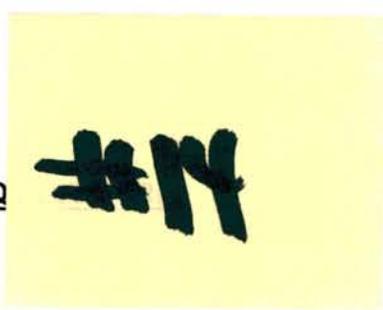


WOODBURY COUNTY BOARD OF SUPERVISORS AGENDA ITEM(S) REQ



Date: 4/13/2016

Weekly Agenda Date: 4/19/2016

ELECTED OFFICIAL / DEPARTMENT HEAD / CITIZEN: Kenny Schmitz Building Services Director

WORDING FOR AGENDA ITEM: Courthouse- South East Windows Needing Emergency Repair

ACTION REQUIRED:

Approve Ordinance

Approve Resolution

Approve Motion

Give Direction

Other: Informational

Attachments

EXECUTIVE SUMMARY: CMBA Architects in conjunction with FEH Architects has performed an examination of the Courthouse Windows & in summary has provided a letter to the Board of Supervisors (attached) dated April 8th. CMBA to present findings and recommendation.

BACKGROUND: The Courthouse 2nd Floor South Courtroom had a piece of marble fall from the interior soffit area at the exterior window location. On observing the anomaly it was discovered that the exterior windows located in the center room area had shifted considerably outward. Other Courtroom areas were inspected & found to have some movement but to a much lesser degree. CMBA Architects was approved to conduct a study of all Courtroom areas to determine what is taking place & report findings.

FINANCIAL IMPACT:

IF THERE IS A CONTRACT INVOLVED IN THE AGENDA ITEM, HAS THE CONTRACT BEEN SUBMITTED AT LEAST ONE WEEK PRIOR AND ANSWERED WITH A REVIEW BY THE COUNTY ATTORNEY'S OFFICE?

Yes No

RECOMMENDATION: CMBA- should draft contracts & return to Board April 26th

ACTION REQUIRED / PROPOSED MOTION:

Approved by Board of Supervisors April 5, 2016.



CANNON MOSS BRYGGER ARCHITECTS

302 JONES STREET, SUITE 200 • SIOUX CITY, IA 51101 • (P) 712.274.2933

April 8, 2016

Mr. Jeremy Taylor, Chairperson
Woodbury County Board of Supervisors
620 Douglas St.
Sioux City, IA 51101

RE: Woodbury County Courthouse Courtroom Windows, Emergency Action

Dear Mr. Taylor:

As you are aware, a piece of marble let loose from the head of the windows in the southeast courtroom of the Woodbury County Courthouse. This occurrence, while not injuring anyone, brought to light two issues with the windows of great significance:

1. The lower clear glass windows are bowing out of plumb and currently are approximately 2" out of place. Noticeable change has been documented in the course of two weeks time and appears to be accelerating. This condition, if left unchecked, could quickly result in the entire section of clear glass windows tipping completely out of their opening and falling to the ground 20' below.
2. The tall art glass windows above the clear glass windows have sagged over time and are also bulging outward. It appears that the sun has warmed and softened the lead came strips allowing the weight of the glass to push downward. This is causing the glass to bulge outward in numerous locations. This condition also, if left unchecked, will result in the glass falling to the ground and could happen at any time without any warning.

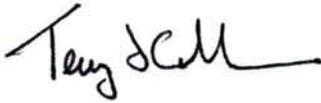
The purpose of this letter is to describe the seriousness of these conditions and the need for emergency action. If either or both sets of glass windows were to suddenly let go and fall to the ground, anyone in their path would be seriously injured or killed. Any property in their path would be severely damaged. Finally, the glass itself would be lost. The art glass being 98 years old is irreplaceable and therefore priceless. It simply cannot be replicated and the historic landmark nature of the building would be compromised.

I am recommending that emergency repairs begin immediately to avoid injury to persons, property and historic significance to this local treasure. In my opinion, the window failure could occur at any time. To delay taking action by going through the usual design, construction documents and bidding process, poses an unacceptable risk

to life and property. This recommendation applies to the windows in the southeast courtroom only. The windows in the other three courtrooms have been reviewed but don't appear to be in as urgent of a condition as the southeast courtroom.

Please call me if you have any questions or concerns about the statements in this letter.

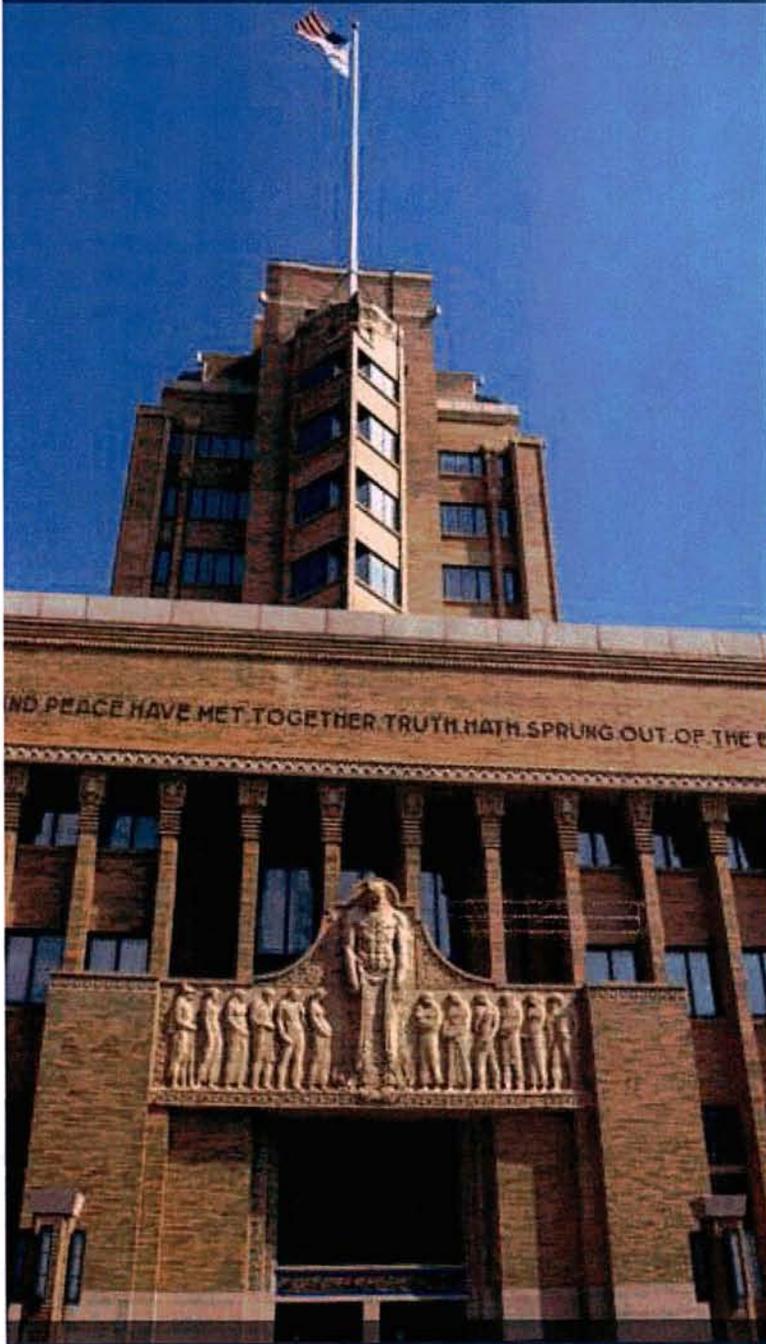
Respectfully,
Cannon Moss Brygger Architects

A handwritten signature in black ink, appearing to read "Terry Glade". The signature is fluid and cursive, with a long horizontal stroke at the end.

