WHEN HERITAGE MEETS CAPITAL PLANNING: MAKING DEFENSIBLE DECISIONS FOR HISTORIC & AGING BUILDINGS

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AGENDA

- Introduction
- Common Misconceptions
- Hidden Risks
- Traditional FCA Limitations for Historic Facilities
- Prioritizing Capital Investment
- Engineering vs. Organizational Expectations
- Adaptive Re-use
- Case Study
- Q & A and Resources

INTRODUCTION

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Andrej Culen
Service Lead, Structural Engineering

- Professional structural engineer, with 25 years of experience and knowledge in structural design, evaluation/ analysis, restoration and forensics of new and existing structures in steel, concrete, wood and masonry.
- Experience managing Structural Condition Assessments and Forensics for facilities and other infrastructure assets such as stadiums, post tension parking garages, retaining walls, historic wood structures.
- Responsible for Roth IAMS structural methodology and leads a team of 5 structural engineers to provide efficient, time sensitive, and cost-effective design/repair solutions.

MISCONCEPTIONS OF HISTORIC STRUCTURES

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MISCONCEPTIONS OF HISTORIC STRUCTURES

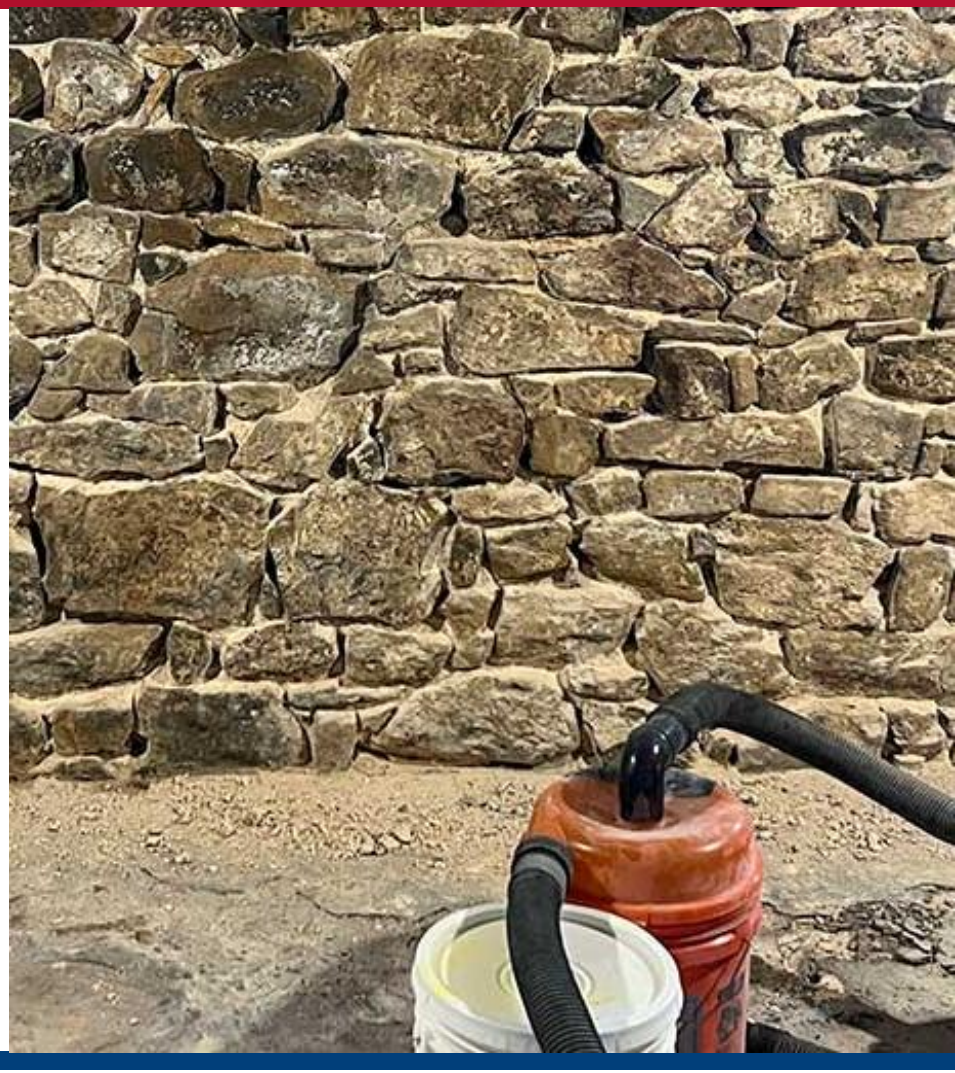
- Common misconception that shape organizational approaches to historic structures:
  - Financial & Economic
  - Regulatory and Developmental
  - Safety and Functionality
  - Preservation Process

FINANCIAL & ECONOMIC

- **Myth**: **It'll cost way too much to restore**
- **Reality**: rehabilitation often is 16% less in construction and 18% less in time compared to new construction

- **Myth**: **New construction is always better and more efficient**
- **Reality**: Older buildings often contain durable high-quality materials

