Part Three: Building Analysis

Site

The total County owned site, contains the historic Ozaukee County court house, annex, and old jail (now the boiler house and used for storage).

Historically, the depth of the north lawn was 26'-0". There is no parking on the historic site. Parallel parking was added on the street with a line of trees between the curb and sidewalk. Main Street parking consists of diagonal parking along the south side and parallel parking along the north side; Wisconsin Street has parallel parking on both sides of the street. A surface parking lot for the use of county employees is located on the corner of Milwaukee and Main Streets.

A historic photograph of the court house with the title, ***"Court House Port Washington, Wis. 104,"*** clearly shows a cast iron light fixture on the north side of the building, **Figure 10**. This fixture has three glass globes. The cars parked on the street in this image date the photograph to circa 1940. A second image titled, ***"Court House Port Washington, Wis. N1659,"*** shows the same light fixture. Currently, there are no site light fixtures with the exception of tall, standard street lighting fixtures.

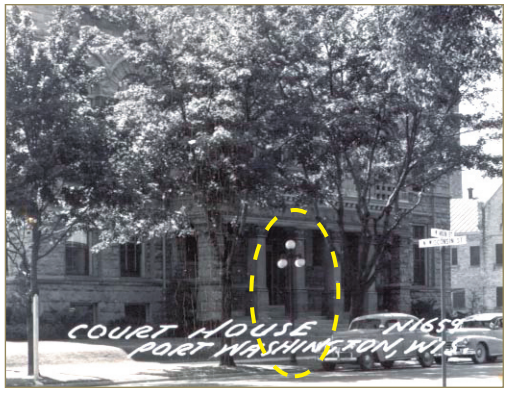

Figure 10: Court house sidewalk light fixture, circa 1940.

The site is located midpoint up the rising elevation from the lakefront to one of the highest points in Port Washington. This location facilitates the drainage of water away from the building. Grading around the building is sloped to encourage water to drain away from the building to the east and south; the south side of the site is particularly steep.

Moisture has been actively infiltrating the interior at the northeast and southeast corners, subsequent plaster damage is detailed in *Interior - Walls*. Information on drainage (gutters and downspouts) contributing to these conditions is located in *Main Roof*, pages 16-19. Clogged gutters (spillover) and short downspout extensions have significantly contributed to these conditions and the resulting mildew and efflorescence. Plastic landscape edging and the planting material selection have also contributed to ponding water against the building foundation as witnessed during rainfall, see **Figure 11**.

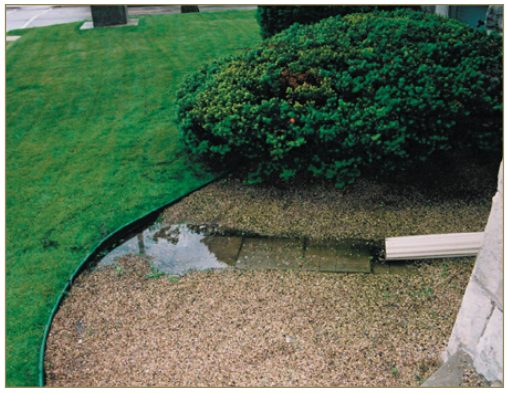

Figure 11: Landscape edging is retaining water run-off.

Vault A06 and Office A07 demonstrate the same plaster deterioration and mildew conditions at the south corner junction of these two rooms, **Figure 12**. Open seams between a one-story storage addition and the adjacent roof of this low structure have resulted in water infiltration at this location.

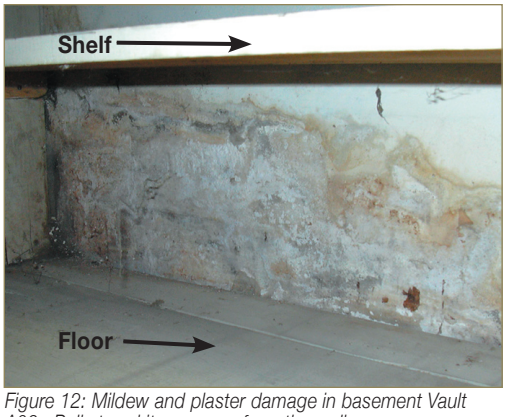

Figure 12: Mildew and plaster damage in basement Vault A06. Pull stored items away from the walls.

Site Recommendations: *The site lighting fixture depicted in historic photographs should be replicated. This low, pedestrian-scaled fixture will provide much needed detail and human scale at the sidewalk and result in establishing a stronger context for the court house. This fixture should be placed flanking the north and east entry sidewalks up to the building for a total of four (4) fixtures.*

The plastic/vinyl landscape edging should be replaced with a natural material or removed entirely. The planting areas, particularly on the east elevation should be planted with native plants that absorb water and allow for better drainage.

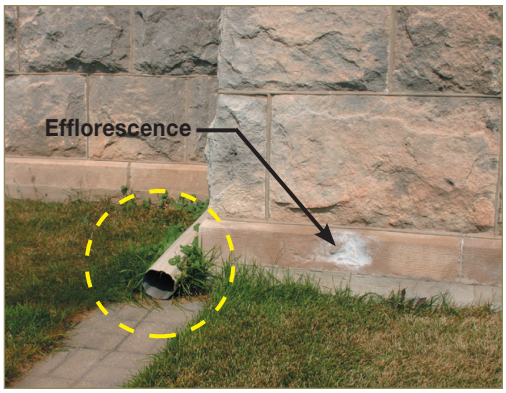

Figure 13: Downspout empties right at building wall, resulting in efflorescence and interior water damage.

Figure 14: Typical structural member checking.

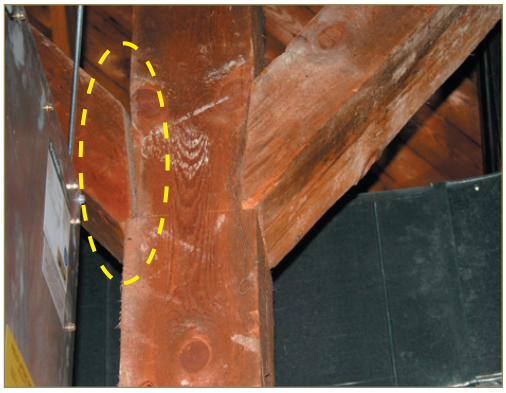

Figure 15: Gap at lateral brace at the west end of the north attic purlin. This gap may have formed when the roof load was lightened after the slate roofing was replaced with much lighter asphalt shingles.

*A landscape architect should be consulted to determine plantings that will not only perform well for the site but be consistent with formal 1900s landscape planning. Leader (downspout) extensions need to be added immediately, **Figure 13**. Vault A06 should be monitored for on-going moisture infiltration. Freestanding shelves should be moved away from exterior walls. Items on fixed shelving located on exterior walls should be moved.*

Structural

Bob Gilomen of Harwood Engineering Consultants performed a visual walk-through assessment on August 16, 2004. No destructive probes were performed to confirm the internal construction or structural integrity of the court house. No significant deterioration of a structural nature was noted. Refer to *Appendix E* for formal results of this visual assessment.

With the exception of the original section drawings, no structural drawings of the building were available for reference. The following information is based on exposed conditions, the 1901 architectural drawings, and original specifications. The footings are comprised of 10”, 8”, and 6” Indiana limestone. The limestone foundation walls and support piers (except for the tower and wall facing) consist of limestone laid in a rubble coursing. The tower walls and support piers are comprised of dimensional Indiana limestone.

Wood framing joists were observed ranging in size from 3” x 14” to 2” x 12” spaced 16” on-center (o.c.). Bridging is used throughout the structure between the floor joists. Concrete floors and vault ceilings, were specified to be comprised of concrete with embedded steel twisted rods or bars. These conditions could not be verified. Vault walls are comprised of brick and are load-bearing.

Heavy-timber 6” x 6” and 8” x 8” posts begin on the second floor and support the roof; these posts are supported by the brick vault walls below which transfer loads to the foundation. Purlins and purlin braces consist of 8” x 8” timbers. Trusses consist of 12” x 12” timbers. 1-1/4” diameter iron rods tie through the trusses; the wooden County Board room ceiling structure hangs from these rods. Checking is evident in several areas of the roof timbers, see **Figure 14**. This checking is typical to large timbers such as these and does not represent hazardous structural conditions.

A lateral brace at the west end of the north purlin has separated slightly from the vertical member, **Figure 15**. This brace is mortised into the vertical timber; all indications are that this connection is secure. This lateral brace was intended to carry thrust from the purlin. Apparently, the roof joists and ridge beams carry much of this load, thus the lateral members are not carrying the thrust anticipated in its design, especially since the slate roofing was removed. This does not indicate structural problems, on the contrary it speaks to the overall strength and redundancy of the roof structure.

Structural Recommendations: *To determine if the lateral brace is in movement, a crack gauge should be installed at the intersection of the brace and the vertical timber. Time will tell if this member is moving and whether additional measures are necessary. A yearly walk-through should be conducted to note changes in structural conditions, such as separating members and cracks in the masonry. This walk-through should be conducted by the same individual(s) to gain a familiarity with conditions. Notes should be kept to record observations.*

Code Compliance, Security, and Hazardous Conditions

Code Compliance

The court house was evaluated for code compliance using the Wisconsin Administrative Code, Chapter Comm 70, Historic Buildings. *"This subchapter of the code provides an alternative method for determining code compliance for a qualified historic building being remodeled, altered, or changed in use."*[8] Buildings listed on the National Register of Historic Places are eligible to use this section of the code. **Note:** The court house is evaluated for code compliance as an independent structure. Any features supplied by the Annex do not contribute to the code standing or handicapped accessibility compliance of the court house. The court house falls within building category Group B, Civic Administration.

Evaluation of the building relating to code issues is typically activated during fire inspections or upon submission of application for a building permit for construction. Construction would be defined as the addition of new walls, building additions, roof protrusions, change in use, etc.

Evaluation of the building under Comm 70 is an accumulative point system. *"If the total building safety score under each column is equal or greater than zero, the qualified historic building is considered to be a code complying building and may be used for the proposed use."*[9] It is the opinion of TKWA that the court house would not have to add features to the building to meet code review compliance by these Comm 70 standards. Comm 70 evaluation awards points for operable windows. Although the Milco windows installed in 1993 were fabricated to be operable, the balances have already failed in many windows. Units should be tested on a periodic basis for operability.

See Table 70.23 taken from the Wisconsin Administrative Code, Comm 70. The court house's actual score is shown on this table.