Terry Glade, AIA, LEED AP

Cc: Kenny Schmitz - Woodbury County Building Superintendent
Ed Storm, AIA - FEH Design
Shane Albrecht - Baker Group

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WOODBURY
COUNTY
SIOUX CITY, IOWA



WINDOW STUDY

SOUTHEAST COURTROOM 203
WOODBURY COUNTY COURTHOUSE / SIOUX CITY, IOWA

PREPARED MARCH 2016 BY:



IN CONJUNCTION WITH:



March 30, 2016

Mr. Kenny Schmitz
Woodbury County Building Services
401 8th Street
Sioux City, IA 51101

RE: **Window Study – Southeast Courtroom 203**
Woodbury County Courthouse – Sioux City, Iowa

Dear Kenny,

Attached find the Study for the Window Assembly at the Southeast Courtroom at the Courthouse.

The displaced marble soffit within the Courtroom served to generate the need for this Study; the historical significance of the Courthouse establishes the care with which the recommendations were composed.

The study provides the following;

1. An architectural evaluation of the interior and exterior of the window assembly.
2. Photographic and dimensional documentation of the current conditions.
3. Recommended steps to address the current failure(s) to mitigate further damage.

We appreciate the opportunity to serve Woodbury County with this Study.

Please contact either one of us with any questions or concerns.

Sincerely,

FEH DESIGN

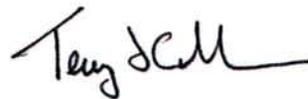


Edward W. Storm, AIA, Principal

FEH DESIGN

701 Pierce Street, Suite 100
Sioux City, Iowa 51101
712 252 3889 / eds@fehdesign.com

CMBA



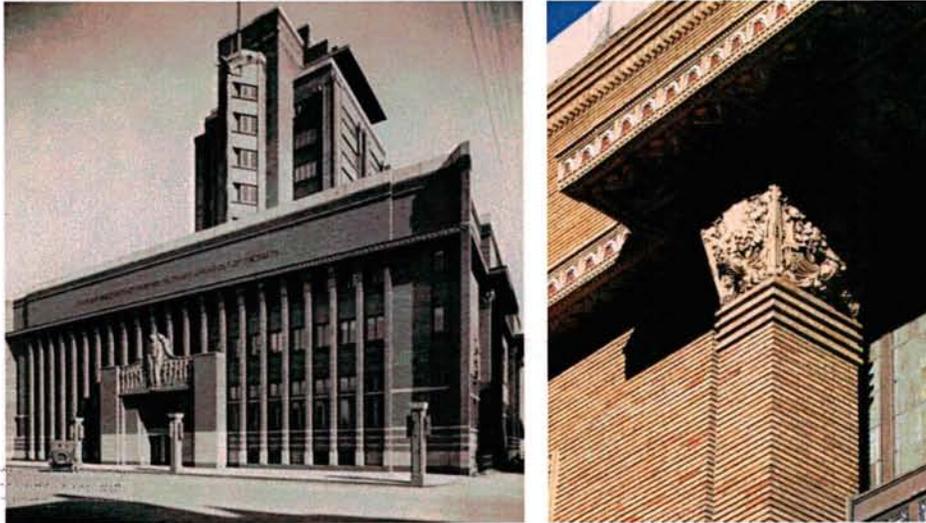
Terry Glade, AIA, LEED AP, Principal

Cannon Moss Brygger Architects

302 Jones Street, Suite 200
Sioux City, Iowa 51101
712 274 2933 / glade.t@cmbaarchitects.com

Window Study – Southeast Courtroom 203 at the Woodbury County Courthouse – Sioux City, Iowa

In 1914, the county determined that the courthouse was too small for the city and they decided to build a new one. The old courthouse was sold and the new one, located at the southeast corner of Douglas and Seventh Streets, designed by the Minneapolis architect George Grant Elmslie in collaboration with the Sioux City architect William L. Steele and Elmslie's partner, William Gray Purcell, was constructed from July 10, 1916 to March 1, 1918 at a cost of \$850,000. It is a nearly square four story structure, with a 157-foot, eight-story tower, built out of Roman brick, with granite and terra cotta trim elements.



The concept of the building, that of a public boxlike volume on the street level coupled with an office skyscraper, was an approach influenced by the 1914 City Hall in Oakland, California. The largest and certainly the widest known variation on this concept is the Nebraska State Capitol building at Lincoln (1920–1932). The Woodbury County Courthouse was the largest public building realized by any of the Midwest Prairie architects, and without question it is one of the most successful.

In 1973, the building was added to the National Register of Historic Places; it was declared a National Historic Landmark in 1996.

Courtroom Windows Study Considered – Fall of 2015

In October 2015, Dean VanRoekel, (Structural Engineer, FEH Design), performed a visual examination of the clear glazed window assemblies at the exterior walls of each of the four (4) courtrooms within the Courthouse. The timing of his visit was important, as a piece of marble had loosened at the head of the southeast window area. The other three (3) courtroom window assemblies were examined at that time as well, to determine if similar movement had occurred; Dean found that two (2) of the other three (3) window assemblies showed a similar condition, although not as severe as the first. This examination was performed primarily from the inside of the building, due to the exterior height above the ground of the window systems.

The FEH Design recommendation was to perform a closer and more detailed examination of the interior and exterior of these window systems, with the purpose of making recommendations for their restoration.

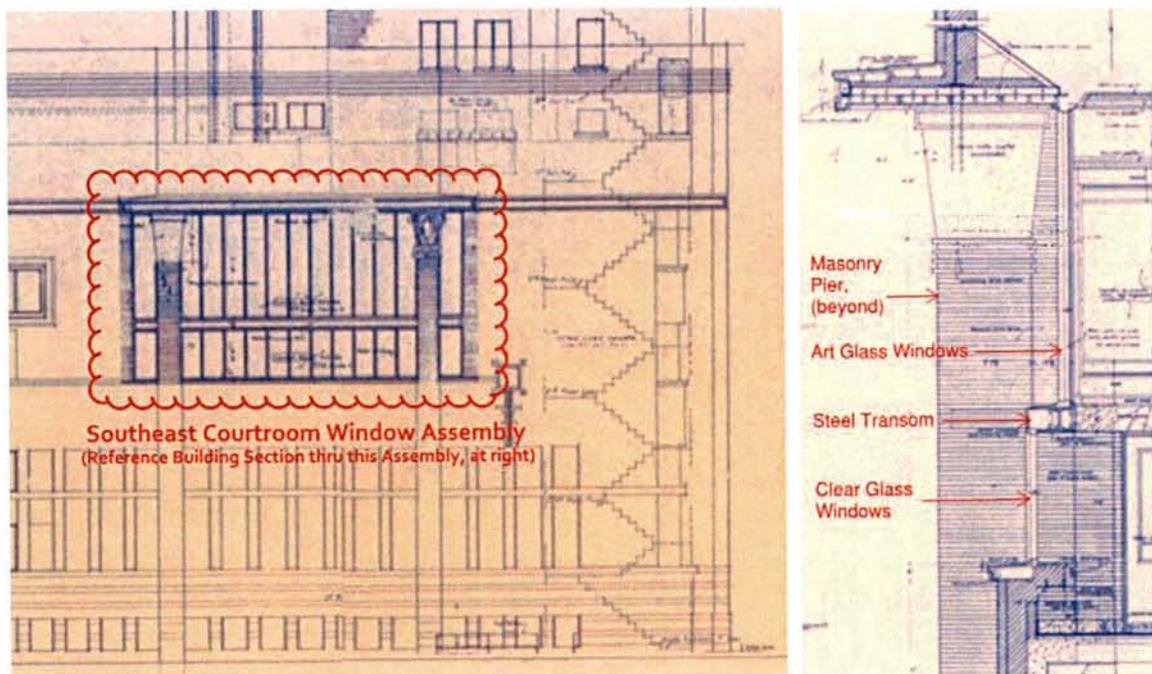
At that time, the County had braced the remaining marble soffit pieces at the southeast courtroom, and caulked all visible openings at the exterior of the four window assemblies, in the interim.