- **Myth**: **Historic designation lowers property values**
- **Reality**: Stabilizes and often increases property values



REGULATORY & DEVELOPMENTAL

- **Myth: If a property is designated, it's protected forever/ cannot be demolished.**
- **Reality:** Only ensures stricter review process; does not prohibit demo

- **Myth: You can't change or update a historic building.**
- **Reality:** Interiors can typically be modernized, and additions permitted, with design considerations

- **Myth: Historic preservation halts progress and development.**
- **Reality:** Preservation guides development, integrating history, and boosting community appeal

SAFETY & FUNCTIONALITY

- **Myth: Older buildings are less safe.**
- **Reality:** Often perform better in natural disasters due to original higher quality materials.

- **Myth: You cannot make a historic building "green".**
- **Reality:** Existing buildings are often the most sustainable.

PRESERVATION PROCESS MISCONCEPTIONS

- **Myth: Preservation is only for national monuments and grand mansions.**
- **Reality:** Diverse building types, including factories, schools, and typical housing

- **Myth: Preservation is a one-time project.**
- **Reality:** Continuous stewardship, requiring ongoing, active management

- **Myth: You must recreate the original interior style.**
- **Reality:** Adaptive re-use allows for interior changes to meet modern needs

HIDDEN RISKS IN OLDER FACILITIES

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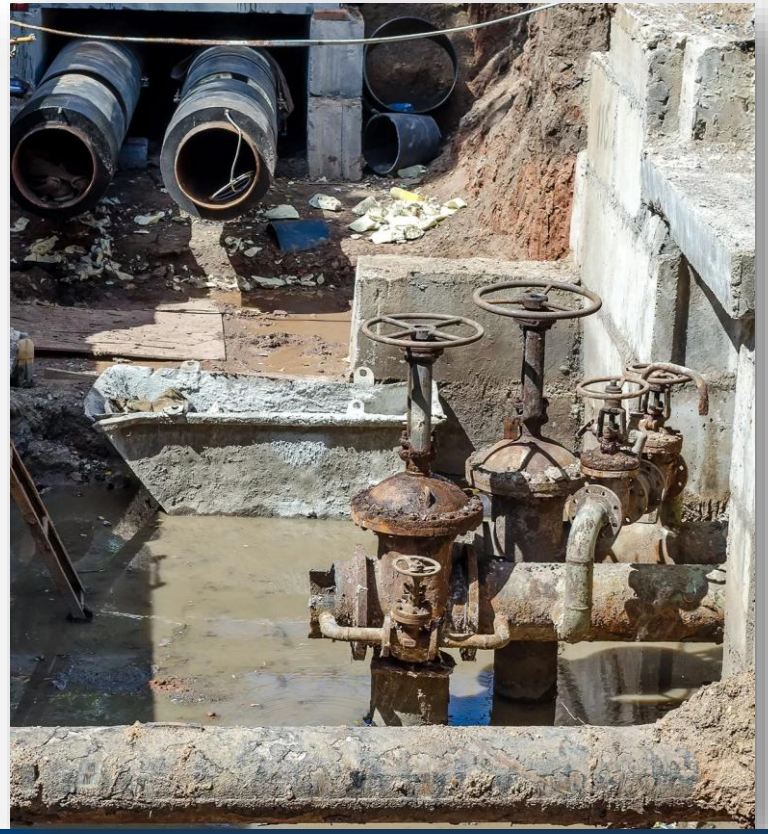
HAZARDOUS MATERIALS