Comm 70.23 Building Evaluation Form			
	Fire Safety	***Means of Egress***	***General Safety***
1. Number of Stories	10	10	10
2. Building Area	5	5	5
3. Building Setback	2	NA	2
4. Attic Compartmentalization	0	NA	0
5. Firestopping	(-5)	NA	(-5)
6. Mixed Occupancies	0	NA	0
7. Vertical Openings	(-3)	(-3)	(-3)
8. HVAC Systems	0	0	0
9. Smoke Detection	0	0	0
10. Fire Alarms	0	0	0
11. Smoke control	NA	2	2
12. Exit Capacity	NA	0	0
13. Dead Ends	NA	(-5)	(-5)
14. Maximum Travel Distance	NA	3	3
15. Emergency Power	NA	0	0
16. Elevator Control	0	0	0
17. Sprinklers	7	7	7
TOTAL SAFETY SCORE	**(+) 16**	**(+) 19**	**(+) 16**

Figure 16: First floor annex stair open to corridor, not an exit stair.

Figure 17: Location of heat-activation fire door on the annex second floor.

Life Safety: The following general egress deficiencies may warrant resolution in the future.

1. The court house does not contain, nor does it have access to a fire exit stair. Currently, the maximum fire travel distance is being met. Therefore, specific enclosed fire exits are not required at this time. However, "exiting" or "egress" is problematic from the second floor as detailed in point "2" below.
2. In the event of an emergency, the northwest corner annex stair (B8) would be utilized as an exit stair for the historic building, **Figure 16**. However, this stair is not fully enclosed, (i.e. no doors or separation). A second floor fire door is temperature activated; in the event of a fire this may allow considerable smoke to pass into the stairwell and building, **Figure 17**. On the first floor, this stair is open to the main corridor. In the event of an emergency, this stair potentially could impede egress on this end of the building.

Modification should be made on the first and second floors of the annex to result in an exit stair with appropriate escape route access out of the building. First, the fire door on the second floor should be replaced with a 3-hour fire door with panic hardware that is always closed or operated with a magnetic closer. Secondly, annex lobby B101 should be separated by a fire-rated wall partition from corridors B131 and B124. Passage A114 would also need to be separated with fire-rated doors, or removed. The desired result is a fully enclosed stair that disperses occupants out of both the court house and the annex. A separation (perhaps fire-rated doors) should be added between first floor entry (B100) and passage (A114) to prevent smoke and fire spread or simply restore doors back to the north historic main entry. *Note: The annex has no fully enclosed exit stair with contiguous exterior access.*

Handicapped Accessibility

General Note: The Court House building currently relies on the annex to meet accessibility criteria, this is not permitted if Comm 70 is used to evaluate the historic court house. The following requirements are outlined in the Wisconsin Enrolled Commercial Building Code as an appendix item – *American National Standard, Accessible and Usable Buildings and Facilities*.

Several accessibility items are specifically required per code in historic buildings. However, allowances **may** be afforded a historic building where these alterations are unfeasible or are determined to undermine the historic character of the building. These requirements are detailed as follows:

Multi-Level Buildings and Facilities: *"An accessible route from an accessible entrance to public spaces on the level of the accessible entrance shall be provided."*[10] In essence, all spaces accessed by the public are required to be handicapped accessible. The first floor is not handicapped accessible since it has no accessible entrance.

Entrances: *"At least one entrance shall be accessible. Exception: If a main entrance cannot be made accessible, an employee or service entrance that is unlocked while the building is occupied shall be made accessible. The accessible entrance shall have a notification system or be provided with remote monitoring."*[11] The Annex entrance cannot suffice to fulfill this requirement, since it is not evaluated by Comm 70. Therefore, the court house must have an independent accessible entrance.

Toilet Rooms: *"Where toilet rooms are provided, at least one accessible toilet room complying with Section 1108.2.1 shall be provided."*[12] No toilet rooms in the court house are currently accessible.

Other Accessibility Upgrades
In general several other accessibility accommodations are suggested to lower the County's exposure to litigation. These suggestions are as follows:

- Handrails: None of the court house's railings meet the current code standards. While two of the railing heights conform to current code, the handrail extensions and continuity do not. The east stair railings are mounted at the following heights:
  Basement
  1. 33" to top of the metal extension and wood handrail, **Figure 18**

  First Floor
  1. Steps A4 and 5 (each side of the main stair), **Figure 19**
     a. 33" from top of stair to top of railing
     b. 34 1/4" from floor to top of railing extension
  2. Main Stair (A6)
     a. 35" from floor to top of stair railing
     b. 32-1/2" from top of tread to railing

  Second Floor
  1. Main Stair (A6)
     a. 33" railing height (original) at top of landing
     b. 47" to top of metal extension

  Code Requirements: Section 505 of Appendix B of the Wisconsin Enrolled Commercial Building Code outlines ADA compliance requirements. To summarize, handrails are to be provided at both sides of stairs and ramps. Handrails shall be mounted no lower than 34" and no higher than 38". Handrail grips shall have a minimum clear space of 1-1/2" from the wall. Handrails shall be continuous within the full length of each stair flight or ramp run. At the top of stairs, handrails shall extend horizontally 12" minimum. At the bottom of stair flights, the handrail shall extend at an angle mimicing the main handrail for the length of one tread. This handrail then turns parallel to the floor a minimum of 12", see **Figure 20**.

- Signage: The international symbol of accessibility shall be used to sign:
  1. Accessible Entrances
  2. Accessible Toilet Rooms (unisex or multi-user
  3. Directional signage shall be located at non-accessible building entrances to provide location information for the nearest accessible entrance.

Fire Protection
The court house has a fire protection system throughout the building. Activation occurs through hard-wired smoke/heat detectors located in key areas of the building including inside ductwork. The fire annunciator panel is located in the annex entry (B100), north entrance. The existing system is adequate and tested on a regular basis.

Exit Signs
Exit signs are located throughout the building, **Figure 21**. *"Exit and exit access doors shall be marked by an approved exit sign readily visible from any direction of egress travel. Access to exits shall be marked by readily visible exit signs in cases where the exit path of egress travel is not immediately visible to the occupants."*[13]

Figure 18: Inappropriate basement stair railing.

Figure 19: Inappropriate main stair railing.

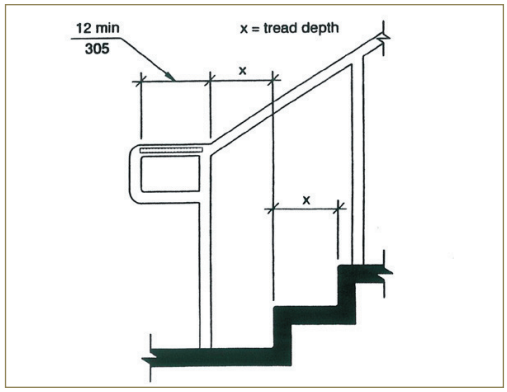

Figure 20: Section 505.10 of ADA requirements regarding handrail extensions on stairs.

Figure 21: Typical wall mounted exit sign.

Figure 22: Magnetic closer on Annex basement door.

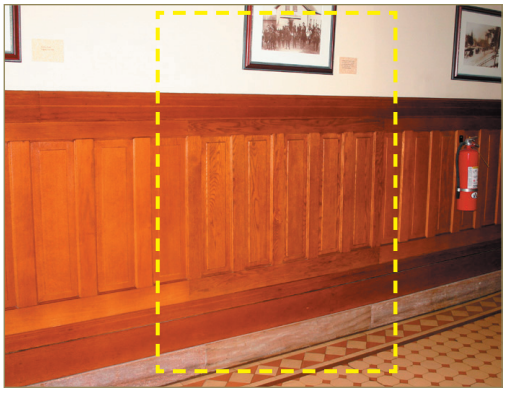

Figure 23: Location of original closet door, now single toilet room.

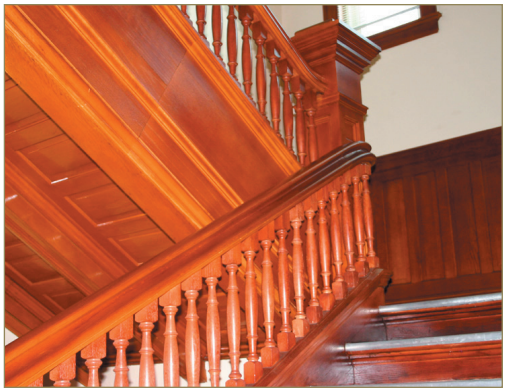

Figure 24: Main stair lacking appropriate height railing.

Figure 25: Unsympathetic second floor landing rail extension.

At stair (A6), entry (A103), stair (A7), lobby (A116), corridor (A117), and corridor (A208) the path of egress is not immediately visible and no exit signs have been provided. A pendant mounted light fixture blocks the exit sign at entry (A103). Lobby (A117/A116) is a dead-end corridor. No exit signs direct occupants upon leaving the elevator.

Emergency Power
Code states that *"Means of egress illumination shall not be lower than one foot-candle at the floor level."*[14] Emergency lighting levels were not assessed for this report and should be tested.

Exits
The basement door to the annex (stair A2) and the main east entry (A103) have standard lock sets. The door at A2 is held open with a magnetic closer, automatically closing upon fire alarm activation, **Figure 22**. Lack of panic hardware at this location presents an exiting hazard once fire alarms are activated.

Code Compliance Recommendations
Access for Persons with Disabilities: Many accessibility short-falls go unnoticed for years until there is a complaint or litigation. As the Court House has minimal use by the general public, the County may want to consider locating the areas most used by the general public in the most accessible areas, i.e. the first and second floors. The County is strongly encouraged to upgrade facilities for total accessibility for employees that are now or in the future may become a person with a disability.

The location of the Public Defender should be accessible to all but is currently inaccessible. The County may want to consider moving this office to other available space in the building in lieu of installing a chair lift. Another option for basement level handicapped accessibility is to install a floor-level entry on the south elevation.

Several of the accessibility requirements may not be required immediately and can be achieved in a logical manner in conjunction with other work on the building. For instance, when the north entry storefront and connecting walkway are removed this entrance can be modified for handicapped accessibility.

*Historically, the first floor toilet room (A111B) was a closet that opened onto corridor (A123B), **Figure 23**. This toilet room is an ideal location for a unisex handicapped accessible toilet room. The basement toilet room (A11) may be convertible into an accessible facility. However, this floor level is not currently handicapped accessible. The second floor toilet room (A206) may also be converted into an accessible facility. The step in the room will need to be investigated to determine is function.*

*Stair Handrails: Handrail height can be amended in most areas by simply raising the height of wall mounted railings. Handrail extensions (wood) should be custom fabricated to mimic the profile and color of the original wood handrail. Vertical supports should be wood and also compliment the existing fabric. The railing height on stair A6 cannot be lowered. A new contiguous inside railing running the entire run of the stairs, should be installed, **Figure 24**. This railing should be wood mimicing the profile of the main stair railing on a smaller scale. Effort should be made to transition this stair into a handrail extension in an historically sympathetic and otherwise pleasing manner.*

One suggestion is to slightly curve the extensions and design small wood vertical supports that mimic the turned railings on the stair. The steel railing extension at the second floor landing should be replaced with an appropriately detailed wood railing, ***Figure 25****.*

Toilet Rooms: When an accessible toilet room is added to the court house, grab bars, toilet fixturing, and all mounting heights, and room clearances should comply with accessibility requirements.

