

Minnesota State Capitol Exterior Stone Repair Project

Presentation to CAAPB, SHPO, MHS and
DOA Representatives
December 19, 2012



Minnesota State Capitol (1899-1904)

White Georgia Marble

Amicalola Quarry – Pickens County, Georgia

Diamond Pink Granite

St. Cloud, Minnesota



MN State Capitol Stone Repair

Project Overview

Planning Considerations

Team

Repair Trials

Video

Evaluation of Repair Strategy Effectiveness

Case Studies

Documentation

Preservation Planning

Project Overview

Primary Objectives

- Life Safety - Maintain Public Safety
- Water management- Restore Building Integrity
- Building stewardship- Preserve



Planning Considerations

- Should we test different repair approaches?
- What is the right balance of maintaining historic fabric and loss of integrity?
- What is the acceptable minimum effort required to protect the building?
- To what extent is modification or reshaping of historic material appropriate?
- What determines an acceptable level of convincing detail?
- When is replacement necessary/acceptable?
- How will new work be distinguished from and/or fit in with historic material?
- Should new work be distinguishable from original?
- What can we do to extend the longevity of the marble?



Exterior Stone Team

Architects & Engineers

- HGA, Inc.
- Wiss, Janney, Elstner (WJE)

Contractors

- JE Dunn (CM)
- Mark 1 (Installation)
- Advanced Masonry Restoration (Repairs)
- Polycor (Marble Supplier)
- Traditional Cut Stone (Decorative Carving)
- Twin City Tile and Marble (Field Measuring)



Minnesota State Capitol Exterior

Subcontractor qualification

- Mark 1 (Chicago, IL)
- Polycor (Quebec, Canada)
- Traditional Cut Stone (Toronto, Canada)

Stone procurement

- Georgia Marble (Pickens County, GA)



Stone Repair Trials

2012 (Phase 1): Stone Repair Trials and Mock-up Evaluation

Start October 22, 2012 – complete mid January 2013.

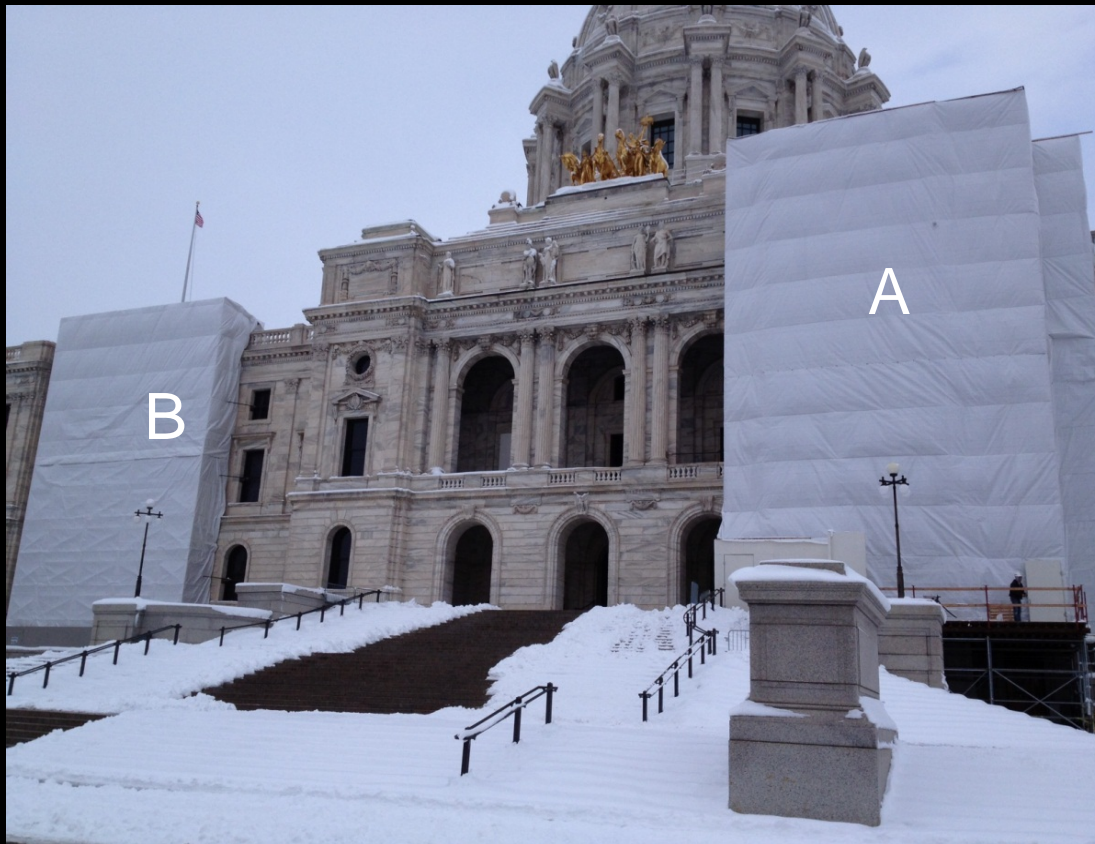
Initial Review - December 2012

The most effective way to fully evaluate the complexities for a restoration project of this magnitude is to execute a wide range of trial repairs and mock-ups on site.

Trial areas were established to demonstrate the following :

- Constructability of various techniques
- Effectiveness of suggested repairs
- Visual appearance of the overall result

Trial Areas



Area A- East Elevator

Chosen for unique character defining historic features (low relief and ornate carved details)

