



**Safety Building  
Penthouse and  
Light Court Parapet  
Evaluation  
June 2011**



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Penthouse and  
Light Court  
Parapet  
Evaluation**

Prepared for

**Milwaukee County  
Department of Public Works**

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## **Part I. Executive Summary**

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### **Building Review**

A visual examination of the brick masonry façade and a review of the original building plans were performed to determine the extent of repairs required on the penthouses and light court walls of the Safety Building. Based on these examinations, recommendations for repairs and cost estimates were developed.

### **Study Area Conditions**

Deterioration of the brick masonry façade was noted on all elevations included in this study. Shifted brick, loose or open mortar joints, deteriorated sealant joints and open roof flashing were found. Past masonry repairs were evident and generally in good condition. Thermal movements and water infiltration are deemed the cause of the masonry deterioration observed. Open roof flashing, deteriorated sealant joints and inner wall condensation are the contributing factors to the water infiltration.

### **Recommendation for Repairs**

A repair program is recommended to restore and maintain the integrity of these walls. Tuck pointing and brick veneer reconstruction is required to restore the facade. Replacement of sealant joints and the repair of open roof flashing are required to prevent water infiltration. Additional expansion joints and weep holes are recommended to enhance the future performance of these walls. Deteriorated door and window frames were also noted but not included in this study.

The repairs required can be prioritized and spread out into several phases. Additionally, the required repairs could be broken into separate projects for the construction trade required. Repairs to the inner court parapet wall are deemed the first priority to prevent loose masonry from falling on the glass skylight on the inner court roof. Roof flashing, counter flashing and parapet caps could be broken out for a roofing repair contractor.

### **Cost Estimates**

Quantities of the recommended repairs were determined and estimates of probable construction costs were developed. The estimated cost to perform the required repairs for all deterioration noted is \$ 437,000.00. These costs could be spread out throughout several phases. Repairs to the inner court parapet wall are deemed the first priority to prevent loose masonry from falling on the glass skylight on the inner court roof.

### **Part III. Description of Examination**

The purpose of this project is to observe, document, and evaluate the current condition of the facade with respect to structural integrity. Facades are typically composed of a number of systems and materials designed to serve three main functions: 1) structural support, 2) weather resistance, and 3) aesthetics. For the purpose of this project, observations are given for consideration and evaluation of the first two main functions. Areas needing repairs as evidenced by visible external distress were identified. Potential repairs were determined to correct deficiencies, such as potentially unsafe conditions, or conditions that if left uncorrected could result in critical system failure or a significant escalation of costs to repair.

In general, the lack of weather resistance, such as water-tightness, may not initially affect the structural integrity of the facade, but over prolonged periods may cause deterioration that reduces structural performance and significantly escalates repair costs. The lack of weather resistance may also affect the performance of other building components, such as inner wall components, building insulation and interior finishes; however, these considerations are beyond the scope of this project.

The examination of the facade included building document reviews and a visual examination of each façade elevation.

#### **Existing Building Document Review**

Building documents were reviewed to determine the specified designs of the facade and building structure to detect and determine the cause of the current conditions of distress and deterioration. The document review included the following documents made available by Milwaukee County Department of Public Works.

Author	Document	Date
Albert Randolph Ross - Architect	City Part of Public Safety Building	March 15, 1927
Clas, Shepherd & Clas - Architects	County Part of Public Safety Building	August 1927

The safety building was originally designed in two halves by separate architects. Milwaukee County originally occupied the west half and the City of Milwaukee originally occupied the east half. The structure is constructed with a concrete encased steel frame with concrete and masonry infill walls. The walls of the penthouses and inner court consist of hollow clay tile inner wythes and a brick outer wythe. The roof and floors structure is concrete encased steel girders and concrete pan joists. The parapets around the inner court and on the penthouses are constructed with three wythes of clay brick. Generally the parapets are capped with stone, however in several locations they have been replaced with bent metal coping.

