



# DISASTER RISK REDUCTION (DRR)

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*FOR BUSINESS CONTINUITY*

**NRMCA**

**Concrete Innovations Session 38**

**May 20, 2026, 11 A.M.- 1 P.M. EST**

# DISASTER RISK REDUCTION

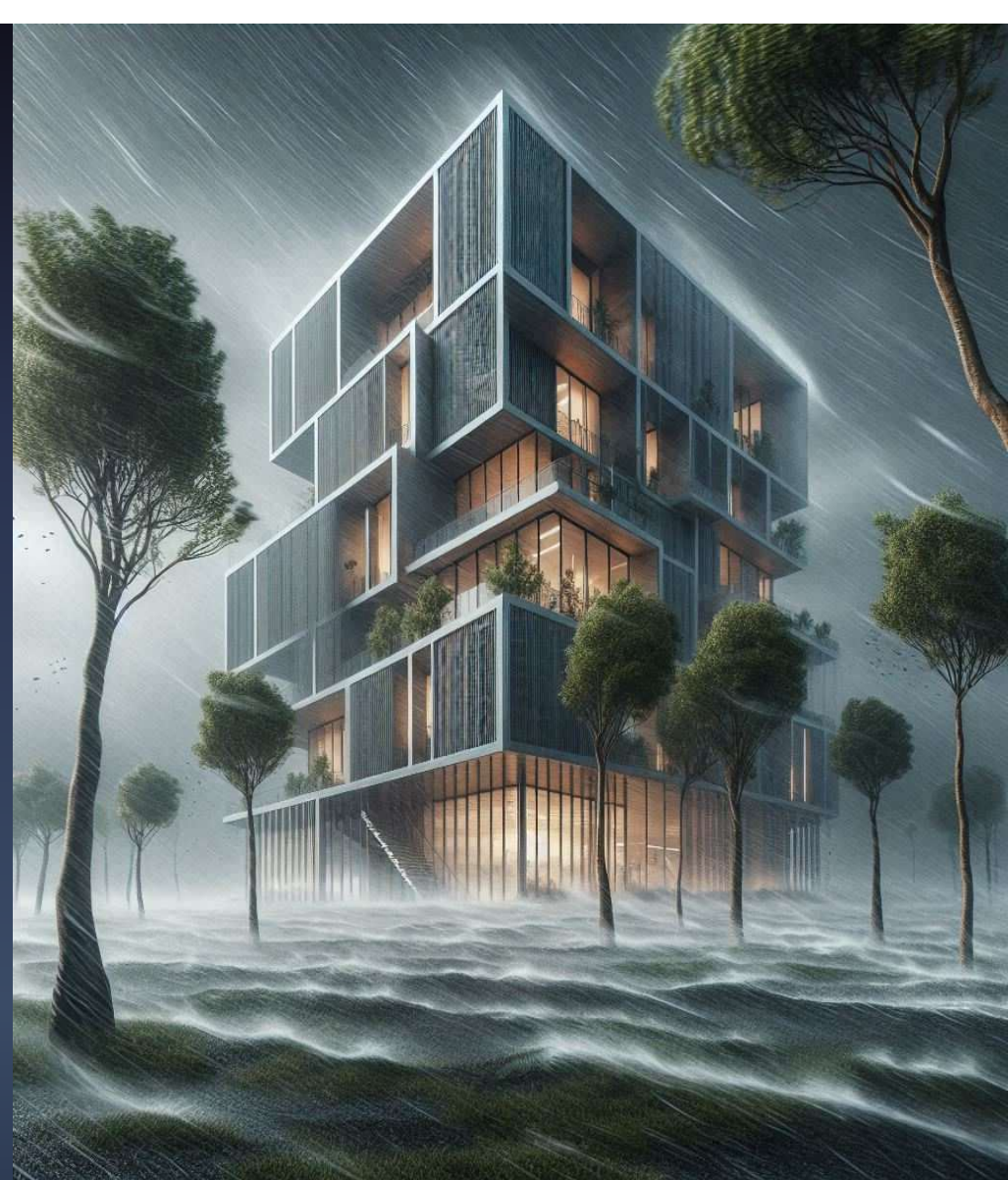
## *FOR BUSINESS CONTINUITY*

WHAT IS DISASTER RISK REDUCTION (DRR) AND WHY DOES IT MATTER?