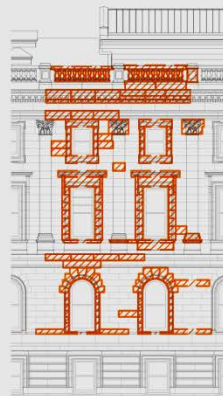
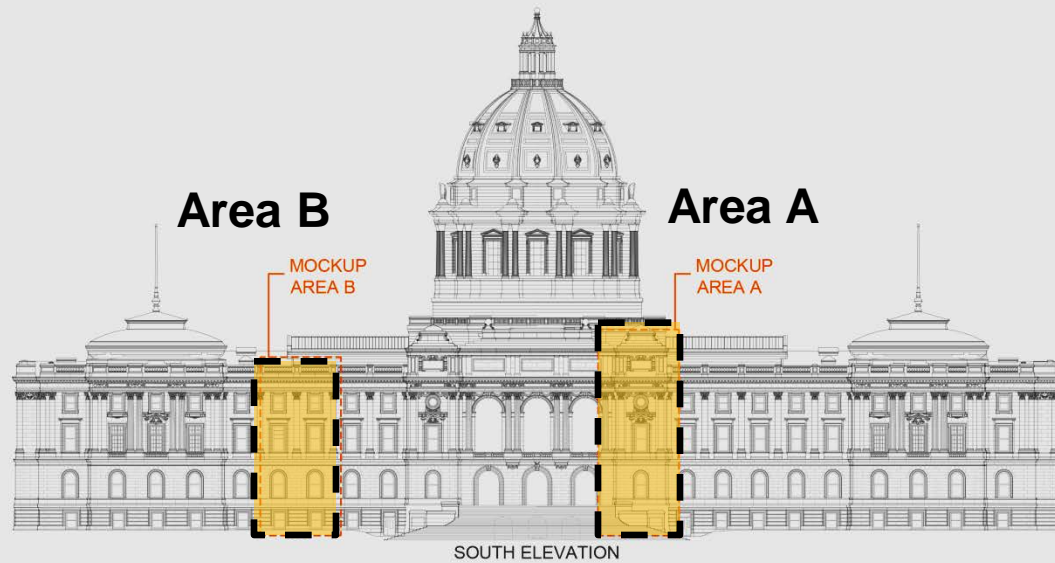
Atypical, but serious, masonry conditions added incentives for further investigation:

- Prolonged water infiltration
- Backup masonry deterioration
- unit displacement

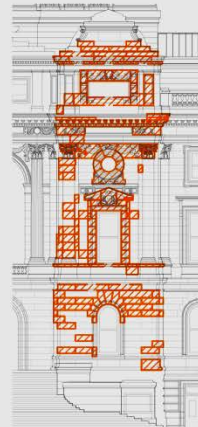
Area B – West Wing South

Chosen as a typical building bay:

- Demonstrates full range of anticipated repair conditions
- Southern exposure is more vulnerable to cumulative effects of thermal hysteresis



MOCKUP AREA B -
West Wing (South)



MOCKUP AREA A -
East Elevator Tower



SOUTH ELEVATION

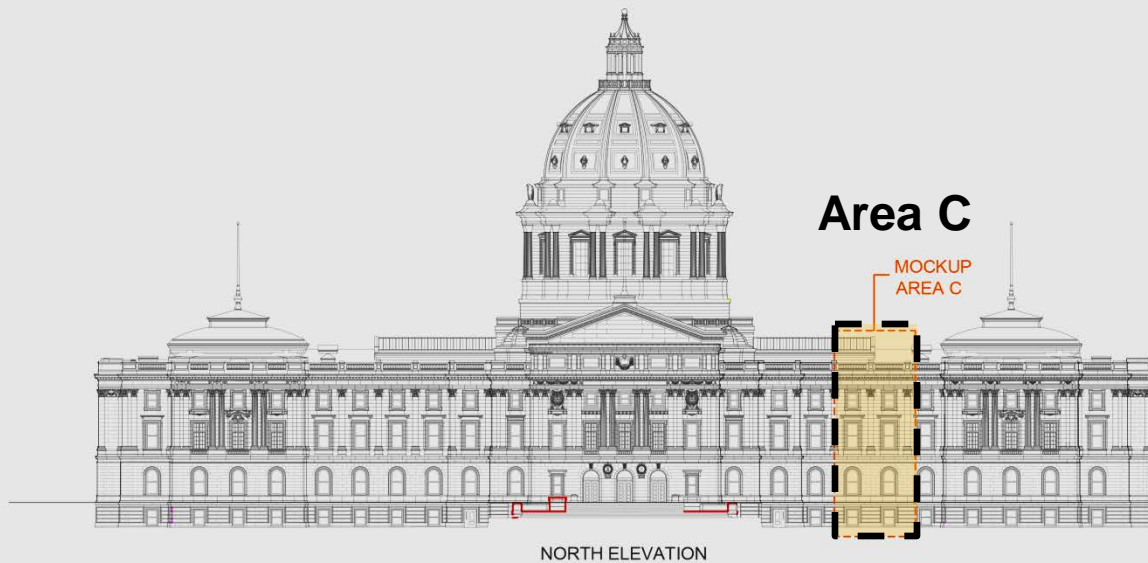
CP-S1

WJE | ENGINEERS
ARCHITECTS
MATERIALS SCIENTISTS

MINNESOTA STATE CAPITOL
EXTERIOR STONE REPAIR
STONE REPAIR TRIALS & TESTING

ST. PAUL, MINNESOTA
RECS PROJECT #02CB0022

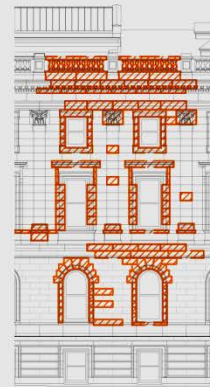
hga
Architecture | Engineering | Planning
Hammel, Green and Abrahamson, Inc.
420 5th Street North - Suite 100



Area C – West Wing North

Chosen as a typical building bay:

- Demonstrates full range of anticipated repair conditions
- Northern exposure is subject to high moisture levels, slower drying and extensive biological growth



CP-S1

NORTH ELEVATION

WJE | ENGINEERS
ARCHITECTS
MATERIALS SCIENTISTS

MINNESOTA STATE CAPITOL
EXTERIOR STONE REPAIR
STONE REPAIR TRIALS & TESTING

ST. PAUL, MINNESOTA
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VIDEO

Perspective

- Close range review – critical observations, detail-based
- Distance viewing – general overview, impression-based

Area A- scaffolding was removed this week.

Areas B & C- scaffolding will come down mid-January

Refer to separate video posting.

Evaluation of Repair Strategy Effectiveness

Life Safety
Building Integrity / Water Management
Historic Preservation
Historic Character
Long Term Stewardship



Life Safety

Architectural features: Displaced units, column capital elements, balustrade components

Problem Summary:

- It is nearly impossible to fully assess integrity based on visual observation alone
- Unstable units and units with unsound material are identified and stabilized as part of an ongoing evaluation process
- All identified life safety issues will be corrected
- Strategies for repair vary widely, ranging from conservative repair to aggressive replacement.
- Each situation is unique, there is no one size fits all solution.

