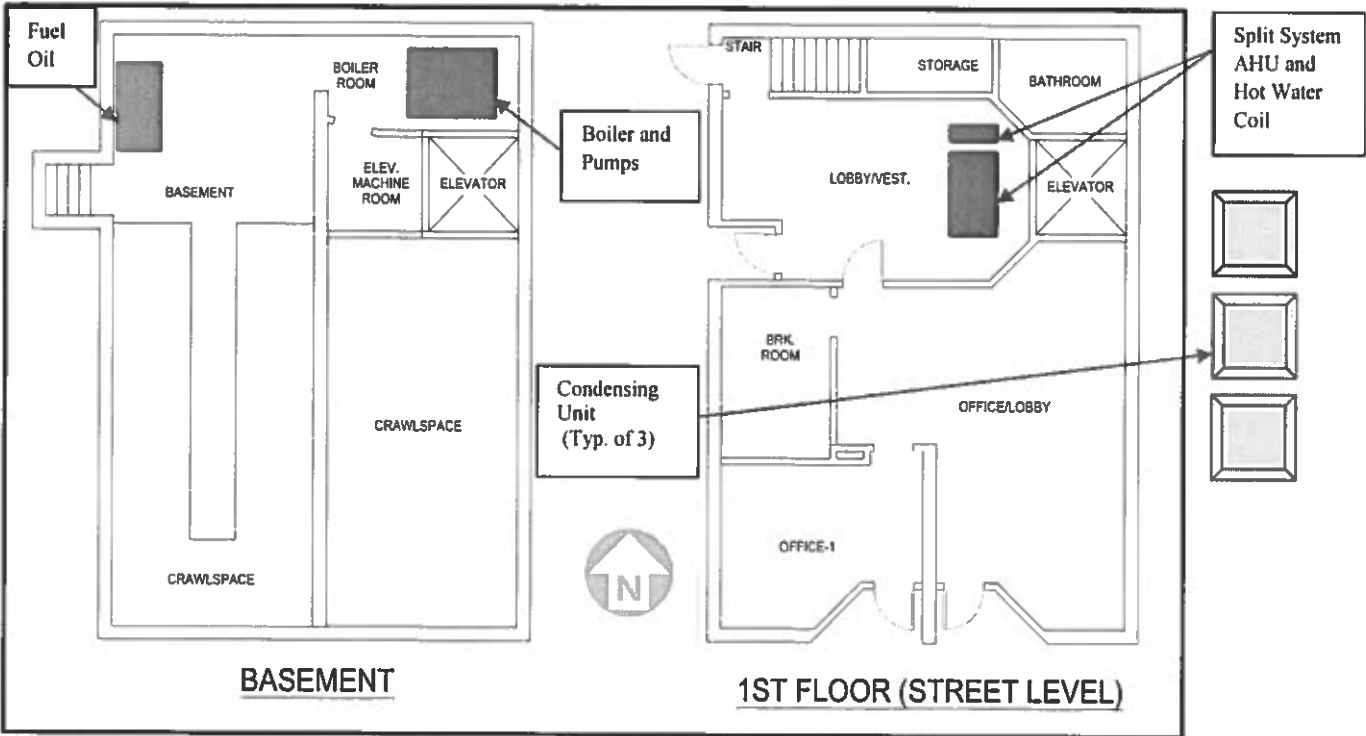


***Photograph #1: Worcester County Tourism Building***

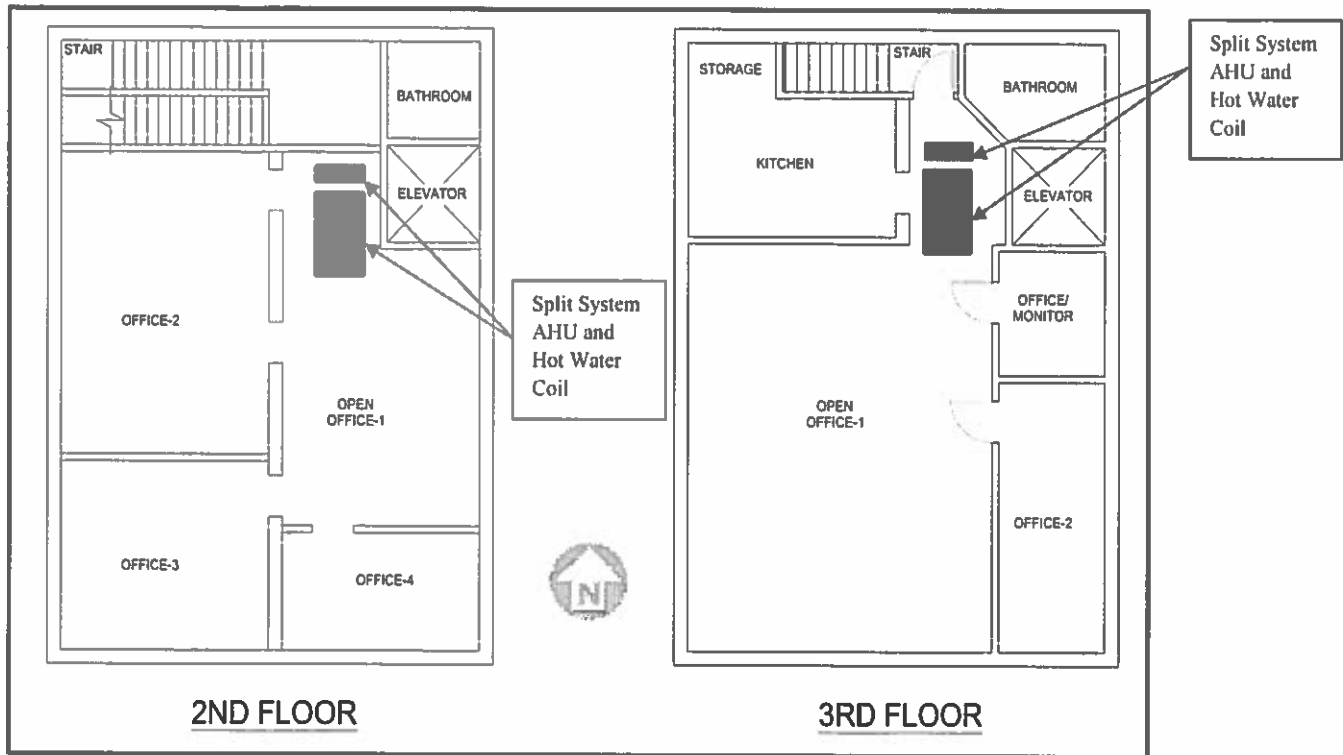
The existing heating, ventilating and air conditioning systems consist of the following major components:

- No. 2 fuel oil fired boiler.
- Zone heating water pumps.
- Duct mounted hot water coils.
- Split system air handling units.
- Condensing units.
- Switch operated exhaust fans (for bathrooms).

Figure #1A & 1B indicate the general overall building floorplan and locations of mechanical equipment within the same.



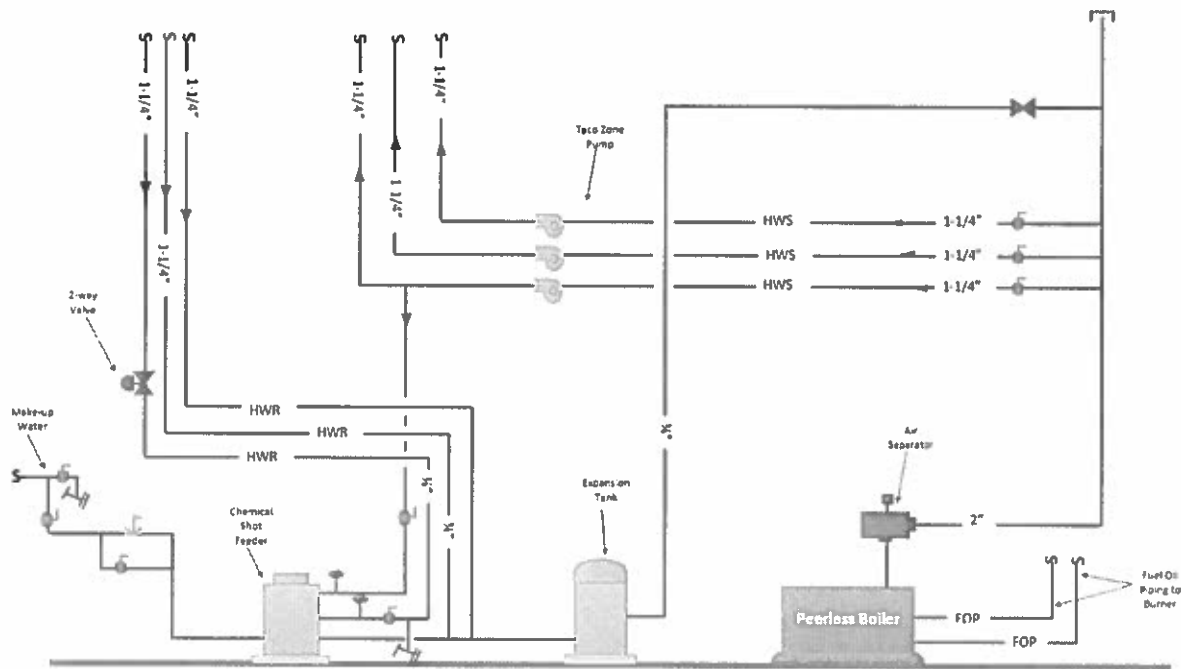
***Figure #1A: Worcester County Tourism Building – Keyplan (No Scale)***



**Figure #1B: Worcester County Tourism Building – Keyplan (No Scale)**

First we will review the existing central hot water heating system.

Figure #2 indicates the various components that are included in the central hot water heating system serving the Worcester County Tourism Building.



**Figure #2: Existing Central Hot Water Heating System (No Scale)**

The existing boiler is a Peerless Model No. TW-5 with the following characteristics:

1. 30 psi max. water pressure.
2. 2 gallons per hour no. 2 fuel oil consumption.
3. Gross output = 241,000 btuh
4. Net IBR Output = 209,000 btuh
5. Installed circa 1993.

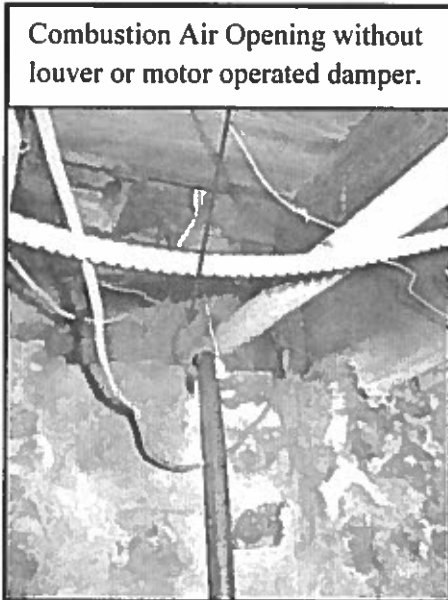
The existing boiler can be seen in Photograph #2.