Study of Southeast Courtroom Window Assembly as Authorized – Spring 2016

Parameters of the Southeast Courtroom Window Study:

- An architectural evaluation of the interior and exterior of the southeast window assembly; (structural evaluation is not part of this survey).
- Photographic and dimensional documentation of current conditions, (as they apply to the southeast window assembly).
- Recommended steps to address current failures to mitigate further damage.

Southeast Courtroom Window Assembly



General Evaluation Notes

In general, the exterior/interior of the southeast Courthouse window assembly is in serviceable condition. Basic exterior maintenance is currently required: general cleaning of existing surfaces, repainting steel surfaces, and replacement of aged sealants at caulked joints.

Specific items that require more than basic maintenance, (reference expanded description under Exterior Conditions & Interior Conditions Sections, below). These items all relate to movement of the steel transom cover at the juncture between the sills of the art glass windows and the heads of the clear

glass windows, at the window assembly; (reference the Steel Transom Evaluation Notes, within the Exterior Conditions below).

Standards for Historic Building Treatments

The *Secretary of the Interior's Standards for Treatment of Historic Properties* provides pertinent direction for building treatments. The guidelines for rehabilitating historic buildings found within those standards are used as a basis for remedial work suggested in this Report. Begin at the following website:

www.nps.gov/history/local-law/arch_stnds_8_2.htm

The National Park Service publishes a series of useful Preservation Briefs & Technical Notes that provide detailed discussion of appropriate treatments for historic buildings and materials. Recommendations of the Preservations Briefs/Technical Notes may be used as a basis for formulating strategies and approaches to implementing remedial work of this project. Begin at the following websites:

www.nps.gov/tps/how-to-preserve/briefs.htm www.nps.gov/tps/how-to-preserve/tech-notes.htm

General Recommendations for Contracting Historic Building Treatments

Many firms have worked on historic buildings, from planning overall strategies to performing highly technical individual efforts; do not hesitate to educate yourself by probing deeper into their experience. However, please be aware that those claiming to have extensive experience with historic building projects may not be familiar with the Secretary of the Interior's Standards or do not adequately understand them. Extensive experience does not necessarily equate to an understanding of appropriate treatments.

In addition, the Historic Preservation Office of each state does not necessarily require the same interpretation of overall historic guidelines, particularly as they pertain to restoration techniques. Become familiar with the procedures and guidelines of the Iowa State Historic Preservation Office. Begin at the following website:

www.iowaculture.gov/history/preservation/preservation-planning/local-preservation-planning

Preference should be given to repairing deteriorated historic fabric over replacement whenever that is feasible. Workmen should be cautioned to protect significant historic features and held responsible to provide satisfactory repair if damage occurs.

EXTERIOR CONDITIONS

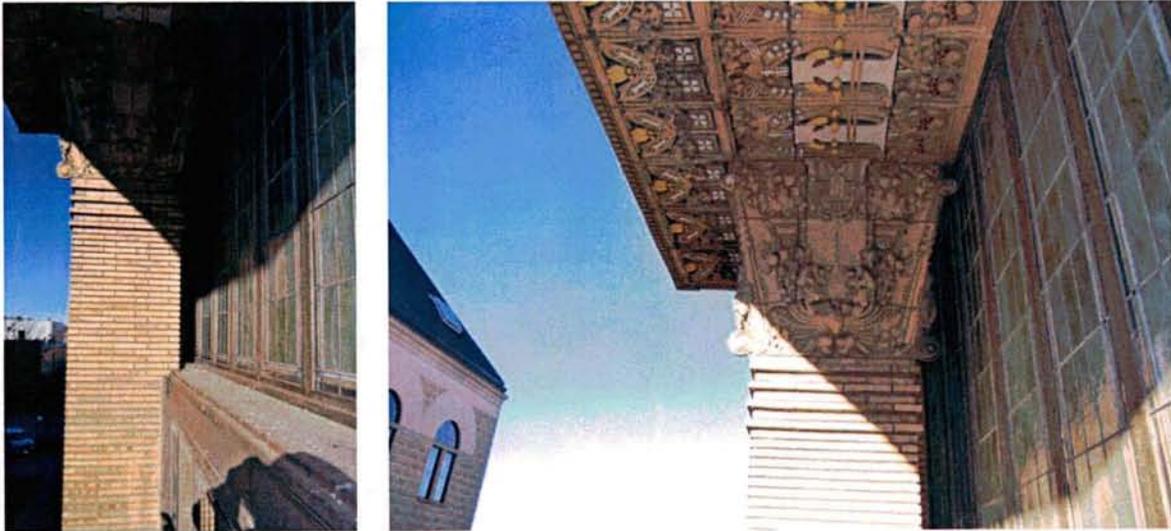
Upper Windows – Steel Sash:

Condition: The photos below indicate the general condition of the Steel Sash containing the Art Glass at the Window Assembly. The portion of the paint system, exposed to the exterior, protecting the steel material, has generally deteriorated, exposing the steel, which exhibits surface rust. Sealants are missing, hardened or cracked in various locations.

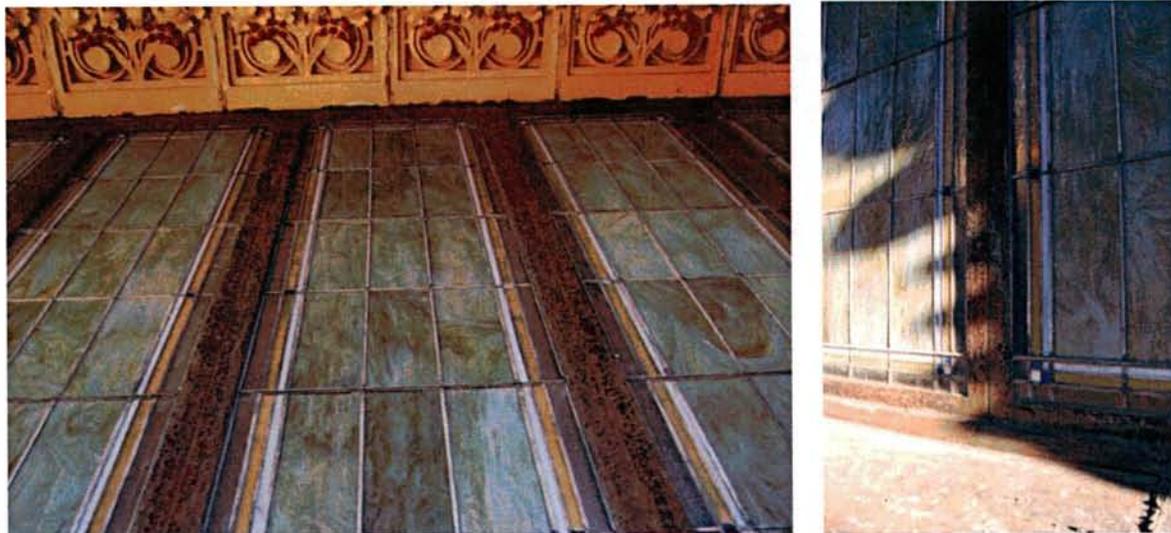
Recommendation: that the remnants of the exterior paint system be removed; the surface rust be removed or otherwise neutralized; a new paint system be installed. Provide an entirely new sealant system.

