





# Revitalizing and Transforming a National Treasure: Planning for Safety during the National Air and Space Museum Renovation

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# Presentation Topics

- Project Background
- Planning and Design
- Pre-Construction and Mobilization
- Enabling Work and Continuity of Operations during Construction



# NASM Building Background

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- Since it opened in 1976, attendance has greatly exceeded expectations.
- After 43 years, the mechanical systems are past due for replacement.
- The exterior stone panels are warping and must be replaced.
- Revitalization addresses these and other building code, security, and sustainability issues.



# Risk Assessment – What were the options?

## ALTERNATIVES EVALUATED

## ANALYSIS

### Status Quo scenario

Replace stone panels as they fail with alternate material. Repair building systems upon demand as the failure rate escalates.

- Safety risk escalates.
- High annual O&M costs.
- Cumulative cost is more than double the cost of replacing the systems now.

### Building Replacement scenario

Relocate building contents and occupants. Demolish NASM and build replacement facility on same site.

- 9-year closure and significant loss in operating income.
- Overall cost is more than double the revitalization scenario.

### Building Revitalization

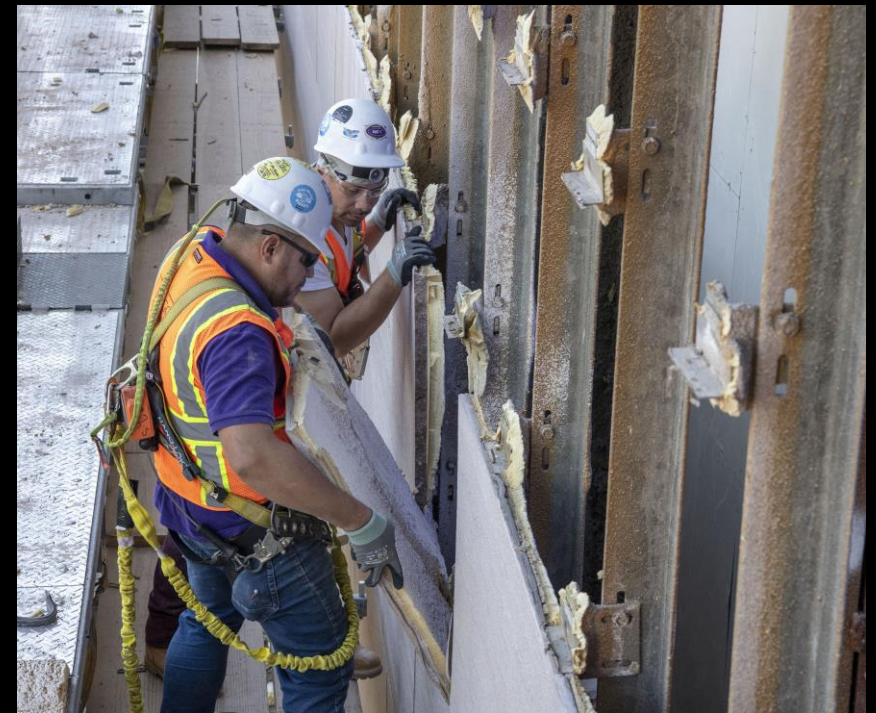
Revitalize building envelope, upgrade structure, modernize building systems, enhance security, and optimize functionality of operations.

- Mitigates impacts on visitation and revenue activities.
- Significant cost savings compared to replacement.

# Building Systems and Envelope

**Modernize Building Systems** - Replace mechanical, plumbing, and fire systems; upgrade electrical/data; optimize energy performance and sustainability opportunities.

**Revitalize Building Envelope** – Replace stone cladding, glass curtain walls, skylights, and roof; improve energy performance and incorporate sustainability goals.