- Hazards Can Become Disasters When We Are Not Properly Prepared For The Hazards.
- DRR Maintains Operations: Over 40% of Businesses Never Reopen After a Major Disaster.
- DRR Preserves Revenue and Minimizes Operational and Repair Costs When Hazards Strike.
- DRR Protects People's Jobs, Health & Welfare.
- DRR Fosters Sustainable Communities.

THIS SESSION IS FOR PROJECT STAKEHOLDERS SEEKING:

1. Insights Into How DRR Supports Operational Continuity for Business & Property Owners.
2. Examples of Design Strategies That Reduce The Risk of Disasters and Improve Business Outcomes.
3. Strategies for Planning & Creating Disaster Resilient Projects and Sustainable Communities.



DRR Via Resilient Architectural Design Is Our Future.

Good project design isn't just about creating beautiful buildings that meet code — it's about keeping businesses and communities functioning when hazards strike. We cannot achieve long-term sustainability if our buildings and infrastructure are not both green and resilient.

# MEET THE PRESENTER

**STEVE SUNDERMAN,**  
*Virginia Architect, NCARB*  
*President, Terrazia PC Architecture*  
*Roanoke, Virginia*

## Leadership & Service:

- Resilient Design Collaborative (Founder 2024-Present)
- ARISE-US Member (2024-Present)
- Resilient Virginia Board Member (2018–2024)
- USGBC Chapter Member (2004-Present)
- USGBC National Green Schools Committee (2011–2015)

📍 Roanoke-based, globally relevant

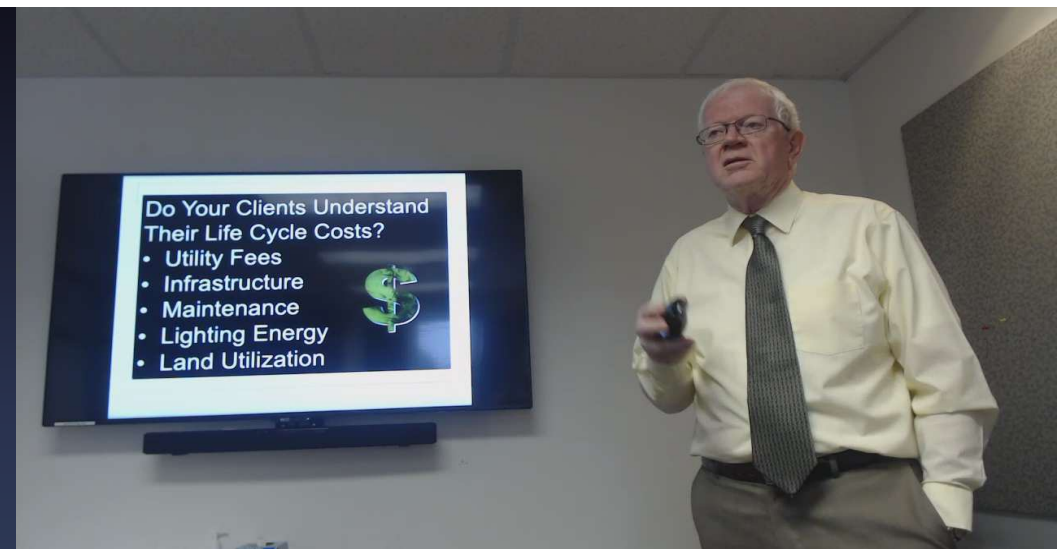
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**Sponsor:** Roanoke Cement Company



## Architecting Resilience for a Sustainable Future:

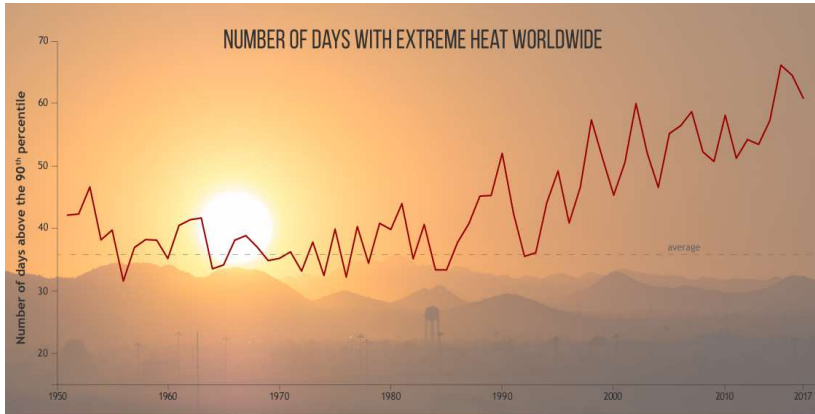
Steve graduated from the University of Oklahoma in 1974 with dual degrees in Architecture and Environmental Design. He has over 56 years of experience in high-performance concrete building design, energy conservation, and environmental stewardship across the U.S. and the Middle East.