Signage: International symbol of accessibility signage should be added to accessible entrances and toilet rooms. Directional signage is recommended at non-accessible building entrances to provide location information for the nearest accessible entrance. These signs would be necessary at the north and east building entrances.

Wall-Mounted Room Signs: The room numbers of the fire annunciation panel correspond to the numbers on the 1992 architectural drawings. All rooms should be numbered based on the 1992 drawings to avoid confusion during an emergency and to provide a source of numbering consistency. All wall mounted room signs should conform to accessibility standards for font requirements, mounting locations and heights, as well as tactile characters, and braille, ***Figure 26****. See page 46 for aesthetic commentary on wall-mounted room signs.*

Exit Signs: Exit signs should be installed at the following locations:

1. *Corridor A123A – South wall midpoint with arrow towards A109, north entry, double-faced unit.*
2. *Stair A6 – West portion of wall near door to A102 with arrow pointing to east entry.*
3. *Lobby A116/117 – East wall across from elevator directing occupants south and south wall directing occupants east, single-faced,* ***Figure 27-28****.*
4. *Corridor A208 – East wall above door with south directing occupants towards east main stair*
5. *Lobby A203 – South wall with arrow pointing to east entry.*

Emergency Power: Lighting levels should be tested while emergency power is activated.

Exiting: The basement door hardware at stair (A2) should be replaced with panic hardware. The east doors should be removed for complete documentation, restoration, and installation of panic hardware immediately; they are a current life safety threat and liability for the County, ***Figure 29****. The doors should also be retrofitted with panic hardware such as the traditional Series 55 in a dull bronze finish available through Von Duprin (verify installation requirements with manufacturer).*

Security

The court house currently has no security system. Generally, security has not been an issue. All incidents reportedly have been related to employee relations, typically past employees. Any security improvements must take into account easy building access by the public. Access to the building is unimpeded during business hours. Currently, this access has not proven to be a problem.

Security Recommendations: *All department managers should be aware of security risks and concerns. Procedural guidelines should be in place for protocol during emergencies. Long-term, a security system should be considered for the building.*

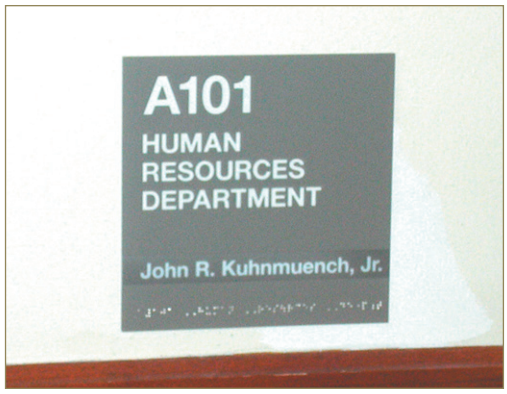

Figure 26: Wall mounted room sign.

Figure 27: First floor, west side, dead end corridor, west view.

Figure 28: First floor, west side, dead end corridor, north view.

Figure 29: East door, interior view of hardware.

Figure 30: Cloth wiring plugged into modern outlet in attic tank room.

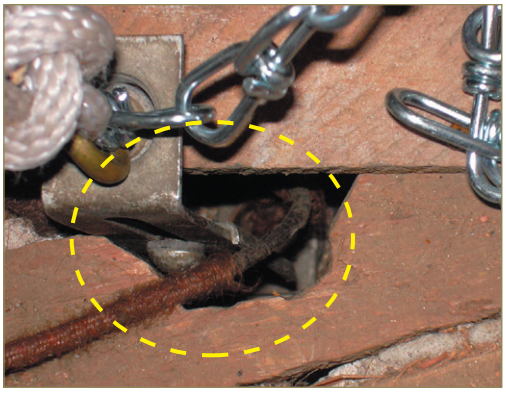

Figure 31: Detail of frayed cloth wiring in attic tank room.

Figure 32: Repairs from lightning strike in clock tower gear house.

Access to the building during business hours should be evaluated to target potential areas of risks. Access to the public corridors and County Board room is encouraged in an effort to raise restoration funds. Thorough discussion should occur to evaluate increased access to this significant public building by the general public.

Hazardous Conditions

Archival Material Storage

Rarely does a historic building have extensive documentation similar to that of the court house. Artifacts and historical documentation including architectural drawings, images, furniture, lighting fixtures, written histories, etc. are stored in various locations within and outside of the court house. These items are critical to the long-term preservation of this structure as it establishes the building's significance, documents the building design, and contributes to its posterity. Existing archival materials have not been treated using proper conservation techniques or storage practices.

Electrical

During the 1992 remodeling, all electrical wiring (feeders) were replaced; non-destructive visual assessment seems to indicate that this has occurred. However, lighting fixtures with cloth wiring are still in use. The main stair second floor pendant mounted ceiling fixture (A6), east side, and the basement closet, (A19) has visible cloth wiring. The cord for the main stair second floor pendant mounted ceiling fixture is plugged into a modern outlet tucked in between the attic floor joist, **Figure 30-31**. This type of wiring is known to arc and brown out the lighting based on weather conditions. Several fixtures were observed that pre-date the 1992 remodeling and 1967 Annex. These fixtures likely have cloth or otherwise outdated wiring. Some alterations may be required to fixtures to obtain "UL" ratings.

Asbestos

As typical with older buildings, there are 9" x 9" flooring tiles located in room A107 (vault) and the main stair landing (A6). Tiles consistent with this style typically contain asbestos counts of 10% to 20%; this can only be confirmed through testing. These tiles are in generally good condition and do not pose a general health risk unless loose, cracked, broken, or "friable". Often this can be reasonably managed in situ.

Lightning Protection

On May 13, 1998[15] the clock tower was struck by lightning causing substantial damage to the tower structure, masonry, and west side of the roof, **Figure 32**. A September 1956 strike damaged a clock face.[16] Several other lightning strikes, although not all specifically dated, are referenced in historical documentation. One such event in 1903[17] necessitated the replacement of the eagle atop the building and damaged the roof and masonry. The building has a history of lightning strikes but no lightning protection system is documented to have ever been in place. It is a fair assumption that the court house will be stuck by lightning in the future.

The existing roof (and historic building) is vulnerable to lightning strikes. According to the Risk Assessment Guide produced by the National Fire Protection Association, the court house has a risk factor of 5.5 "moderate to severe."

Fire-Stopping
The 16" (+/-) wall cavity/chase between the court house and annex has no apparent fire-breaks. Penetrations into this chase occur in the basement at the mechanical room just west of A09. In the attic the rafter tails and historic eave line along the west wall have been cut back exposing long runs open to the wall cavity, **Figure 33**. A fire occurring in the basement has a natural chimney allowing fire and smoke spread to the attic. No fire or smoke detection or suppression systems are located within this cavity. Penetrations through the annex CMU wall could not be determined but are likely to exist at mechanical connections. If this proves to be accurate, smoke (and potentially fire) could easily spread between the two buildings.

Figure 33: Attic opening into wall cavity between buildings.

Hazardous Conditions Recommendations:
Archival Materials: Artifacts and archival materials owned by or in the possession of the County should be conserved and properly stored. Vaults A107, and A15 should be considered as storage rooms for these materials. Reproducing items such as drawings, images, etc. should be considered for the purposes of interpretive displays. In addition, duplicate copies of all archival materials should be made and stored off-site. Furniture pieces will contribute to the building aesthetics if located in prime locations (throughout the building), once conserved.

Electrical: The (2) two ceiling mounted fixtures on the second floor of the east stair (A6) should be rewired. All fixtures pre-1980 should be inspected for outdated wiring. Fixtures with outdated wiring should either be rewired or replaced based on their significance to the building. Suspect fixtures are located as follows:

1. *A03 Vault – Ceiling Mounted Fluorescent*
2. *A04 Vault - Ceiling Mounted Fluorescent*
3. *A06 Vault – Ceiling Mounted Fluorescent*
4. *A15 Vault - Ceiling Mounted Fluorescent*
5. *A16 Janitor – Ceiling Mounted Fluorescent*
6. *A17 Vault – Ceiling Mounted Fluorescent*
7. *A18 Storage – Ceiling Mounted Fluorescent*
8. *A19 Closet – Ceiling Mounted Pendant*
9. *A20 Closet – Ceiling Mounted Pendant*
10. *A21 Closet – Ceiling Mounted Pendant*
11. *A22 Closet – Ceiling Mounted Pendant*
12. *A103 Entry - Ceiling Mounted Pendant*
13. *A104 Vault – Ceiling Mounted Fluorescent,* ***Figure 34***
14. *A106 Vault - Ceiling Mounted Pendant*
15. *A107 Vault – Ceiling Mounted Pendant*
16. *A110 Vault - Ceiling Mounted Fluorescent*
17. *A201 Closet - Ceiling Mounted Sconce,* ***Figure 35***
18. *A203 Stair – Ceiling Mounted Pendant*

Figure 34: Likely suspect for outdated wiring.

Figure 35: Likely suspect for outdated wiring.

Asbestos: Suspect areas should be tested to determine asbestos content.

Lightning Protection: Install a modern lightning protection system. Modern systems are available that monitor all strikes to the building, including very minor strikes. Insurance policies are also available as part of the lightning protection packages to cover damages. The buildings current insurance policy covers damage to lightning strikes. The intent of this recommendation is to preserve the integrity and lifespan of the existing historic fabric.

Fire-Stopping: Fire-stops should be installed in the wall cavity between the court house and annex. Installing breaks around all wall penetrations and filling in the openings along the historic attic eave line would accomplish this goal.

Figure 36: Intersecting gable roof covered in asphalt shingles.

Figure 37: Original roof appearance.

Figure 38: Colortone postcard interpretation of roofing colors.

Main Roof

The court house is covered by a hip roof with intersecting gables on all sides, **Figure 36**. The hip roof has a 12/12 pitch on the north-south slopes and 18/12 pitch on the east-west slopes and intersecting gables. The total square footage of the roof, including the clock tower roof, is approximately 10,400 square feet (or 104 roofing "squares"). The roofing is installed over 1" x 6" tongue and groove sheathing carried by 2" x 8" rough-sawn rafters spaced 16" o.c. (on center). Heavy timber trusses and 8" x 8" purlins carry the rafters.