During this procedure, the steel sash pieces shall be closely examined for deterioration, beyond 'surface' rust condition, and appropriate repairs be made at that time. It is not expected that removal of the existing steel sash will be required.

Coordinate this activity with required Art Glass repairs.



Art Glass Windows – looking West

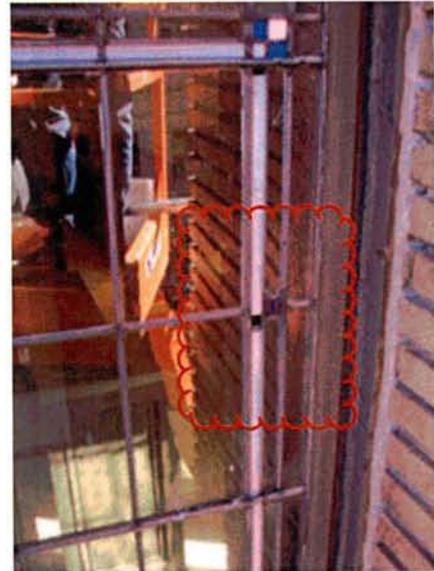


Steel Sash at Art Glass Windows – Views of Deteriorated Paint System & Surface Rust

Upper Windows – Art Glass/Lower Windows – Clear Glass:

Condition: information given during on-Site interviews is that a company that specializes in stained glass repair & construction will be consulted for required repairs, where necessary. As such, no recommendations are offered.

For information purposes, the photos below show two (2) areas where glass is broken or missing and one (1) area where the glass has shifted and deformed:



Missing Pieces of Art Glass, (shown within 'clouds')



Deformed Area at Bottom of Art Glass Panel

Steel Transom – General Condition

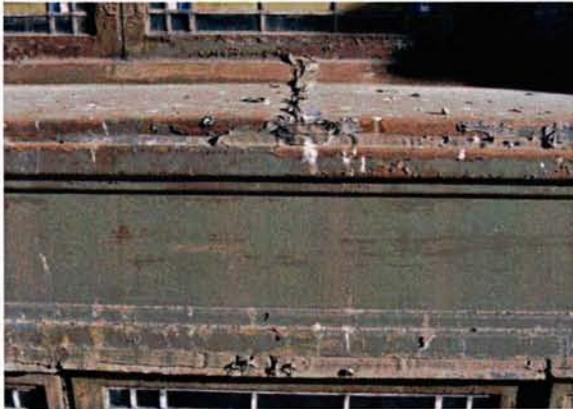
General Condition: The photos below indicate the general condition of the Steel Transom. The paint system, protecting the steel material, has generally deteriorated, exposing the steel, which exhibits surface rust. The top surface of the Transom is covered with grime and bird droppings. Sealants are missing, hardened or cracked in various locations. There are various maintenance repairs that have been made over time that require attention.

Recommendation: that the existing paint system be removed, along with the grime and bird droppings; the surface rust be removed or otherwise neutralized; a new paint system be installed. Provide an entirely new sealant system.

Reference 'Miscellaneous Items', (below), for recommendations concerning the 'various maintenance repairs'.



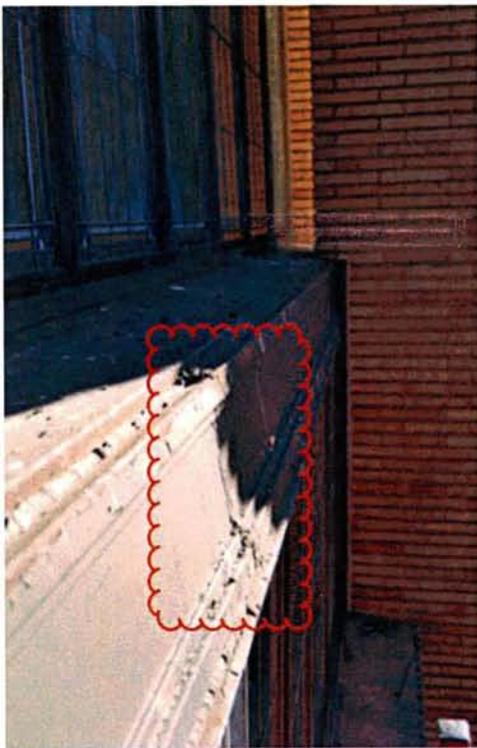
*View along top of Steel Transom – Looking West
(Note bird droppings and various areas of surface rust)*



Exterior View - top of Steel Transom – Caulked Splice Cover

Interior View - top of Steel Transom – Steel Slip

(Note that one such joint exists, located at the center of the steel transom, and that prior to re-caulking this joint in the Fall of 2015, light could be viewed from the interior & rain leaked at this area.)



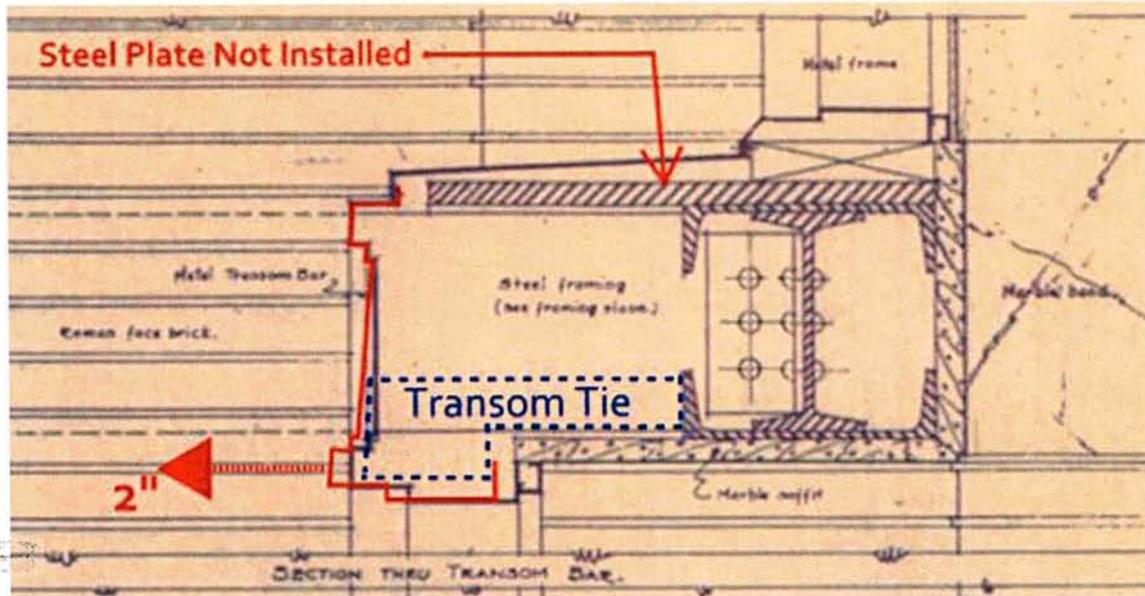
Exterior View at face of Steel Transom – Caulked Splice

Interior View at face of Steel Transom – Steel Slip Cover

(Note that one such joint exists, located four feet east of the center of the steel transom, and that prior to re-caulking this joint in the Fall of 2015, light could be viewed from the interior & rain leaked at this area.)