- Asbestos
- Lead
- Mold & Rot

AGING INFRASTRUCTURE & UTILITY RISKS

- Outdated Electrical Systems
- Mechanical Failure
- Plumbing Corrosion

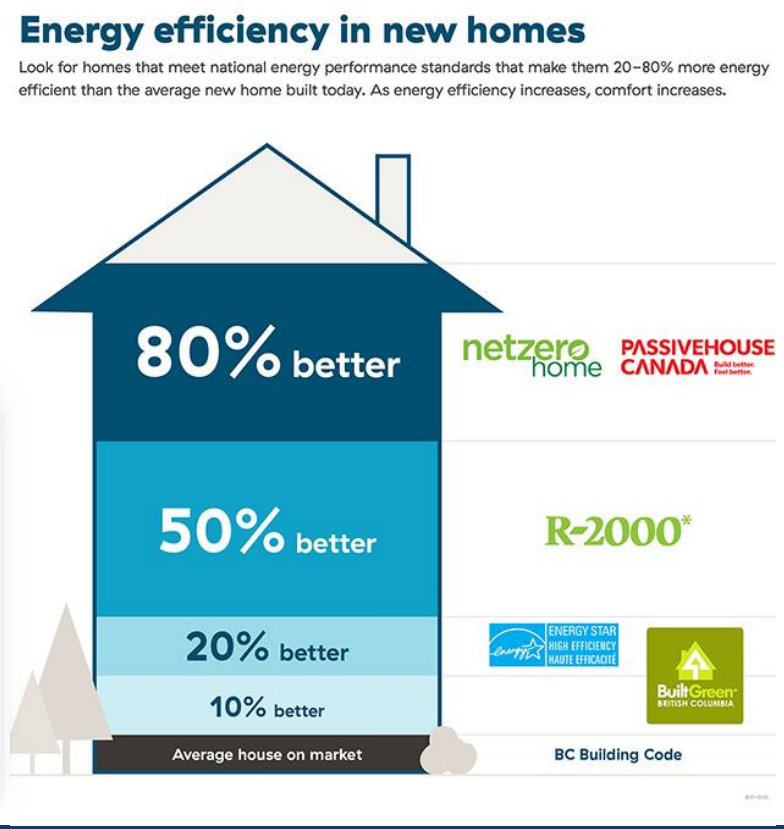


STRUCTURAL VULNERABILITIES

- Concrete and Foundation Degradation
- Steel Corrosion
- Connection
- Undocumented Changes
- Inadequate design for current usage

COMPLIANCE ISSUES

- Energy Efficiency Codes
- Fire Safety and Exit Compliance
- Accessibility Standards



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POLL

LIMITATIONS IN YOUR FACILITY CONDITION ASSESSMENTS (FCA) FOR HISTORIC BUILDINGS

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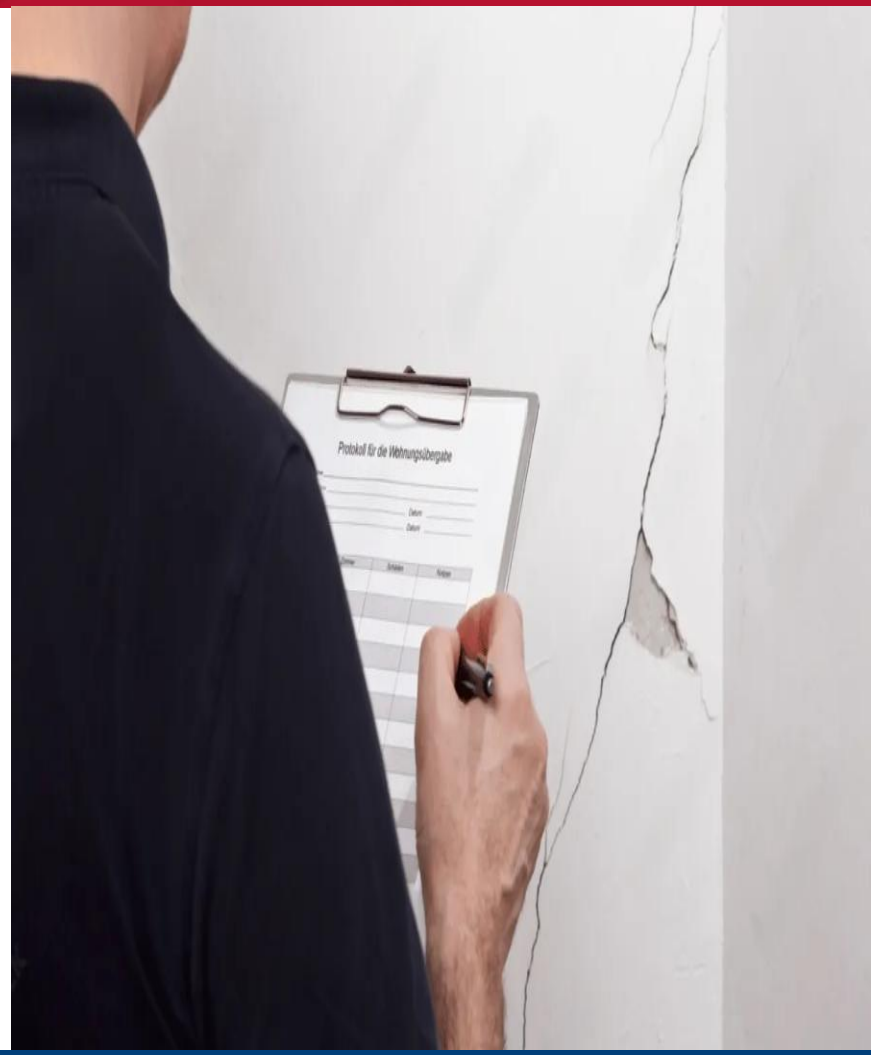
WHAT CAN BE MISSED FOR HISTORIC STRUCTURES IN FCAS?