He is a nationally recognized architect and thought leader who has provided educational seminars promoting resilient design since 2011 and has relentlessly advocated for energy conservation and sustainable architecture since the early 1970s.

“I am compelled to provide a sustainable future for my descendants and all of society by implementing a strategy of change for our built environment that saves money, improves people’s lives, and ensures a sustainable planet.”

As architects, we have the opportunity and responsibility to design facilities that do more than meet code and look aesthetically pleasing. We should help our clients protect their operations, people, and finances by embedding resilience into every project.

# INTRODUCTION



*Warming Planet Increasing Disasters*



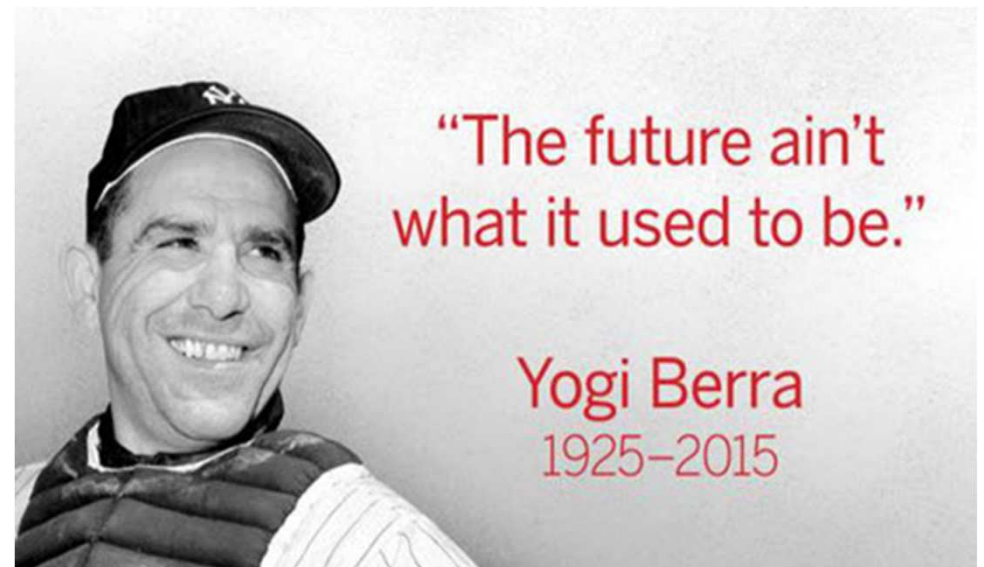
*We know how to prevent disasters.*

Past 25 Years in the US:

- \$2.4 trillion in direct damages
- 11,000 lives lost
- 2024: \$223 billion uninsured

Why is DRR **NOT** Standard Practice?