The following deficiencies were noted regarding the existing boiler system:

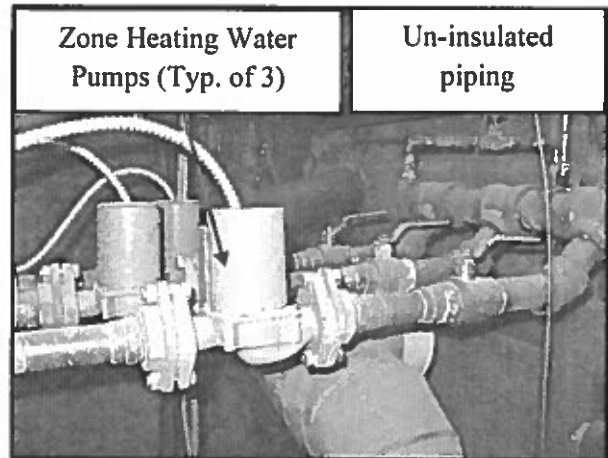
1. Combustion air is provided through an opening in the masonry wall without a damper or louver (See Photograph #3).
2. A backflow preventer is not provided for the make-up water valve train serving the heating system as required by the Plumbing Code to protect the potable water system.



*Photograph #2: Existing Fuel Oil Fired Boiler*



*Photograph #3: Un-protected Combustion Air Opening*



*Photograph #4: Zone Heating Pumps and Un-Insulated Piping*

3. All of the heating supply and return piping appears to be un-insulated which violates the Energy Code. (See Photograph #4)
4. Existing boiler flue is single wall with penetrations of the same allowing for flue gases to escape.
5. Existing pumps lack balance valves for Testing/Balancing.

- Existing pumps lack pressure gauges necessary for verifying flow, impeller size, etc...
- Did not have Carbon Monoxide Sensor in basement (highly recommended).

Due to the age and condition of the existing boiler system we would recommend replacement of the same.

**Existing Air Handling Systems:**

The central heating water system serves three duct mounted hot water coils serving the split system air handling units. Photograph #5 indicates a typical duct mounted hot water coil.

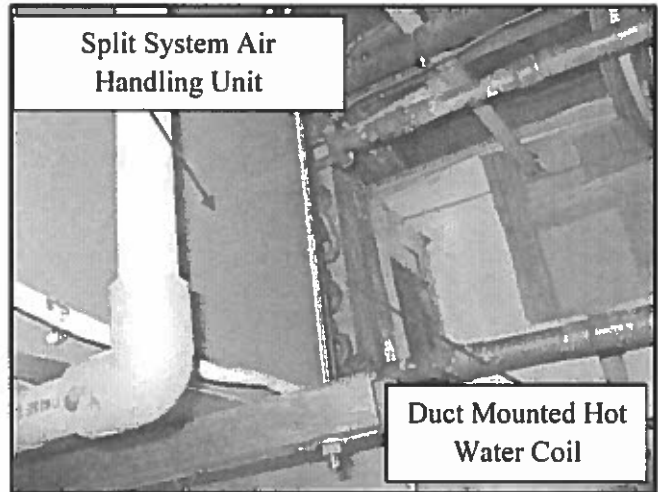
The duct mounted hot water coils are not provided with any isolation valves (for servicing the same), insulation, balance valves or control valves. Each hot water coil (typ. of 3) is served by a single zone heating pump (located adjacent to the boiler).

As indicated previously in Figure #1, there are currently three (3) split system air handling units serving the three main floors of the Tourism Building. Each air handling unit is provided with the following components:

- Supply fan.
- DX (Direct Expansion) cooling coil.
- Duct mounted hot water coil.
- Condensate drain pan.
- Refrigerant, heating water and condensate piping.
- Programmable thermostat for temperature control.
- Ducted distribution system including minimal rigid ductwork and extensive flexible ductwork.

All three of the existing air handling units are recirculating type only and are not provided with any Ventilation (Fresh Air) as required by the International Mechanical Code. This violation results in the occupants working in an enclosed space with no fresh air ventilation which needs to be addressed.

The exact age of the air handling units is unknown but the same appear to be greater than 10 years of age and are nearing the end of their useful service life and should be replaced. We would also recommend the replacement of the existing duct distribution system due to the use of large amounts of flexible ductwork which increases duct pressure losses and is prone to leakage. The current air handling units are located above ceilings/bulkheads and are not easily serviceable. We would recommend any future HVAC systems be evaluated for better locations for the air handling units to allow service/maintenance (i.e. basement, closet, etc.) Per the International Mechanical Code the suspended air handling units shall be provided with auxiliary condensate drain pans or A/C condensate safety switches to prevent damage from an overflowing primary drain pan. Each air handling unit is coupled with a remote condensing unit located in an adjacent alley-way. Photograph #6 indicates two (2) of the existing condensing units.



**Photograph #5: Duct Mounted Hot Water Coil**



**Photograph #6: Existing Condensing Units**

Two of the condensing units were manufactured by York and one of the condensing units was manufactured by Carrier. The nameplate date for all units indicates the same are served by R-22 refrigerant. R-22 refrigerant is currently being phased out due to its ozone depletion characteristics. Due to their age, condition and use of R-22 refrigerant we would recommend replacement of the existing condensing units.

It is also important to note that the location for the existing condensing units makes it very difficult to access. Access is provided through a narrow alley opening or through the bathroom window on the 1<sup>st</sup> floor. Future equipment could be located on the roof if permanent access to the same is provided.

The only ventilation provided in the building is through switch operated exhaust fans in the bathrooms located on the 1<sup>st</sup> and 3<sup>rd</sup> floor. The 2<sup>nd</sup> floor bathroom does not appear to be provided with exhaust airflow as required by the International Mechanical Code. A new exhaust fan should be provided for the 2<sup>nd</sup> floor bathroom.

Photograph #7 indicates a typical switch operated exhaust fan serving the 1<sup>st</sup> floor bathroom.



*Photograph #7: Bathroom  
Exhaust Fan*

Additional field observations regarding the HVAC systems are as follows:

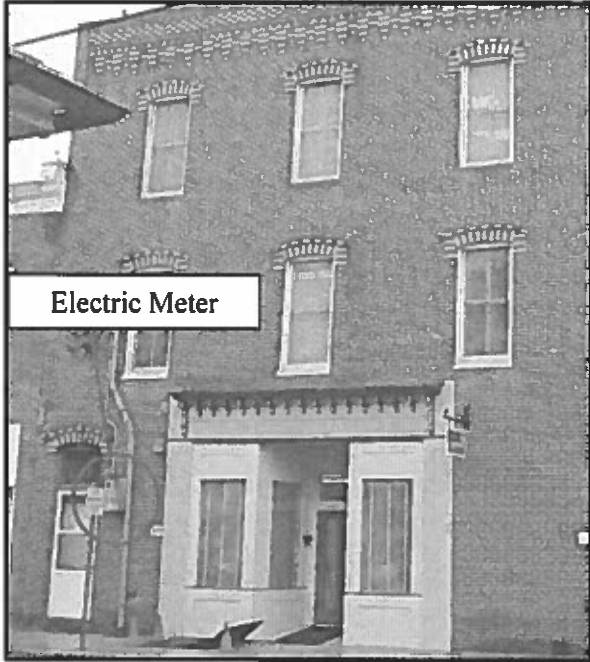
1. The Elevator machine room is not provided with dedicated conditioning as required by the Elevator Code.
2. The 3<sup>rd</sup> floor Sheriff's office has a high internal load associated with occupants, computers and printers. We would highly recommend supplemental "peaking" units be provided to supplement the primary HVAC system when loads increase due to increased occupants and computer usage. These could be simple direct expansion split system ductless units with low ambient cooling controls.
3. The basement and crawlspace are provided with open vents through the walls. These should be sealed to eliminate unnecessary infiltration/exfiltration and to prevent potential freezing of sprinkler and domestic water piping in the winter.
4. The existing stairway is currently provided with heating and cooling off of the air handling units. Per NFPA-101 Life Safety Code ductwork/penetrations of stairwell enclosures is not permitted. A dedicated unit heater should be provided to serve the stairwell with heating.
5. Heating within the basement and crawlspace is primarily provided by un-insulated piping that is connected to the central hot water heating system. A dedicated unit heater should be provided to serve the same and all openings should be sealed.
6. Ceiling tiles are stained indicating condensate or building envelope leaks.

The next section of the report will review the existing electrical systems serving the Tourism Building.

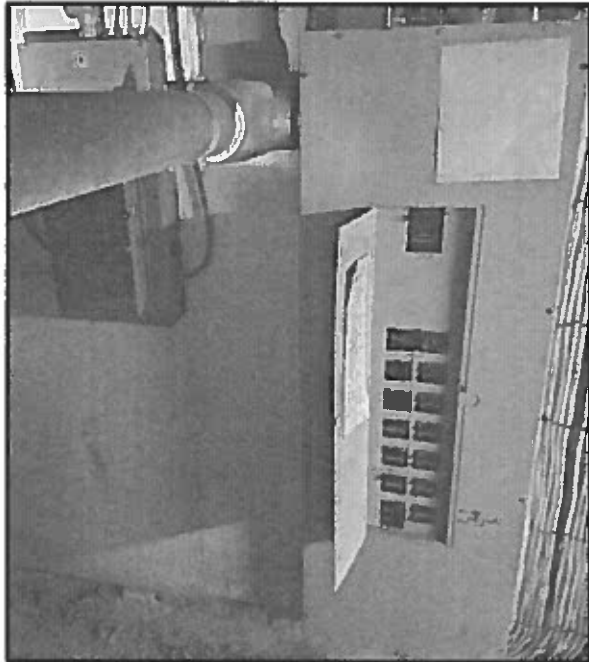
#### **EXISTING ELECTRICAL DISTRIBUTION SYSTEM:**

Electric energy is provided to this building overhead from a Delmarva Power utility pole located on Pearl Street to a service mast located on the side of the building facing Pearl Street. The electric meter for the building is located on the building wall next to the service mast as shown in Photograph #8. The building service conductors enter a 120/208V, 3 phase, panelboard with a 400A main circuit breaker in the basement via the service mast and conduit. This 400A panelboard is manufactured by General Electric and shown in Photograph #9. The same service conductors also feed a Square D 20 circuit panelboard with a 200A main circuit breaker located in the basement next to the 400A panelboard. These two panelboards serve all of

the loads throughout the building. The 400A panelboard appears to have been installed around 1980 and therefore is over 38 years old.



*Photograph #8: Front Exterior of the Building showing Electric Meter*



*Photograph #9: General Electric 400A Panelboard*

In accordance with National Electrical Code (NEC) Article 220.87 – “Determining Existing Loads”, Gipe Associates, Inc. conducted a review of electrical demand for a twelve-month period (February 2017 through January 2018), which indicated a peak demand of 19 kilowatts (kW) during the month of July 2017. See Table #1 below for a summary of the electrical demand data.

<b>Table #1 - Electricity Meter Data From Delmarva Power</b>	
<b>Month/Year</b>	<b>Demand (kW)</b>
January 2018	14
December 2017	14
November 2017	15
October 2017	17
September 2017	18
August 2017	18
July 2017	19
June 2017	18
May 2017	16
April 2017	15
March 2017	12
February 2017	13
<b>Note: Peak Values are indicated in red font.</b>	

Assuming a power factor (PF) of 0.8, 19 kilowatts equals 24 kilovolt-amperes (kVA) which converts to a maximum current of 67 amperes during the twelve-month period. Based on the peak current of 67 amperes,

it appears that the existing service to the building has adequate space to accommodate the proposed HVAC changes.