- Material Compatibility
- Historic Significance and Craftmanship
- The Pathology of Decay

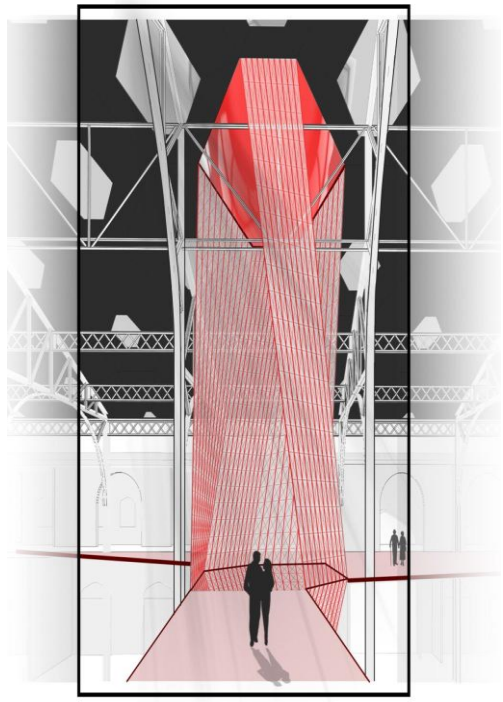


WHAT CAN BE MISSED FOR HISTORIC STRUCTURES?

- Code exemption nuances
- Specialized cost multipliers

- Capturing Historic Repairs for period-accurate materials
- Costs for engaging specialized conservators

- **Pair an FCA with a comprehensive Historic Structure Report**



PRIORITIZING CAPITAL INVESTMENTS FOR HISTORIC BUILDINGS

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PRIORITIZING CAPITAL INVESTMENTS

- **For Historic Buildings:**
  - Need to prioritize capital investments relying on multi-criteria frameworks
- **While balancing:**
  - Lifecycle maintenance
  - Cultural Significance
  - Economic Viability

6 Core Concepts to help evaluate and sequence preservation projects

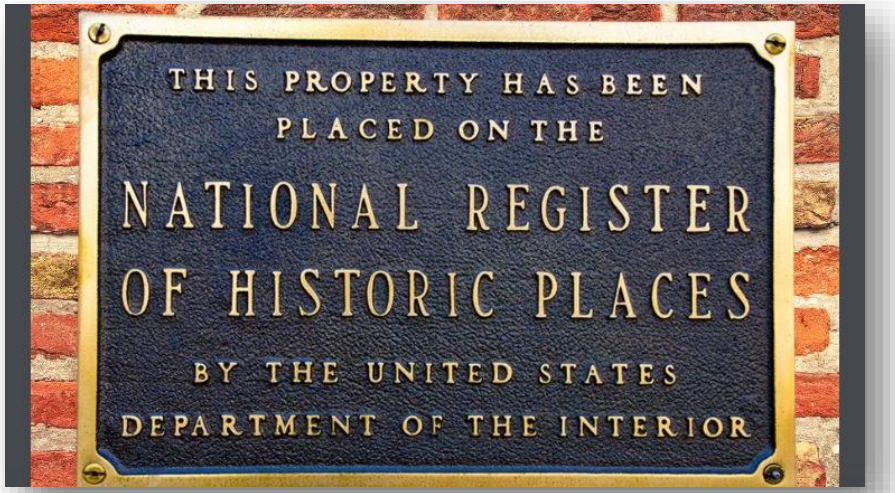
6 CORE CONCEPTS:
HISTORIC PRESERVATION PROJECTS

1. **Risk Mitigation and Structural Integrity**

- **Life-Safety Compliance**
  - Address immediate health and safety hazards first
  - e.g. asbestos removal, fire suppression, seismic retrofitting

- **Watertight Envelope**
  - Prioritize the protection of the building envelope to prevent deterioration
  - Specifically, roofs, masonry, and foundations

6 CORE CONCEPTS:
HISTORIC PRESERVATION PROJECTS

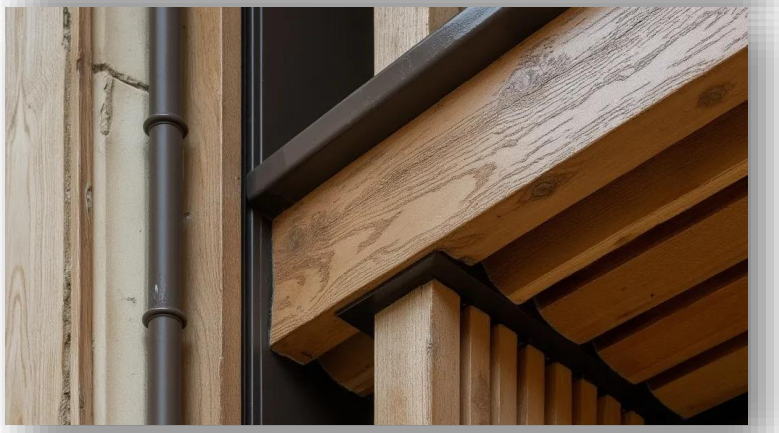


2. **Built-Heritage Significance**

- **Asset Categorization**
  - Rank investments based on historic designation and architectural integrity

- **Conservation vs. Modernization**
  - Protect defining historical characteristics and authentic fabric
  - Prioritize repairs and compatible, reversible interventions over total gut renovations