The heavy timber structure of the court house roof was designed to carry a steep slate roof, **Figure 37**. According to the 1901 specifications, the slate employed was *"Genuine number one (No. 1) Excelsior Bangor black Pennsylvania slate, eight x sixteen (8" x 16") inches, put on six and one-half (6-1/2") inches face (ed.-"exposure") to the weather."*[18] Pennsylvania was the largest slate producer when the court house was built and Bangor "black" slate was likely employed—particularly since it was among the most common and least expensive slates at the time. Bangor slate was typically 3/16" thickness and weighed approximately 700 lbs. per square depending on the quarry. Therefore, the roof structure originally carried 72,800 lbs. (36 tons) of roofing, which was reduced by 50% when it was replaced with asphalt shingles.

Early 20th-century colortone postcards show the slate roof in a variety of colors including blue-gray, charcoal-gray and green, while the galvanized-iron hip and ridge rolls (tiles) are shown in charcoal-gray or red, **Figure 38**. The graphic artists at postcard companies relied on photographer's field notes and descriptions regarding color and are generally unreliable—artistic liberty abounds in their coloration, particularly with neutral and dark colors. Bangor slate was an umbrella term for slate from the Bangor region of Northampton County, Pennsylvania that actually varied from black to blue-gray. One postcard shows the roof in a blue-gray color with red roof trimmings (hip and ridge rolls) and a red ventilator behind the clock tower; this is the most probable color scheme for the roof.

Early 20th-century black and white film tends to convey reds very dark or black and the hip and ridge rolls appear very dark (almost black) in early photo postcards. Moreover, red roof trimmings were a prominent feature of Romanesque Revival buildings, particularly those without red tile or red slate roofs. Red roofs were employed by the innovator of American Romanesque Revival architecture, Henry Hobson Richardson. The hip and ridge rolls were therefore an important stylistic feature of the Romanesque Revival style and added considerable architectural character to the court house roofline. They were likely a "Milcor" galvanized sheet metal product provided by the Milwaukee Corrugating Company painted with durable red-lead enamel. The siding and louvers of the roof ventilator were likely painted dark red to match these roof trimmings.

Bangor slate is a smooth surfaced finely grained slate that lasts around 90 years. The documentation regarding slate roof replacement is somewhat contradictory and it is unknown precisely how long the original slate survived on the court house but it still appears in a photo from the early to mid-1950s. Pending further documentation, the slate was likely replaced in 1958[19] by Kaltenbrun Brothers Roofing Co. and was already asphalt "shingles" in 1967 (as noted on the Stubenrauch and Associates drawings for the addition).

Although the 1976 National Register Nomination Form indicates the roof was "black slate," this was probably a visual misinterpretation of black asphalt shingles, or a poorly written reference to the original roof. Unfortunately, the large central roof ventilator and hip and ridge rolls were removed with the slate—further diminishing the architectural character of the roofline, while increasing the need for, and dependence on, central air conditioning.

Presuming the roof was removed in 1958, the slate only survived 56 years, which raises several questions regarding the premature failure of the roof, or the necessity for removal at that time. Roof repairs are noted in the Building Committee Meeting Minutes dating back to 1909 when the clock tower was "re-roofed" presumably due to a lightning strike. Slate roof repairs are also noted in 1920, 1940, 1951 but the extent of the work is not mentioned and there is no particular indication of major problems. If the roof failed uniformly by the mid-1950s, it was likely due to corrosion of the fasteners rather than deterioration of the slate. Although copper was in common use by 1900, the original specifications call for *"two galvanized iron slate nails"*[20] per slate. Whether standard iron nails or poorly galvanized nails were used is unknown. If the nails were not corroding and there was no uniform failure, the slate roof was probably replaced prematurely. Typically, copper fasteners were, and are, specified for use on higher quality slate roofs.

Replacement of the slate roof and ridge rolls with asphalt shingles diminished the historic character of the court house, increased the vulnerability to storm damage (more susceptible to wind up-lift), and raised attic temperatures in the summer (less attic ventilation increased the call for central air conditioning). Hotter attic conditions also lead to more severe checking and shrinkage of the heavy timbers. Moreover, asphalt shingles tend to hold more snow on the roof and contribute to increased ice damming at the gutters.

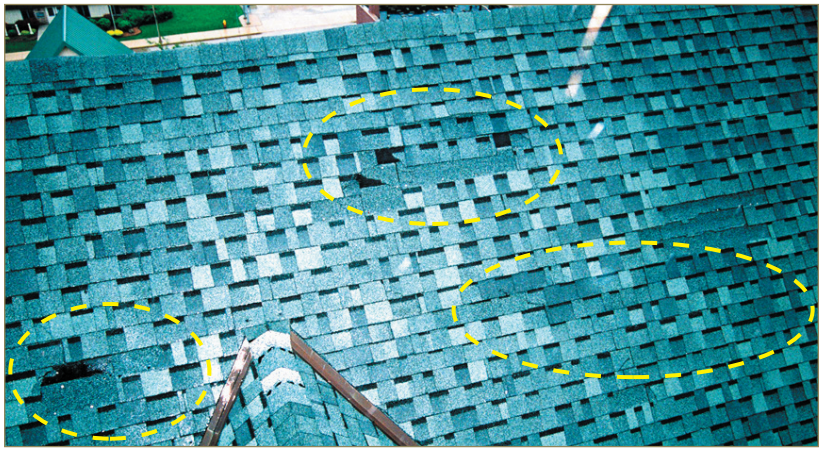

Figure 39: Areas of missing and loose asphalt shingles on the main roof.

While building records are spotty, particularly in the later 20th century, the first generation of asphalt shingles were apparently repaired or roofed over in 1986 by Haug Roofing, West Bend, WI, for $31,869. This roof was completely torn off and replaced in 1993 with new asphalt shingles by J.T. Roofing (Saukville, WI) at a cost of $45,000, according to Jerry Thull, owner of J.T. Roofing. A total of $76,869 was spent in just 7 years. The current roof shingles appear to be a heavy Celotex, Globe, or IKO organic shingle (around 350 lbs/square); these shingles are no longer made and matching shingles are not available for repairs. However, Maintenance Supervisor Joe Hicks indicated an acceptable substitute has been found.

Figure 40: 1967 pocket roof between court house and annex.

Figure 41: Overflowing northeast corner main roof gutter.

Figure 42: Overflowing northwest corner main roof gutter, clogged with roofing shingles and other debris/sediment.

At the basement level, the court house has suffered moderate, but chronic moisture problems along the perimeter walls in the northeast and southeast corners and along the south elevation. These problems are likely related to alterations in the roof drainage and underground drain tile system over the years—particularly changes that likely occurred with the 1967 addition.

Originally, each roof slope drained into a built-in gutter and two 5" diameter leaders (i.e. "downspouts," or "conductors" as noted on the original drawings) that drained into cast iron ground receivers and an underground drain tile system beneath the court house. As shown on the original basement plan, the drain tiles fed into an 8" main that flowed east into the storm sewer under Wisconsin Street. In addition, the original specifications call for a perimeter drain *"around the entire footing of inside of outside (ed.- perimeter) basement walls lay four (4) inch diameter porous drain tiles at a proper incline toward the catch basins."*[21] Verification of these drain tiles, and whether they are still functioning would require selective demolition. A drainage analysis of the main roof indicates that the original system was properly sized with more than enough capacity to handle the 6" rainfall intensity over five minutes (design standard per *Architectural Graphic Standards*) for the Milwaukee area.

When the 1967 addition was built, new pocket roofs were created on the west slope with internal leaders, presumably tied into the 1967 drainage system, **Figure 40**. The remaining underground drainage system may have been abandoned at that time in favor of draining the leaders (downspouts) on-grade. Given the elevated site of the Court House, on-grade drainage may be acceptable if the downspouts are extended further away from the foundation walls. However, moisture problems along the foundation walls reveal that too much water is deposited too close to the building at this time.

Moreover, there appear to be overflow problems at the main roof gutters for two reasons. First, the gutters were lined with an EPDM membrane in recent years, which was only cut to approximately 3" in diameter at the leader inlet (mouth). This effectively reduced the capacity of the leaders 63% from 3,800 s.f. of roof area (each) to 1,400 s.f. of roof area (each)—less than the amount of rainwater runoff on the primary north and south roof slopes. In other words, the leaders could no longer drain the north and south gutters faster than the roof could fill them during heavy rains. This has likely caused, or significantly contributed to, the moisture problems on the south foundation wall. The north foundation wall is generally spared by the north portico roof. Even reduced to 3", the leaders on the east and west slopes would be adequate for the volume of runoff. However, clogged gutters and leaders have also contributed to significant overflow, **Figure 41**.

During the initial inspection, the north roof gutters were found clogged by loose asphalt shingles and were cleared, **Figure 42**. Joe Hicks indicated that the roof regularly loses shingles and is checked after major storms, however, the roof had not been checked since the storm just prior to the inspection.

Roof access is the chief barrier to maintenance, **Figure 43**. There are no roof hatches on the main, roof and maintaining the high built-in gutters on the steeply pitched roof is exceedingly difficult requiring aerial-lifts and very tall extension ladders. While the west slope is relatively easy to access from the flat roof over the addition, and the north slope can be accessed by an extension ladder passed through a second story window onto the portico roof, the east and south slopes

are virtually impossible to access without a lift; this has likely been the chief cause of clogged gutters and spillover contributing to the basement moisture problems along these elevations. Access for maintenance must be improved to all of the gutters, particularly near the leader inlets in all of the corners.

Main Roof Recommendations: *The current roofing materials are too lightweight for the large and steep court house roof. The County spent $31,000 in 1986 for a roof that was replaced 7 years later in 1993, at the current rate of lost shingles, the existing roof may not fair much better and total roof replacement may very well be required by 2015 or before.*

The County should establish a fund to replace the existing roof with dark-gray slate to match the original and hip and ridge rolls (ideally in glazed red clay tile for durability, but alternatively in sheet metal). This would restore the original architectural character of the roofline. The new slate should be carefully selected (avoid imported black slate from China which is on the rise) and properly specified and installed with copper nails to last through the 21st century. If scaffolding is installed around the clock tower for masonry repairs, or any other reason, the County should seriously consider replacing the asphalt shingles with slate and hip and ridge rolls to inspire fund raising for the main roof.

Reconstruction of the central ridge ventilator may be viewed as an unnecessary expense. Although this was a large rooftop feature (five feet square and 21' high), it was tucked directly behind the clock tower and further obscured by the 1967 addition. Moreover, its primary role for passive natural ventilation has been rendered obsolete by central air conditioning. If the County pursues a more active environmentally conscious roll towards energy use and reduction in energy bills, reconstruction of the rooftop ventilator could be investigated in coordination with other comfort issues addressed during a full energy audit.