***Generator:***

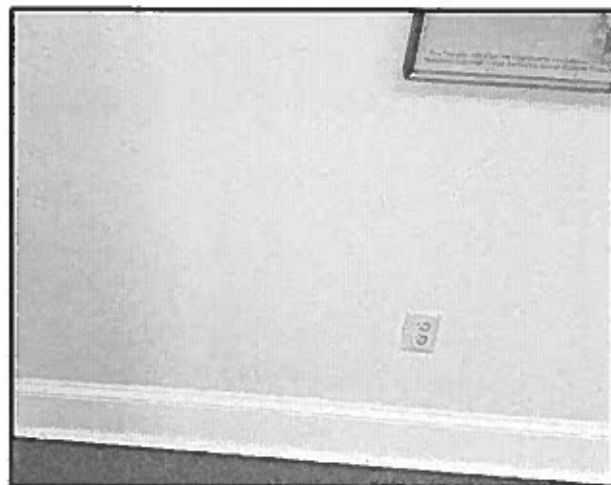
This building does not currently have a generator or means to provide power to the building if utility power is lost.

***General Building Power:***

While the existing service appears to have capacity to accommodate the proposed HVAC changes, the existing panelboards appear to have exceeded their useful life expectancy. Based on that information we would recommend that the existing panelboards be replaced in their entirety. The majority of the existing wiring from the panelboards in the basement to their various loads is nonmetallic sheathed cable as shown in Photograph #10. Per the National Electrical Code (NEC) Article 325 any nonmetallic sheathed cable needs to be protected if it is exposed in a basement as is the case in this building. Therefore, we would recommend that all of the exposed nonmetallic sheathed cable be replaced with wiring installed in electrical metallic tubing (EMT). The building has receptacles throughout which all appear to be in good shape as shown in Photograph #11 and can remain.



***Photograph #10: Example of Non-Metallic Sheathed Cable***

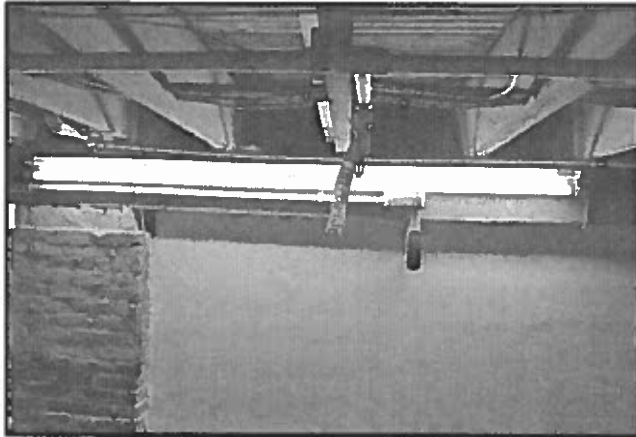


***Photograph #11: Example of Receptacles (Typical Throughout Building)***

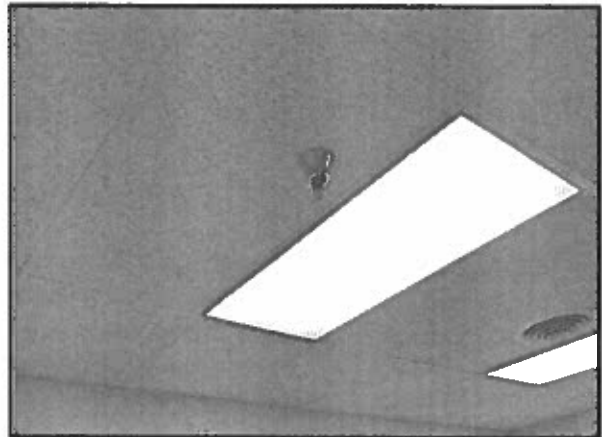
***Lighting:***

The lighting in the basement consists of one strip fluorescent lamp with two T-12 lamps and no cover as shown in Photograph #12. There is an elevator machine room located in the basement that has a vaportight wall mounted lighting fixture with an incandescent lamp. The lighting throughout the 3 floors of the occupied portion of the building are recessed 2'x4' fluorescent light fixtures with an acrylic lens as shown in Photograph #13. These fluorescent fixtures contain four (4) T-8 lamps. All of these fixtures were working at the time of our visit. These fixtures have T8 fluorescent lamps as their light source and appear to be in good condition.





*Photograph #12: One Strip Fluorescent Lamp with Two T-12 Lamps and No Cover*



*Photograph #13: Example of the General Lighting Fixtures Found throughout Most of the Building*

While fluorescent fixtures are less efficient than LED light fixtures, the existing T8 fluorescent fixtures are more efficient than incandescent or T12 fluorescent light sources, as shown in Table #2. Efficacy is the measure of how well a light source produces visible light, also commonly referred to as “lumens per watt”, whereas efficiency is the ratio based on total energy (wattage) consumed versus useful energy out as light. The following Table #2 compares the efficacy and efficiency of T8 fluorescent lamps to other common light sources.

Table #2: Efficacy Of Common Light Sources		
Light Source	Luminous Efficacy (lumens/watt)	Luminous Efficiency (percent)
Incandescent	5-12.6	0.7-1.8%
T12 Fluorescent	60	9%
T8 Fluorescent	80-100	12-15%
T5 Fluorescent	70-104	10-16%
LED	Up to 150	Up to 22%

As a result of the lower efficacy/efficiency values, the existing building has more lighting fixtures and lamps than a modern building would in order to achieve similar illumination levels.

In addition, the State of Maryland now requires that all new construction and major renovation projects comply with the requirements of the International Energy Conservation Code (IECC) and/or ASHRAE 90.1: Energy Standard for Buildings Except Low-Rise Residential Buildings. One such requirement states that the installed interior lighting power, which is commonly referred to as Lighting Power Density (LPD) (or more commonly as watts per square foot), for office buildings shall be no more than 0.82 watts/square foot. Based on the four (4) lamp T8 fixtures, the existing lighting layout would not meet those levels. Therefore we would recommend any new lighting to have an LED light source to comply with current energy codes.

The only exterior lighting is under the overhang of each of the two doors into the building from the street. The lighting fixture is a surface mounted lighting fixture with a compact fluorescent screw-in lamp installed in the fixture as shown in Photograph #14. There is also one light near the top of the building above the door from Market Street, and this light is used to light up the Worcester County Seal installed on the side of the building. Compact fluorescent lamps perform poorly outdoors during cold temperatures. Low mercury content lamps may struggle to turn on, and will take several minutes to warm up to full light output.



*Photograph #14: Exterior Light*

***Lighting Controls:***

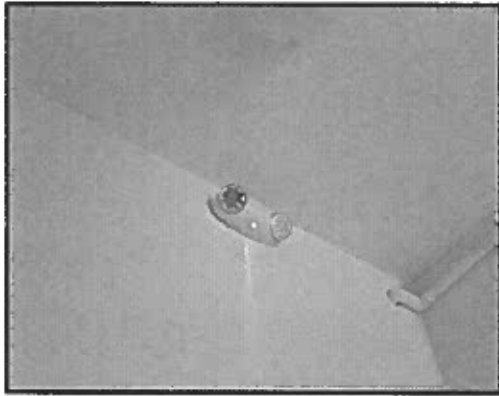
All of the building's lighting fixtures in individual spaces are controlled by standard toggle switches. These switches are in fair to good physical condition and appear to be operational as shown in Photograph #15. However, the building is not equipped with any automatic lighting controls, i.e. occupancy/vacancy sensors, relay/control panels, etc. If the lighting in a given space is modified or for all new lighting, ASHRAE 90.1 requires that all interior lighting in that space shall be controlled by an automatic means of turning off the lights after a certain period of space vacancy and/or between night-time hours. Automatic shut-off reduces energy consumption, resulting in a lower electricity bill, and can also extend the life of light sources and drivers/ballasts and reduce maintenance cost.



*Photograph #15: Lighting Switch*

***Life Safety:***

The emergency egress lighting for the building is provided in the building via dual head emergency battery units as shown in Photograph #16. During a power outage, the integral battery would provide emergency lighting for 90 minutes in accordance with requirements of NFPA 101: Life Safety Code. The internal battery units must be tested every 30 days for a minimum of 30 seconds, and annually for a minimum of 90 minutes. Reports of these tests must be maintained on site for review with the Fire Marshal. We did not simulate a power outage to verify if emergency lighting levels were compliant with NFPA 101 requirements. While the interior paths of egress have emergency lighting, there does not appear to be any egress lighting at the exterior doors out of the building, which current codes would require at any new exterior egress doors provided. The exit signs in the building are equipped with integral battery backup and appear to be in good condition as shown in Photograph #17.



***Photograph #16: Emergency Egress Lighting***



***Photograph #17: Exit Sign with Integral Battery Backup***

***Fire Alarm:***

The building is currently protected by a fire alarm system, comprised of a Silent Knight fire alarm control panel shown in Photograph #18, analog initiating devices and notification appliances throughout the building. The initiating devices, e.g. manual pull stations shown in Photograph #19, appear to be in fair to good condition, however, the same were not tested for operation. The notification appliances shown in Photograph #20 are horns/strobes, and also appear original to be in fair to good condition. Based on the existing fire alarm system being in good condition, we would recommend that the existing fire alarm remain.



***Photograph #18: Silent Knight Fire Alarm Control Panel***



***Photograph #19: Initiating Device – Manual Pull Station***



***Photograph #20: Horns/Strobes***

***Security System:***

The building has video surveillance in the lobby on the first floor and on the third floor as shown in Photograph #21. Based on the video surveillance cameras being in good condition we would recommend that the existing video surveillance cameras remain.



***Photograph #21: Video Surveillance Camera***

***Information Technology:***

The building has fiber ran to network gear in the basement from Market Street as shown in Photograph #22. There is an uninterruptable power supply in the basement that will back up the data network for 50 minutes if power to the building is lost. This UPS is manufactured by APC and is shown in Photograph #23. From the basement there is a combination of CAT 5E and CAT 6 cabling up to the individual data outlets in the space. This system appears to be working well but we would recommend that this type of sensitive equipment is kept in a conditioned space instead of an unconditioned space like a basement.



***Photograph #22: Fiber Cabling and Network Gear***



***Photograph #23: Uninterrupted Power Supply***

Due to the existing deficiencies, type of refrigerant, type of heating fuel and age/condition of the existing HVAC systems we would recommend replacement of the same. In order to properly evaluate replacement systems, it is important to calculate the required heating, cooling and ventilation loads associated with the building. In the next section of the report we will review the heating, cooling and ventilation load calculations.

**MECHANICAL CALCULATIONS:**

The existing wall and roof U-values utilized for our heating/cooling load calculations for the Tourism Building are based on the existing conditions observed during our field survey, and are as follows (Existing Architectural Documents were not available at the time of this report):

- Brick Masonry Wall U-Value = 0.269 BTU/hr/°F/ft<sup>2</sup> (approximate R-value of R-3.71 (hr x°F x ft<sup>2</sup>)/BTU)
- Existing Roof U-Value = 0.061 BTU/hr/°F/ft<sup>2</sup> (approximate R-value of R-16.31 (hr x°F x ft<sup>2</sup>)/BTU)

We utilized the following U-values and shading coefficients for the windows in our load calculation:

- Existing Window U-value = 0.595 BTU/hr/°F/ft<sup>2</sup> (approximate R-value of R-1.68 (hr x°F x ft<sup>2</sup>)/BTU)
- Shade Coefficient = 0.746

Based on the following assumptions and ambient outside air conditions/interior conditions, we calculated the required heating and cooling capacity for the Tourism Building:

- Summer interior design conditions = 73-75°F Dry Bulb (+3°F and -3°F accuracy), and 50% (+/-20%) Relative Humidity.
- Summer ambient design conditions = 95°F Dry Bulb and 78°F Wet Bulb.
- Winter interior design conditions = 70-72°F Dry Bulb (+3°F and -3°F accuracy), and 35% (+/-20%) Relative Humidity.
- Winter ambient design conditions = 10°F Dry Bulb.
- Ventilation airflow rates as calculated for each Zone (See Appendix).
  - a. Basement and Heat Only Spaces = 0 CFM
  - b. 1<sup>st</sup> Floor Zone (Tourism Office) = 92 CFM
  - c. 2<sup>nd</sup> Floor Zone (Economic Dev. Office) = 103 CFM
  - d. 3<sup>rd</sup> Floor Zone (Sherriff's Office) = 143 CFM

We have summarized the existing block heating, cooling and ventilation loads in Table #3. The detailed load calculations are included in the Appendix of the report.