Additional factors for consideration:

- Overall visual character
- Long term stewardship of the building



East elevator cornice (top view) – identified in 2010 as possible life safety concern



East elevator cornice (side view) – vein erosion and diagonal cracking

Life Safety – Case 1

Location: South entry - east elevator

Problem Summary:

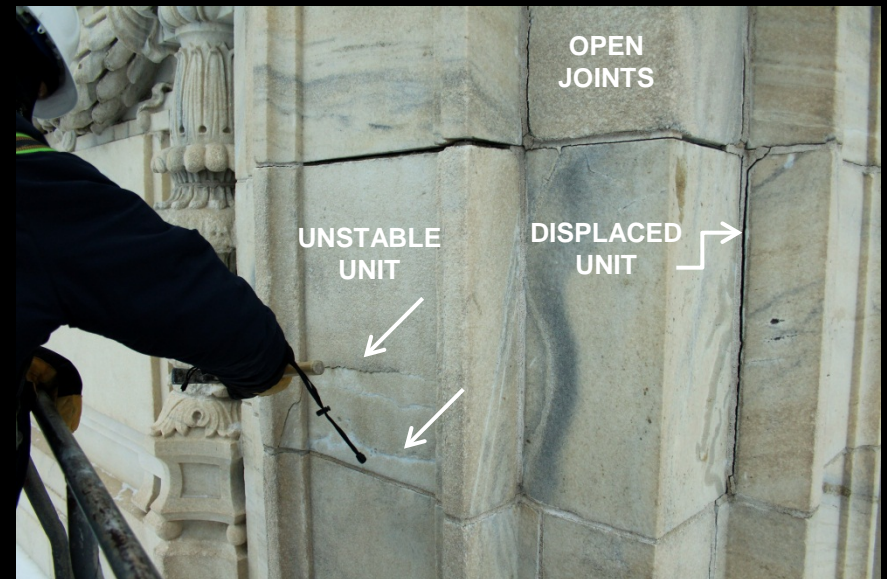
- The east elevator has been subjected to long term water infiltration from above.
- Back-up masonry is saturated and never completely dries.
- Brick and stone show evidence of freeze/thaw damage.
- Stone anchors are corroded and embedded.
- Freeze/thaw expansion is causing several units to shift outward.

Additional factors for consideration:

Location is immediately above public access (drive lane to Porte Cochere).



East elevator pilaster (side view) – identified in 2010 as life safety item



East elevator cornice (front view)

Life Safety – Case 1

Repair / Restoration Strategies:

- Option A – Minimal intervention. **Original stone is retained**. Emergency repair remains in place as is.
- Option B- Aggressive intervention. **Original stone is replaced** with new material to match existing.



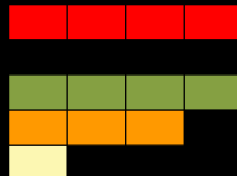
East elevator pilaster– emergency repairs 2010

Option A

- + Unit is secure for now
- + Original material remains in place
- + Visually unobtrusive
- Brick back-up deterioration is not addressed
- Material is still compromised
- Stone will continue to deteriorate
- Frequent inspection is required

Option A – 12 pts

Life Safety
Building Integrity / Water Management
Historic Preservation
Historic Character
Long Term Stewardship



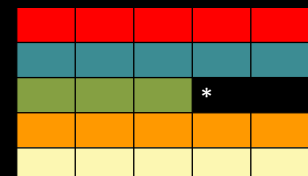
East elevator pilaster - unit replacement 2011

Option B

- + Satisfies all criteria
- New stone stands out against adjacent weathered material (may be non-issue when building is cleaned)
- * Affords better protection for historic material below

Option B– 23 pts

Life Safety
Building Integrity / Water Management
Historic Preservation
Historic Character
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Life Safety – Case 2

Architectural feature: Column and pilaster capitals

Problem Summary:

Highly carved elements consistently demonstrate the most severe damage and loss of detail.

- Projecting units have larger surface areas exposed to damaging climate factors.
- Ornately carved features are more vulnerable to distress than are flat surfaces.
- Original carving practices exacerbate naturally occurring micro-fractures – stone is more vulnerable to water infiltration.

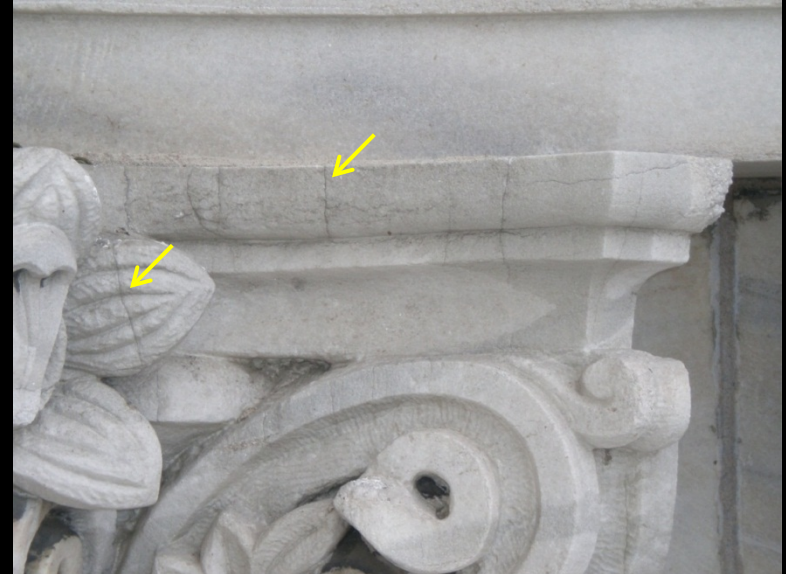
Additional factors for consideration:

Important character defining feature. Location is immediately above areas of public access (entries, terraces, Quadriga)

Notes: Condition varies widely from column to column



West Façade column capital – missing and unstable acanthus leaves



North Façade pilaster capital – Micro-fractures and minor cracking

Life Safety – Case 2

Preservation Strategies (east elevator pilaster capital):

- Option A – Conservative. Unstable elements are removed as life a safety precaution. Granulation and eroded surfaces are left as is.
- Option B- Minimal intervention. Loose, granulated material is removed. No replacement

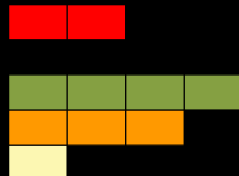


Option A

- + Natural aging and weathering processes is accepted
- Material continues to deteriorate
- Frequent inspection is required

Option A – 10 pts

Life Safety
Building Integrity / Water Management
Historic Preservation
Historic Character
Long Term Stewardship

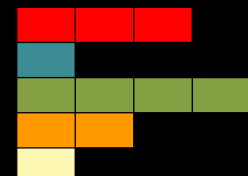


Option B

- + Minimal intrusion, marginal improvement in overall integrity
- Material continues to deteriorate
- Frequent inspection is required

Option B– 11 pts

Life Safety
Building Integrity / Water Management
Historic Preservation
Historic Character
Long Term Stewardship



Life Safety – Case 2

Preservation Strategies (south façade pilaster capitol):

- Option C – Moderate-high intervention. Eroded surfaces are **smoothed & carved**. Unstable elements are **removed and replaced**.