## **Visual Examinations**

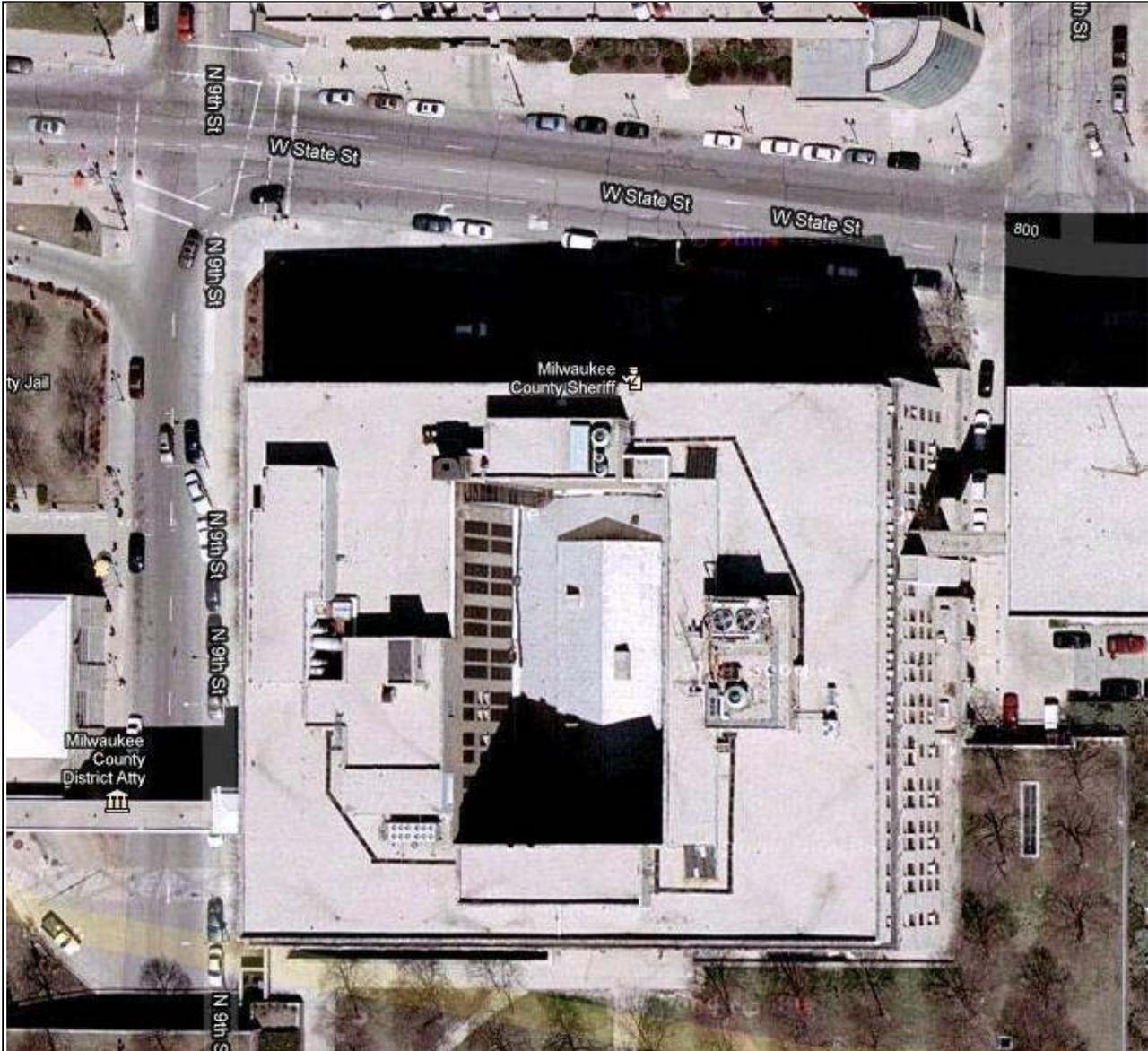
The facade was visually examined in October and November 2010. The outer walls facade of each penthouse was examined from the adjacent roof levels. Visual examinations were performed on the inner court parapets from the adjacent roofs and the opposite roofs using binoculars.

All examinations were documented by field notes and photographs. Refer to Appendix A for survey notes of the visual examinations. Please note that certain conditions of distress and/or deterioration cannot be detected by visual examination and other conditions of significant distress or deterioration may exist that have not been detected. Conditions of significant distress are presented in Part IV. An initial evaluation of the deterioration found is presented in Part V.

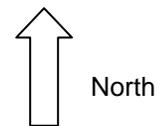
## Part II. General Information

### Roof Plan

This ariel view of the safety building shows the relationship of light court and penthouses.



