

**Project Details**

Project Title	PNC Bank Building Facade Restoration
Property Name	PNC Bank Building
Location	Springfield Illinois
Entry Classification	Restoration
Project Cost (dollar amt)	2 500 000
Duration (calendar days)	620
Start Date (mm/dd/yy)	1/14/2013
End Date (mm/dd/yy)	10/1/2014

**Scope of Work**

Located in the Central Springfield Historic District the PNC Bank building is a five-story commercial office building which was designed by Skidmore Owings & Merrill LLP and built in 1974. The buildings design features an exterior cladding facade comprised of polished granite panels and an aluminum-framed strip window system at each floor. A contractor was originally retained by the owner of the building to perform sealant repairs when they noticed that several granite facade panels had experienced displacement raising concerns regarding the condition of the granite panel supports. The owner retained a forensic architectural/engineering firm (A/E) to investigate the displacement of the granite facade panels and the condition of the supporting hardware as well as to develop repair recommendations before proceeding with any further repairs. A visual condition survey was conducted selected panels were removed to observe concealed supports and testing of the adhesives used was performed as part of the investigation. Original design and shop drawings were reviewed by the A/E to understand the construction and installation of the granite panels. The investigation concluded the deterioration and disengagement of anchors as well as rotation and separation of the liner blocks. A repair program was recommended to the owner to repair all column cover and spandrel panel supports on the building. An integral part of the repair and design process involved the A/E performing in-house granite and anchor testing. The A/E obtained attic stock granite panels from the original construction and cut the granite down to smaller test specimens. ASTM C880 Standard Test Method for Flexural Strength of Dimension Stone and ASTM C1354 Standard Test Method for Strength of Individual Stone Anchorages in Dimensional Stone were then performed on multiple granite specimens. The testing was paramount in determining anchor type design and spacing to meet code prescribed loading requirements. The stone testing allowed reuse of the existing granite panels and incorporated a fully mechanical anchoring system to replace the existing liner block anchors saving the client a considerable amount of money and preserving the aesthetic of the Central Springfield Historic District. The repair design also incorporated substantial sealant

replacement of both glazing and granite panel joints with silicone sealant roofing replacement a continuous mineral wool insulation behind the granite panels and firestopping at each floor line. Following the completion of the repair documents and bid period the same contractor initially retained by the owner to perform sealant repairs was awarded the repair contract and self-performed the majority of the repair scope. Special attention was given to preserving the use and safety of the building itself and surrounding sidewalks and street-sides during construction. A custom panel support-rig was fabricated by the contractor to remove transport and reinstall the granite panels. Construction administration services were provided by the A/E and included frequent site visits and inspections daily communications with the contractors foreman and project manager and bi-weekly construction progress meetings. Due to unforeseen conditions new details custom anchors and specialty product selections became key tasks for both the A/E and contractor.

### **Abstract**

Located across the street from Illinois Old State Capitol Building the deterioration and disengagement of granite panel anchors created a monumental safety concern for the PNC Bank Building. Replacement of all granite panel anchors was imperative to maintaining the life-safety of the building occupants and visitors of the Central Springfield Historic District. Elaborate stone testing was paramount in the reuse of existing granite utilizing a new fully mechanical anchoring system saving the owner a substantial amount of money and preserving the historic districts aesthetic. Sealant roofing insulation and firestopping replacement also helped in prolonging the life of this significant structure.

### **Unforeseen Conditions:**

- Panel Support Angle Modifications (due to varying locations of existing structural elements) - Lateral Support Frames (due to varying locations of existing structural elements) - Column Cover Support Modifications - Fireproofing Replacement (where existing fireproofing eroded away) - Unfireproofed Structural Steel - EPDM Roofing Replacement - Additional Flashing Necessary at Multiple Roof Levels - Soffit Panel Anchor Repairs and Replacement - Fragment/Dutchman Repair of Cracked Granite Panels

### **Problems/Challenges/Solutions:**

The largest challenge was the fact that when the granite panels were removed the building was opened up to the weather. There were no backup walls behind the granite. The space behind the granite was an air plenum that circulated air

throughout the building. Once the panels were removed a temporary weather barrier was erected. Due to all the various repairs required behind the panels the temporary barriers had to be easily removable. The temporary barriers were reinstalled daily so areas of the facade were not left exposed overnight. Several different work scopes were required at each panel location prior to reinstalling the granite. The contractor self-performed all repairs one floor at a time in order to expedite the schedule. The contractor also fabricated all the stainless steel plates and anchors in-house which allowed a quick turnaround following the granite panel removal. The replacement granite came from Finland which took several weeks to receive. The contractor ultimately replaced approximately 15 of the 1 050 panels removed. The contractor also needed to perform fireproofing replacement and installation on un-fireproofed structural steel elements which involved the procurement of and training of staff on new equipment.