TABLE #3: HEATING AND COOLING LOAD SUMMARY (in BTU/hr)								
Zone Served	COOLING LOAD					HEATING LOAD		
	Sensible Load (Btuh)	Total Load (Btuh)	Ventilation Total (Btuh)	Zone Total Cooling Load Btuh (Tons)	Sq. Ft. per Ton	Total Load (Btuh)	Ventilation Total (Btuh)	Zone Total Heating Load (Btuh)
<b>Basement/Stair</b>	--	--	--	--	--	24,543	--	<b>24,543</b>
<b>1<sup>st</sup> Floor Zone</b>	33,775	36,828	7,851	<b>44,679</b> (3.7 Tons)	299 S.F./Ton	31,731	8,446	<b>40,177</b>
<b>2<sup>nd</sup> Floor Zone</b>	28,334	32,035	8,789	<b>40,824</b> (3.4 Tons)	328 S.F./Ton	24,909	9,455	<b>34,364</b>
<b>3<sup>rd</sup> Floor Zone</b>	43,934	49,757	12,203	<b>61,960</b> (5.16 Tons)	228.5 S.F./Ton	38,751	13,127	<b>51,878</b>

The relatively “high” cooling and heating loads are associated with the poor insulation R-Values, high infiltration loads (building leakage) and high internal loads (people and computers).

Please note, any final HVAC equipment selections should be based on finalized load calculations and airflow balancing during the design phase of the project.

The next portion of our report will review the Life Cycle Cost Analysis.

### **LIFE CYCLE COST ANALYSIS:**

There are multiple potential new HVAC systems that can serve the Worcester County Tourism Building, but to be of maximum benefit, any replacement HVAC system must meet the following criteria:

1. High energy efficiency;
2. Must be easy to maintain;
3. Must provide code required amount of ventilation airflow for people and spaces;
4. Have the capability to maintain temperature and humidity levels in the space required for comfort and maintain good indoor air quality;
5. Have low life cycle cost;
6. Have long useful service life.

The existing HVAC system is at or nearing the end of its useful service life.

We have evaluated two (2) potential HVAC systems for incorporation into the Worcester County Tourism Building based on the following criteria:

- Availability of cooling/heating energy sources;
- Required mechanical room/ceiling space;
- Installation costs (first costs);
- Service and maintenance costs (annual costs);
- Annual energy costs;
- Fuel Types;
- Maintenance involvement;
- Utility costs.

Based on the above criteria, the following two (2) systems were analyzed for a Life Cycle Cost Analysis for the facility. They are as follows:

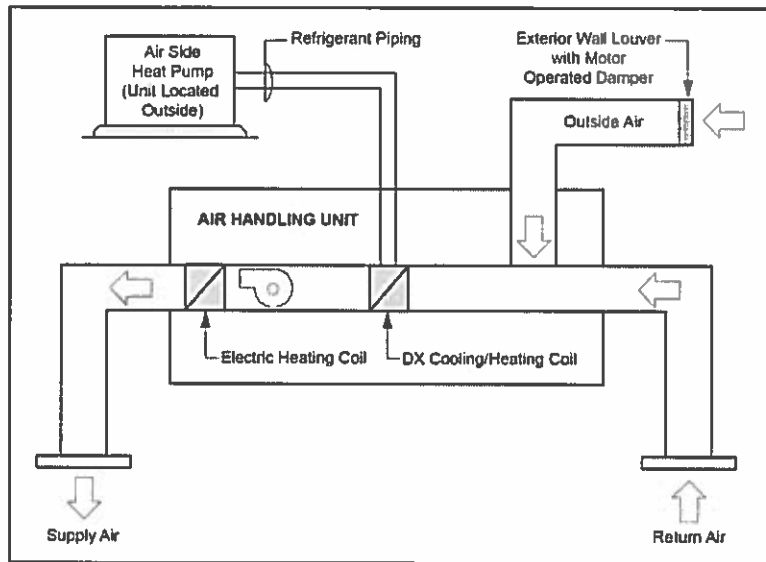
System #1. A conventional split system heat pump with packaged DX (direct expansion) cooling/heating coil, electric heat (back up and dehumidification) and direct ventilation airflow through unit. Heat pump units shall have variable speed compressors and ECM (Electro Commutating Motor) fan motors for air handling units.

System #2. Air side heat pump variable refrigerant flow (VRF) system. Air side heat pump units would be located on the roof. Heat pumps would be interlocked with ductless type terminal equipment through refrigerant piping. Simultaneously heating and cooling is possible with the VRF systems. All heat pump equipment shall utilize variable speed compressors and fan motors. Ventilation shall be provided directly through the heat pumps via o.a. supply air fan.

The following sections will outline the basic elements of each system.

**SYSTEM #1: AIR-COOLED HEAT PUMP SYSTEM:**

The air-cooled heat pump and air handling unit system, as shown in Figure #3 will provide the cooling/heating and required amount of ventilation airflow, respectively. The air handling units would be served by the refrigerant piping system from the air-cooled heat pumps. The heated/cooled air would be delivered through above ceiling ductwork to the spaces within the building and outside air would be provided to the spaces through the air handling units.



***Figure #3—Air-Cooled Heat Pump System Diagram***

Ventilation would be provided by outside air being drawn into the return air duct from an air intake hood or louver. This method of outside air delivery relies on the AHU to fully condition the outside air, which makes it difficult to control humidity. In order to maintain space relative humidity, an electric reheat coil is provided to allow the system to provide dehumidification. Dehumidification is essential due to the outside airflow being delivered through the heat pump units.

The following are the advantages /disadvantages of this system:

**Advantages:**

1. Lowest first cost when compared to System #2.
2. Each floor is served by a dedicated unit. Shut down of one unit does not affect the other areas.
3. Low service and maintenance costs when compared to System #2.
4. Simple system to understand.
5. Technology is familiar to current work force in the area.

**Disadvantages:**

1. Higher operating costs compared to System #2.

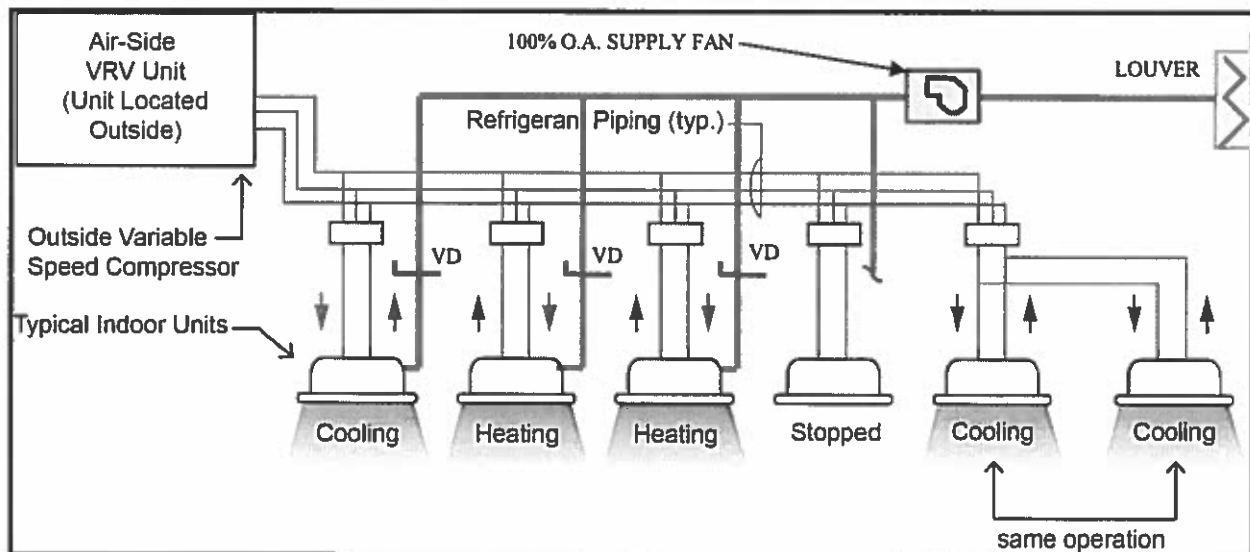
2. Reduced temperature zones associated with single heat pump per floor.
3. Supplemental ductless units required for peaking units.
4. Requires longer ducts than System #2 since ductwork must handle conditioning air with ventilation air.

Next, we will explore System #2, an air cooled VRF heat pump system.

#### SYSTEM #2: AIR COOLED VRF HEAT PUMP SYSTEM:

The air cooled VRV (heat pumps) will provide cooling/heating to all zones/areas of the building. The variable refrigerant volume system allows simultaneous heating and cooling throughout zones by utilizing individual ductless heat pump units. The VRV system is a ductless multi-split system which uses air-cooled remote compressor units which houses a variable speed compressor unit in conjunction with multiple terminal heat pump units. Variable speed compressors are utilized in the VRV heat pump compressor units.

The ducted air distribution network is minimized, and small indoor units are distributed throughout the building. As shown in Figure #4, the VRV system can eliminate most of the required ductwork as the individual indoor units can be small wall, floor, or ceiling mounted ductless cassette styles for each space. As each indoor unit will have its own thermostat, flexibility of control is greatly enhanced. Moreover, the installation only requires refrigerant piping to be routed throughout the facility, which is much smaller and easier to install than water pipes or air ducts having comparable heat transfer capacities.



***Figure #4– Variable Refrigerant Volume System***

A unique feature of the ductless multi-split systems is the ability to transfer the heat removed from one space (while in cooling mode) to another space where it is used for heating. For example: Heat can be taken from a Meeting Room, when in need of cooling due to high occupancy, and used to heat other perimeter spaces when it's cold outside. Or, on a spring morning, heat can be taken from the rooms with South & East exposures, requiring cooling due to the sun shining on them, and used to heat rooms on opposite exposures that are still cold and require heat. By moving unwanted heat from a space needing



cooling to a space needing heating, minimal new energy is expended to create the heat. This approach has the ability to provide simultaneous heating and cooling while saving on energy usage.

Another essential feature of this system is the ability of the system to match system capacity heating and cooling. There is a large variation in the cooling load between the building (as well as spaces in the building) at full occupancy and when the building and spaces inside the building are unoccupied or have reduced occupancy. Due to the variable speed operation of the compressor and the supply fans in a variable refrigerant volume system, the system is able to provide the required reduction in capacity without excessive cycling of the compressor. This prevents the wear and premature failure of equipment associated with the excessive cycling of compressors at part load conditions that are typical of more conventional systems.

**Advantages:**

1. Increased number of zones (temperature control) versus System #1.
2. Digital scroll technology provides reduced operating power at part load.
3. Inherent energy recovery.
4. Lower operating cost when compared to System #1.
5. Smaller and less ductwork required when compared to System #1.

**Disadvantages:**

1. Higher service and maintenance cost when compared to System #1.
2. Higher first cost when compared to System #1.
3. “More complicated” system compared to System #1.
4. Not as familiar to current work force in the area.