6 CORE CONCEPTS:
HISTORIC PRESERVATION PROJECTS



3. **Lifecycle Cost-Efficiency**

- **Total Cost of Ownership**
  - Evaluate investments based on long-term lifecycle value
- **Embodied Energy**
  - Factor in the environmental and economic savings of reusing existing materials and infrastructure

6 CORE CONCEPTS:
HISTORIC PRESERVATION PROJECTS

4. Adaptive Reuse & Functionality

- **Market Viability**
  - Prioritize buildings/ spaces that can be economically repurposed

- **Functional Obsolescence**
  - Invest modern layouts, upgraded HVAC systems, accessibility

6 CORE CONCEPTS:
HISTORIC PRESERVATION PROJECTS

5. Socio-Cultural & Community Impact

- **Community Benefit**
  - Assess how the restored building contributes to neighborhood revitalization, local tourism, and cultural identity

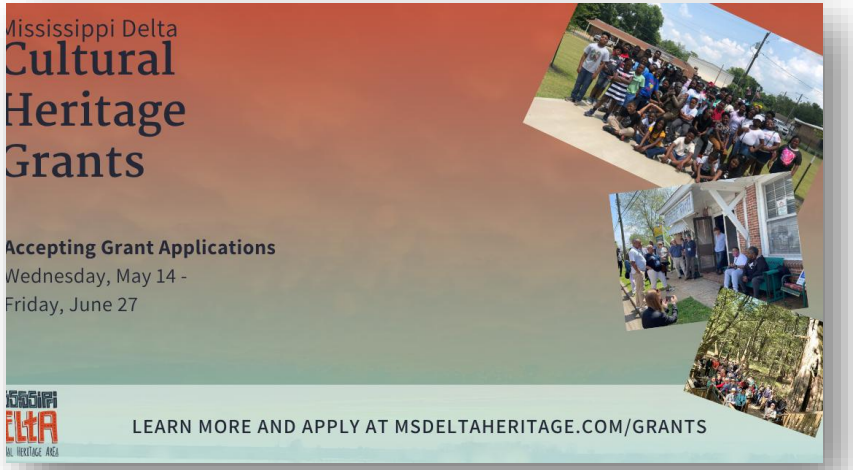
- **Stakeholder Engagement**
  - Align capital planning with community stakeholders and local heritage boards

6 CORE CONCEPTS:
HISTORIC PRESERVATION PROJECTS

6. Availability of Financial Incentives

- **Leveraging External Funds**
  - Prioritize projects that qualify for heritage grants, historic tax credits, or public-private funding

- **Strategic Staging**
  - Break larger rehabilitation projects into smaller, financially digestible phases



ENGINEERING REALITIES VS. ORGANIZATIONAL EXPECTATIONS FOR HISTORIC STRUCTURES

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THE ENERGY EFFICIENCY PARADOX

The Expectation:

- massive carbon reductions, airtight envelopes, and modern HVAC systems

The Reality:

- Modern Vapour Barriers can trap moisture, causing historic wood and masonry to rot from the inside out

The Solution:

- Use technology to analyze moisture flow non-invasively. Upgrades should focus on weatherizing original historic windows where possible, and use vapour-permeable materials.

STRUCTURAL LIMITS VS. OPEN FLOOR PLANS

The Expectation:

- Demand for large, unobstructed spaces and high load-bearing floors.

The Reality:

- Modifying weight-bearing walls or cutting through floors without localized reinforcement risks immediate collapse.

The Solution:

- Structural reinforcing - carbon fiber wraps or hidden steel framing.

REGULATORY REQUIREMENTS VS. ARCHITECTURAL INTEGRITY

The Expectation:

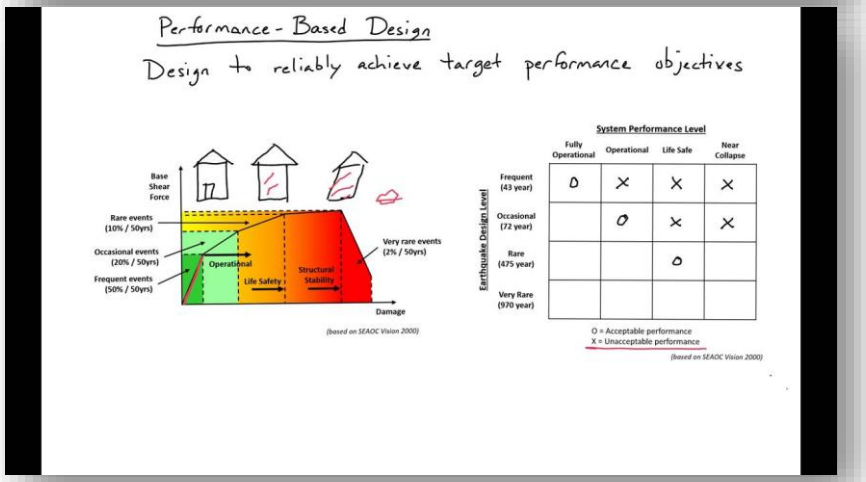
- Expectation for buildings to instantly meet current fire, egress, and accessibility codes.