**Safety Considerations (public/property/hours accident free, etc):**

Because of the buildings location adjacent to frequently visited sites in Springfield the owner requested that all repairs be performed while the building was occupied without any major disruptions to the building tenants or closing of public sidewalks major building entrances tenant spaces or parking surfaces. This meant that special considerations were necessary to protect the safety of the public and preserve the surrounding downtown Springfield area. Temporary fencing was erected around the building to keep the public out of the work areas and engineered canopy systems were installed at the building entrances in accordance with the requirements of the City of Springfield. The larger granite panels weighing approximately 360 pounds each were difficult to maneuver on the swing stages. Additionally the tight tolerances with the windows above and below the panels increased the level of difficulty. Trolley and hoist systems were erected at the roof in order to safely move the panels. At the lower few floors the panels were lowered down to the ground for repairs. At the upper floor levels the panels were taken up to the roof for repairs. A custom panel support-rig with supplemental suction cups was fabricated by the contractor to remove transport and reinstall the granite panels.

**Community/Environmental Impact:**

The PNC Bank building is located in the Central Springfield Historic District and is adjacent to well-known and frequently visited landmark sites such as Lincoln Library and Old State Capitol Building therefore it was very important to maintain the aesthetic and integrity of this structure and the surrounding downtown area. Special attention was given to preserving the use and safety of the building itself and the surrounding sidewalks and street-sides. Temporary fencing and rigging had to be removed from the site periodically during

parades and other special events occurring in the Central Springfield Historic District. Special attention was also given to maintaining a clean and aesthetically pleasing work zone at the ground level and minimizing construction dust and debris.

#### **Technology/Innovation:**

Communication and the instantaneous transfer of photographs and details between the contractor and the A/E was critical for this project. There were several details that were not constructed according to the original design documents and the locations of many structural elements varied which resulted in several anchorage changes. Special rigging panel support-rigs and tools were designed fabricated and utilized by the contractor to safely and efficiently handle the 1 050 granite panels and several soffit panels. Adjustable panel supports and anchor designs were incorporated into the design to aid in the constructability and allow for the varying existing conditions.

#### **Site Constraints**

The PNC Bank buildings site consists of public streets to the south and west a parking lot to the north and an abutting building on the east side of the building. The abutting building which was occupied by a museum was losing funding and in transition mode. At first the buildings owner would not allow the contractor and A/E on their roof in order to access the exposed upper three floors of the PNC Bank building to perform repair work. Luckily during the course of the project a new building management team was put in place who granted the contractor permission to access their roof as long as any roof damages that occurred were addressed. Other constraints included the active alley to the north and requiring the contractor to keep access open to hydrants at all times for the fire department.

#### **Quality Control/Field Testing**

Weekly site visits were performed by the A/E. During the site visits the A/E along with the project foreman would perform inspections of installed anchors and panel supports as well as verify the locations of existing structural elements to be used for new panel supports. Existing fireproofing was inspected to assess the condition of the material and determine if additional fireproofing was necessary. The A/E and project foreman also performed inspections of installed firestopping mineral wool and silicone sealants. Silicone sealant pull tests of each type of joint were performed on every building drop in accordance with published manufacturer recommendations. Panels cracked during removal were assessed and frequently repaired using a

Dutchman repair method with reinforcing rods. Work found not in conformance with the repair documents or manufacturer recommendations was noted and replaced by the contractor.

### **Rigging Approach**

Mast climbers were originally considered as an option for this project but were ruled out due to vaulted sidewalks on two sides of the building. Suspended scaffolds were instead used for five separate drops on the north and south elevations and 3 separate drops on the east and west elevations totaling 16 suspended scaffolding drops. There were very few safety tieback options on the roof of the PNC Bank Building. Early on the contractor proposed that the building owner install a permanent structure for tiebacks. The owner decided not to proceed with the system due to mandated annual inspections and certifications that would be required. Ultimately the anchor points were tied back to the skylight curb structure for the majority of the suspended scaffold drops and the remaining anchor points were tied back to Jersey barriers located on grade level on the opposite side of the building.

### **Sustainment**

Repair design product selection contractor selection and construction quality control and field testing were all focused on prolonging the life of the building. Stainless steel anchors and panel supports were utilized for panel repairs and high quality silicone sealants flashings and coatings waterproof membranes fireproofing firestop and insulation products were utilized for the building repairs to help prolong the life of the PNC Bank Building. The elaborate in-house stone testing program allowed reuse of the existing granite panels and incorporated a fully mechanical anchoring system to replace the existing liner block anchors preserving the aesthetic and safety of the Central Springfield Historic District.

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**Image File**

[PNC Bank Building Facade Restoration Photos.zip](#)

**Fees**

Base Entry Fee: \$200  
Total: \$200