Steel Transom – Bowed Shape

Condition at Bowed Shape: the position of the east and west ends of the steel transom, (in relation to the masonry piers at either side of the central portion of the window assembly), seems to be the same as when constructed in 1916-18; however, the center of the steel transom has bowed out, away from the interior of the building, by 2 inches, (see diagram, below).



This movement has caused a gap between the steel transom metal, (which has moved), and the marble soffit material, (which has not moved).

For comparison purposes, the following are the 'bow out' dimensions at the center of the Courtroom Window Assemblies:

1. Southeast Window Assembly: 2 inches.
2. Southwest Window Assembly: ½ inch.
3. Northwest Window Assembly: ¼ inch.
4. Northeast Window Assembly: ¼ inch.

As the movement is most severe at the window (southeast) that has received the most sun over the years, it is conjectured that the beam & transom elongate with the heat and bow outward. When conditions cool, the beam straightens out, but the transom, which is tied to the windows below, stops slightly short of straight. During the 100 years life of the building, this slightly less than straight recovery has permanently warped the shape of the transom.

This heat buildup may also have been exacerbated by the addition of glass panels at the interior of the lower windows, increasing the air temperature at the bottom side of the transom area.

Recommendations: rather than dis-assemble the entire window assembly and replace the transom material with new, straight material, our opinion is that tying the vertical face of the transom in place, to contain the transom and prevent additional bowing, seems the logical alternative.

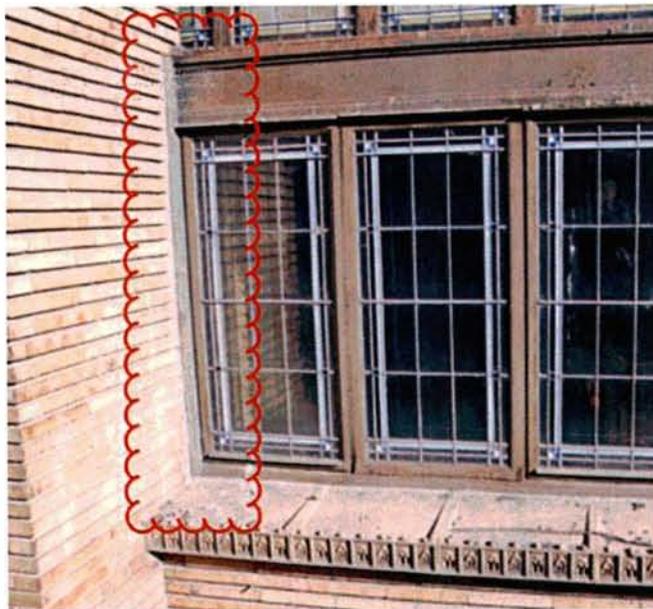
Adding a horizontal tie within the transom, between the exterior face of the structural steel and the inner edge of the transom, just above the windows, (see diagram above), would allow the transom to move with heat buildup, but keep it in a parallel relationship to the structural steel, which would bring it back to its original position when conditions cooled. (Note: a structural engineer's opinion would be required for configuring this design.)

Steel Transom – Miscellaneous Items:

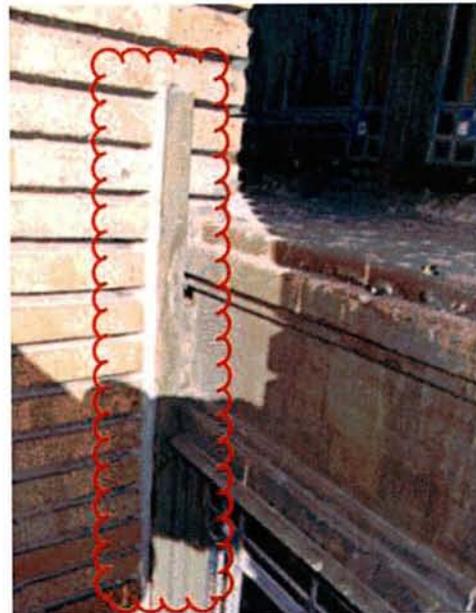
General Condition – 'Extra' Steel Channels: The photos below indicate vertical steel channels that have been installed at locations where the lower (clear glass) windows meet masonry walls; this occurs only at the Southeast Courtroom Windows. The vertical edges of the channels are caulked against the masonry and the window sash; the open, upper and lower ends of the channels have been filled with sealant; some of which is missing.

It is assumed that gaps between the masonry and window sash developed that were too wide to effectively receive (and hold) sealants; and that the channels were applied to cover the gaps.

Recommendation: that the channels be removed and a less obvious means be developed to extend the metal window sash. Provide an entirely new sealant system.



Steel Channel at Lower Window Jamb & Steel Transom – West End of Center Windows



Steel Channel at Lower Window Jamb & Steel Transom - East Side of East Masonry Pier



*Top of Steel Channel above Steel Transom –
East Side of East Masonry Pier – Sealant Missing*

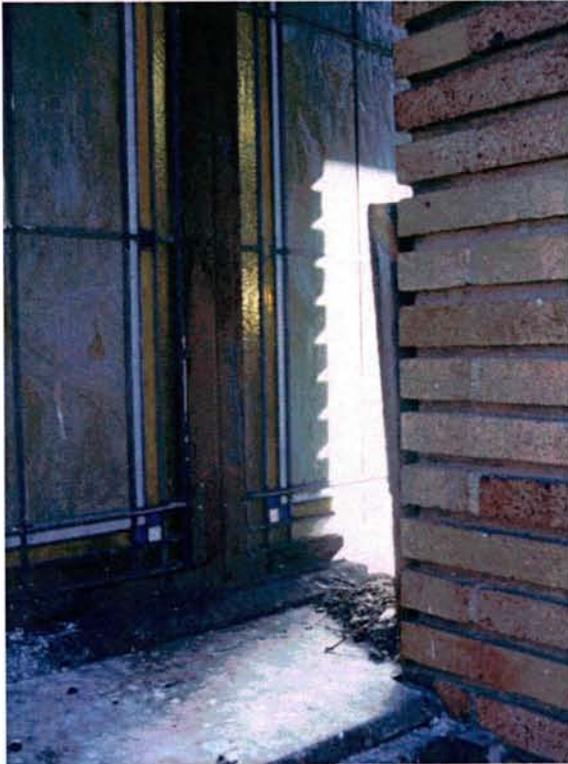


*Top of Steel Channel at Steel Transom
– East End of Lower Window
Assembly - Filled with Sealant*

General Condition – Wood Fill Piece: The photos below indicate a gap that developed between the top of the Steel Transom and the north side of the West Masonry Pier; (this condition does not occur at the East Masonry Pier). It appears that the east end of the gap has been filled with sealant, but when the gap became too large to caulk, a wood board was inserted as a filler.

It is assumed that this area has allowed rain and cold to enter the building.

Recommendation: that the wood filler be removed and a bent sheet metal piece be installed to fill the gap. Shape the sheet metal filler to receive sealant; pop-rivet the filler to the transom. Provide an entirely new sealant system.



View from Southwest – Showing Wood Filler above Transom at North Side of West Masonry Pier



View from West – Showing Wood Filler and Gap Between Transom and North Face of West Masonry Pier

Lower Windows - Steel Sash – General Notes:

Condition: The photos below indicate the general condition of the Lower Steel Window Sash, (both 'Operating' and 'Fixed'), containing the Clear Glass at the Window Assembly. The portion of the paint system, exposed to the exterior, protecting the steel material, has generally deteriorated, exposing the steel, which exhibits surface rust. Portions of the steel sash at the 'fixed' windows are severely deteriorated. Sealants are missing, hardened or cracked in various locations.