The Reality:

- Retrofitting modern fire stairs, elevators, and wide corridors can destroy a building's historic fabric.

The Solution:

- Rather than applying prescriptive building codes, fire protection and structural engineers use alternative compliance paths and performance-based design



HIDDEN CONDITIONS & BUDGET REALITIES

The Expectation:

- Renovate within set timelines and predictable budgets.

The Reality:

- Decades of deterioration, moisture damage, and hazardous materials.

The Solution:

- Non-destructive testing, Ground penetrating radar, and structural health monitoring. (Crack Gauges).

ADAPTIVE RE-USE

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ADAPTIVE RE-USE

Transforming Historic Structures into High Performing Assets

By integrating modern building systems with heritage preservation, this strategy:

- Revitalizes Urban Spaces
- Drastically cuts embodied carbon
- Creates resilient mixed-use environments
- Attracts premium tenants
- ESG (Environmental, Social, Governance) mandate

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ADAPTIVE RE-USE

Transforming Historic Structures into High Performing Assets

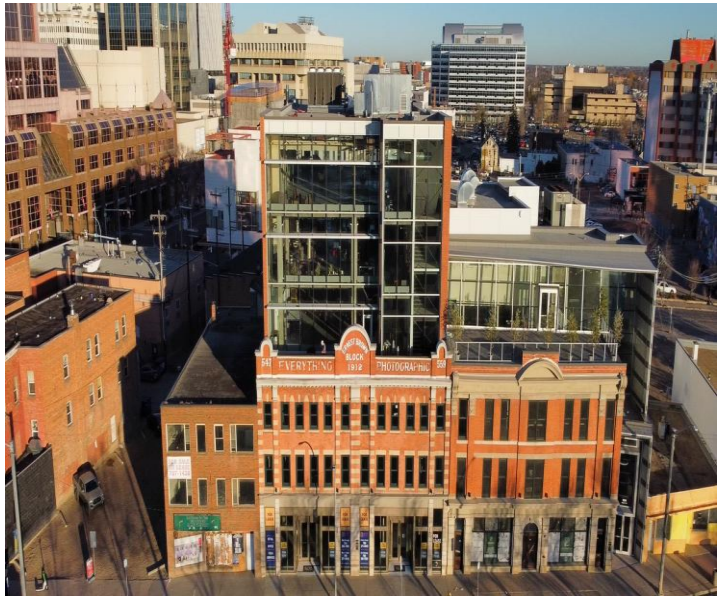
London, England

Austin, Texas

New York City

ADAPTIVE RE-USE

Transforming Historic Structures into High Performing Assets



Edmonton, Alberta

Niagara Falls, Ontario

New York City

CASE STUDY: JAMES A. BANKS, SR. EXPOSITION CENTRE

CITY OF PORTLAND, MAINE

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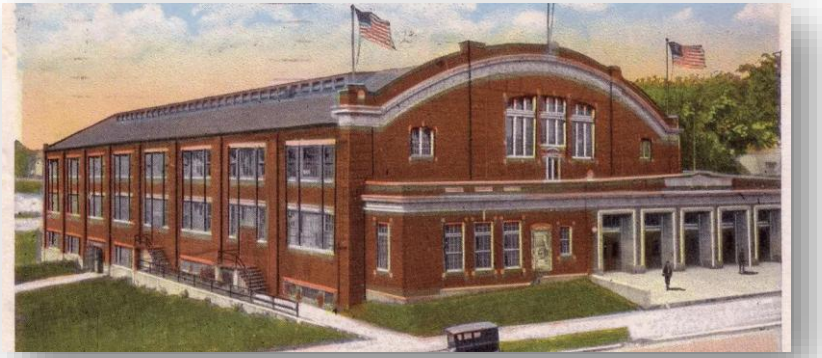
HISTORY, JAMES A. BANKS SR. EXPOSITION

- Built in 1914, by Architect Fredrick A.Thompson
- 66,450 square foot
- Load bearing brick masonry, curved metal truss roof structure. Construction cost of $80,944
- Now the oldest arena in continuous operation in the United States. (As of 2 months ago, was second behind the Matthews Arena in Boston.)
- Hosted appearances by celebrities, sports icons, and presidents.
- James Brown, Beach Boys, Queen, The Clash, Dolly Parton, Janis Joplin, and Babe Ruth.