.Roof layout plan.



**East Penthouse Elevations**



East Penthouse -South Elevation



East Penthouse -East Elevation



East Penthouse -North Elevation



East Penthouse -.West Elevation

**North Penthouse Elevations**



North Penthouse -East Elevation



North Penthouse -North Elevation



North Penthouse -West Elevation

Note: South elevation is included with the Light Court Elevations

**West Penthouse Elevations**



West Penthouse -North Elevation



West Penthouse -North Elevation at Light well



West Penthouse -West Elevation -



West Penthouse -South Elevation – West end



West Penthouse -South Elevation - East end

Note: East elevation is included with the Light Court Elevations

**South Penthouse Elevations**



South Penthouse -West Elevation



South Penthouse -South Elevation



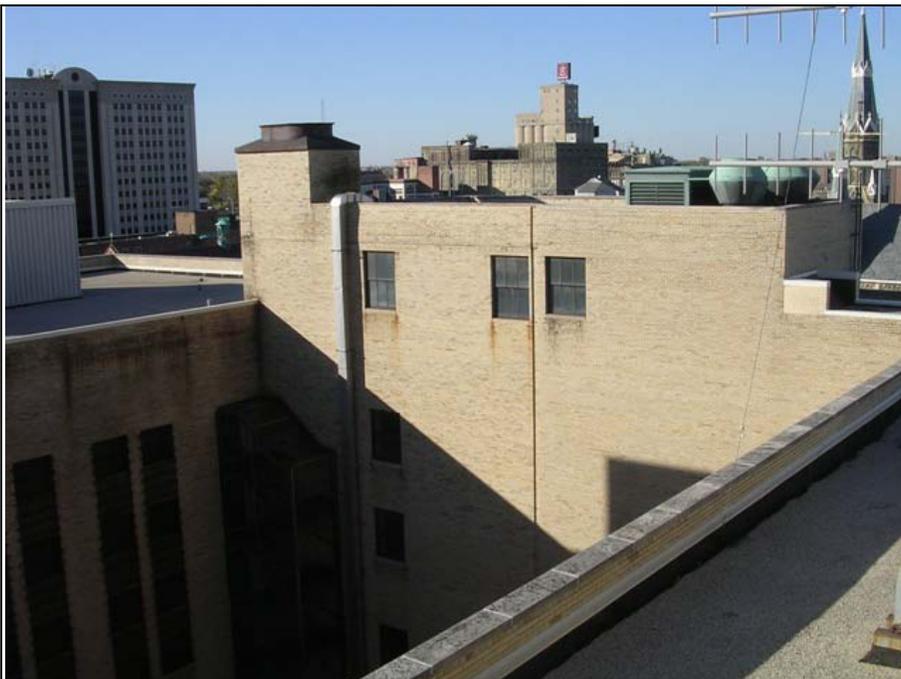
South Penthouse -East Elevation

Note: North elevation is included with the Light Court Elevations

**Light Court Elevations**



Light Court - East Elevation



Light Court - North Elevation



LightCourt - West Elevation - North End



Light Court - West Elevation – South End



Light Court - South Elevation

## **Part IV. Conditions of Distress or Deterioration**

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Conditions of significant distress and deterioration found that affect the structural integrity of the facade are summarized below. Representative photographs of the conditions are included. Recommendations for repairs and/or stabilization, if applicable, are provided. Stabilization is a temporary measure that can be employed to prevent façade components from becoming unsafe or imminently hazardous conditions until permanent repairs are made. Please note that certain conditions of distress and/or deterioration cannot be detected by visual examination alone, therefore, conditions of significant distress or deterioration on the inner wythes may exist that have not been detected.

Refer to Appendix A for the elevations with noted conditions located. The following photographs indicate typical conditions of the distress that was observed. The evaluation of the cause of the deterioration and anticipated repairs required are provided.

**Condition #1 Light Deterioration of Mortar Joints**

*Observations:* Light deterioration of mortar joints.

*Photographs indicating general condition:*



Condition 1 - North penthouse



Condition 1 - North penthouse



Condition 1 - North penthouse

*Evaluation:* Mortar joint deterioration due to moisture penetration and freeze thaw action.