In terms of roof drainage, there are several options. First and foremost, the gutter liners should be inspected and cut back to prevent any flow reduction at the inlet to the leaders, ***Figure 44****. The north gutters were corrected during the inspection with Superintendent Hicks but the other gutters could not be safely accessed and may very well have the same problem. The gutters should also be cleaned of any debris at that time. The County should investigate why the original drain tile system was abandoned and possibly rod and re-connect the system for some or all of the leaders (the north and east leaders being the most important). New drain tiles could be installed for the existing problematic leaders to drain far away from the building into catch basins, a drain field, or into the street (north and east). Another option is to simply extend the leaders (downspouts) further out on grade and install French drains and better landscaping around the foundation areas where moisture problems occur,* ***Figure 45****.*

Improved access is critical to the long-term maintenance of the roof, drainage, and indirectly the pressed metal cornices, ***Figure 46****, regardless of the material chosen for roofing. Six new spring-loaded roof hatches should be installed low, near the leader inlets for ready access from the attic on the north, east and south gables. The gutters and clock tower lighting could be inspected and maintained more safely from the new hatch locations. Safety harnesses, short "chicken" ladders and other manageable equipment could be effectively utilized from these proposed locations.*

Figure 43: Extension ladder access to north main roof gutter off of flat roof.

Figure 44: Northeast main roof gutter liner.

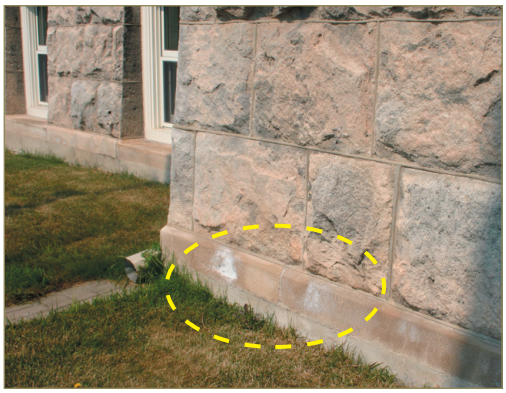

Figure 45: Short leader on south elevation resulting in efflorescence.

Figure 46: Metal cornice on east elevation

Figure 47: East flat roof.

The two west leaders are reasonably accessible from the 1967 addition, but two additional hatches could be installed here as well.

Flat Roofs

There are four lower flat roofs in addition to the belfry roof covered under the *Clock Tower* section. Two of these, over the east, **Figure 47,** and north porticos, **Figure 48**, are original while the other two in the southwest and northwest corners, were added with the 1967 addition. The original roofs were covered with Johns-Manville asbestos roofing felt and tinned (the belfry was also originally tinned). Core cuts were not taken on any of the flat roofs; these are recommended prior to any additional roof installation. Presumably the original tin roofs were stripped off many years ago, if not, the contractor should ensure proper disposal of the asbestos roofing felt when they are replaced.

Figure 48: North portico flat roof, note the algae growth on the roofing membrane, concrete counterweights, and lower wall portions.

Figure 49: South addition flat roof, note vegetative growth.

The age of the southwest flat roof, **Figure 49,** is unknown but appears to be a coal-tar roof and may very well be original to the 1967 addition (coal tar roofs can last 40 years or more). The roof is approximately 460 square feet with a single internal leader at the northwest corner of the roof. This small addition may have partially settled with the larger building mass of the original court house. As a result, the roof is pitched back towards the south court house wall and is likely contributing to the moisture problems in the southwest basement vault and office (A06/A07). Despite the copper counter-flashing, the height of this addition roof was poorly established in relation to the window openings and prevents a minimum 8" wall flashing.

Figure 50: North flat roof parapet wall with extensive algae growth.

The remaining three roofs were all covered with EPDM single-ply membrane roofing with pavers for ballast in 1993. The east portico roof is 216 s.f., the north portico roof is 620 s.f., and the 1967 north breezeway roof is 207 s.f. All three roofs appear to be watertight and in relatively good condition although several leaders were found clogged with debris, **Figure 51**. The north flat roofs have considerable ponding due to improper pitch and the pavers, which are necessary to secure and protect the single-ply membrane but restrict water flow. Vegetative and algae growth were observed on the roofing and parapet surfaces, indicating poor drainage, **Figure 52**.

Figure 51: East elevation clogged gutter at leader location.

One problem with the flat roofs is their "waterfall" role in ushering rainwater runoff from the main roof to the ground. Originally, the main roofs drained directly into ground receivers that led to underground drain tiles. Today, the north slope of the main roof (and all rainwater runoff from the clock tower) drains onto the north portico roof, taxing lower flat roof leaders. This has obviously lead to considerable water problems around the north portico as evidenced in the stains and efflorescence on the east and west interior face of the portico entablature (immediately below the main roof leaders). The west half of the north portico roof then dumps water onto the breezeway roof which has a single internal leader that is now handling approximately 2,117 square feet of roofing (more than any other leader on the building), **Figure 53**.

Flat Roof Recommendations: *Tear-off and replace the southwest corner roof and rod the drain to ensure proper flow. Install tapered insulation and a new roof to pitch water to the drain and/or new scuppers installed on the south edge of the roof, away from the south court house wall. As with the steep roofs, the drainage system for the flat roofs should be regularly monitored for debris. The leaders should be inspected and rodded (if necessary) several times in fall and again in early spring at minimum. If the north roof continues to be used as a staging area for accessing the north gutters on the main roof, this roof should be replaced with a more durable built-up or modified bitumen roof instead of a single-ply material that can be easily punctured by tools or ladders.*

The flat roof drainage should be re-designed to divert the flow of water from the main roof more directly to the ground and pitched with tapered insulation to prevent ponding. Water damage in the north portico will likely remain a periodic and chronic problem until the two primary leaders from the north slope of the main roof are either re-connected to ground receivers and catch basins, or routed across the roof into their own external leader (essentially installing a second external leader for the north portico roof, at minimum on the east end). The internal leader on the west breezeway should be investigated further to confirm whether it is properly sized to handle the rain water runoff from 50% of the main roof (north slope) and north portico roof in addition to draining the breezeway roof. If undersized, supplemental drainage must be added.

Metal Cornice and Wood Trim

The original galvanized iron pressed-metal cornices around the clock tower, main roof, and porticos are defining architectural features of the Romanesque Revival court house, **Figure 55**. The original specifications call for *"IX" old style redipped roofing tin."*[22] "IX" stood for a heavier gauge (10 oz.), "old style" likely refers to hand-fabricated (brakes, crimps, etc.) and "re-dipped" is obviously a reference to a doubled protective primer or coating (usually red-lead, red-oxide, and linseed oil). The pressed metal cornice was an economical alternative to carved Indiana limestone and was finely corrugated and painted with sand-paint to match the color, tool marks, and gritty texture of limestone. The original specifications read: *"paint all of the exterior wood, galvanized iron…three good coats of pure white lead and linseed oil, mixed with colors, to bring the shade as directed by the Superintendent, and the last two (2) coats of all wood and galvanized iron work to be sand blown with clean fine lake sand."*[23] The presence of sand paint was verified during the investigations for this report.

Figure 52: North portico flat roof sediments sprouting vegetative growth, all of which advance roof membrane deterioration.

Figure 53: North elevation breezeway roof.

Figure 54: Once the north gutter was cleaned, water rushed onto the flat roof below.

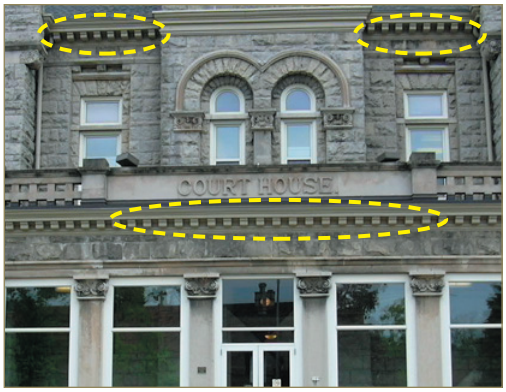

Figure 55: Metal cornice on north elevation.

Figure 56: Small rust spots on north elevation metal cornice.

The cornice was apparently last painted in 1993, a complete inspection was not possible without an aerial-lift. It is unknown how the cornice was prepped or what coatings were used, but the paint appears to be holding up well after 11 years of exposure.

The color is reasonably close to the historic color, but appears a shade dark and a little too brown to match the limestone. Small rust spots are beginning to appear as seen from the porticos and ground with binoculars, **Figure 56**. There is relatively little exterior wood trim around the court house, particularly with the removal of the original wood windows. Most of the wood ceilings and trim are protected underneath the clock tower roof and portico roofs and are in good condition. Although painted now, the porch ceilings were originally specified to be "quarter sawn oil finish Georgia pine."

Metal Cornice and Wood Trim Recommendations: *A full inspection of the cornice is recommended from an aerial-lift to verify the condition of the gutter liners all around the building and ensure that the cornice is secure. There are numerous coatings on the cornice, which have likely been hand prepped with scraping, wire brushes, and wire wheels. Prior to contracting any new coatings on the cornice, a section should be dry-grit blasted at low pressures to strip the various coatings back to metal. This scenario presumes that a full inspection confirms the cornice can be repaired and preserved. The mock-up should then be primed and painted with several coats of flat, corrosion-resistant epoxy paint (such as Tnemec) impregnated with blown sand to reproduce the original color and texture. This will not only preserve the original appearance of the historic court house, but will be an extremely durable finish that may last up to 20 years or more. Careful protection measures must be taken to protect any adjacent masonry during the dry-grit-blasting of the metal cornice. The original finishes on the portico ceilings should be investigated further. If the ceilings are quarter-sawn, and were stained with a natural finish, they could be stripped and restored for a beautiful finish.*

Figure 57: West elevation of clock tower.

Clock Tower

The Court House features a prominent four-dial clock tower centered on the north elevation that contains an open belfry with Romanesque arches exposed on all four elevations, **Figure 57**. Massive, rusticated Cedarburg limestone buttresses trimmed with carved Indiana limestone anchor the corners of the clock tower, which embodies the judicial and civic role of the court house. A gilded eagle with outstretched wings, an American icon of both government and justice, is perched atop the clock tower 136' feet in the air, while the clocks and bell housed within toll for both time and justice. The resulting architectural composition of the clock tower is an impressive symbol of public pride and instrument of civic order.