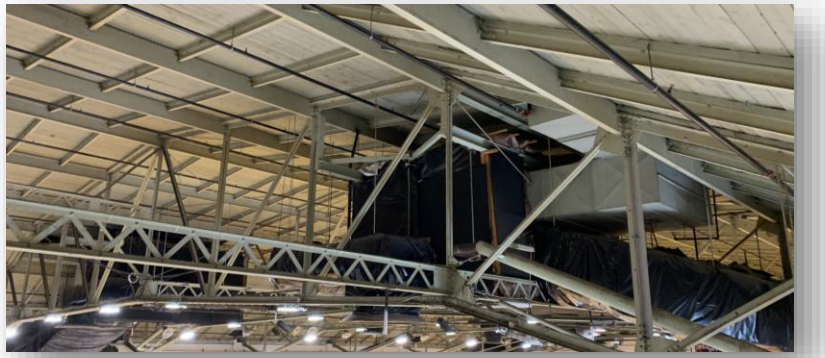
RECENT HISTORY
BUILDING USAGE & UPGRADES

- 1960s – significant renovation, including pouring concrete to level the floor due to settlement
- Roof replacements were completed
- Past Major Masonry Repairs were completed due to cracking issues
- More Recent:
- In 2009, NBA awarded a D-League expansion team to Portland (Maine Celtics)
- $1,000,000 renovations with new court flooring and bleachers
- Recent years served as a temporary shelter for 300 asylum seekers

ENGINEERING ISSUES & STRUCTURAL CONDITION ASSESSMENT

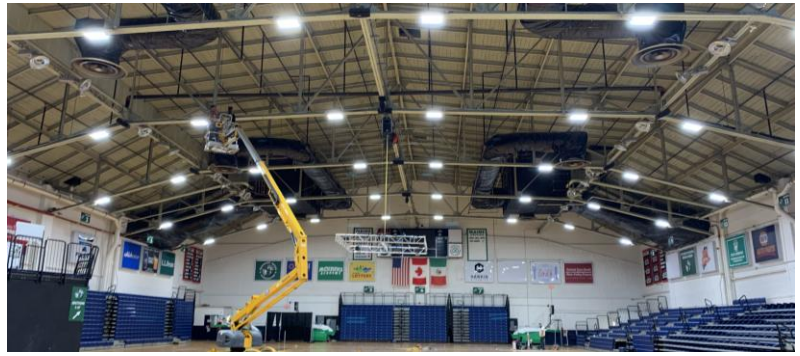
- 2024 Investment Consideration for modernization:
  - HVAC upgrades
  - Roofing Energy Efficiency upgrades
  - Cooling the Arena

- Review of structural issues
- Review of potential code upgrade requirements for change in use and occupancy



PHASE 2 INVESTIGATION

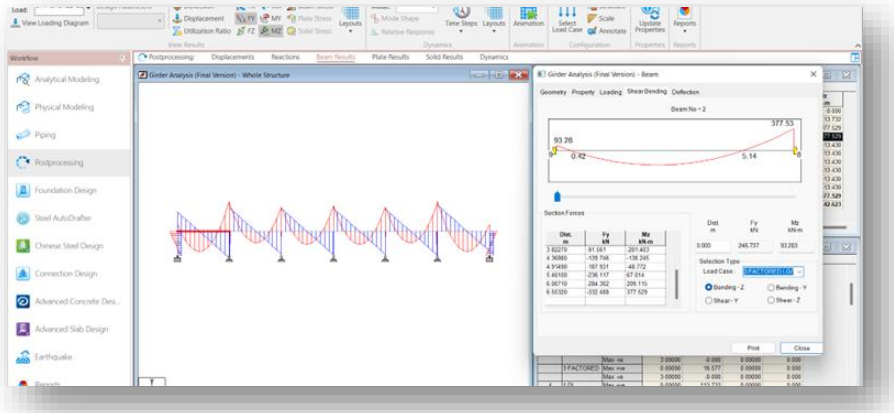
- Lifts used to access roof structure
- Steel Curved Truss measurements taken
- Invasive investigation – concrete core samples
- Non-invasive testing – GPR (Ground Penetrating Radar)



STRUCTURAL ANALYSIS, ASSET MANAGEMENT ASSESSMENT

- Substantial Structural upgrades are required, including:
  - **main concrete structural floor beam reinforcing**
  - **load bearing masonry wall crack repairs and stabilization**
  - **Roof Steel Truss reinforcing**

- Costs for overall structural building upgrades, including mechanical and electrical close to $30,000,000



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JAMES A. BANKS SR. EXPOSITION CENTER, COMMUNITY OUTREACH

- Is Adaptive Re-Use an Option?
- Cultural value
- Needs for more capacity/ a larger arena space
- Cost comparison needs to be completed of new versus rehabilitation
- Will it still hold the title of “Oldest operating municipal arena in the United States”?
- Community Outreach

MATTHEWS ARENA BOSTON

- As of time of closure, it was the World's Oldest Multi-purpose athletic building still in use, as well as oldest arena in use for hockey.
- Original home of the Boston Bruins, Boston Celtics, New England Whalers (Carolina Hurricanes).