*Repair Recommendation:* Tuck pointing mortar joints

## **Condition #2 Heavy Deterioration of Mortar Joints**

*Observations:* Heavy deterioration of mortar joints.

*Photographs indicating general condition:*



Condition 2 - North penthouse



Condition 2 - North penthouse



Condition 2 - East penthouse



Condition 2 - East penthouse

*Evaluation:* Mortar joint deterioration due to moisture penetration and freeze thaw action.

*Repair Recommendation:* Tuck pointing mortar joints

### **Condition #3 Potential Loose Outer Wythe**

*Observations:* Heavy deterioration of mortar joints, open cracks and slight movement of outer wythe.

*Photographs indicating general condition:*



Condition 3 - North penthouse



Condition 3 - East penthouse



Condition 3 - North penthouse



Condition 3- North penthouse

*Evaluation:* Open joints and cracks with slight movement

*Repair Recommendation:* Add renovation anchors to reattach outer brick wythe to inner wall.

**Condition #4 Deteriorated or Cracked brick**

*Observations:* Face spalls or broken bricks at wall cracks.

*Photographs indicating general condition:*



Condition 4 - North penthouse



Condition 4 - South Penthouse

*Evaluation:* Wall cracks due to thermal movement of walls.

*Repair Recommendation:* Replace cracked or deteriorated bricks. Further enhance wall system by adding additional control joints.

**Condition #5 Severe Deterioration and Shifted Outer Wythe**

*Observations:* Severe deterioration of mortar joints and shifted outer wythe.

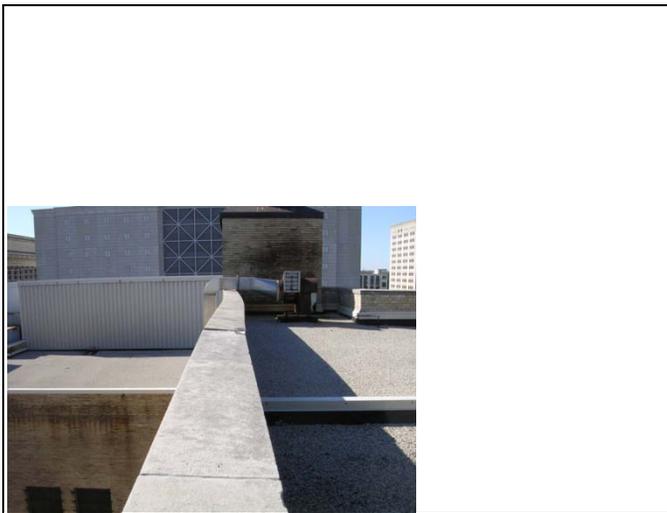
*Photographs indicating general condition:*



Condition 5 - East inner court parapet



Condition 5 - East inner court parapet



Condition 5 - North inner court parapet



Condition 5 - East penthouse

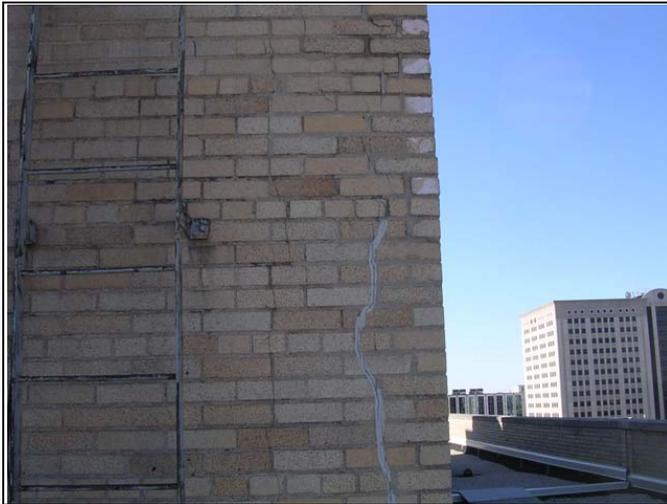
*Evaluation:* Lateral movement of outer wythe occurs when water penetration into the wall freezes, and expands. Brick ties to the inner wall wythes are generally loosened or broken. Damage to the inner wythe may be found.

*Recommendation:* Reconstruction of outer wythe. Evaluation of inner wythe once outer wythe is removed.