Because each system has unique advantages and disadvantages, a life cycle cost analysis was performed on each system which evaluates initial cost, operating costs and maintenance costs associated with each system over a 20 year period.

The initial mechanical installation costs for the two options are tabulated in Table #4.

<b>Table #4: Estimated Initial Mechanical Installation Costs</b> <i>(Not including costs associated with plumbing systems, electrical system upgrades, future additions, or architectural work.)</i>		
<b>System</b>	<b>Mechanical Construction Cost</b>	<b>Cost/Square Foot</b>
<b>System #1: Air Cooled Heat Pump System</b>	<b>\$298,925</b>	<b>\$56.4/S.F.</b>
<b>System #2: Air-Cooled VRF Heat Pump System</b>	<b>\$308,100</b>	<b>\$58.13/S.F.</b>
<i>Note: Mechanical Construction costs indicated above include supporting electrical connection costs and roof structural modifications to accommodate roof mounted condensing units. Cost does NOT include any architectural modifications (ceilings, chases, etc...), bonds, insurance, or contingency that would be required to accommodate the HVAC system installation.</i>		

The next step of the life cycle analysis is to identify the annual operating cost based on energy, service, and maintenance costs. The estimated costs for each of these are summarized below in Table #5

<b>Table #5: Estimated Annual Operating Cost</b>				
<b>System</b>	<b>Annual Energy Cost (\$)</b>	<b>Annual Service Cost (\$)</b>	<b>Annual Maintenance Cost (\$)</b>	<b>Total Annual Operating Cost (\$)</b>
<b>System #1: Air Cooled Heat Pump System</b>	<b>\$8,673</b>	<b>\$1,000</b>	<b>\$1,100</b>	<b>\$10,773</b>
<b>System #2: Air-Cooled VRF Heat Pump System</b>	<b>\$7,807</b>	<b>\$1,700</b>	<b>\$1,500</b>	<b>\$11,007</b>

The final step in the life cycle analysis is to apply a present worth factor to these costs as appropriate for a 20 year life. This factor accounts for escalation in cost of utilities and discount (interest rate) over a 20 year period. Applying the factor to the costs summarized previously yields a total estimated life cycle cost for each system as summarized below.

The total 20-year life cycle cost for System #1 and System #2 are as follows:

- System #1(Air Cooled Heat Pump System) – 20 year life cycle cost = **\$537,522**
- System #2 (Air Cooled VRF Heat Pump System) – 20 year life cycle cost = **\$551,880**

From this data the recommended system based on a life cycle cost analysis is the Air Cooled Heat Pump System #1. The air-cooled D/X heat pump system appears to be the overall optimal system due to its lower initial cost and competitive operating costs. The full Life Cycle Cost Analysis can be found in the Appendix.

Next, we will explore the electrical system recommendations.

**ELECTRICAL SYSTEM RECOMMENDATIONS:**

Based on the proposed HVAC changes to the building, we would recommend the following items regarding the electrical system.

***Electrical Distribution System:***

The proposed load of the new HVAC for the Tourism building is 84kVA or 232A at 208V, 3 phase. The existing HVAC units that are being replaced have an approx. load of 18kVA or 50A at 208V, 3 phase. Based on this information, the proposed HVAC system will add an additional 66kVA or 182A at 208V, 3 phase. When we add this new HVAC load to the 67A peak demand that the building currently draws, it results in a total load of 249A, which means the existing 400A service is still adequate to serve the proposed HVAC changes. While the 400A service is adequate, we would recommend that both existing panelboards be replaced with one (1) 400A, 42 circuit panelboard and one (1) 200A 42 circuit panelboard to match what is currently in the basement.

***Generator:***

Based on the current use of the building, there is no need in our opinion to provide an emergency generator to serve this building.

***General Building Power:***

Due to the existing wiring installation not meeting the current version of the National Electrical Code (NEC), we would recommend that all of the exposed nonmetallic sheathed cable be replaced with THWN wire in electrical metallic tubing (EMT). Since the HVAC system is being replaced, new disconnect

switches would be provided at each piece of mechanical equipment with associated wiring back to the new panelboard.

***Lighting:***

As part of this project, we would recommend that the existing lighting in floors 1-3 remain. If any ceilings need to be removed as part of the HVAC project, we would recommend that the lights installed in these ceilings be removed and stored and then reinstalled when the ceiling is installed. We would recommend that the existing strip light in the basement with no cover, be removed and replaced by two (2) LED strip lights with covered lenses.

***Lighting Controls:***

Based on the proposed HVAC changes, there will be no need to provide lighting controls for this project. If the lighting is replaced in any area of the building besides for the basement, then additional lighting controls would need to be provided in those same areas.

***Life Safety:***

Based on the proposed HVAC changes, there will be no need to change the emergency lighting or exit signs for this project.

***Fire Alarm:***

Based on the proposed HVAC changes, the existing fire alarm system will need to be expanded to add duct detectors. The existing fire alarm system is capable of supervising the duct detectors if the duct detectors are powered at 120 volts. If the duct detectors are 24V and powered from the fire alarm panel then the existing fire alarm panel would need to be replaced and upgraded.

***Security System:***

Based on the proposed HVAC changes, there will be no need to change the security system for this project.

***Information Technology:***

Based on the proposed HVAC changes, there will be a need to add three data outlets for and their associated cabling back to the basement for HVAC ATC panels. Other than these data outlets the Information Technology System can remain the same.

Next we will review the implementation HVAC and Electrical System implementation recommendations

**IMPLEMENTATION OF RECOMMENDED SYSTEM**

As a part of this report we also evaluated some additional design considerations for the Worcester County Tourism Building.

To implement the recommended System #1 the following items would also need to be addressed/considered:

1. Demolition of existing walls/chases to allow installation of new ductwork and insulation.
2. Creation of new closets to house the split air handling units.
3. Installation of a roof hatch and ladder to allow for access to the condensing units.
4. Removal and replacement of ceilings to accommodate installation of new ductwork.
5. Sealing of basement wall openings/vents should be completed.
6. Will the building be occupied during construction? Does the construction need to be phased to allow partial occupancy of the facility?

7. Does the building contain Asbestos that requires abatement?

The next portion of our report will summarize our findings and conclusions.

**SUMMARY AND CONCLUSIONS**

Based on our review of the HVAC systems for the Worcester County Tourism Building and Life Cycle Cost Analysis, the recommended HVAC system for cooling and heating the building is Option #1 – (Air Cooled D/X Heat Pump System).

We have summarized the construction cost estimates for the HVAC and electrical systems in Table #6.

Table #6: System #1 - Air Cooled DX Split Heat Pump Construction Cost Estimate	
Heating, Ventilating and Air Conditioning	\$298,925
Electrical	\$61,500
25% added for Overhead, Profit, Bonds, Insurance and Design Contingency	\$90,106
<b>Estimated Total Cost of HVAC and Electrical</b>	<b>\$450,531</b>

Please note that the new HVAC and electrical system costs indicated above do not include any of the following:

1. Costs associated with Architectural, Structural, or Engineering design fees;
2. Architectural and general construction costs associated with new finishes, walls, chases, painting, etc... required for installation of new HVAC system;
3. Plumbing or Fire Protection construction costs.

If the project were to move forward, all of the cost items listed above would need to be incorporated into the overall project budget. The costs of the items above are dependent on numerous items including construction contract type, scope of work, etc. and could not be reasonably defined at this time. Again, please note that all of the above items would need to be included in the overall project budget once the scope of work is further defined.

We look forward to reviewing our findings with you at your earliest convenience. Please do not hesitate to call should you have any questions about the report.

Sincerely,

GIPE ASSOCIATES, INC.



R. Adam Kegan, P.E., LEED AP  
Vice President  
RAK/lks

Appendix:

1. Heating, Cooling and Ventilation Calculations
2. Life Cycle Cost Analysis

# APPENDIX 1

## HEATING, COOLING, AND VENTILATING CALCULATIONS

## Air System Sizing Summary for System #1 (1st Floor HP)

Project Name: 18015 - Worcester Tourism Building  
 Prepared by: Gipe Associates, Inc.

04/17/2018  
 11:00AM

### Air System Information

Air System Name ..... <b>System #1 (1st Floor HP)</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>1107.0</b> ft <sup>2</sup>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Salisbury, Maryland</b>

### Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone CFM Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space CFM Sizing ..... <b>Individual peak space loads</b>

### Central Cooling Coil Sizing Data

Total coil load ..... <b>3.5</b> Tons	Load occurs at ..... <b>Aug 1500</b>
Total coil load ..... <b>42.3</b> MBH	OA DB / WB ..... <b>95.0 / 78.0</b> °F
Sensible coil load ..... <b>36.2</b> MBH	Entering DB / WB ..... <b>77.1 / 64.4</b> °F
Coil CFM at Aug 1500 ..... <b>1677</b> CFM	Leaving DB / WB ..... <b>57.1 / 55.9</b> °F
Max block CFM ..... <b>1677</b> CFM	Coil ADP ..... <b>54.8</b> °F
Sum of peak zone CFM ..... <b>1677</b> CFM	Bypass Factor ..... <b>0.100</b>
Sensible heat ratio ..... <b>0.854</b>	Resulting RH ..... <b>50</b> %
CFM/Ton ..... <b>475.3</b>	Design supply temp. .... <b>55.0</b> °F
ft <sup>2</sup> /Ton ..... <b>313.7</b>	Zone T-stat Check ..... <b>1 of 1</b> OK
BTU/(hr-ft <sup>2</sup> ) ..... <b>38.2</b>	Max zone temperature deviation ..... <b>0.0</b> °F
Water flow @ 10.0 °F rise ..... <b>N/A</b>	

### Central Heating Coil Sizing Data

Max coil load ..... <b>35.8</b> MBH	Load occurs at ..... <b>Des Htg</b>
Coil CFM at Des Htg ..... <b>1677</b> CFM	BTU/(hr-ft <sup>2</sup> ) ..... <b>32.4</b>
Max coil CFM ..... <b>1677</b> CFM	Ent. DB / Lvg DB ..... <b>67.6 / 87.5</b> °F
Water flow @ 20.0 °F drop ..... <b>N/A</b>	

### Supply Fan Sizing Data

Actual max CFM ..... <b>1677</b> CFM	Fan motor BHP ..... <b>0.48</b> BHP
Standard CFM ..... <b>1674</b> CFM	Fan motor kW ..... <b>0.38</b> kW
Actual max CFM/ft <sup>2</sup> ..... <b>1.51</b> CFM/ft <sup>2</sup>	Fan static ..... <b>1.25</b> in wg

### Outdoor Ventilation Air Data

Design airflow CFM ..... <b>92</b> CFM	CFM/person ..... <b>22.90</b> CFM/person
CFM/ft <sup>2</sup> ..... <b>0.08</b> CFM/ft <sup>2</sup>	

## Zone Sizing Summary for System #1 (1st Floor HP)

Project Name: 18015 - Worcester Tourism Building  
 Prepared by: Gipe Associates, Inc.