CASE STUDY 2: FARYON AND BATA CATWALK BRIDGES TRENT UNIVERSITY

PETERBOROUGH, ONTARIO

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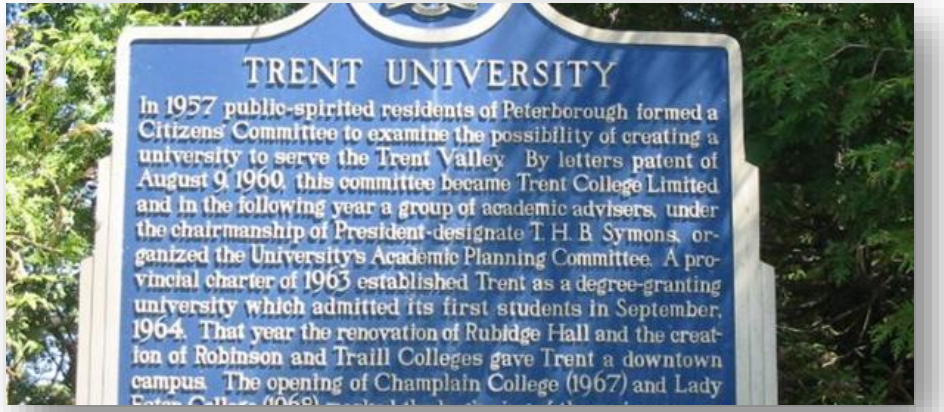
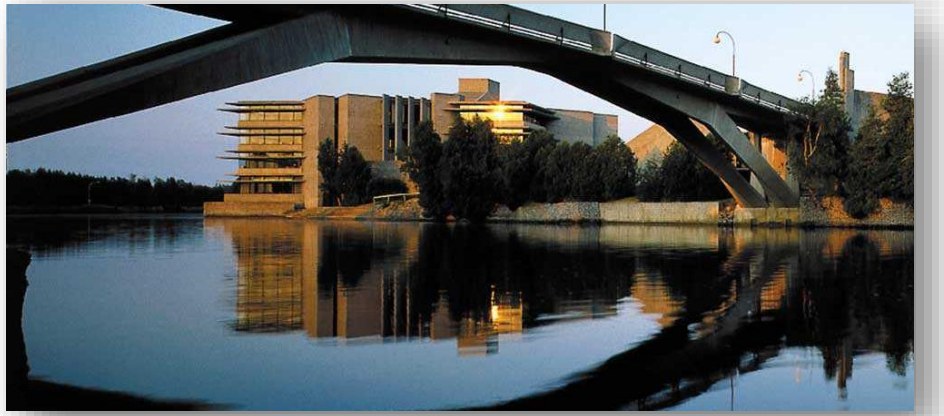
HISTORY, ARCHITECT RON THOM TRENT UNIVERSITY

FARYON BRIDGE: HERITAGE ASSET, PRESERVATION

- Faryon Bridge
  - Built in 1968
  - 182 feet long
  - Post-tensioned concrete parabolic arches
  - Ron Thom awarded Design Merit of Citation in 1971
  - Level 1 Heritage Asset





ENGINEERING ISSUES & STRUCTURAL CONDITION ASSESSMENT – FARYON BRIDGE

ENGINEERING ISSUES & STRUCTURAL CONDITION ASSESSMENT – BATA CATWALK

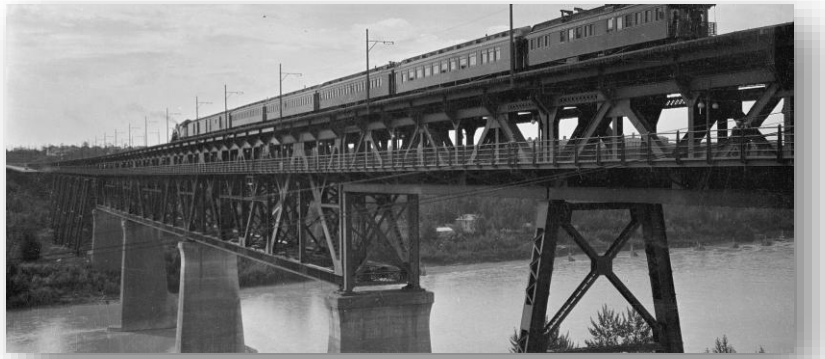
HISTORIC RESTORATION FARYON BRIDGE

- Currently Restoration is underway
- Includes:
  - Complete restoration of the upper bridge deck
  - Rebuilding of the abutment beams
  - Select restoration of the concrete parabolic arches
  - Galvanic Cathodic Protection for post-tensioned and traditional reinforcing
  - Historic Preservation - Waterproofing top of concrete arches and upper deck with architecturally sensitive paints

HISTORIC RESTORATION BATA CATWALK

- Currently Restoration is underway
- Includes:
  - Complete restoration of the upper bridge deck
  - Galvanic Cathodic Protection for architecturally sensitive stone columns
  - Historic Preservation – construction/ repair will involve experienced historic masons carefully photographing, documenting, removing and marking each river stone in order to replace in its original position.

HIGH LEVEL BRIDGE
EDMONTON, ALBERTA



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ACKNOWLEDGEMENTS

- **Adaptive Re-use Case Studies:**
- **Metropolis – Architecture and Design Magazine/ Publication**
- https://metropolismag.com/projects/this-120-year-old-brooklyn-building-is-now-a-powerhouse-for-the-arts/

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Q & A

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THANK YOU FOR ATTENDING

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