Note: Deep deterioration required more extensive removal of original material than was originally assumed.

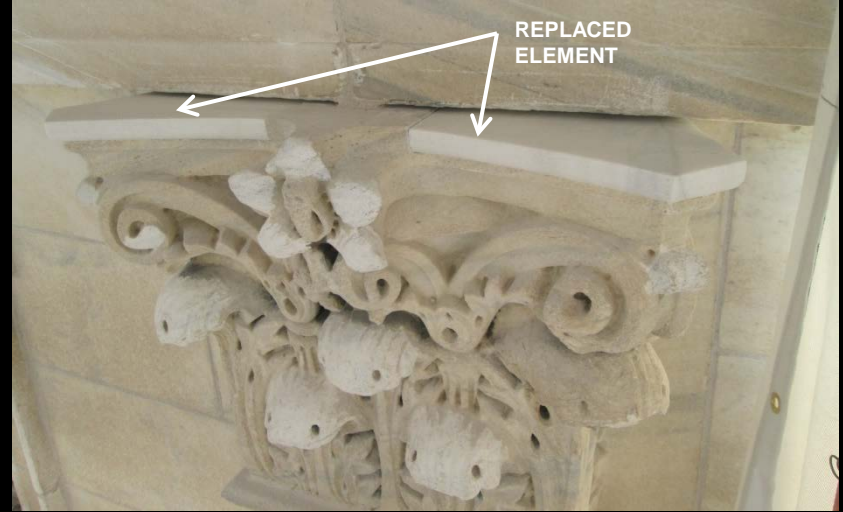
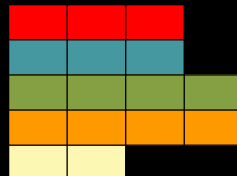


Option C (initial assumption)

- + Historic material is retained as much as possible
- + Improved water management and surface protection
- Weathered material is interspersed with fresh stone

Option C – 16 pts

Life Safety
Building Integrity / Water Management
Historic Preservation
Historic Character
Long Term Stewardship



Option C (field revisions)

- + Historic material is retained as much as possible
- + Improved water management and surface protection
- Weathered material is interspersed with fresh stone

Option C– 18 pts

Life Safety
Building Integrity / Water Management
Historic Preservation
Historic Character
Long Term Stewardship



Life Safety – Case 2

Restoration Strategies (north façade pilaster):

- Option D- High intervention. Extensive replacement
- Option E- Extreme intervention. Full replacement



Option D –

- + Historic material is retained as much as possible
- + Improved water management and surface protection
- Weathered material is interspersed with fresh stone
- Constructability issues: difficult stone prep, additional joints

Option C – 19 pts

Life Safety
Building Integrity / Water Management
Historic Preservation
Historic Character
Long Term Stewardship

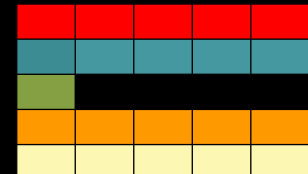


Option E –

- + Satisfies all criteria
- + Restores Character
- + Simplifies construction: unified installation
- Loss of original material
- Constructability issues: size and weight increases substantially

Option D– 21 pts

Life Safety
Building Integrity / Water Management
Historic Preservation
Historic Character
Long Term Stewardship



Building Integrity / Water Management

Architectural features:

- Vertical - Fascia bands, drip edges, pediment returns, balustrade caps
- Horizontal - Wash bands, cornice ledges, window hoods, sills

Problem Summary:

- Horizontal surfaces and vertical faces of projecting bands and ledges are subject to long periods of water saturation and repeat wetting/drying cycles
- Drip edges are particularly vulnerable to freeze/thaw damage.
- Thin profiles and exposed edges are particularly vulnerable to water damage and the cumulative effects of thermal hysteresis
- Building Integrity and water related issues will be corrected to prevent further damage from occurring.
- Strategies for repair will vary widely depending on constructability

Additional factors for consideration:

Location, access, original construction, size



South cornice fascia w/ failed joint



South window hood drip edge
(previous patch repair at corner)

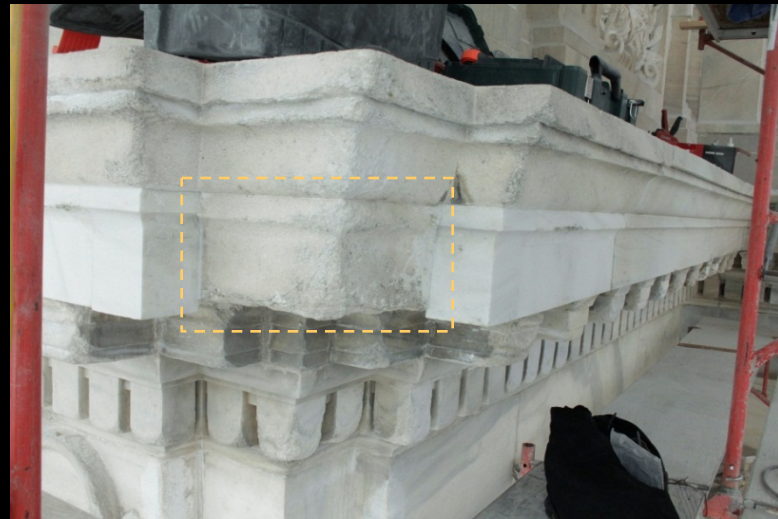


South loggia balustrade rail cap. Balusters were replaced several years ago

Building Integrity / Water Management - Case 3

Restoration Strategy for vertical water-shedding components (typical outside corner)

- Option A – Aggressive Intervention. Damaged material is **removed** and **restored** with new stone Dutchman replacement.
- Option B – Cementitious patch repairs are no longer acceptable in these locations. Previous patch repairs may actually have accelerated damage to adjacent stone.



Note: Inside corner (shown dashed) is scheduled for future replacement

Option A

- + Original material is left in place to the greatest extent possible.
- + New work is integrated with existing material at logical breaks, recesses or changes in profile
- Weathered material is left in place above new work, deterioration will continue at a different (faster) pace than new material
- Removal of sound material is sometimes required to maximize performance, provide visual consistency and/or preserve character

Option A – 20 pts

Life Safety

Building Integrity / Water Management

Historic Preservation

Historic Character

Long Term Stewardship



Building Integrity / Water Management - Case 4

Restoration Strategy for vertical water-shedding components (pediment return)

- Option A – Aggressive Intervention. Damaged material is **removed** and **restored** with new stone Dutchman replacement.
- Option B – Cementitious patch repairs are no longer acceptable in these locations. Previous patch repairs may actually have accelerated damage to adjacent stone.