Recommendation: that the remnants of the existing exterior paint system be removed; the surface rust be removed or otherwise neutralized; a new paint system be installed. Provide an entirely new sealant system.

During this procedure, all steel sash pieces shall be closely examined for deterioration, beyond 'surface' rust condition, and appropriate repairs be made at that time. It is not expected that removal of the existing steel sash will be required, except as noted in the paragraph below.

Reference 'Lower Windows – Steel Sash (Fixed)', below, for recommendations at the 'fixed' steel sash pieces, portions of which are severely deteriorated. It is expected that removal of certain existing steel sash may be required to effect repairs.

The glass within these windows, although designated 'Clear' for the purposes of this Study, comes under the portion of the Study termed 'Upper Windows – Art Glass/Lower Windows – Clear Glass'; (reference this portion of the Study, above, for additional information).



View of West Portion of Center Windows



View of East Portion of Center Windows

(Note that every other window is operable, indicated by the small drip metal piece applied to the bottom of the sash; and that each operable window has a fixed sash adjacent.)

(Note: the single windows at the east and west ends of the window assembly, 'outside' the masonry piers, are operating sash.)

Lower Windows - Steel Sash (Operating):

Condition: The portion of the paint system, exposed to the exterior, (including the interior portion of the operating sash, protecting the steel material, has generally deteriorated (exterior portion of window, exposing the steel, which exhibits surface rust), and is in a somewhat worn condition (interior portion of operating sash). Sealants are missing, hardened or cracked in various locations.

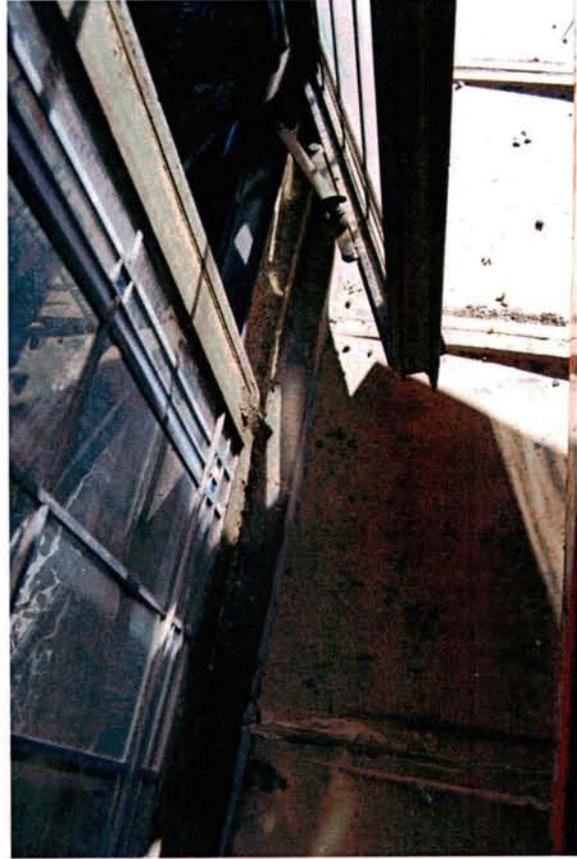
Reference 'Lower Windows – Steel Sash – General Notes', (above), for additional requirements.

The photos below indicate an operating sash in the 'open' position.

It is not expected that repair will be required for the operating hardware at these windows.

Recommendation – Exterior Surfaces: that the remnants of the existing exterior paint system be removed; the surface rust be removed or otherwise neutralized; a new paint system be installed. Provide an entirely new sealant system.

Recommendation – Interior Surface of Operating Sash: that the existing interior paint system, at the operating portion of the window, receive an additional coat of paint.



View of Upper Portion of Operating Sash

View of Lower Portion of Operating Sash

Lower Windows - Steel Sash (Fixed in Place):

Condition: The portion of the paint system, exposed to the exterior, protecting the steel material, has generally deteriorated, exposing the steel, which exhibits surface rust at most locations. Sealants are missing, hardened or cracked in various locations.

In addition, at the lower corners of the some of the fixed windows, the steel is deteriorated to the extent that it is flaking in layers from long-term rusting.

Reference 'Lower Windows – Steel Sash – General Notes', (above), for additional requirements.

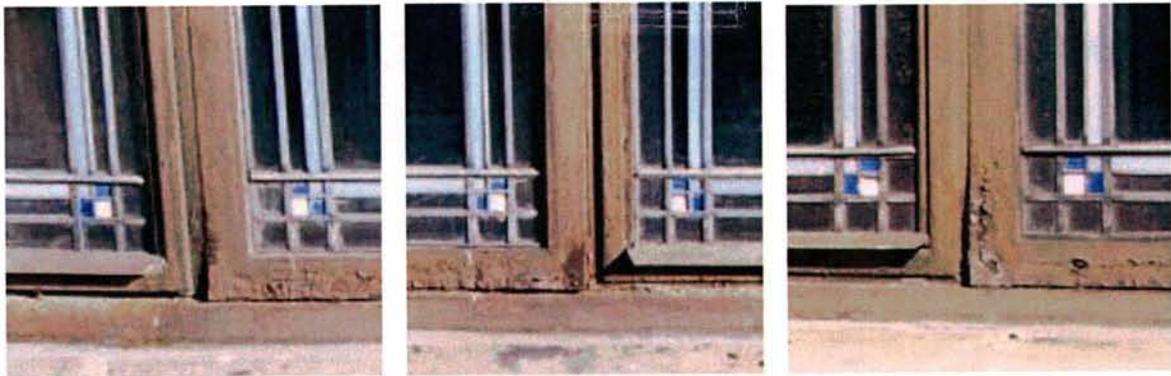
Recommendation: that the remnants of the existing exterior paint system be removed; the surface rust be removed or otherwise neutralized; a new paint system be installed. Provide an entirely new sealant system.

During this procedure, all steel sash pieces shall be closely examined for deterioration, beyond 'surface' rust condition, and appropriate repairs be made at that time.

At the bottom portions (sills) of these windows, methods shall be investigated to make repairs 'in place', if at all possible; however, it is a possibility that removal of the existing steel sash will be required to affect repairs.



View of Fixed & Operating Sash - Note the deteriorated portions of the Fixed Window Sills



Closeup Views of Fixed & Operating Sash - Note the deteriorated portions of the Fixed Window Sills

Terra Cotta Sill:

Condition: The photos below indicate the general condition of the Terra Cotta Sill, below the Window Assembly. The top surface of the Terra Cotta is covered with grime and bird droppings. Mortar joints seem solid and intact.

Recommendation: that the grime and bird droppings are removed; and the terra cotta cleaned.

During this procedure, the perimeter sealants shall be closely examined for deterioration, and repairs be made at that time.