04/17/2018  
 11:00AM

### Air System Information

Air System Name ..... <b>System #1 (1st Floor HP)</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>1107.0 ft<sup>2</sup></b>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Salisbury, Maryland</b>

### Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone CFM Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space CFM Sizing ..... <b>Individual peak space loads</b>

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (CFM)	Minimum Supply Airflow (CFM)	Zone CFM/ft <sup>2</sup>	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Unit Coil Load (MBH)	Zone Htg Unit Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	1677	1677	1.51	0.0	-	0.0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (MBH)	Time of Peak Sensible Cooling Load	Zone Heating Load (MBH)	Zone Floor Area (ft <sup>2</sup> )
Zone 1	34.0	Sep 1500	31.7	1107.0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Peak Sensible Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
<i>Zone 1</i>							
1-BATHROOM	1	1.9	Jul 1400	96	2.4	64.0	1.50
1-BREAK ROOM	1	4.4	Jul 1700	205	4.1	104.0	1.97
1-LOBBY/VEST	1	7.7	Aug 1600	356	6.9	281.0	1.27
1-OFFICE/LOBBY	1	12.5	Sep 1400	578	8.3	453.0	1.28
1-OFFICE-1	1	9.3	Sep 1400	432	9.8	167.0	2.59
1-STORAGE	1	0.2	Jul 1500	11	0.2	38.0	0.28

# Ventilation Sizing Summary for System #1 (1st Floor HP)

Building

04/17/2018  
11:00AM

ASHRAE Std 62.1-2016

Heating operation

1.000

87 CFM

0.945

92 CFM

	Supply Air (CFM)	Space Floor Area (ft <sup>2</sup> )	Area Outdoor Air Rate (CFM/ft <sup>2</sup> )	Time Averaged Occupancy (Occupants)	People Outdoor Air Rate (CFM/person)	Air Distribution Effectiveness	Space Outdoor Air (CFM)	Breathing Zone Outdoor Air (CFM)	Space Ventilation Efficiency
ult.	(Vpz)	(Az)	(Ra)	(Pz)	(Rp)	(Ez)	(Voz)	(Vbz)	(Evz)
1	96	64.0	0.00	0.0	0.00	0.8	0	0	1.052
1	205	104.0	0.12	1.0	5.00	0.8	22	17	0.945
1	356	281.0	0.06	0.0	5.00	0.8	21	17	0.992
1	578	453.0	0.06	2.0	5.00	0.8	46	37	0.971
1	432	167.0	0.06	1.0	5.00	0.8	19	15	1.008
1	11	38.0	0.00	0.0	0.00	0.8	0	0	1.052
	<b>1677</b>							<b>87</b>	<b>0.945</b>



## Air System Design Load Summary for System #1 (1st Floor HP)

Project Name: 18015 - Worcester Tourism Building  
 Prepared by: Gipe Associates, Inc.

04/17/2018  
 11:00AM

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 95.0 °F / 78.0 °F			HEATING OA DB / WB 10.0 °F / 8.0 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	273 ft²	12872	-	273 ft²	-	-
Wall Transmission	484 ft²	3044	-	484 ft²	8078	-
Roof Transmission	0 ft²	0	-	0 ft²	0	-
Window Transmission	273 ft²	2703	-	273 ft²	10063	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	0 ft²	0	-	0 ft²	0	-
Floor Transmission	1107 ft²	2928	-	1107 ft²	5646	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	2112 W	7206	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	724 W	2470	-	0	0	-
People	4	920	480	0	0	0
Infiltration	-	1632	2573	-	5059	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	10%	2885	0
>> Total Zone Loads	-	33775	3053	-	31731	0
Zone Conditioning	-	33008	3053	-	31109	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	1677 CFM	0	-	1677 CFM	0	-
Ventilation Load	92 CFM	1873	3114	92 CFM	6020	0
Supply Fan Load	1677 CFM	1291	-	1677 CFM	-1291	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	36171	6167	-	35838	0
Central Cooling Coil	-	36171	6168	-	0	0
Central Heating Coil	-	0	-	-	35838	-
Terminal Reheat Coils	-	0	-	-	0	-
>> Total Conditioning	-	36171	6168	-	35838	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

## Air System Sizing Summary for System #1 (2nd floor HP)

Project Name: 18015 - Worcester Tourism Building  
 Prepared by: Gipe Associates, Inc.

04/17/2018  
 11:00AM

### Air System Information

Air System Name ..... <b>System #1 (2nd floor HP)</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>1118.0 ft<sup>2</sup></b>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Salisbury, Maryland</b>

### Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone CFM Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space CFM Sizing ..... <b>Individual peak space loads</b>

### Central Cooling Coil Sizing Data

Total coil load ..... <b>3.2 Tons</b>	Load occurs at ..... <b>Aug 1400</b>
Total coil load ..... <b>37.9 MBH</b>	OA DB / WB ..... <b>94.4 / 77.9 °F</b>
Sensible coil load ..... <b>30.7 MBH</b>	Entering DB / WB ..... <b>77.6 / 64.9 °F</b>
Coil CFM at Aug 1400 ..... <b>1372 CFM</b>	Leaving DB / WB ..... <b>56.8 / 55.6 °F</b>
Max block CFM ..... <b>1372 CFM</b>	Coil ADP ..... <b>54.5 °F</b>
Sum of peak zone CFM ..... <b>1372 CFM</b>	Bypass Factor ..... <b>0.100</b>
Sensible heat ratio ..... <b>0.812</b>	Resulting RH ..... <b>50 %</b>
CFM/Ton ..... <b>434.8</b>	Design supply temp. .... <b>55.0 °F</b>
ft <sup>2</sup> /Ton ..... <b>354.3</b>	Zone T-stat Check ..... <b>1 of 1 OK</b>
BTU/(hr·ft <sup>2</sup> ) ..... <b>33.9</b>	Max zone temperature deviation ..... <b>0.0 °F</b>
Water flow @ 10.0 °F rise ..... <b>N/A</b>	

### Central Heating Coil Sizing Data

Max coil load ..... <b>30.7 MBH</b>	Load occurs at ..... <b>Des Htg</b>
Coil CFM at Des Htg ..... <b>1372 CFM</b>	BTU/(hr·ft <sup>2</sup> ) ..... <b>27.4</b>
Max coil CFM ..... <b>1372 CFM</b>	Ent. DB / Lvg DB ..... <b>66.5 / 87.3 °F</b>
Water flow @ 20.0 °F drop ..... <b>N/A</b>	

### Supply Fan Sizing Data

Actual max CFM ..... <b>1372 CFM</b>	Fan motor BHP ..... <b>0.39 BHP</b>
Standard CFM ..... <b>1370 CFM</b>	Fan motor kW ..... <b>0.31 kW</b>
Actual max CFM/ft <sup>2</sup> ..... <b>1.23 CFM/ft<sup>2</sup></b>	Fan static ..... <b>1.25 in wg</b>

### Outdoor Ventilation Air Data

Design airflow CFM ..... <b>103 CFM</b>	CFM/person ..... <b>14.66 CFM/person</b>
CFM/ft <sup>2</sup> ..... <b>0.09 CFM/ft<sup>2</sup></b>	



# Ventilation Sizing Summary for System #1 (2nd floor HP)

Building

04/17/2018  
11:00AM

ASHRAE Std 62.1-2016

Heating operation

1.000

99 CFM

0.967

103 CFM

	Supply Air (CFM)	Space Floor Area (ft <sup>2</sup> )	Area Outdoor Air Rate (CFM/ft <sup>2</sup> )	Time Averaged Occupancy (Occupants)	People Outdoor Air Rate (CFM/person)	Air Distribution Effectiveness	Space Outdoor Air (CFM)	Breathing Zone Outdoor Air (CFM)	Space Ventilation Efficiency
ult.	(Vpz)	(Az)	(Ra)	(Pz)	(Rp)	(Ez)	(Voz)	(Vbz)	(Evz)
1	81	47.0	0.00	0.0	0.00	0.8	0	0	1.072
1	353	327.0	0.06	2.0	5.00	0.8	37	30	0.967
1	357	205.0	0.06	2.0	5.00	0.8	28	22	0.994
1	280	205.0	0.06	2.0	5.00	0.8	28	22	0.973
1	300	334.0	0.06	1.0	5.00	0.8	31	25	0.968
	<b>1372</b>							<b>99</b>	<b>0.967</b>

## Air System Design Load Summary for System #1 (2nd floor HP)

Project Name: 18015 - Worcester Tourism Building  
 Prepared by: Gipe Associates, Inc.

04/17/2018  
 11:00AM

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1400			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 94.4 °F / 77.9 °F			HEATING OA DB / WB 10.0 °F / 8.0 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	162 ft²	7032	-	162 ft²	-	-
Wall Transmission	667 ft²	5271	-	667 ft²	11132	-
Roof Transmission	0 ft²	0	-	0 ft²	0	-
Window Transmission	162 ft²	1545	-	162 ft²	5972	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	0 ft²	0	-	0 ft²	0	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	2189 W	7469	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	1071 W	3654	-	0	0	-
People	7	1625	925	0	0	0
Infiltration	-	1737	2776	-	5541	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	10%	2264	0
>> Total Zone Loads	-	28334	3701	-	24909	0
Zone Conditioning	-	27661	3701	-	24959	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	1372 CFM	0	-	1372 CFM	0	-
Ventilation Load	103 CFM	2015	3436	103 CFM	6758	0
Supply Fan Load	1372 CFM	1056	-	1372 CFM	-1056	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	30732	7137	-	30662	0
Central Cooling Coil	-	30732	7138	-	0	0
Central Heating Coil	-	0	-	-	30662	-
Terminal Reheat Coils	-	0	-	-	0	-
>> Total Conditioning	-	30732	7138	-	30662	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

## Air System Sizing Summary for System #1 (3rd Floor HP)

Project Name: 18015 - Worcester Tourism Building  
 Prepared by: Gipe Associates, Inc.

04/17/2018  
 11:00AM

### Air System Information

Air System Name ..... System #1 (3rd Floor HP)	Number of zones ..... 1
Equipment Class ..... SPLT AHU	Floor Area ..... 1179.0 ft <sup>2</sup>
Air System Type ..... SZCAV	Location ..... Salisbury, Maryland

### Sizing Calculation Information

Calculation Months ..... Jan to Dec	Zone CFM Sizing ..... Sum of space airflow rates
Sizing Data ..... Calculated	Space CFM Sizing ..... Individual peak space loads

### Central Cooling Coil Sizing Data

Total coil load ..... 4.9 Tons	Load occurs at ..... Jul 1500
Total coil load ..... 58.2 MBH	OA DB / WB ..... 95.0 / 78.0 °F
Sensible coil load ..... 47.6 MBH	Entering DB / WB ..... 77.4 / 64.8 °F
Coil CFM at Jul 1500 ..... 2138 CFM	Leaving DB / WB ..... 56.8 / 55.6 °F
Max block CFM ..... 2138 CFM	Coil ADP ..... 54.5 °F
Sum of peak zone CFM ..... 2138 CFM	Bypass Factor ..... 0.100
Sensible heat ratio ..... 0.818	Resulting RH ..... 51 %
CFM/Ton ..... 440.8	Design supply temp. .... 55.0 °F
ft <sup>2</sup> /Ton ..... 243.1	Zone T-stat Check ..... 1 of 1 OK
BTU/(hr-ft <sup>2</sup> ) ..... 49.4	Max zone temperature deviation ..... 0.0 °F
Water flow @ 10.0 °F rise ..... N/A	

### Central Heating Coil Sizing Data

Max coil load ..... 45.9 MBH	Load occurs at ..... Des Htg
Coil CFM at Des Htg ..... 2138 CFM	BTU/(hr-ft <sup>2</sup> ) ..... 38.9
Max coil CFM ..... 2138 CFM	Ent. DB / Lvg DB ..... 66.9 / 86.8 °F
Water flow @ 20.0 °F drop ..... N/A	

### Supply Fan Sizing Data

Actual max CFM ..... 2138 CFM	Fan motor BHP ..... 0.61 BHP
Standard CFM ..... 2134 CFM	Fan motor kW ..... 0.48 kW
Actual max CFM/ft <sup>2</sup> ..... 1.81 CFM/ft <sup>2</sup>	Fan static ..... 1.25 in wg

### Outdoor Ventilation Air Data

Design airflow CFM ..... 143 CFM	CFM/person ..... 8.40 CFM/person
CFM/ft <sup>2</sup> ..... 0.12 CFM/ft <sup>2</sup>	

## Zone Sizing Summary for System #1 (3rd Floor HP)

Project Name: 18015 - Worcester Tourism Building  
 Prepared by: Gipe Associates, Inc.