Option A

- + Original material is left in place to the greatest extent possible.
- + New work is integrated with existing material at logical breaks, recesses or changes in profile.
- Removal of sound material is sometimes required in order to maximize performance, provide consistency and preserve character.

Option A – 22 pts

Life Safety

Building Integrity / Water Management

Historic Preservation

Historic Character

Long Term Stewardship



Note: Deterioration was more extensive than initially assumed. The entire length of the return will be replaced in the future (area shown dashed)

Building Integrity / Water Management - Case 5

Protect and Repair Strategy for horizontal components (cornice wash ledge) :

- Option A –Localized repair stabilizes damaged material. May be appropriate where constructability prevents replacement.
- Option B – Protection. New materials are introduced to **protect** original material.

Note: Replacement, although on option, may not be practical due to constructability issues (original construction, size, weight, location)



Option A

- + Original material is retained.
- Repairs may not address full extent of damage material.
- Routine inspection and ongoing repair are required

Option A – 14 pts

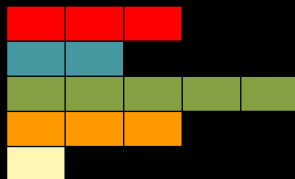
Life Safety

Building Integrity / Water Management

Historic Preservation

Historic Character

Long Term Stewardship



Option B

- + Original material, weathered or damaged, is retained but **protected**
- + Water management is improved.
- Installation may require alteration to existing material.
- New materials may alter historic appearance

* Compatibility could be an issue

Option B – 14 pts

Life Safety

Building Integrity / Water Management

Historic Preservation

Historic Character

Long Term Stewardship



Building Integrity / Water Management - Case 6

Protect and Repair Strategy for horizontal components (window hood)

- Option A –Localized repair stabilizes damaged material. May be appropriate where constructability prevents replacement.
- Option B – Protection. New materials are introduced to **protect** original material.

Note: Feature exceeds maximum length that can be cut from typical quarried block. Replacement units would have to be installed in two pieces or opportunities for custom cut blocks would have to be explored



Option A

- + Original material is retained
- Repairs may not address full extent of damage material.
- Routine inspection and ongoing repair are required

Option A – 14 pts

Life Safety

Building Integrity / Water Management

Historic Preservation

Historic Character

Long Term Stewardship



Option B

- + Original material, weathered or damaged, is retained
- + Conservative protective measures are typically reversible
- Installation may require alteration to existing material
- New materials may alter historic appearance

* Compatibility could be an issue, additional testing required

Option B – 14 pts

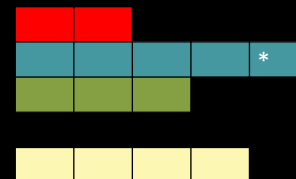
Life Safety

Building Integrity / Water Management

Historic Preservation

Historic Character

Long Term Stewardship



Building Integrity / Water Management - Case 6

Note: For the trials, installation of new material was accomplished without altering historic material. All fasteners and cleats were inserted in joints. For future consideration, in some cases the closest joint is over a foot above the horizontal surface. To minimize visual impact in these locations, cutting a reglet into existing material may be an acceptable alternative.



a. Flashing is wrapped and formed over edge of wash ledge to create a friction fit in lieu of fasteners



b. Cleats are inserted in joints and flashing is attached to cleats



c. Fasteners are inserted in joints. Flashing is custom fit on site to conform to original shape and profile

Building Integrity / Water Management - Case 7

Preservation Strategy for ashlar units with rough, eroded or pitted surface texture:

- Option A – Protect. Mild grinding and smoothing of weathered surfaces to improve water runoff. Margins are **re-carved and trued** uniformly **to an established line**.
- Option B – Aggressive grinding and smoothing of weathered surface. Surface deterioration is removed to sound stone and surfaces are **re-carved and blended** to transition to adjacent material.



Option A

- + Original material, weathered or damaged, is retained
- + Perceived character is improved
- Light repairs may not address full extent of damage material

Option A – 15 pts

Life Safety
Building Integrity / Water Management
Historic Preservation
Historic Character
Long Term Stewardship

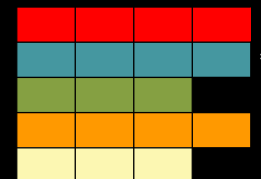


Option B

- + Original material is retained
- + Water-shedding capabilities and surface durability are improved
- Removal of deeply eroded material may trigger replacement.*

Option B– 18 pts

Life Safety
Building Integrity / Water Management
Historic Preservation
Historic Character
Long Term Stewardship



Building Integrity / Water Management - Case 8

Preservation Strategy for window surround units with rough, eroded or pitted surface texture:

- Option A – Protect. Mild grinding and smoothing of weathered surfaces to improve water runoff. Margins are **re-carved and trued** uniformly **to an established line**.
- Option B – Aggressive grinding and smoothing of weathered surface. Surface deterioration is removed to sound stone and surfaces are **re-carved and blended** to transition to adjacent material.



Nearly ¼” of surface material has been removed which is noticeable when viewed from the side

Option A

- + Original material, weathered or damaged, is retained
- + Perceived character is improved
- Light repairs may not address full extent of damage material

Option A – 17 pts

Life Safety

Building Integrity / Water Management

Historic Preservation

Historic Character

Long Term Stewardship



Option B

- + Original material is retained
- + Water-shedding capabilities and surface durability are improved
- Dimensional variability from unit to unit, scalloped effect
- Removal of deeply eroded material may trigger replacement.*

Option B– 17 pts

Life Safety

Building Integrity / Water Management

Historic Preservation

Historic Character

Long Term Stewardship



Building Integrity / Water Management - Case 8

Preservation Strategy for window surround units with rough, eroded or pitted surface texture



- Option A – Protect. Mild grinding and smoothing of weathered surfaces to improve water runoff. Margins are **re-carved and trued** uniformly **to an established line**.
- Option B – Aggressive grinding and smoothing of weathered surface. Surface deterioration is removed to sound stone and surfaces are **re-carved and blended** to transition to adjacent material

Historic Character

Architectural features: High and low relief sculptural panels, decorative brackets, statuary, balustrade railings

Problem Summary:

- Highly carved, ornate elements typically have **the most severe damage**.
- Delicate carved features and thin profiles are vulnerable to effects of thermal hysteresis.
- Micro-fractures occur naturally in marble but original carving techniques and heightened exposure to weather related stresses cause these cracks to widen over time and the process of deterioration accelerates
- Ornate features are **typically located in highly visible areas** and are **often directly above public access**
- Although sometimes life safety concerns, rarely do decorative elements effect general building performance.
- Loss of detail does affect **perception of building integrity** and historic character

Additional factors for consideration: Constructability, cost, historic value



East elevator – east façade high relief detail



East elevator – south façade high relief detail

Historic Character - Case 9

Preservation Strategies : Balusters

- Option A – Protect. Mild grinding and smoothing of weathered surfaces. Profiles are re-carved to blend with adjacent units.
- Option B – Replacement of deteriorated balusters.