1. Assume It Costs Too Much
2. Don't Know How (KEY)
3. Resist Change or Don't Care



***Resilient Infrastructure Must Be Our Future***

# DEFINE RESILIENCE

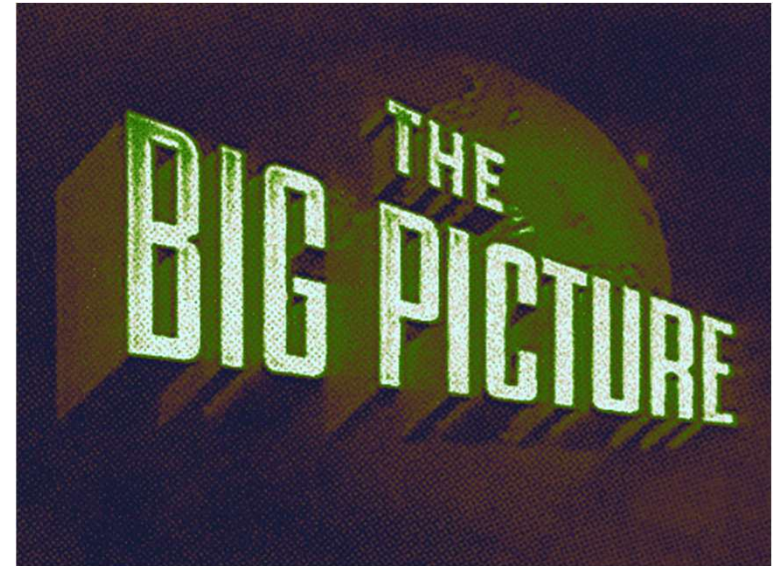


**Resilience: the ability to resist, absorb, recover from or successfully adapt to adversity or a change in conditions.**

*-Department of Homeland Security, Risk Lexicon 2008*

*Basically, Resilience Is The Ability To Endure*

# SUSTAINABLE ARCHITECTURE



## Complementarity Design Solutions:

- Green Design: Impact on Our Environment
- Resilient Design: Impact on Our Projects

**Shared goals:** Triple Bottom Line

## Integrated Outcomes:

- Environmentally Sound
- Economically Efficient
- Socially Secure
- Sustainable Communities



*Our Projects Are Not Sustainable If They Are Not Both Green And Resilient*



# AGENDA

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- 1. Why Disaster Risk Reduction Matters*
- 2. Architectural Strategies for DRR*
- 3. Tools for Project Consultants*
- 4. Call To Action*

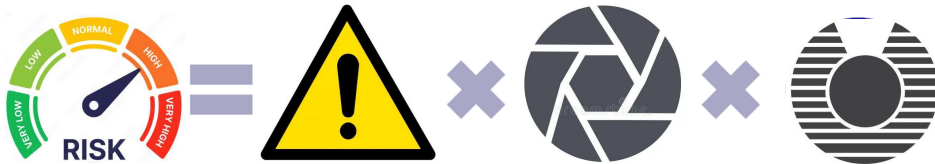


# WHY DRR MATTERS



# DISASTER RISK REDUCTION

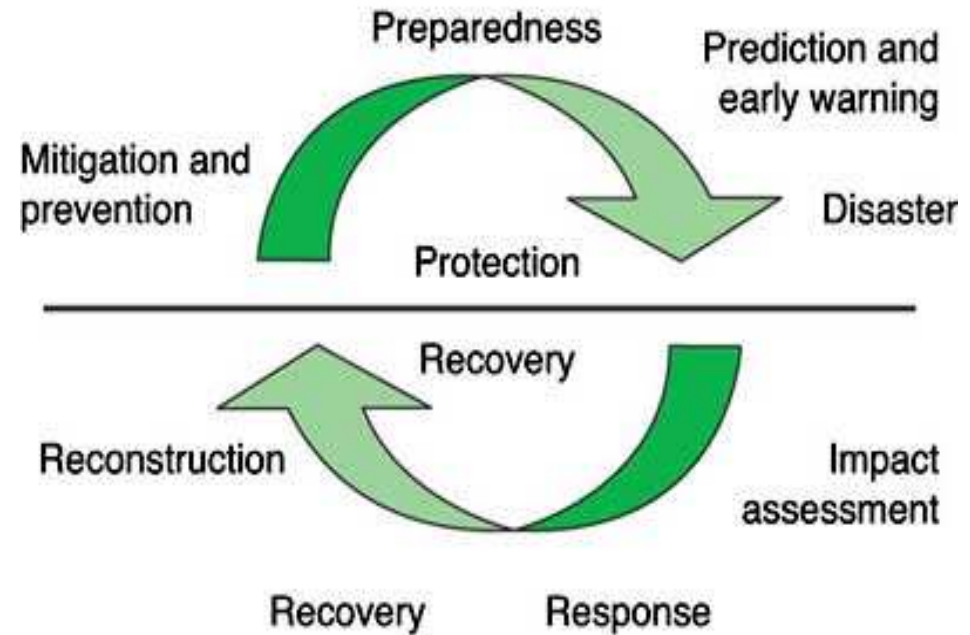
DRR is about preventing natural and human-caused hazards from becoming disasters.