**Condition #6 New Control Joints**

*Observations: Vertical cracks at corners*

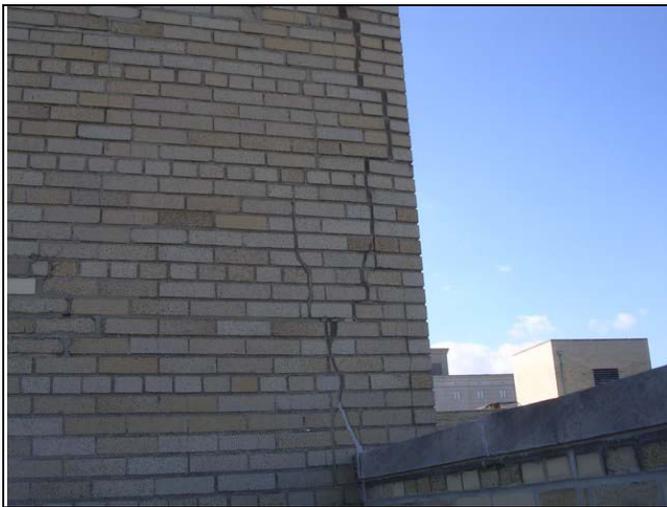
*Photographs indicating general condition:*



Condition 6 - North Penthouse



Condition 6 - East Penthouse



Condition 6 - South Penthouse



Condition 6 - North Penthouse

*Evaluation:*

Lack of control joints prevents thermal movements. Vertical cracks generally indicate locations where the brick facing relieves thermal expansion.

*Recommendation:*

Sawcut new vertical control joints. Provide backer rod and sealant.

## **Condition #7 Parapet Cap Sealant**

*Observations:* Stone parapet cap joint sealant is deteriorated.

*Photographs indicating general condition:*



Condition 7 - North Penthouse



Condition 7 - East Penthouse



Condition 7 - South Penthouse



Condition 7 - West Penthouse

*Evaluation:*

Open joints in caps allows water to penetrate walls and causes deterioration of mortar joints and shifting of outer wythe.

*Repair Recommendation:*

Provide new backer rod and sealant or replace with metal coping.

**Condition #8 Corroded Steel Lintels**

*Observations:* Thick layers of rust between steel lintel and supported brick facing.

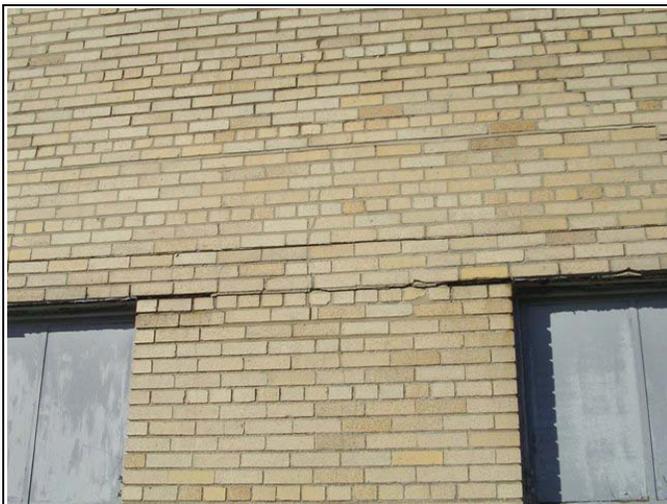
*Photographs indicating general condition:*



Condition 8 - North Penthouse



Condition 8 - North Penthouse



Condition 8 - South Penthouse



Condition 8 - East Penthouse

*Evaluation*

Rust buildup on steel lintel jacks masonry creating open joints. (Rust-Jacking)

*Repair Recommendation:*

Replace lintels with galvanized steel. Provide new flashing and weeps.

## **Condition #9 Deteriorated Widow and Door Sealant**

*Observations:* Sealants at widow and door frames are cracked, torn or missing.

*Photographs indicating general condition:*



Condition 9 - North Penthouse



Condition 9 - South Penthouse

*Evaluation:* Open joints around doors and windows allow water penetration which causes deterioration of brick facing below. Water trapped in metal frames can expand or cause internal corrosion that can break the glass.

*Recommendation:* Provide new sealant. Note: Many window frames are severely corroded.

**Condition #10 Open Roof Flashing**

*Observations:* Open joints in roof flashing and counter flashing on backside of parapet walls.

