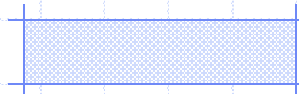


Cradle to **Grave** Approach to Service Life Management



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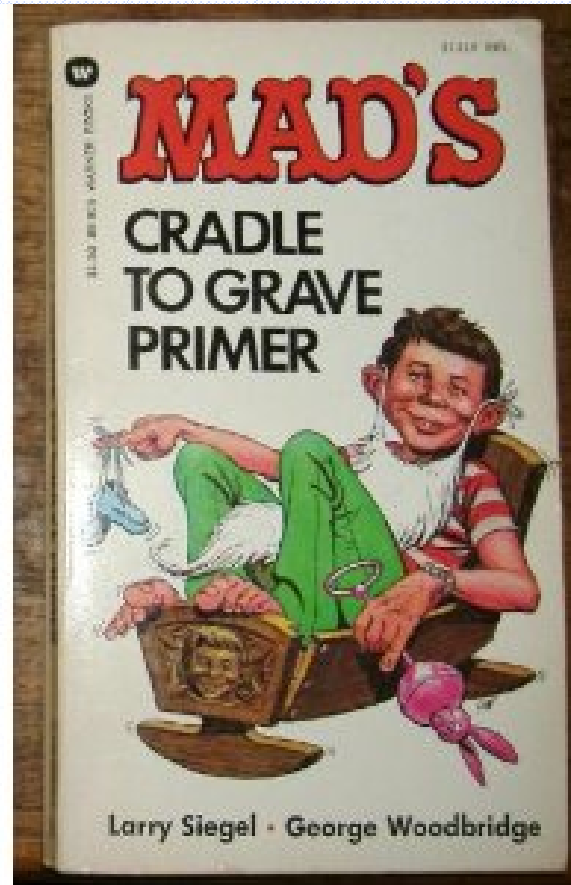


Welcome to the ICRI 2012 Fall Convention!

This Session's Agenda:

- What is **Service Life Management** as it relates to our repairs/restoration industry?
- **Sustainability** is a popular industry word these days, what does it mean in the Cradle to Grave Life Span of buildings/structures?
- The Importance of **Life Cycle Assessment** to the Service Life
- **Value Engineering** and its role in Building Design, Repair and Re-Use solutions. Think Strategic!
- Service Life Ethics 101 – **Periodic Inspections** are Critical
- **Educating** our Clients/Customers about Durability materials choices, best construction practices, the applicability of Life Cycle Assessment (LCA), Value vs. Cost, warranties, etc.

All Buildings and Structures should be viewed through the prism of best practices by both the design and construction team to ensure optimal service life.



OK, so what is Service Life Management?

- First, the Cradle to Grave process starts with the new building's Birth Certificate. An existing building's restoration can (in theory!) too.
- The Service Life of a Building, Bridge, Parking Structure, Tunnel, and other Structures is really defined by a number of initial and lifespan variables.
 - Life Cycle Assessment (LCA) Decisions made during Design/Repairs
 - Durability is the most sensitive service life predictor
 - Preventative/Planned Maintenance are interactive tools
 - Building/Structure Periodic Inspections are Necessary!
 - Environmental Exposures, Corrosion Development Issues
 - The "Throw Away" mentality, undue acceleration of End of Life
 - Ownership changes, The Economy, Tactical Thinking

Design Life vs. Service Life (Management)?

- The Design Life of a Building may often be programmed for 30 to 50 years, but often is expected to last (and many do) 50 to 100 years
- Don't confuse Design Life with the Service Life (Management) process; they may not be the same
- Sustainable Buildings employ the Life Cycle modeling process, look at materials resilience, the needed balance between Aesthetics and Longevity
- Don't overlook Existing Buildings/Infrastructure – they are all around us in every city

Service Life Decisions

- It goes without saying that owners may change the requirements of the facility over time
- Rising expectations can shorten facility life span, which can lead to obsolescence
- During design, address possibility of future functional changes in the facility. Make flexibility a design goal
- Assure quality in construction & maintenance to avoid deterioration at rates faster than design criteria
- Review new developments for trends that may foster obsolescence

Life Cycle Assessment and Sustainability

- LCA and **Sustainability** must be a Balanced Approach
- Life Cycle Assessment (LCA): Science of measuring the environmental effects of a building from “cradle to grave,” from the harvesting and extraction of the materials used to make a building to its ultimate disposal. (Re: US EPA)
- Sustainable Building: One in which the site, design, construction, occupancy, maintenance, and deconstruction are accounted for in ways that promote energy and materials efficiencies, healthy indoor environment & long-term benefits to owners (Re: Sustainable Buildings Industry Council)

More on Sustainable Buildings . . .