Figure 58: Historical image of tower eagle,

The eagle's wings measure over seven feet (86") wide from tip-to-tip while the overall height of the finial is approximately six feet tall, **Figure 58**. Highly exposed to the elements, the finial was re-gilded several times in the 1910s, 1920s, 1930s, and 1950s. The eagle was replaced in 1903 due to damage from a lightning strike and "rebuilt" or "replaced" (depending on the source) in 1979. The eagle, which originally faced north, was oriented to the east when it was reinstalled. The eagle was not accessible during the survey and its condition could not be evaluated. The current gold painted finish is weathering thin on the ball as are the painted coatings on the tower roof finial.

Though clock face openings are indicated on the original exterior elevations, the clock faces were left blank upon building completion, despite the otherwise highly detailed drawings. During the early years of the 20th-century, the tower was missing a clock and it is possible that a clock maker or funding for the clock works and bell were not yet secured. Several early 20th century photos and colortone postcards of the court house can be dated by the missing clock faces. One, labeled "Industrial Parade" and dated July 6, 1908, confirms that the clock faces were still missing at that time. However, the clockworks and bell were apparently installed the following year.

The embossed bell reads "McShane Bell Foundry Co. Baltimore, MD 1909," **Figure 59**, on one side and "E. Howard Clock Co. Boston, New York and Chicago" on the reverse. McShane is still in business in Glen Burnie, Maryland. E. Howard produced their last new tower clock in 1964 but reproduction parts can still be found and installed by clock restoration specialists. The original clock mechanism is housed beneath the belfry, **Figure 60**. A union gearbox and clock faces can be found in the gear house above the belfry, **Figure 62**.

The clock faces are exposed to the elements and limited access has resulted in sporadic repairs, to the clockworks, electrified in 1946. In fact, the clock faces have reportedly endured two lightning strikes during the 20th century, the faces were cracked by a strike on May 13, 1998 that resulted in their replacement. The replacements have roman numerals but the faces and hands appear powder-coated with high-gloss finishes and a modern sheen. The original clock faces were also black, or other dark color, while the numerals were likely silver or white; Building Committee Meeting Minutes indicate the hands were originally gold-leafed.[24] The gear house is accessed from the belfry through a small wood hatch on the southwest corner; an extension ladder must be maneuvered into place. The hatch was found partially open during the survey and pigeons were nesting in the gear house. The tower roof framing and interior of the buttresses are exposed in the clock house and both reveal physical evidence of the lightning strikes, **Figure 61, 63-5,** and **71**.

Previous clock house repairs were left incomplete, but the present conditions are minor and do not warrant any further work until more substantial repairs are contracted above the belfry.

Figure 59: Clock tower bell embossing.

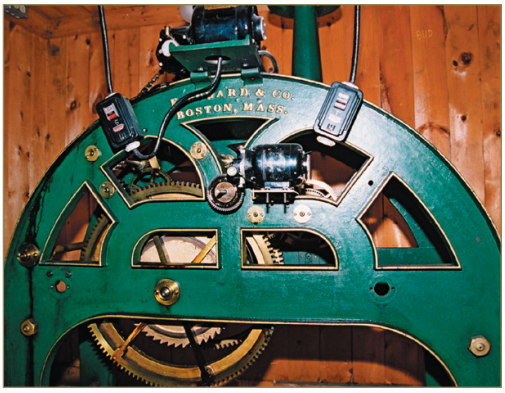

Figure 60: The original clock mechanism.

Figure 61: Gear house above the belfry lightning damage.

Figure 62: Gear house above the belfry.

Figure 63: Gear house above the belfry lightning damage.

Figure 64: Gear house above the belfry lightning damage.

Figure 65: Belfry lightning damage to stone.

Figure 66: Stone and mortar deterioration from wind driven rain.

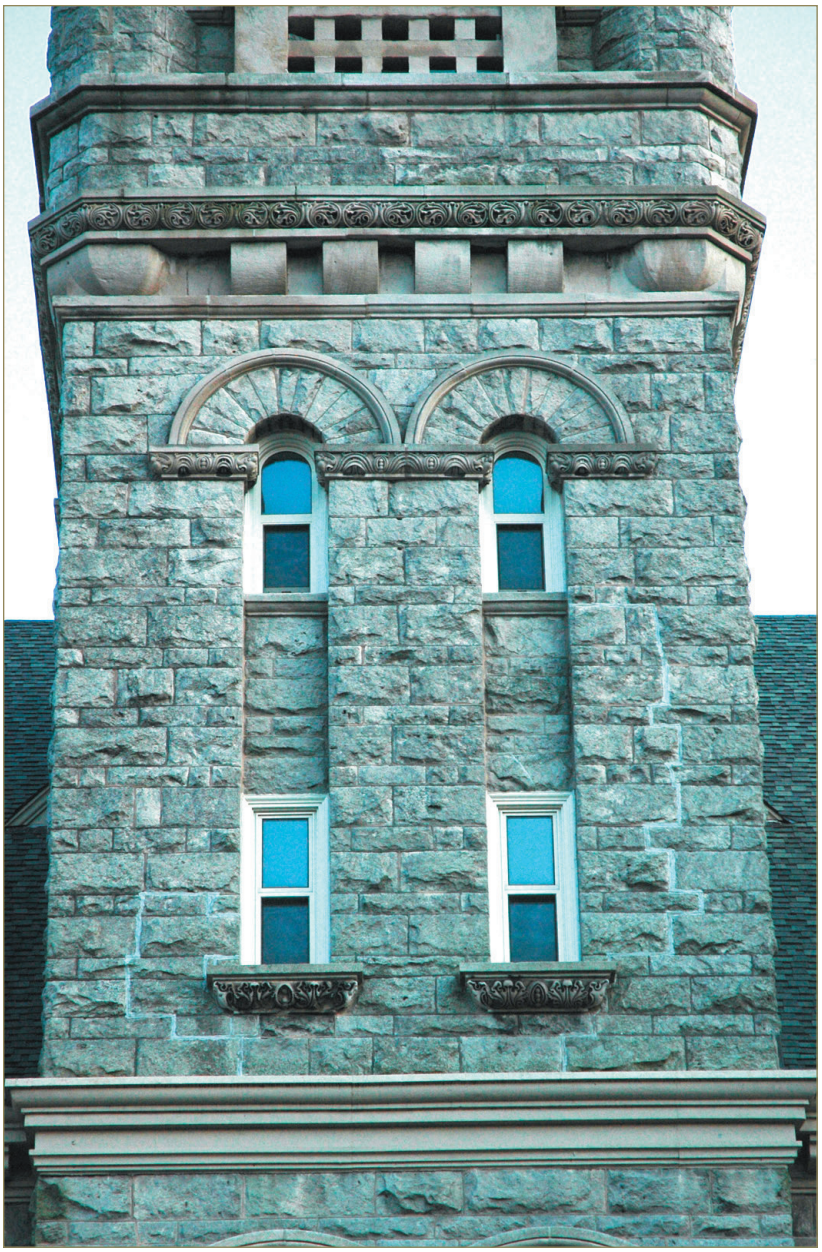

Figure 67: North elevation of clock tower. Sealants have inappropriately been utilized to repair mortar cracks and deterioration.

According to historical records, aluminum screens were installed over the belfry openings in 1958 but only remnants survive. Belfry screens will detract from the Romanesque openings and should be avoided. The bell headstock has been re-oriented across the east/west belfry openings and can be see from high ground and adjacent buildings.

The belfry deck is about 200 square feet and originally covered with galvanized sheet metal (i.e. "tinned"). The belfry deck was covered with an EPDM roof in 1993 and appears to be watertight with minor ponding. When replaced, the belfry deck is an ideal location for tapered insulation to add a slight pitch and help ensure good drainage. Wooden underlayments and joists as viewed from the underside of the roof are stained due to water infiltration and some wood rot is evident in the northwest and southeast corners. Roof sagging and water ponding occur at these locations. Further evaluation is necessary to determine the extent of damage to the belfry deck.

Historical records indicate the County has performed cyclical maintenance on the tower about every fifteen-to-twenty years. Currently, the tower is in good condition overall with the recent roof and painting work completed in the past six years. However, the tower masonry still reveals damage from lightning strikes (which may be covered by insurance) and has been poorly maintained by others, particularly from the roofline up. Previous contractors have failed to properly rake out the mortar joints, select, and apply the appropriate mortar composition and color, or tool the joints to match the original "struck" profile. Some contractors (or in-house maintenance personnel) have even used inappropriate caulks and sealants to repair masonry cracks in the tower, **Figure 67**. The apparent partial cleaning of the tower in the past has left uneven staining and subtle dirt deposits. However, most of the deterioration is simply caused by higher exposure to wind driven rain and freeze-thaw conditions, **Figure 68-70**.

Figure 68: Deterioration is simply caused by higher exposure to wind driven rain and freeze-thaw conditions.

The interior belfry also indicates a number of on-going water infiltration problems and leaching lime and efflorescence. These masonry restoration problems surrounding the tower may be the result of poor professional consulting or specifications, as well as poor contracting, **Figure 71**. The tower should be investigated further to develop tight specifications and bid documents for proper masonry restoration and to ensure there are no loose stones or more serious masonry problems at the top of the buttresses. This area was inaccessible during the survey for this report.

Figure 69: Efflorescence caused by improper masonry repairs trapping moisture inside of the wall.

Clock Tower Recommendations: *The eagle should be restored to its original orientation when any future work is completed above the belfry.*

In the future, appropriate finishes should be selected to preserve the clock's historic appearance.

Figure 70: Deterioration caused by higher exposure to wind driven rain and freeze-thaw conditions.

For convenience and safety, a permanent, wall-mounted steel access ladder should be installed on the south belfry wall of the clock tower to access the gear house. The pigeons and debris should be removed from the gear house and a light installed to encourage future inspections and maintenance. Less visually intrusive pigeon control measures such as strobe lights (on timers) and ultrasound devices are available.

As the visual focal point of the building, the Romanesque belfry openings should remain clear of wires, screens, pipes, ducts, etc. If restored, all of these items should be removed from view to leave the graceful silhouette of the bell only.

Figure 71: Improper masonry repairs.

Figure 72: Unique rusticated Cedarburg limestone.

Figure 73: Indiana limestone trim details standout from Cedarburg stone.

Figure 74: Note the Indiana limestone sills.

Figure 75: Indiana limestone carved detail.

All rotted wood members should be replaced when the next roofing membrane is installed. Avoid physical contact with theses areas until repairs are completed. In the meantime, ponding water and heavy snow should be swept off the roof after storms to mitigate further deterioration and water infiltration. The tower masonry should be slated for restoration in the near future.