Note: White Georgia marble was not available when previous unit replacement was undertaken. Balusters were replaced with Cherokee white and Cherokee grey marble which are not visually compatible. *



Option A

- + Original material is retained and repaired as required
- + Redressing restores honed surface finish, blends well with new work

Option A – 25 pts

Life Safety
Building Integrity / Water Management
Historic Preservation
Historic Character
Long Term Stewardship



Option B

- + New White Georgia marble blends with resurfaced historic stone
- Deconstruction of balustrade system to replace individual units may cause additional damage

Option B– 19 pts

Life Safety
Building Integrity / Water Management
Historic Preservation
Historic Character
Long Term Stewardship



Historic Character - Case 10A

Various Strategies : High and Low Relief Carved Detail (east elevator medallion)

- Option A – Protect. Mild grinding and smoothing of weathered surfaces. Features are re-carved to removed surface deterioration.



Option A

- + Original material is retained
- + Re-carving restores honed surface finish
- Light repair may not remove full extent of damage material.

Option A – 14 pts

Life Safety

Building Integrity / Water Management

Historic Preservation

Historic Character

Long Term Stewardship



Historic Character - Case 10A

Various Strategies : High and Low Relief Carved Detail (various features - east elevator)

- Option A – Protect. Mild grinding and smoothing of weathered surfaces. Features are **re-carved** to removed surface deterioration.



East elevator – corner pilaster fleuron



East elevator – east façade pilaster acanthus leaves



East elevator – east façade high relief detail



East elevator – south façade high relief detail

Historic Character - Case 10B

Various Strategies : High and Low Relief Carved Detail

- Option B – Restore. Missing detail is replaced with newly carved detail.

Note: Adjacent features in this location have deep erosion, removal of loose material will result in significant loss of detail.

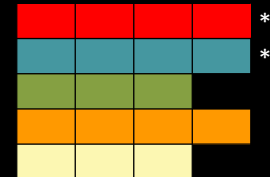


Option B

- + Character is restored
- Original material is removed in order to reach sound stone
- * Loss of adjacent material could effect durability/stability of new installation

Option B– 18 pts

Life Safety
Building Integrity / Water Management
Historic Preservation
Historic Character
Long Term Stewardship



Historic Character - Case 11

Restoration Strategy : Scrolls

- Option A – Protect. Mild grinding and smoothing of weathered surfaces.
- Option B – Replacement. Partial or full replacement where detail is missing.



Option A

- + Original material is retained
- Detail is lost



Option B

- + Character is preserved
- Original material is lost
- * Dependent on extent of weathered material left in place

Option A – 10 pts

Life Safety
Building Integrity / Water Management
Historic Preservation
Historic Character
Long Term Stewardship



Option B– 21 pts

Life Safety
Building Integrity / Water Management
Historic Preservation
Historic Character
Long Term Stewardship







Documentation

Documentation of existing conditions

1. Field Condition assessment (HGA-2010, WJE-2011, HGA / WJE-2012)
 - Hand annotated notes on field drawings
2. Laser scanning - 3D of the exterior (Clark Engineering)
 - Accuracy is equipment dependent (+/- 6")
 - Field verification is required
3. 2D Cad background drawings (Clark Engineering)

Documentation of Repairs

4. Building Information Management (BIM) using highly customized CAD program
 - Identify, name and catalogue condition of every piece of stone on the building that requires work
 - Generate stone repair schedules (600 page schedule (11 x 17 sheets) estimated at completion)
 - Communicate repair recommendations graphically to contractors and client
 - Track status of repair work completed
 - Summarize recommended future work and maintenance schedule

AutoCAD Architecture 2011 S:\0...\A-Exterior Elevation-South_Central Core.dwg Type a keyword or phrase

Express Architectural Details HGA Tools

Home Insert Annotate Render View Manage Express Tools Architectural Details HGA Tools HGA Documentation My Ribbon

Design Display Extended Data

Space

CLASSIFICATION

Elevation Sheet Number	A445
Repair Package	CP-S1
Repair Tier	T1
Repair Type	New Stone
S1 Repair Decision	Accept
S1 Repair Status	By style ("Unspecified")
S2 Repair Decision	By style ("Unspecified")
S2 Repair Status	By style ("Unspecified")
Severity	Severe

DOCUMENTATION

Hyperlink	..\..\6. Construction A...
Notes	Total replacement - em...
Reference documents	(0)