04/17/2018  
 11:00AM

### Air System Information

Air System Name ..... System #1 (3rd Floor HP)	Number of zones ..... 1
Equipment Class ..... SPLT AHU	Floor Area ..... 1179.0 ft <sup>2</sup>
Air System Type ..... SZCAV	Location ..... Salisbury, Maryland

### Sizing Calculation Information

Calculation Months ..... Jan to Dec	Zone CFM Sizing ..... Sum of space airflow rates
Sizing Data ..... Calculated	Space CFM Sizing ..... Individual peak space loads

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (CFM)	Minimum Supply Airflow (CFM)	Zone CFM/ft <sup>2</sup>	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Unit Coil Load (MBH)	Zone Htg Unit Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	2138	2138	1.81	0.0	-	0.0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (MBH)	Time of Peak Sensible Cooling Load	Zone Heating Load (MBH)	Zone Floor Area (ft <sup>2</sup> )
Zone 1	44.1	Aug 1500	38.8	1179.0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Peak Sensible Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
Zone 1							
3-BATHROOM	1	2.6	Jul 1500	189	4.7	66.0	2.86
3-KITCHEN	1	5.4	Jul 1400	251	5.8	175.0	1.43
3-OFFICE/MONITOR	1	3.7	Jul 1400	170	2.8	69.0	2.47
3-OFFICE-2	1	7.5	Aug 1400	349	8.1	150.0	2.33
3-OPEN OFFICE-1	1	25.4	Aug 1600	1179	17.3	719.0	1.64

# Ventilation Sizing Summary for System #1 (3rd Floor HP)

Building

04/17/2018  
11:00AM

ASHRAE Std 62.1-2016

Heating operation

1.000

136 CFM

0.954

143 CFM

Unit	Supply Air (CFM) (Vpz)	Space Floor Area (ft²) (Az)	Area Outdoor Air Rate (CFM/ft²) (Ra)	Time Averaged Occupancy (Occupants) (Pz)	People Outdoor Air Rate (CFM/person) (Rp)	Air Distribution Effectiveness (Ez)	Space Outdoor Air (CFM) (Voz)	Breathing Zone Outdoor Air (CFM) (Vbz)	Space Ventilation Efficiency (Evz)
1	189	66.0	0.00	0.0	0.00	0.8	0	0	1.064
1	251	175.0	0.00	1.0	0.00	0.8	0	0	1.064
1	170	69.0	0.06	2.0	5.00	0.8	18	14	0.960
1	349	150.0	0.06	2.0	5.00	0.8	24	19	0.996
1	1179	719.0	0.06	12.0	5.00	0.8	129	103	0.954
	<b>2138</b>							<b>136</b>	<b>0.954</b>



## Air System Design Load Summary for System #1 (3rd Floor HP)

Project Name: 18015 - Worcester Tourism Building  
 Prepared by: Gipe Associates, Inc.

04/17/2018  
 11:00AM

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 95.0 °F / 78.0 °F			HEATING OA DB / WB 10.0 °F / 8.0 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	216 ft²	9188	-	216 ft²	-	-
Wall Transmission	913 ft²	6296	-	913 ft²	15238	-
Roof Transmission	1179 ft²	5426	-	1179 ft²	4483	-
Window Transmission	216 ft²	2138	-	216 ft²	7962	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	0 ft²	0	-	0 ft²	0	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	2292 W	7820	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	1970 W	6722	-	0	0	-
People	17	3910	2040	0	0	0
Infiltration	-	2434	3783	-	7546	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	10%	3523	0
>> Total Zone Loads	-	43934	5823	-	38751	0
Zone Conditioning	-	43061	5823	-	38119	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	2138 CFM	0	-	2138 CFM	0	-
Ventilation Load	143 CFM	2897	4784	143 CFM	9388	0
Supply Fan Load	2138 CFM	1646	-	2138 CFM	-1646	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	47605	10607	-	45860	0
Central Cooling Coil	-	47605	10605	-	0	0
Central Heating Coil	-	0	-	-	45860	-
Terminal Reheat Coils	-	0	-	-	0	-
>> Total Conditioning	-	47605	10605	-	45860	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

## Dedicated Outdoor Air System (DOAS) Sizing Summary for System #1 (Heat Only)

Project Name: 18015 - Worcester Tourism Building  
Prepared by: Gipe Associates, Inc.

04/17/2018  
11:00AM

### Air System Information

Air System Name ..... System #1 (Heat Only)  
Equipment Class ..... TERM  
Air System Type ..... PKG-FC

Number of zones ..... 1  
Floor Area ..... 992.0 ft<sup>2</sup>  
Location ..... Salisbury, Maryland

### Sizing Calculation Information

Calculation Months ..... Jan to Dec  
Sizing Data ..... Calculated

Zone CFM Sizing ..... Sum of space airflow rates  
Space CFM Sizing ..... Individual peak space loads

**NOTE: No other data is applicable for a Terminal Units air system without a Dedicated Outdoor Air System (DOAS).**

## Zone Sizing Summary for System #1 (Heat Only)

Project Name: 18015 - Worcester Tourism Building  
 Prepared by: Gipe Associates, Inc.

04/17/2018  
 11:00AM

### Air System Information

Air System Name ..... System #1 (Heat Only)      Number of zones ..... 1  
 Equipment Class ..... TERM      Floor Area ..... 992.0 ft<sup>2</sup>  
 Air System Type ..... PKG-FC      Location ..... Salisbury, Maryland

### Sizing Calculation Information

Calculation Months ..... Jan to Dec      Zone CFM Sizing ..... Sum of space airflow rates  
 Sizing Data ..... Calculated      Space CFM Sizing ..... Individual peak space loads

### Terminal Unit Sizing Data - Cooling

Zone Name	Total Coil Load (MBH)	Sens Coil Load (MBH)	Coil Entering DB / WB (°F)	Coil Leaving DB / WB (°F)	Water Flow @ 10.0 °F (gpm)	Time of Peak Coil Load	Zone CFM/ft <sup>2</sup>
Zone 1	0.0	0.0	-1.0 / -1.0	-1.0 / -1.0	0.00	Des 0000	0.92

### Terminal Unit Sizing Data - Heating, Fan, Ventilation

Zone Name	Heating Coil Load (MBH)	Heating Coil Ent/Lvg DB (°F)	Htg Coil Water Flow @20.0 °F (gpm)	Fan Design Airflow (CFM)	Fan Motor (BHP)	Fan Motor (kW)	OA Vent Design Airflow (CFM)
Zone 1	23.9	68.8 / 95.0	-	911	0.067	0.053	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (MBH)	Time of Peak Sensible Cooling Load	Zone Heating Load (MBH)	Zone Floor Area (ft <sup>2</sup> )
Zone 1	16.5	Jul 1700	24.5	992.0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Peak Sensible Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
Zone 1							
1-STAIR	1	9.7	Jul 1700	598	16.1	178.0	3.36
B-BASEMENT AND CRAWL	1	5.7	Jul 2100	257	6.9	660.0	0.39
B-BOILER ROOM	1	0.8	Jul 1800	56	1.5	102.0	0.54
B-ELEV. MACHINE RM	1	0.5	Jan 2300	0	0.0	52.0	0.00

# Ventilation Sizing Summary for System #1 (Heat Only)

Building

04/17/2018  
11:00AM

## Sum of Space OA Airflows

Mult.	Floor Area (ft²)	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft²)	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
1	178.0	0.0	598.3	0.00	0.00	0.0	0.0	0.0
1	660.0	0.0	256.9	0.00	0.00	0.0	0.0	0.0
1	102.0	0.0	55.6	0.00	0.00	0.0	0.0	0.0
1	52.0	0.0	0.0	0.00	0.00	0.0	0.0	0.0
			<b>910.7</b>					<b>0.0</b>

## Air System Design Load Summary for System #1 (Heat Only)

Project Name: 18015 - Worcester Tourism Building  
 Prepared by: Gipe Associates, Inc.

04/17/2018  
 11:00AM

	DESIGN COOLING			DESIGN HEATING		
	NO COOLING DATA			HEATING DATA AT DES HTG		
	NO COOLING OA DB / WB			HEATING OA DB / WB 10.0 °F / 8.0 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	43 ft²	-	-	43 ft²	-	-
Wall Transmission	522 ft²	-	-	522 ft²	8431	-
Roof Transmission	178 ft²	-	-	178 ft²	655	-
Window Transmission	43 ft²	-	-	43 ft²	1534	-
Skylight Transmission	0 ft²	-	-	0 ft²	0	-
Door Loads	0 ft²	-	-	0 ft²	0	-
Floor Transmission	992 ft²	-	-	992 ft²	6194	-
Partitions	0 ft²	-	-	0 ft²	0	-
Ceiling	0 ft²	-	-	0 ft²	0	-
Overhead Lighting	-	-	-	0	0	-
Task Lighting	-	-	-	0	0	-
Electric Equipment	-	-	-	0	0	-
People	-	-	-	0	0	0
Infiltration	-	-	-	-	5498	0
Miscellaneous	-	-	-	-	0	0
Safety Factor	0% / 0%	-	-	10%	2231	0
>> Total Zone Loads	-	-	-	-	24543	0
Zone Conditioning	-	-	-	-	24035	0
Plenum Wall Load	0%	-	-	0	0	-
Plenum Roof Load	0%	-	-	0	0	-
Plenum Lighting Load	0%	-	-	0	0	-
Exhaust Fan Load	-	-	-	0 CFM	0	-
Ventilation Load	-	-	-	0 CFM	0	0
Ventilation Fan Load	-	-	-	0 CFM	0	-
Space Fan Coil Fans	-	-	-	-	-169	-
Duct Heat Gain / Loss	0%	-	-	0%	0	-
>> Total System Loads	-	-	-	-	23866	0
Terminal Unit Cooling	-	-	-	-	0	0
Terminal Unit Heating	-	-	-	-	23866	-
Terminal Reheat Coils	-	-	-	-	23866	-
>> Total Conditioning	-	-	-	-	23866	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

## APPENDIX 2

### LIFE CYCLE COST ANALYSIS

**WORCESTER CO. TOURISM BUILDING**

**IV. LIFE CYCLE COST ANALYSIS - SYSTEM DESCRIPTION**

PROJECT: WORCESTER CO. TOURISM BUILDING LOCATION: SNOW HILL, MARYLAND	USING AGENCY WORCESTER COUNTY	DATE:  4/14/2018
--	----------------------------------	------------------------

BY: R. ADAM KEGAN, P.E.