Masonry

The original 1901 architectural drawings and specifications by Frederick A. Graf indicate the young court house architect, or someone affiliated with his office, was particularly knowledgeable about masonry construction. Trained as a carpenter prior to becoming an architect, it is readily apparent that Graf was competent in virtually all aspects of construction. However, the extensive and detailed instructions for the masonry work indicate that it held special importance to Graf and the County Board. In the original specifications, considerable time was spent describing the stone to be salvaged from the earlier court house, the optional stone materials for consideration, and perhaps the most amazing aspect of all, the precise stone coursing on the "Front Elevation." It was no doubt the single largest building expenditure and the overall character and performance of the masonry is proof that the time invested in selecting the materials and detailing the installation were well spent. It is also readily apparent that the contractor employed highly competent masons to execute the work.

The court house walls are constructed with a unique rusticated limestone, **Figure 72**. In speculation, the County Board may have chosen Cedarburg limestone as a concession to the citizens of Cedarburg as they were not awarded the Court House location. According to *Building and Ornamental Stones of Wisconsin* (the authoritative historical reference on Wisconsin quarries), there was *"a single quarry, owned by John Groth"*[25] in Cedarburg (a.k.a. *"Groth's Quarry"), which was used "almost exclusively for lime."*[26] The stone is described as *"light, porous and fossiliferous, similar to that which is quarried at Germantown…this rock is very finely porous and in the sunlight the many small crystals, lining the walls of the minute pores, throw a myriad of sparkling reflections. The stone works readily under the hammer, and has a pleasant creamy color."*[27] This reference elaborates on the difference between the various beds of the quarry but closes by noting, *"The light spongy type, when it occurs in sufficiently large dimensions, can be used to advantage for building purposes."*[28] Apparently, "sufficiently large dimensions" were hard to find because there are very few buildings of any scale constructed with Cedarburg limestone. The only other major building known to be constructed with Cedarburg limestone is St. Mary's Church, constructed two decades earlier and located a few blocks northeast of the court house. Several other smaller-scale-buildings in Cedarburg and the surrounding area were constructed with this stone.

Graf recognized that the Cedarburg limestone may not perform well as the trim stone for copings, capitals, corbels, columns, skewbacks, and other intricately carved and projecting elements that form horizontal ledges and drips (which take the brunt of weathering and erosion), **Figure 73**. Exposed to the weather for 20 years prior to the court house's construction, St. Mary's would have been an excellent case study; here too, an alternate trim stone was selected for the Cedarburg limestone walls. The Court House specifications call for *"Blue Bedford Indiana Lime-stone"*[29] for the sills, **Figure 74**, porch floors, steps, and the base course around the building (where Cedarburg limestone was actually used instead)—all other carved, **Figure 75,** and ornamental trim stones were specified to be *"buff*

Bedford Indiana lime-stone."[30] The footings were specified to be *"Waukesha, Menomonee Falls or Wauwatosa lime-stone;"*[31] it is unknown which stone was employed.

Of particular interest, is a hand-written note in the specification margin that appears to be Graf's handwriting that reads: *"give separate figure to substitute 'Variegated Marquette Raindrop' sandstone in all places where now specified "Bedford."*[32] Variegated Marquette rain drop sandstone is a reddish-brown sandstone (a.k.a. Lake Superior brownstone) with dark gray spots (thus, "raindrop"). This further proves that Graf was inspired by H.H. Richardson and his followers dabbling in Romanesque Revival buildings. Richardson frequently employed red Long Meadow sandstone in his East Coast buildings and was copied by many Midwestern architects using reddish-brown Lake Superior sandstones in the late 19th century. The Marquette stone performed reasonably well further north but proved problematic in the Milwaukee area due to more prevalent freeze-thaw cycles. The handwritten note implies that the Marquette stone substitution was an afterthought, or possibly a request from the County Board. It is very fortunate that this alternate was not chosen, if so, much of the trim stone would likely need to be replaced today. In contrast, the Bedford Indiana limestone has performed exceptionally well, a few highly carved stones show a century of erosion and isolated cracks, but many are so crisp they appear to have been carved within the last decade.

The Cedarburg limestone facing was rusticated and laid up in coursed ashlars, refer to Figure 74. The *"shallow rock face...-without margins-"*[33] texture specified was not only the best way to dress the porous stone, it was the least expensive. Margins were added in some areas around the porticos, belfry, and other locations adjacent to the Indiana trim stone. *"Tooth chiseled," "incised," "bush hammered,"*[34] and other stone treatments were included in the specifications. In general, the stone tooling found on the building follows the drawings and specifications. Iron anchors and dowels are specified and were presumably installed throughout the building. Fortunately, there is no indication of "oxide jacking" or corroding and expanding steel behind the Cedarburg limestone facing. However, oxide-jacking is the likely culprit for masonry damage on the interlocking Indiana limestone balustrades, **Figure 76**. The exposed iron pintles and catches (originally intended for mounting the exterior iron window shutters for the vaults) on the south elevation are rusting and should be removed, **Figure 77**. The ornamental iron grills mounted beneath the porticos are also mortised into the stone. Some of the original grills have been removed or covered up and should be investigated closer, **Figure 78**. In general, these grills were intended to allow good ventilation underneath the porticos and should remain open.

The rusticated limestone walls were originally pointed with a raised-squared (or "beaded") "struck" joint with tapered shoulders to shed water, **Figure 79**. This profile is incorrectly referred to by some as a "tuckpoint" profile. The original British origin of "tuckpointing" refers to the insertion or "tucking" of one mortar joint into the center of a wider joint, typically in a contrasting color. This type of joint is rarely seen today. The original mortar appears to survive in a number of locations, particularly under the porticos and in the belfry, and was an appropriate, refined choice for the rusticated stone. The mortar mix was generally specified to be *"one (1) of cement, one (1) of lime and four (4) of sand"*[35] while a harder one (1) to three (3) mix was specified in areas which required greater strength.

Figure 76: Interlocking stone balustrade on the east flat roof.

Figure 77: Iron pintels for hanging shutters should be removed before causing damage.

Figure 78: Ornamental iron grill mounted below porticos.

Figure 79: Original mortar joint profile.

Figure 80: Wall below east portico exhibits stone and brick back-up failure.

Figure 81: Outline of ornamental stone likely removed in 1967.

Figure 82: Vertical shear cracks at northeast corner end gable.

Although these mixtures are somewhat harder than recommended mortar mixtures for historic buildings, the porous Cedarburg stone has been forgiving and there is no apparent damage from the original masonry pointing. The "cement" referred to in the spec is not the standard Portland cement used today. It was more likely a hydraulic lime cement, much softer than today's cement. The mortar composition was not analyzed as part of this assessment, analysis should take place prior to any masonry work.

According to the Building Committee Meeting Minutes, numerous masonry repairs were executed on the Court House during the 20th century dating back to 1924 when foundation and stoop repairs were completed on the east portico. Apparently, the original north leader on the east elevation was dumping water in, or near, the east portico foundation wall. The stone and brick disintegrated on the interior from freeze-thaw damage; this condition was apparently rectified after many years of damage. The masonry back-up was never reconstructed and remains badly deteriorated today, **Figure 80**. In 1944, the Committee received a price to rebuild the chimney, but it is unknown whether it was carried out; the chimney was subsequently dismantled in 1967 when the addition was built and a massive carved ornamental stone on the west face was likely removed at that time, **Figure 81**. The limestone steps of the north portico were also replaced with concrete when the storefront addition was constructed in 1967. Unspecified masonry repairs (probably inappropriate spot pointing) were also carried out in 1961 and 1983.

More than likely, additional masonry repairs have been contracted over the past century that were not recorded in the Building Committee Meeting Minutes. For instance, one of the historic black and white photos (labeled "Court House, Port Washington, WI N1659") depicts wider and whiter mortar joints at the top of the buttresses. This photo probably dates from the early 1940s (a circa 1942 Cadillac appears in the foreground while the tree growth is similar to another photo that appears to date from the late 1930s). These repairs were presumably due to lightning strikes since considerable masonry damage is evident on the backside of the buttresses as observed in the gear house, see *Clock Tower* section.

In general, the masonry repairs are concentrated around the upper reaches of the building, such as the backside of the gables (in coordination with roofing work) and the clock tower, in particular from the roofline up. In more recent decades, elastomeric sealants have been used in place of pointing mortars on vertical shear cracks, **Figure 82** and step cracking in the clock tower. The step cracking may be related to building settlement. When the compressive strength of mortar is not required and the masonry is still settling (moving) a flexible sealant is occasionally appropriate. Masonry towers are notorious for differential settlement from the primary building mass–due to uneven loads on the footings—and there is a shear crack through the stone lintel over the original north entrance. Nevertheless, it appears that the court house has settled relatively uniformly and there is no apparent structural concern for the masonry.

Mortar joints are open in several areas concentrated at pilaster capitals, the clock tower, and highly exposed areas such as the gable end walls and parapets. On the side joints of the pilaster columns the open joints are particularly large. At more than one location a large gap exists at the top of the capital. These gaps allow moisture into the building. For now, no significant stone deterioration can be noted at these locations, these areas should be periodically monitored.

Conversely, most of the vertical shear cracks appear to be the direct result of lightning strikes and it is unlikely that any further movement will occur with these cracks, which should be repointed as opposed to caulked with sealants. Open mortar joints, primarily found around the east portico and clock tower, have simply failed due to their exposure to the elements and sacrificial role in masonry. It appears that many of these joints were subsequently repointed but the masons failed to rake out the joint, use an appropriate mortar match, or tool the joints to match the original profile.

There is approximately 18,000 s.f. of masonry surface around the building, which includes the clock tower masonry (from the roofline up) that constitutes approximately 3,500 s.f. of masonry surface. The masonry beneath the portico roofs was always well protected from the elements and requires less work than the masonry that has been exposed to the weather. These portico areas account for approximately 3,000 s.f. and should be deducted from any general figures to restore the masonry exposed to the weather.

The unusual Cedarburg limestone adds tremendous beauty to the refined, stately court house. Unfortunately, the black-carbon deposits, iron stains, algae stains, and efflorescence on the stone create an uneven, dingy appearance. As a result, the unique Cedarburg limestone, with its myriad of inclusions and impurities that add considerable aesthetic appeal, along with the intended contrast of the lighter Indiana limestone trim, is somewhat muted and drab.