View of Terra Cotta Sill – East End of Center Window



View of Terra Cotta Sill – East of East Masonry Pier

INTERIOR CONDITIONS



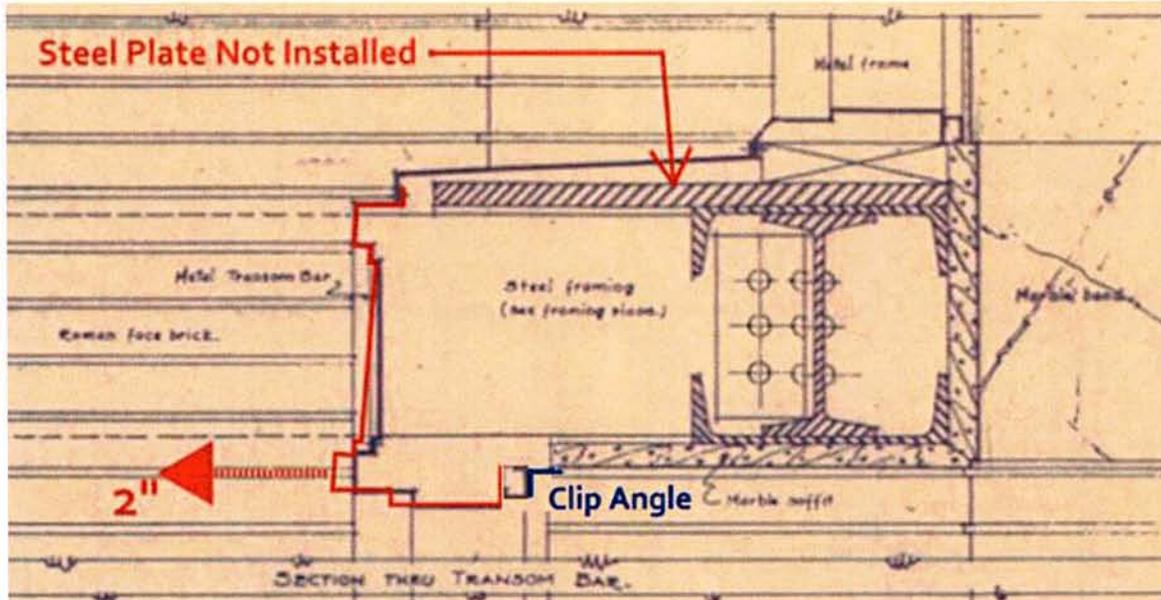
Interior View of Courtroom Window Assembly, (northeast Courtroom pictured), showing fifteen (15) Art Glass Windows above the Transom above (13) Clear Glass Windows, (separated by masonry piers into a 1 + 11 + 1 arrangement)

Upper Windows – Art Glass/Lower Windows – Clear Glass: reference the Exterior Conditions portion of this Study for information concerning Window Glass.

Painting: reference 'Lower Windows - Steel Sash (Operating)' for interior painting recommendations.

Steel Transom: reference 'Steel Transom – Bowed Shape' for opinion concerning deformation of steel transom.

The cross-section of the Transom, repeated from the 'Steel Transom – Bowed Shape' portion of the Study, is shown below.



Note: the terminology for the marble lining the structural steel is 'Marble Banding' (for the vertical marble) and 'Marble Soffit' (for the horizontal marble).

Deformation of the Steel Transom has exposed the exterior (away from the Courtroom) edge of the marble at various locations. The photos below indicate the movement of the Transom in lesser amounts.



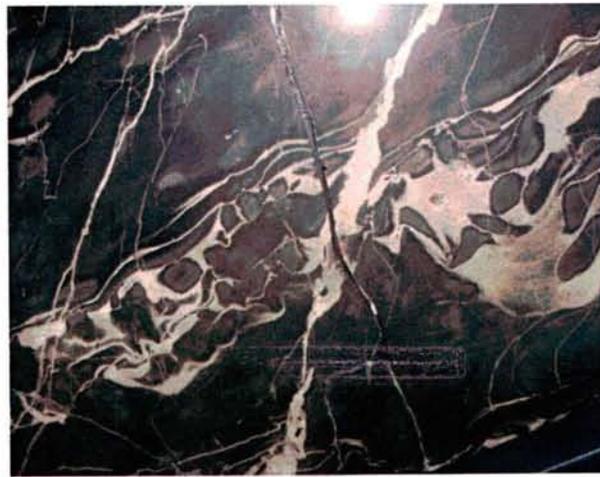
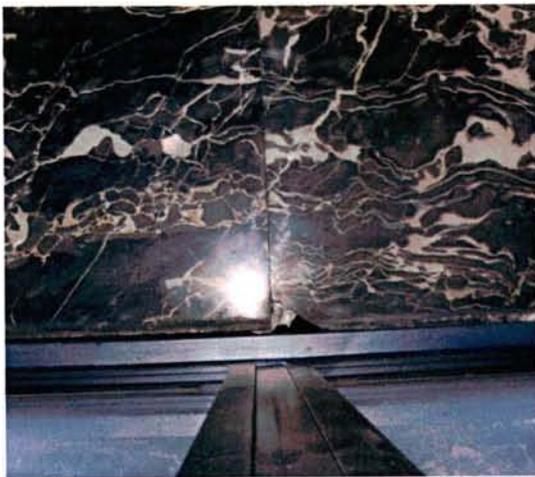
Views of the Marble Soffit where it meets the (blue) metal trim at the top of the Lower Windows.

An earlier location of the face of the window trim is thought to be the 'brown' paint line, on the surface of the marble in both photos, (above), caused by an earlier painting of the windows. The current gap is approximately ½ to ¾ inch in the photos.

Clip Angle Suggestion: a Clip Angle, such as the one shown on the diagram on the previous page, could be screw attached to the trim channel at the window head, (or replace the trim channel), to cover the gaps at windows having that condition. Paint to match window color.

Joints in the Marble Banding & Soffits: were placed at approximately 4 foot intervals during construction of the Courthouse, except for the marble at the center of the window assembly, which is approximately 6 feet wide; (it is this 6 foot portion of marble soffit that is missing).

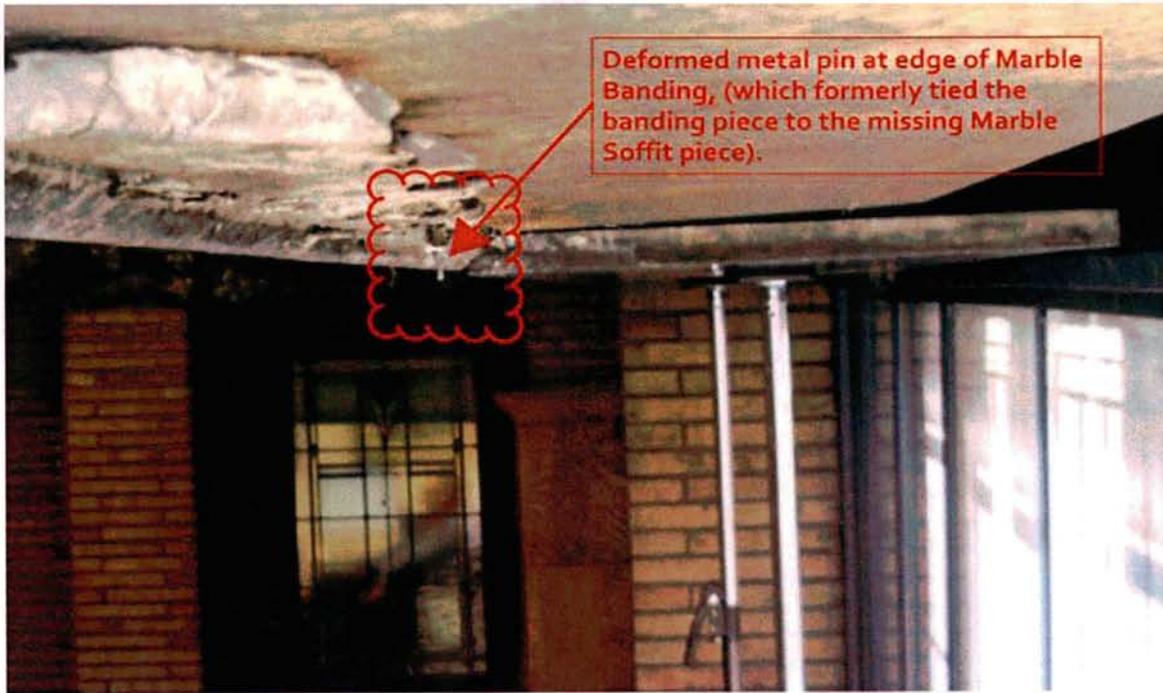
The marble banding and soffits have also developed random (unplanned) cracks in various places, over the life of the building, as well. This Courtroom has developed four (4) cracks in the marble banding and one (1) crack in the marble soffit.