- **Sustainable Buildings** offer best practices in design and construction solutions,
- Add an extra layer of scrutiny to every decision you make about your building

The Kansas City Ballet



Building Facades

- **THE PROBLEM –**
(and the Challenge)
**PROGRESSIVE
DETERIORATION OF THE
ELEMENTS OF CONCRETE AND
MASONRY FACADES**





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Periodic Inspections are Important

Façade Inspection ordinances exist in approximately 9 major cities around the country, including:

CHICAGO, NEW YORK, ST. LOUIS,
MILWAUKEE, COLUMBUS, BOSTON,
DETROIT, PHILADELPHIA, PITTSBURGH

Periodic Garage Inspections exist in a number of cities too.

PURPOSE OF A FACADE INSPECTION ORDINANCE



- The purpose of a facade inspection is to identify unsafe conditions so that they can be remediated before they cause injury or death.

Façade Inspection Ordinances

THE DEVELOPMENT AND PASSAGE OF THESE ORDINANCES HAS BEEN PROMPTED IN MANY CASES BY INJURIES OR DEATH CAUSED BY MASONRY OR GLASS FALLING FROM THE FACADES OF MULTISTORY BUILDINGS.

ASTM E2270-05 KEY POINTS



“It is the responsibility of the Owner to retain a qualified professional who can demonstrate expertise in the evaluation of various facade materials and their assemblies.”

ASTM E 2270-05 KEY DEFINITIONS

- **QUALIFIED PROFESSIONAL** — AN ARCHITECT OR STRUCTURAL ENGINEER DULY LICENSED. THE QUALIFIED PROFESSIONAL MUST BE KNOWLEDGEABLE OF THE DESIGN, CONSTRUCTION, AND INSPECTION OF BUILDING FACADES, STABILITY, AND DETERIORATION MECHANISMS RELATIVE TO THE SPECIFIC MATERIALS AND ASSEMBLIES PARTICULAR TO THE FACADE BEING INSPECTED.

ASTM E 2270-05 KEY DEFINITIONS

- **QUALIFIED INSPECTOR** – A QUALIFIED PROFESSIONAL OR A PERSON WORKING UNDER THE DIRECT SUPERVISIONS OF A QUALIFIED PROFESSIONAL.

ASTM E 2270-05 KEY POINTS

- LEVELS OF INSPECTION
 - “GENERAL INSPECTION”
 - “DETAILED INSPECTION”

ASTM E 2270-05 KEY POINTS

- CATEGORIES OF FACADE CONDITIONS

- “UNSAFE CONDITION”
- “REQUIRES MAINTENANCE”
- “ORDINARY MAINTENANCE”

Encourage Facility Inspections

- In short, periodic façade and garage inspections by qualified engineers, is just good Service Life ethics by the Owner. It's just good planning.

Why our Existing Buildings Matter

- Existing Buildings are one of our greatest renewable resources
- Many older/historic buildings are actually more energy efficient than recent buildings
- Re-Use of our Existing buildings reduces demolition to landfills
- In a weak economy, it is more attractive to repair/restore/remodel an existing building than to build new
- Recent studies suggest that by 2030 we will demolish about 1/3 of our building stock
- Besides, Restoration is challenging and fun!

Older Building Repairs vs. Demolition?

- Older buildings should not be considered Disposable resources, they are Renewable resources.
- In the U.S., the Brookings Institution projected that by 2030, we will demolish and replace 82 billion square feet of our current building stock, or nearly 1/3 of buildings in the next 20 years.
- It would take as much energy to demolish and reconstruct 82B sq. ft. as it would to power CA for 10 years.
- Huge reduction in construction debris to landfills.

Value Engineering and its Role

- The GSA says that "V/E can be defined as an organized effort directed at analyzing design features, systems, equipment, and material selections for the purpose of achieving functions at the lowest life cycle cost consistent with required performance, quality & safety."

What is the Role of V/E in Construction?

- First, what is Value?
- Value is a discussion of what something costs vs. what it is worth.
- Value = Function/Cost
- Value = Return/Investment
- “If it costs what it’s worth, it is a good value”
- Time Value of Money (LCA again)
- What are the key Service Life Factors involved?

V/E can be misused/misapplied by the Contractor and the Design Team

- Assist the Owner, Architect and Contractor in making real V/E decisions
- Stand by technical specifications, know repairs and waterproofing product data, warranty criteria, and applications
- Front-end “V/E” decisions driven by the contractor may be short term solutions

Our Industry and Education

- We have to (continue) educate Owners, other Design Professionals, Building Officials, Government Agencies and the Public on Service Life vs. V/E proposals
- Again, Durability is the key to good service life practices
- If you fix it, they will come...

References for this session from:

- ICRI, ACI, IPI, GSA, Corps of Engineers, BOMA, PCA, AIA, National Trust for Historic Preservation, The Masonry Society, US Whole Building Group, EPA, NIST, NIBS, USGBC.