*Photographs indicating general condition:*



Condition 10 - Spalled patches East Elevation



Condition 10 - East Penthouse



Condition 10 - North penthouse



Condition 10 - North penthouse

*Evaluation:* Open flashing system allows water entry into wall cavities which cause freeze thaw damage to brick facing and mortar joints.

*Repair Recommendation:* Reseal flashing joints.

## **Part V. Repair Priorities**

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We recommend that all repairs be completed within four years. The recommended repairs can be prioritized to spread the costs over this four year period. The amount of repairs accomplished in any year could be based on available budget.

The first priority for the recommended repairs is the east light court parapet wall. The displaced masonry may be loose or could become loose. Falling masonry could hit the skylight at the bottom of the light court. Also the loose flashing on the south elevation of the south penthouse should be removed. These potentially loose items should be repaired during first repair cycle.

The second priority should be the repairs to the north wall of the light court. While this area appears to only need tuck pointing, the parapet is leaning in and should be addressed due to the potential for loose material falling to the skylight at the bottom of the light well.

The third priority should be the parapet cap sealants and roofing repairs. These repairs will prevent the greatest amount of water from entering the walls and should slow any future deterioration.

The fourth priority would be the areas that require heavy tuck pointing or where reconstruction of the outer wythe is anticipated. These areas should be monitored and yearly and included in earlier repair periods if conditions worsen.

## **Part VI. Estimate of Probable Construction Costs**

Costs estimates were determined for each of the penthouse wall and for the inner court walls. The outer penthouse walls were assumed to be repaired from roof supported scaffolding. The inner court penthouse and parapet walls were assumed to be repaired from roof supported swing stages. Each wall was field measured and elevations developed to aid in the determination of quantities. Potential repairs were determined to correct the deterioration found. Reconstruction methods and costs were selected to restore the facades to their original condition. Some savings could be realized if the stone caps were removed and replaced with metal copings. The addition on of expansion joints and weep holes has been included to enhance the future performance of the walls.

The estimate of probable construction costs for each of the penthouses and the light court walls are:

East Penthouse	\$108,000.00
North Penthouse	\$51,000.00
West Penthouse	\$37,000.00
South Penthouse	\$59,000.00
<u>light Court Walls</u>	<u>\$182,000.00</u>
Total	\$437,000.00

Please note; Since GRAEF has no control over the cost of labor, materials, equipment or services furnished by others, the contractor's means of determining prices or over the competitive bidding or market conditions. GRAEF's opinions of probable construction cost are made on the basis of our experience and qualifications and represent our best judgment as an experienced professional familiar with the construction industry; however GRAEF cannot and does not guarantee that the proposals bids or actual project costs will not vary from these opinions of probable construction costs.

## **Part VII. Report Preparation and Use**

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### **Limitations**

This report is based on information obtained from reviews of building documents and from on-site visual examinations. Review of building documents included pertinent drawings provided by the Owner. The on-site observations included visual examinations of all facades within the project scope. The observations were performed without disassembling or damaging the existing exterior wall systems. No calculations have been performed to determine the adequacy of the original facade design, or subsequent alterations or repairs. No physical tests were performed or samples taken to evaluate performance of the existing facade. Such are beyond the scope of this project.

Consequently, certain assumptions have been made regarding conditions and performance of these building elements. Additional study may be warranted to fully evaluate the conditions of the facade. The facade evaluation contained in this report shall not be construed as a warranty or guarantee of the current or future performance, or remaining useful life, of any building material, system, or improvement.

### **Reliance and Use Restrictions**

The observations, findings, and conclusions contained in this report are based on the professional judgment of a qualified professional experienced in this type of work using that degree of skill and care normally exercised by consultants performing similar services under like assignments and circumstances. This report is intended to be read in its entirety. Information provided in a specific section may be related and clarified by descriptions and discussions in another part of the report. Therefore, interpretations and conclusions drawn by reviewing only isolated statements are the sole responsibility of the reader. This report has been prepared in the present tense as it is intended to only describe conditions at the time of the on-site visual examinations.

Possession of this report does not imply the right to publication, nor may it be used for any purpose by anyone but the Building Owner without the prior written consent and approval of GRAEF-USA Inc. and, in any event, only in its entirety.