**SYSTEM DESCRIPTION**

**BASE SYSTEM (SYSTEM #1) AIR COOLED HEAT PUMPS**

Air cooled split system heat pump air handling units with DX cooling/heating. Ventilation airflow shall be direct through the split system heat pump air handling units. Electric back up heating coils provided. Heat pumps shall utilize variable speed compressors and variable speed supply air fans. Switch operated exhaust fans shall be provided in the bathrooms

**SYSTEM #2 AIR COOLED VRF HEAT PUMP SYSTEM WITH HEAT RECOVERY AND DIRECT VENTILATION**

Air side heat pump variable refrigerant flow (VRF) system. Air side heat pump units are located on the roof. Heat pumps are interlocked with ductless type terminal equipment through refrigerant piping. Simultaneous heating and cooling is possible with the VRF system. All heat pump equipment utilizes variable speed compressors and fan motors. Direct ventilation is provided to the ceiling cassette heat pump units through supply fan. Switch operated exhaust fans shall be provided in the bathrooms

**SYSTEM #3 NOT USED**

**WORCESTER CO. TOURISM BUILDING**

**V. ENERGY COST ESTIMATE:**

**A. COST OF ENERGY**

ENERGY TYPE	ESTIMATED AVERAGE UNIT COST	ESCALATION RATE
ELECTRIC ENERGY CHARGE	<u>0.109</u> \$ PER KWH* (WINTER)	_____
	<u>0.109</u> \$ PER KWH* (SUMMER)	_____
DEMAND CHARGE	<u>3.6</u> \$ PER KW (WINTER)	_____
	<u>3.6</u> \$ PER KW (SUMMER)	_____
STEAM ENERGY CHARGE	_____ \$ PER MLB (winter)	_____
	_____ \$ PER MLB (summer)	_____
STEAM DEMAND CHARGE	_____ \$ PER MLB (winter)	_____
	_____ \$ PER MLB (summer)	_____
PROPANE GAS	_____ \$ PER THERM	_____
FUEL OIL	_____ \$ PER GALLON	_____
COAL	_____ \$ PER TON	_____
NATURAL GAS	_____ \$ PER THERM	_____
	_____ \$ PER _____	_____

UTILITY SUMMER RATE MONTHS: June TO August

UTILITY WINTER RATE MONTHS: September TO May

USEFUL EQUIPMENT LIFE: 20 YEARS (N)

DISCOUNT RATE: 0.04 (D)

ESCALATION RATE: 0.05 (E)

PRESENT WORTH FACTOR: 22.15 PW

$$PW = \frac{1 + E}{D - E} \times \left( \left( \frac{1 + E}{1 + D} \right)^N - 1 \right)$$



**WORCESTER CO. TOURISM BUILDING**

**VI. INITIAL COST ESTIMATE**

ITEM	SYSTEM #1	SYSTEM #2
	(VFD HEAT PUMP AND DIRECT O.A.)	(AIR SIDE VRV AND DIRECT O.A.)
<b>SALISBURY UNIVERSITY ALUMNI HOUSE</b>		
MECHANICAL INSULATION	\$26,500	\$34,450
SPLIT SYSTEM HEAT PUMP UNITS	\$31,800	\$0
VRV HEAT PUMP SYSTEM	\$0	\$53,000
REFRIGERATION	\$15,900	\$47,700
LOUVERS/INTAKES	\$21,200	\$21,200
UNIT HEATERS	\$9,275	\$9,275
POWER VENTILATORS	\$10,600	\$10,600
DUCTWORK	\$42,400	\$26,500
AIR OUTLETS/INLETS	\$15,900	\$0
ATC CONTROLS	\$34,450	\$39,750
TESTING/BALANCING	\$10,600	\$11,925
	\$0	\$0
DEMOLITION OF EXISTING HVAC	\$10,600	\$10,600
ELECTRICAL CONNECTIONS	\$15,900	\$26,500
DUCTLESS SPLIT SYSTEMS	\$21,200	\$0
ELEV. MACHINE ROOM UNIT	\$10,600	\$10,600
	\$0	\$0
	\$0	\$0
	\$0	\$0
	\$0	\$0
	\$0	\$0
	\$0	\$0
	\$0	\$0
	\$0	\$0
	\$0	\$0
	\$0	\$0
<b>GRAND TOTAL</b>	<b>\$276,925</b>	<b>\$302,100</b>

**WORCESTER CO. TOURISM BUILDING**

**VII. ANNUAL COST**

SYSTEM #: 1

A. ENERGY (TOTAL BUILDING ENERGY)

ENERGY SOURCE	UNIT OF MEASURE	ENERGY CONSUMPTION	ENERGY COST	DEMAND CHARGE	TOTAL ENERGY COST
ELECTRIC (year)	KWH	70,194	\$7,651	\$1,022	\$8,673
ELECTRIC	KWH			\$0	\$0
GAS (year)	MCF OR THERM				\$0
GAS	MCF OR THERM				\$0
STEAM (Winter)	MLB/HR				\$0
STEAM (Summer)	MLB/HR				\$0
FUEL OIL	GALLONS			\$0	\$0
COAL	TON				\$0
OTHERS PROPANE	GALLON				\$0

**GRAND TOTAL** \$8,673

**WORCESTER CO. TOURISM BUILDING**

**VII. ANNUAL COSTS (Cont'd.)**

SYSTEM #: 1

**B. SERVICE AND MAINTENANCE COSTS**

MAJOR EQUIPMENT	SERVICE COST	MAINTENANCE COST	TOTAL SERVICE AND MAINTENANCE COST
1. CHILLERS	\$0	\$0	\$0
2. BOILERS			\$0
3. PUMPS			\$0
4. AIR HANDLING UNITS			\$0
5. FANS: SUPPLY	<u>\$200</u>	<u>\$200</u>	<u>\$400</u>
RETURN	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
EXHAUST	<u>\$100</u>	<u>\$100</u>	<u>\$200</u>
6. SPLIT & UNITARY EQUIPMENT	\$500	\$500	\$1,000
7. THRU THE WALL UNITS - PACKAGED TERMINAL AIR CONDITIONING UNITS			\$0
8. HEAT PUMPS	\$0	\$0	\$0
9. TERMINAL UNITS (VAV BOXES, FCU, ETC.)			\$0
<b>SUBTOTAL</b>	<b>\$800</b>	<b>\$800</b>	<b>\$1,600</b>

**WORCESTER CO. TOURISM BUILDING**

**VII. ANNUAL COST (Cont'd.)**

**SYSTEM #:** 1

**B. SERVICE AND MAINTENANCE COSTS**

MAJOR EQUIPMENT	SERVICE COST	MAINTENANCE COST	TOTAL SERVICE AND MAINTENANCE COST
10. HOT WATER CONVERTORS, FTR, Uhs, CUHs, ETC.			\$0
11. COOLING TOWERS			\$0
12. DOMESTIC WATER HEATERS	\$0	\$0	\$0
13. TEMPERATURE CONTROL SYSTEM	\$200	\$300	\$500
14. MISCELLANEOUS EQUIPMENT	\$0	\$0	\$0
<b>SUBTOTAL</b>	<b>\$200</b>	<b>\$300</b>	<b>\$500</b>

**GRAND TOTAL** **\$2,100**

**WORCESTER CO. TOURISM BUILDING**

**VII. ANNUAL COST**

SYSTEM #: 2

A. ENERGY (TOTAL BUILDING ENERGY)

ENERGY SOURCE	UNIT OF MEASURE	ENERGY CONSUMPTION	ENERGY COST	DEMAND CHARGE	TOTAL ENERGY COST
ELECTRIC (year)	KWH	62,902	\$6,856	\$951	\$7,807
ELECTRIC (Summer)	KWH				\$0
GAS (year)	MCF OR THERM				\$0
GAS (Summer)	MCF OR THERM				\$0
STEAM (Winter)	MLB/HR				\$0
STEAM (Summer)	MLB/HR				\$0
FUEL OIL	GALLONS				\$0
COAL	TON				\$0
OTHERS PROPANE	GALLONS				\$0

GRAND TOTAL \$7,807

**WORCESTER CO. TOURISM BUILDING**

**VII. ANNUAL COSTS (Cont'd.)**

SYSTEM #: 2

**B. SERVICE AND MAINTENANCE COSTS**

MAJOR EQUIPMENT	SERVICE COST	MAINTENANCE COST	TOTAL SERVICE AND MAINTENANCE COST
1. CHILLERS	\$0	\$0	\$0
2. BOILERS			\$0
3. PUMPS	\$0	\$0	\$0
4. AIR HANDLING UNITS			\$0
5. FANS: SUPPLY	\$100	\$100	\$200
RETURN	\$0	\$0	\$0
EXHAUST	\$100	\$100	\$200
6. SPLIT & UNITARY EQUIPMENT			\$0
7. THRU THE WALL UNITS - PACKAGED TERMINAL AIR CONDITIONING UNITS			\$0
8. HEAT PUMPS	\$750	\$800	\$1,550
9. TERMINAL UNITS (VAV BOXES, FCU, ETC.)			\$0
<b>SUBTOTAL</b>	<b>\$950</b>	<b>\$1,000</b>	<b>\$1,950</b>

**WORCESTER CO. TOURISM BUILDING**

**VII. ANNUAL COST (Cont'd.)**

SYSTEM #: 2

**B. SERVICE AND MAINTENANCE COSTS**

MAJOR EQUIPMENT	SERVICE COST	MAINTENANCE COST	TOTAL SERVICE AND MAINTENANCE COST
10. HOT WATER CONVERTORS, FTR, Uhs, CUHs, ETC.			\$0
11. THERMAL STORAGE TANKS			\$0
12. DOMESTIC WATER HEATERS	\$0	\$0	\$0
13. TEMPERATURE CONTROL SYSTEM	\$750	\$500	\$1,250
14. MISCELLANEOUS EQUIPMENT	\$0	\$0	\$0
<b>SUBTOTAL</b>	<b>\$750</b>	<b>\$500</b>	<b>\$1,250</b>
<b>GRAND TOTAL</b>			<b><u>\$3,200</u></b>

**WORCESTER CO. TOURISM BUILDING**

**VIII. SUMMARY**

**A. LIFE CYCLE COST ANALYSIS**

**PW FACTOR:** 22.15  
**N=20, E=.05 AND D=.04**

PROJECT: WORCESTER CO. TOURISM BUILDING LOCATION: SNOW HILL, MARYLAND		USING AGENCY WORCESTER COUNTY		DATE: 4/14/2018
	BASE SYSTEM (VSD HEAT PUMPS)	SYSTEM #2 (AIR-VRF)	SYSTEM #3 NOT USED	
<b>INITIAL COST</b>				
MECHANICAL INSTALLATION	\$276,925	\$302,100	\$0	
INCREMENTAL COST OF ARCHITECTURAL COMPONENTS (+ OR - OVER BASE SYSTEM)	\$15,000 (HEAT PUMP CLOSETS)	\$0	\$0	
INCREMENTAL COST OF STRUCTURAL COMPONENTS (+ OR - OVER BASE SYSTEM)	\$7,000 (ROOF ACCESS AND STRUC.)	\$6,000 (ROOF ACCESS AND STRUC.)	\$0	
INCREMENTAL COST OF ELECTRICAL COMPONENTS (+ OR - OVER BASE SYSTEM)	\$0	\$0	\$0	
(a) TOTAL INITIAL COST	\$298,925	\$308,100	\$0	
<b>ANNUAL COSTS</b>				
ENERGY	\$8,673	\$7,807	\$0	
SERVICE	\$1,000	\$1,700	\$0	
ROUTINE MAINTENANCE	\$1,100	\$1,500	\$0	
(b) TOTAL ANNUAL COST	\$10,773	\$11,007	\$0	
(c) PRESENT VALUE OF TOTAL ANNUAL COST: (b) X PW FACTOR	\$238,597	\$243,780	\$0	
TOTAL LIFE CYCLE COST: (a) + (c)	\$537,522	\$551,880	\$0	

**RECOMMEND SYSTEM NO.**      BASE