View of a construction joint in the Marble Soffit View of a random crack in the Marble Soffit

Supports for the Marble Soffits: were placed to mechanically attach the marble pieces to the structural steel within the Transom, (using bent wire supports) and to each other, (using metal pins); reference photos, below.

These supports failed at the missing piece of marble soffit, allowing it to fall from its place.



Deformed metal pin at edge of Marble Banding, (which formerly tied the banding piece to the missing Marble Soffit piece).

View of Underside of Transom, looking East, at area where Marble Soffit is missing.



View of Underside of Transom, looking at Marble Soffit west of missing Soffit piece ; showing wire tie from connection to Marble Soffit vertically to where it clips over the steel support channel, above.



View of Underside of Transom, looking West, toward missing Soffit piece.

Transom – General Condition at Marble Banding & Soffit

General Condition: The marblework covering the interior portion of the Transom appears to be in sound condition. The marble pieces on either side of construction joints, including the mitered joints between the Marble Banding and Soffit pieces, and at the random cracking locations, are flush with one another and have not moved out of alignment with each other.

There is no certain means to determine what, if any, damage has occurred to the existing support wiring at the remaining soffit pieces; this is an unknown. To determine the actual condition, 'destructive' testing, (i.e. removing the marble pieces to determine the condition of the support wires and the integrity of the marble at the wire support points), would be necessary. And, as removal of the marble, under these conditions, would demolish it, the result effectively becomes entire removal and replacement of the marblework.

On the other hand, regular monitoring of the existing materials, to become aware of any shifting between the various marble pieces could forewarn of an impending failure.

The question becomes 'what level of risk are you, as the Owner, willing to assume'?

Recommendation: provide a matching replacement for the marble soffit piece that is missing. Design a means to secure it in place that is seamless with adjacent work.

Install a continuous clip angle, (as noted at Clip Angle Suggestion, above), to provide additional support for the window edge of the marble soffit pieces

Regularly monitor the various marble pieces at transoms to discern movement.

**Window Study – Southeast Courtroom 203
at the
Woodbury County Courthouse – Sioux City, Iowa**

Summary – Materials Examination

This Study began when a 1" thick x 72" long x 16" deep marble soffit piece detached from its place within the window assembly at the southeast courtroom within the Woodbury County Courthouse.

Prior to beginning this Window Study, our speculation was that the exterior of the transom bar, (the 14" high x 22" wide metal & marble covered structure between the lower portion of the art glass windows and the upper portion of the clear glass windows within the window assembly), was constructed of heavy sheet copper which had deteriorated to the point that the copper would require replacement.

Comments by Building staff and the personal experience gleaned by a visit to the courtroom by our structural engineer informed us that daylight could be seen through the transom, strengthened our speculation that water was the issue. Its deterioration of the protective exterior copper, we felt, had opened up the exterior skin, allowing water to deteriorate whatever devices, (metal clips or wires), securing the marble soffit in place.

At this time, winter intervened, and Building staff temporarily sealed any apparent openings in the transom bar with sealant.

Our recent, close examination of the exterior of the transom bar area, and measurements of the interior of the marble soffit with the courtroom, has modified our view, as follows:

1. The exterior metal at the transom bar is a heavy pressed steel (not copper) sheet, constructed in two (2) pieces – a horizontal top/cover piece and a vertical front/face piece, overlapped and tightly joined together.
2. The two pieces of the transom bar each have one slice which do not align, (the top piece is spliced at its center point; the front piece is spliced east of its center point), and are each backed by a steel plate, which acts to fill the gap between the top/front pieces when they move.
3. Over time, the juncture between the top and front pieces has moved outward, (away from the interior of the building), twisting the vertical, transom bar front piece into a bow shape along its length.
4. The lower courtroom windows are attached to the transom bar front piece, so the movement of the transom bar has moved tops of the lower windows outward as well.
5. The movement of the lower transom bar metal and windows has exposed the exterior edge of the marble soffitwork.
6. The examination of the opening caused by the detachment of the center marble soffit piece revealed that the marble is being held in place by heavy gauge wire, set into the sides of the marble and wrapped over the top of the steel structure within the transom bar.
7. The paint at the exterior sheet, (and the adjoining steel windows), has deteriorated, exposing some of the steel; surface rust has developed where the steel is exposed.

Summary – Materials Condition & Recommendations

General Maintenance: most of the exterior issues that we discovered can be addressed through general maintenance: remove the old paint system and residual rust from all steel surfaces and repaint; re-caulk all joints and openings with new sealant. This recommendation will eliminate further deterioration of the steel surfaces, and can be applied to all four (4) of the courtroom window assemblies at the second floor of the Courthouse, as they all exhibit similar conditions.

Glass: there are specific issues with the art glass and 'clear' glass at the windows, which are addressed more fully within the body of the Study.

Transom Bar: concerning the cause of the movement within the transom bar, our opinion that the water penetration is symptomatic of the real reason, and not the cause. Our observations of the window assemblies within the other three (3) courtrooms indicate similar movement, but not anywhere near that occurring in the southeast courtroom. Our opinion is that the southeast window has had more exposure to the sun than those at the remaining courtrooms, and that each cycle of summer heat/sun has expanded the transom bar (and its steel support structure), slightly warping it outward; then, when the structure within the transom bar straightened as the weather cooled, the steel sheet portion did not quite return to its original shape. 100 years of this movement has warped the transom bar nearly 2 inches at its center.

Our transom bar recommendations considered two scenarios:

a) in order to restore the transom bar to its original shape, removal of all of the windows, including all interior marble pieces, as they all attach to the transom bar steel sheet, would be required; removal of the steel sheet pieces, would be required as well, and replacement with new, as the steel sheet is 'stretched' into its current shape, precluding pressuring it back to its original form.

b) allow the transom bar to remain in its current configuration, but develop a clip piece to tie the front (vertical) sheet back to the steel structure within the transom bar. The purpose of this clip would be to keep the front sheet parallel with the structural steel, so that the current condition would not get any worse.

As the first scenario replaces all of the historic materials at the transom bar and incurs the expense of entirely removing and replacing the windows; and the second scenario stabilizes the existing conditions, resisting future deterioration, while retaining the existing building materials, our opinion is that the second scenario is as effective as the first, without the additional cost and inconvenience.

Marble Soffit: the wire ties at the marble soffit pieces, adjoining the one that displaced, were examined and found to be sound, exhibiting no rust and otherwise not deteriorated. It could not be determined if the wire ties at the soffit piece that displaced had a) deteriorated, allowing it to fall; or b) the marble itself had broken at the wire tie location, allowing it to fall.

The condition of the marble that remains in place at this courtroom and at the remaining courtrooms, and the wire supporting ties, cannot be determined without a more invasive examination; either by removing the marble, (which effectively destroys it), or by optic camera examination (which would require localized removal of portions of the marble).

The available range of options, between regular monitoring, (of the condition the various marble pieces and their position relative to one another and adjoining materials), and invasive examination, (as noted above), should be a topic of discussion by the Board of Supervisors. The authors of this Study would be available such a discussion.

Historic Building Fabric: due to the status of the Woodbury County Courthouse as a Landmark Historic Structure, all activities shall be performed in strict adherence to the Secretary of the Interior's Standards for Historic Preservation.

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Woodbury County Courthouse
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