PROPERTY SETS

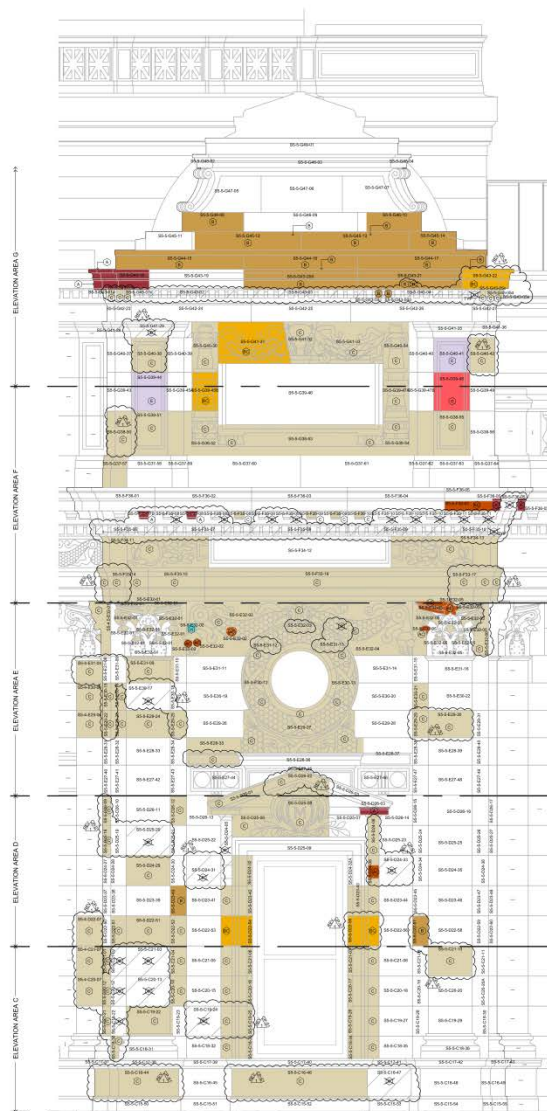
ElevationBlocks

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PlanLocator	S5
Bay	5
ElevationZone	G
Course	39
Block	48
Element	Pilaster
PayItem	
TCTM	B
RepairType	New Stone
RepairTier	T1
Severity	8
Condition_Unsound	True
Condition_DisplacedUnit	True
Condition_CrackedUnit	True
Condition_SpalledMaterial	False
Condition_SurfaceLoss	False
Condition_Anchors	False
Condition_PreviousRepair	True
Condition_SurfaceStaining	False
Condition_Other	False
Condition_Remarks	Emergency pin repair 2011
RepairPackage	CP-S1
Notes	Total replacement - emerg...
CornerBlockReference	
A_Strategy_DutchmanRepair	False
B_Strategy_CrackRepair	False

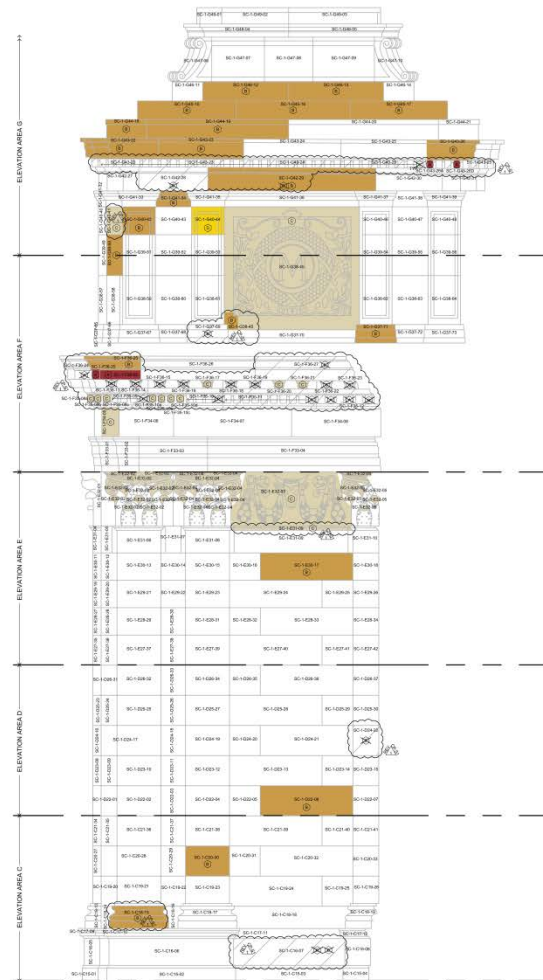
Model Work A445-S (1) A445-S (2) A445-S (3) A445-S (4) A445-S (5) Layout1 A445-CS (1) A445-CS (2) A445-CS (3) A445-CS (4) A445-C

SCAFFOLDING FASTENER DAMAGE

[illegible]



1 EAST ELEVATOR TOWER SOUTH ELEVATION BAY S5-5, SECTIONS C THROUGH G



2 EAST ELEVATOR TOWER EAST ELEVATION BAY SC, SECTIONS C THROUGH G

Repair Type	
	A/C/J
	A/C
	B/C
	A - Dutchman
	B - Crack Repair
	C - Carve/Smooth
	D - Pin Repair
	E - Remove/Reset Unit
	F - Repair/Rebuild Backup
	G - Unit Replacement
	H - Remove Metal Anchors
	I - Ledge Flashing
	J - Blotche
	C/J
	A/I
	B/I
	A/C/I
	B/C/I
	B/C/J

WJE ENGINEERS
ARCHITECTS
MATERIALS SCIENTISTS

HA
HARRISON ARCHITECTS
ARCHITECTS & INTERIORS
1000 E. WISCONSIN AVENUE, SUITE 100
MINNEAPOLIS, MN 55401
TEL: 612.464.1000 FAX: 612.464.1001