Disaster Risk = Hazard X Exposure X Vulnerability

Sendai Framework  
for Disaster Risk Reduction  
2015 - 2030

## RISK MANAGEMENT



## CRISIS MANAGEMENT

**ARISE-US, AIA, FEMA,  
FORTIFIED, ASTM, Etc.**

*“An Ounce Of Prevention Is Worth A Pound Of Cure” - Benjamin Franklin*

# IMPACTS OF DISASTERS

- High Cost of Disruption
- Increased global warming
- Over 40% of Businesses Lost
- Occupant Health & Welfare
- Community Disruption



Structure and Application  
2021 IEBC

Beth Tubbs, PE, FSFPE  
Senior Staff Engineer



We must inform our clients that current codes are not enough.

***Resilient Infrastructure Prevents Disasters and Maintains Business Continuity.***

# CLIENT PAIN POINTS



Operation  
Disruptions



ENERGY  
Availability



Repair &  
Maintenance



Property  
Insurance



Talent  
Attraction



Cyber  
Security








*Consultants Who Relieve Client Pain Points Become Trusted Advisors.*

# FEMA: Cumulative Savings of \$13:1

## DRR BENEFITS

- Insurance availability
- Faster recovery
- Competitive edge
- Lower cost of operations
- Stronger ESG alignment and brand reputation

$$\frac{\text{(gain from investment - cost of investment)}}{\text{cost of investment}} = \text{ROI}$$

National Benefit-Cost Ratio (BCR) Per Peril <i>*BCR numbers in this study have been rounded</i>		Beyond Code Requirements	Federally Funded
<b>Overall Hazard Benefit-Cost Ratio</b>		<b>\$4:1</b>	<b>\$6:1</b>
 <b>Riverine Flood</b>		<b>\$5:1</b>	<b>\$7:1</b>
 <b>Hurricane Surge</b>		<b>\$7:1</b>	Too few grants
 <b>Wind</b>		<b>\$5:1</b>	<b>\$5:1</b>
 <b>Earthquake</b>		<b>\$4:1</b>	<b>\$3:1</b>
 <b>Wildland-Urban Interface Fire</b>		<b>\$4:1</b>	<b>\$3:1</b>

***We're Paying For High-Performance Projects Whether We Build Them Or Not.***

# RETURN ON INVESTMENT



## Return on investment (ROI):

Ratio between net income/profit to costs from investment of resources. ROI evaluates the efficiency of an investment and relates profits to capital invested.

## Past 30 Year S&P 500 ROI:

1. Price-only return (no dividends):
  - Roughly 8.3% per year.
2. Total return (price + dividends reinvested)
  - Roughly 10.3–10.7% per year.
3. Inflation-adjusted (real) ROI
  - ~7–8% real annual return

**H-P Buildings can return 15% or more annually and are inflation-proof.**

American Institute of Architects

[The ROI of High-Performance Design](#)