A variety of cleaning efforts have left the masonry very uneven. The 1993 Building Committee Meeting Minutes note that *"a motion was carried to clean the stone"*[36] but the scope of work is not well documented and the means and methods of various cleaning efforts remain an enigma. The interior of the east portico has apparently never been cleaned and has heavy black-carbon deposits on the stone, **Figure 83**. The Indiana limestone trim also has heavy deposits on the underside, particularly the most ornately carved pieces such as the column and pilaster capitals, corbels and belt courses on the gables, **Figure 84**. Meanwhile, the area under the north portico enclosed by the storefront addition has been over-aggressively cleaned and is either acid-burned by a hydrochloric acid (turning the stone whiter), or was insufficiently rinsed and is still coated with a lye or detergent residue, **Figure 85**. Masonry testing with litmus paper may verify weather the pH levels are too acidic or too alkaline. This cleaning probably dates from the 1967 storefront addition. Additional touch-up cleaning has likely occurred on the inside face of the portico entablature to address the rusty water stains and efflorescence caused by roof leaks.

Although improper cleaning may have damaged the stone under the north portico, it will remain a mute point aesthetically until the storefront is removed in an effort to restore the original grandeur to the court house. If so, this stone may need to be cleaned and intentionally stained in an effort to even out the appearance with the exterior walls surrounding the portico.

The two chief "unknowns" regarding the masonry revolve around the extent of damage to the original court house stone caused by the west addition and north storefront construction. According to the 1967 drawings, the addition is only attached at the second floor level and of course generally sealed at the rooftop and perimeter walls.

Figure 83: Black-carbon deposits on the interior of the east portico.

Figure 84: Heavy deposits on carved ornament, particularly on the underside.

Figure 85: Bleached limestone wall on the interior of the north portico.

Figure 86: Storefront additions intersection with original stone details.

Figure 87: The extent of damage caused by the storefront addition should be determined prior to its removal.

Meanwhile, the storefront addition was specified to be cut to fit the existing stone columns, which appears to be the case, **Figure 86**. The window jambs and header are probably bucked into the stone which will likely require repairs if they are ever removed, but the panning around the windows may require removal of the caulk only.

Masonry Recommendations: *Masonry repairs should be contracted for the back-up and stoop underside masonry under the east portico, the back-up masonry in the belfry, and repointing the clock tower above the roofline. The iron grills beneath the porticos and balustrades should be partially dismantled and investigated for corrosion of internal dowels and anchors. Where necessary, stainless steel pins and anchors (or traditional stone joinery) should be employed to restore these elements with new matching stone to avoid the chronic repairs associated with oxide-jacking.*

A total repointing of the building is not necessary at this time and may not be required for several decades. However, a full mortar analysis and standardized mortar mix and joint profile should be established prior to contracting any additional masonry repairs or repointing.

A competent masonry restoration company should properly clean the entire court house. This work could be phased one elevation at a time, as scaffolding is available for other work. If for instance, the slate roof or masonry is restored on the clock tower, the stone should be cleaned down to the roof line at the same time. ProSoCo representatives were met on site to discuss cleaning materials, methods, and costs. Their general recommendation was to perform testing with their Limestone Prewash, followed by their Limestone Afterwash or Limestone Restorer. Any materials adjacent to the stone should be masked during testing and actual cleaning. These cleaners will etch the new aluminum windows if they are not protected. Some heavily soiled areas, such as the stone beneath the east portico roof, may require several applications. Testing areas should be located on visually obscured portions of the building and be no larger than 48" x 48".

Selective demolition should be performed to further investigate the storefront construction around the north portico and connection of the 1967 addition to determine the full scope of masonry restoration prior to contracting their removal, ***Figure 87****. The critical concern will be the challenge of finding matching stone for any replacement of the Cedarburg limestone walls and or columns. Extensive use of stone patching materials, such as Jahn or U.S. Heritage, may be required in these areas. Fortunately, given its variegated character, these patches may readily blend with the Cedarburg stone. If the County intends to eventually remove the 1967 alterations and further investigations reveal that significant replacement stone will be required, opportunities to secure salvaged Cedarburg limestone should be sought. For instance, if the County learns about the pending demolition or partial demolition of any other Cedarburg limestone buildings (especially St. Mary's) due to a proposed addition, fire, etc., the stone should be carefully salvaged and stored for restoration of the court house.*

Exterior Windows and Doors

Three sets of exterior wood doors were originally located on the court house, one set for the north, east, and west elevations each. The north and west doors were both presumably removed when the 1967 west addition and the steel/glass storefront enclosing the north portico were constructed. As shown on the original drawings, the west doors provided basement access and were standard panel doors with glass lites. The six-panel north doors matched the surviving east doors with beveled plate glass lites but were 6" taller; only the beveled glass transom and transom hardware survive today, **Figure 88**. The whereabouts of the original north entrance doors is unknown. Despite their heavier use, they were likely in better condition than the east doors since they were well protected under the deep north portico. Such doors will be very expensive to reproduce and worth some preliminary detective work to ascertain their fate; previous Superintendents might be able to provide leads or confirm that they were discarded.

Figure 88: Original north entry.

Door details are found in the specifications which note, *"the outside entrance doors of the first story to be made of three thicknesses of seven-eights (7/8) inch stuff with pine center and quarter-sawed red oak of uniform color on face sides."*[37] Two alternative hardware companies are mentioned in the specifications, Corbin and Chicago Hardware Manufacturing Company. However, some of the hardware on the east doors has been removed several times over the years and is suspect, **Figure 89**. The original east doors do not have any panic hardware. Although commercially unavailable until 1908, it is remarkable that such hardware has not been installed given the public assembly role of the court house. The east doors are weathered and checking on the exterior face and poorly refinished on the interior, **Figure 90**. The refinishers selected an inappropriate finish for the red oak, which mutes the grain and diminishes the natural beauty of the wood; even the hardware was reinstalled with the wrong screws. The right (south) leaf closure is missing; the left (north) leaf closure is an undersized replacement that was not designed for the weight of the massive oak door. As a result, both doors slam closed, which causes considerable wear and tear on the doors and door frames.

Figure 89: East door hardware.

The stainless steel doors on the storefront are stamped Tubelight doors and are glazed with thermalpane lites (presumably tempered) and feature felt astragals, sweeps (i.e. weather-stripping) and panic bars. While completely out of character with the historic court house, these doors are well constructed and appear to be in relatively good working condition.

Figure 90: East doors.

Figure 91: Steel hopper window.

Figure 92: North elevation original window unit.

Figure 93: South elevation replacement window unit.

The storefront enclosing the north portico is steel frame construction fitted with large single-glazed plate glass windows and steel hopper windows at floor level. The hoppers are awkwardly located and difficult to operate, and thus, rarely used. The steel panning conceals the storefront jambs, headers, and bucks, **Figure 91**. This could be easily removed to verify how the storefront was anchored to the original masonry walls and columns, and to help determine the anticipated cost of removal and masonry restoration, see *Masonry* section.

Originally, the entire court house was filled with traditional block and tackle wood double-hung windows, many with transoms and arched tops, **Figure 92**. The original drawings indicate the "daylight" glass sizes for each sash. There is approximately 1,500 s.f. of windows around the entire court house. All of the transoms over the exterior windows were fixed. The original specifications call for 1-1/2" sash of *"first quality pine"*[38] with the exception of the transoms over the doors which were specified to match the door species and finish. The window glass was specified as *"American A.A. glass"* except *"first and second story on front and main side to be American polished plate glass."*[39] The original windows featured heavy-gauge interlocking metal weather-strips and *"No. 10 Samson sash cord."*[40] The original window frames and "brick molds" were painted with a sand-finish to match the Indiana limestone trim (see *Metal Cornice*). The sashes were presumably painted a very dark blackish-green, to match the storm windows from the ca. 1920s that can still be found in the attic. According to Building Committee Meeting Minutes, modern combination storm/screen windows were contemplated as early as 1950, but it is uncertain when, or if, they were actually added.

The original windows lasted more than 90 years before they were replaced with aluminum Milco windows in 1993. Based on the condition of the few surviving units in the vaults and under the porticos, these windows were very well built and could have lasted another 90 years if they had been properly restored. This was the worst alteration that has occurred to the historic court house with the exception of the 1967 addition and storefront.

According to the 1992 Ozaukee County Administration Center Remodeling Plan (Sheet A4.3) by Eppstein Keller Uhen Architects, the original wood jambs, brick molds, heads and sills were merely covered with aluminum panning and the wood sashes replaced with aluminum sash and "low-E" thermalpane glass. The new balance systems for the poorly constructed Milco windows are already failing throughout the building, increasing the reliance on continuous climate control and higher energy bills. The Milco windows have a "putty" gray-white aluminum finish and were a very poor color choice for the court house. Historically, Romanesque Revival buildings invariably had dark sashes that allowed the window to recede. Meanwhile, the brick molds and sills at the court house were painted to match the stone and further shrink the window openings. This was an intentional architectural ploy to accentuate the rusticated stone walls and massing of the building. Today, the modern light-colored aluminum windows have ruined the architectural relationship of the window openings to the walls, particularly since the window openings are actually enlarged by the panning covering the original sand-painted wood frames, **Figure 93**. In brief, the historic window-to-wall color and architectural relationships were actually reversed in 1993.

Window and Door Recommendations: *The east doors should be removed for complete documentation, restoration, and installation of panic hardware immediately; they are a current life safety threat and liability for the County. The local Fire Marshall may have to approve the temporary doors. The historic doors should be restored with appropriate closures, hinges, and locksets. All of the hardware must be removed for a closer inspection and compared to the specifications and period hardware catalogs to determine which pieces are original and what replacement parts are required. The doors should also be retrofitted with panic hardware such as the traditional Series 55 in a dull bronze finish available through Von Duprin. The east doors are very important and should also be preserved and utilized as templates to reproduce the north entrance doors, pending removal of the storefront enclosure.*

The steel and glass storefront enclosure should be slated for removal; this work could be completed prior to removing the northwest corner one-story addition only if doors were installed in the breezeway, ***Figure 94****. At the very least, the County should remove some of the panning to investigate the extent of damage to the masonry to help determine the removal and restoration costs for fund-raising or budgeting.*

Unfortunately, the damage has been done regarding the windows. The few surviving original windows should be retained for posterity. The current sashes have performed miserably and should be slated for replacement with higher-quality wood replacement units, such as those manufactured by Marvin. This cost should be investigated and compared to restoring the original block and tackle balance systems and replacing the wood sash by a custom millwork shop, at least on the primary north and east elevations. At minimum, a few of the original wood windows could be restored or replaced as a mock-up to compare to the aluminum windows, perhaps as part of a clock tower restoration project.

The wood storm windows could be saved for posterity or eventually reinstalled over windows that are rarely operated, if the aluminum windows are removed, ***Figure 95****. Keep in mind, window operability is a key Historic Building Code, Comm 70, compliance. However, if the County elects to dispose of the old storm windows, some art glass studios and glass shops may be interested in salvaging the double-strength and plate glass for repairing other historic windows.*

Figure 94: North elevation one-story addition.

Figure 95: Original storm windows stored in attic.