MINNESOTA STATE CAPITOL
EXTERIOR STONE REPAIR
CP-S1 - STONE REPAIR TRIALS & TESTING
RECS PROJECT PRO-0002

DESIGNED BY: WJE
DRAWN BY: WJE
CHECKED BY: WJE
DATE: 08/28/12
PROJECT NO: 0476-097-00

DESIGNED BY: WJE
DRAWN BY: WJE
CHECKED BY: WJE
DATE: 08/28/12
PROJECT NO: 0476-097-00

DESIGNED BY: WJE
DRAWN BY: WJE
CHECKED BY: WJE
DATE: 08/28/12
PROJECT NO: 0476-097-00

TRIAL REPAIRS & TESTING
DATE: 0476-097-00
SCALE: AS NOTED
DATE: AUGUST 28, 2012
DRAWN: GLACKOWICZ

**EAST ELEVATOR
TOWER ELEVATIONS
(DUTCHMAN REPAIRS)**
CP-S1
A445

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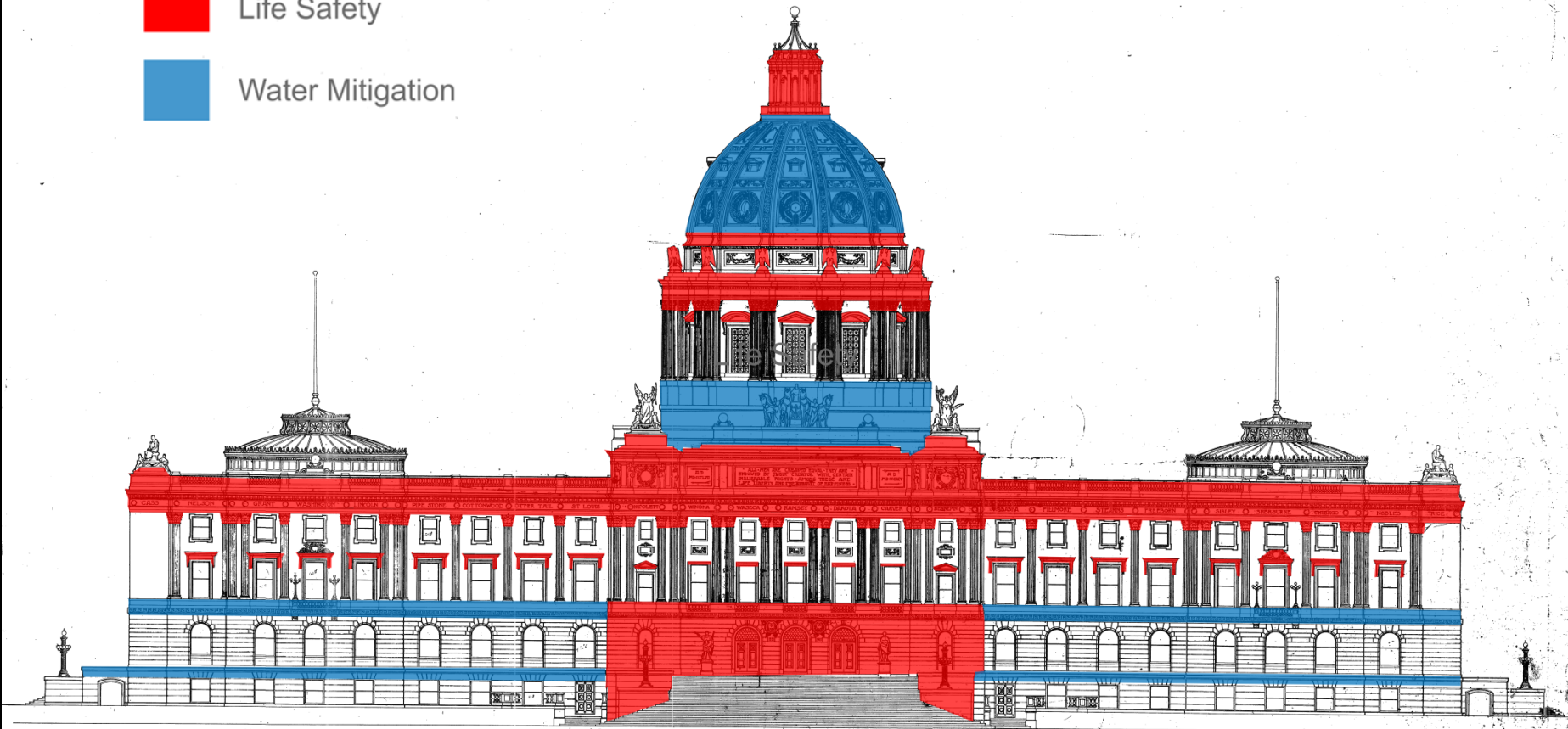
Preservation Planning



Life Safety



Water Mitigation



DESIGN FOR MINNESOTA STATE CAPITOL
- ELEVATION OF SOUTH FRONT -

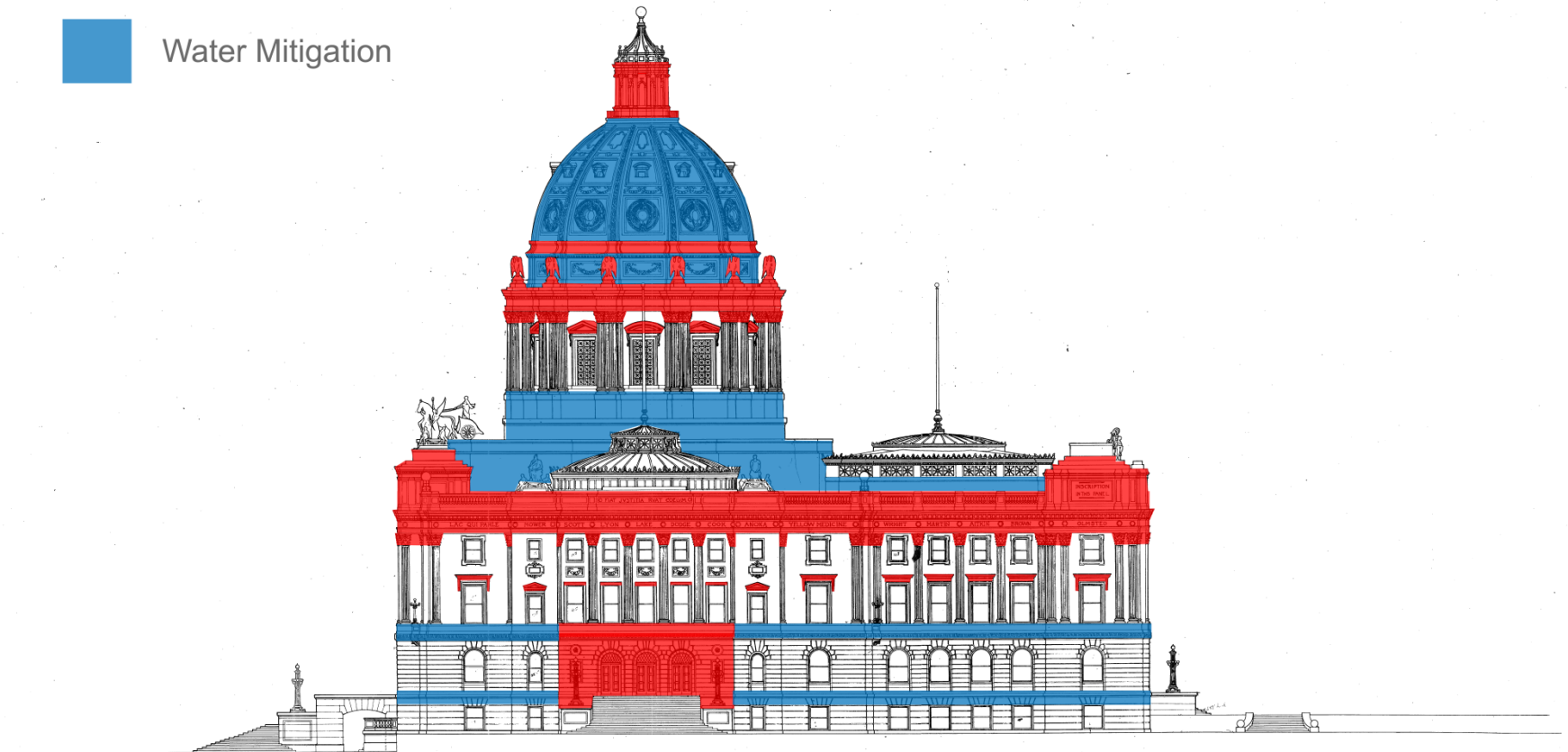
SCALE - 1/8" = 1' - 0"



Life Safety



Water Mitigation



DESIGN FOR MINNESOTA STATE CAPITOL
ELEVATION OF EAST FRONT

SCALE - 3/8" INCH = 1 FOOT