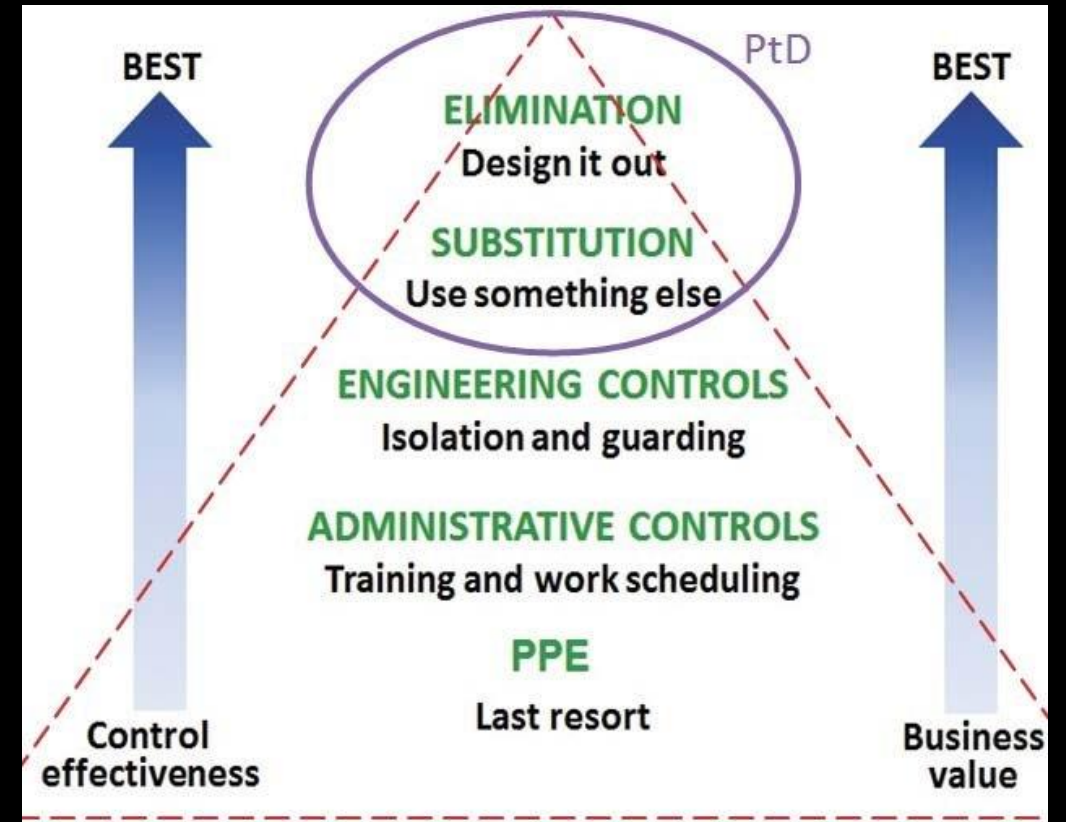
Visible yellowing on John Young's  
Gemini 10 space suit

## Glazing System Replacement

- Protection of exhibits which can degrade with light exposure.
  - Current maximum interior daylight levels of 8,000 lux. Post-renovation performance requirement of 1,000 lux.
- Mitigate solar heat gain.
- Maintain a view of the exhibits from the exterior and a view of the National Mall from the interior.

# Designing the Future

- Learn and understand the design process to take full advantage of review time.
- Train your team in Prevention through Design (PtD).
  - Integrate hazard identification into the design process.
  - Identify elimination or substitution options.
  - Increased value and effectiveness when compared to modifying an existing structure, system, or process.



Source: *Professional Safety Journal*, 61(4): 54



# Examples of PtD

## What needs to be corrected?

- **Problem** – Visitors frequently utilize museum outlets to charge devices. Outlet covers are not effective and require constant replacement.
- **Solution – Substitution**
  - Installing tamper resistant receptacles in public areas.

## Are there unintended consequences?

- **Problem** – Proposal for rooftop solar panels create access and maintenance challenges for facilities personnel.
- **Solution – Elimination**
  - Solar panels removed from the project scope during value engineering.

# Pre-Construction and Mobilization

- **Prepare staff for change**
  - Communicate information and expectations early and often.
    - Changes to building configuration and work places.
    - New safety requirements such as site safety briefings and personal protective equipment (PPE).
- **Plan ahead for changes to public spaces to maintain safety and the visitor experience**
  - How will the visitor experience change and how can you communicate the message?
  - Focus on the positives.
  - What amenities will you lose and how can you adapt?
  - How is your building occupancy and fire egress affected?



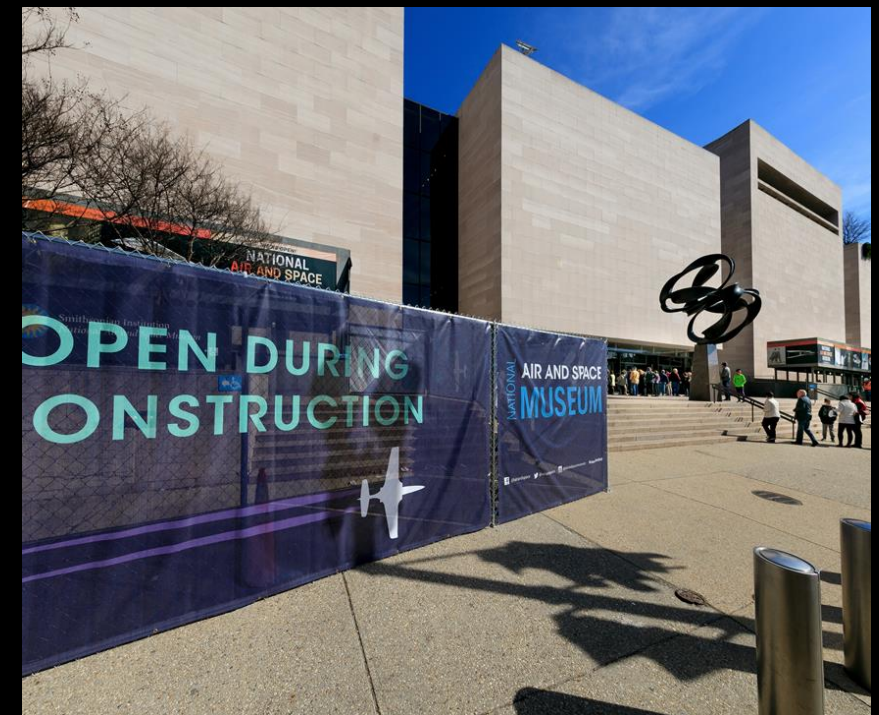
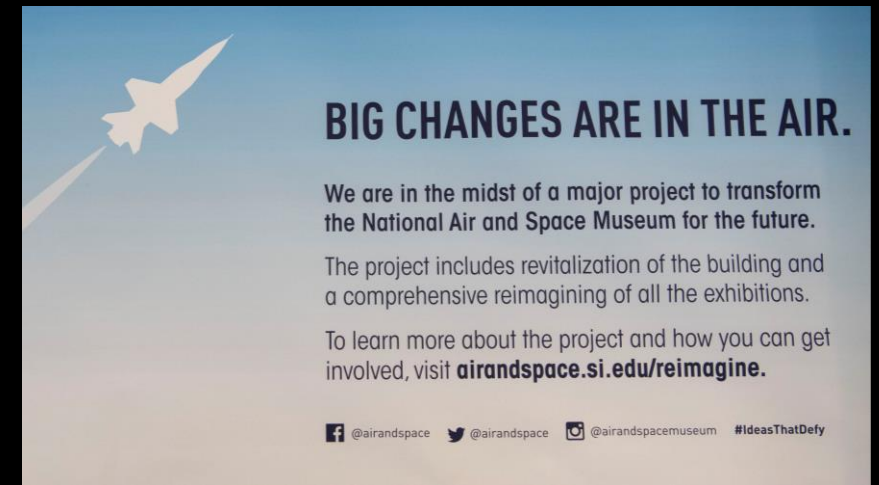
# Pre-Construction and Mobilization

- **Contractor Selection**
  - Provide clear expectations for contractor qualifications in scopes of work.
  - Contractors may not have a background in working with or around museum collections.
- **Establishing the Project Team**
  - Meet project stakeholders and establish a rapport. Team-building sessions are useful to introduce many different team members at once.
  - Set clear expectations for roles and responsibilities.



# Change is in the Air – Enabling Work

- Enabling activities often happen quickly and are some of the most challenging moments for museum staff.
  - Good planning helps lessen the impact.
  - Adapt when the unexpected arises.
  - Maintain (or increase) communications.
  - Understand your limitations and the resources at your disposal.



# Other Considerations During Construction

## Managing Guests in Construction Areas

- Start establishing expectations during planning and pre-construction.
- Limit non-essential personnel in construction areas.

## Emergency Planning and Response

- How can we improve our capabilities through planning and design?
- How do construction activities impact pre-existing plans and processes?
- Keep local emergency responders informed of critical facility changes.
- Does the contractor have an emergency plan?



# Questions?

Image Credits – Jim Preston, Eric Long, and Mark Avino; NASM Photography