***Resilient Facilities Ensure Long-Term Positive Return On Investment***

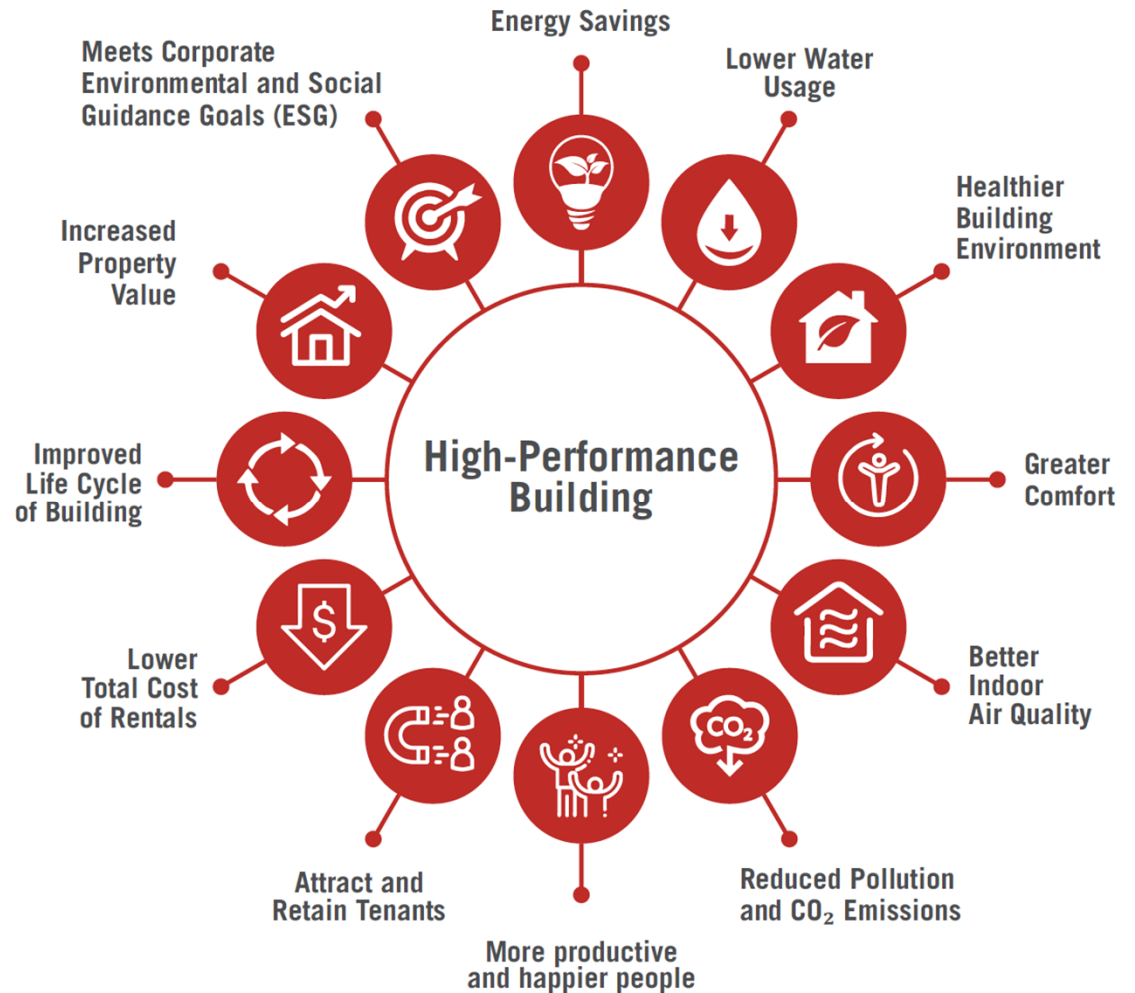


# ARCHITECTURAL STRATEGIES FOR DRR



# FOUR KEY DESIGN STRATEGIES

- 1. Resilient Infrastructure
- 2. Resource Efficiency
- 3. Adaptive Architecture
- 4. Health & Well-being



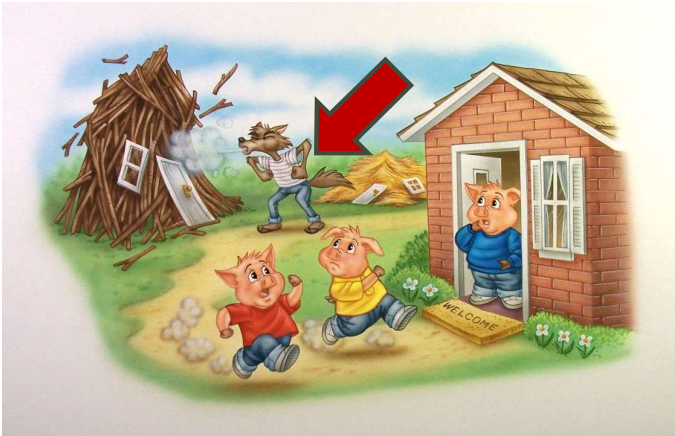
*Again, We Know How To Create H-P Projects; We Just Need To Do It.*



## KEY STRATEGY 1:

### *RESILIENT INFRASTRUCTURE*

- Durable Envelope
- Redundant Power
- Site Adaptation
- Smart Systems



*Beware the big bad hazard!*



*Mexico Beach, FL, Hurricane Michael*

***Durable Building Envelopes Are The Grand Master Key To Sustainable Architecture.***

# RESILIENT INFRASTRUCTURE: *CONCRETE CONSTRUCTION*



In Situ (Cast-In-Place)



ICF



Tilt-Up



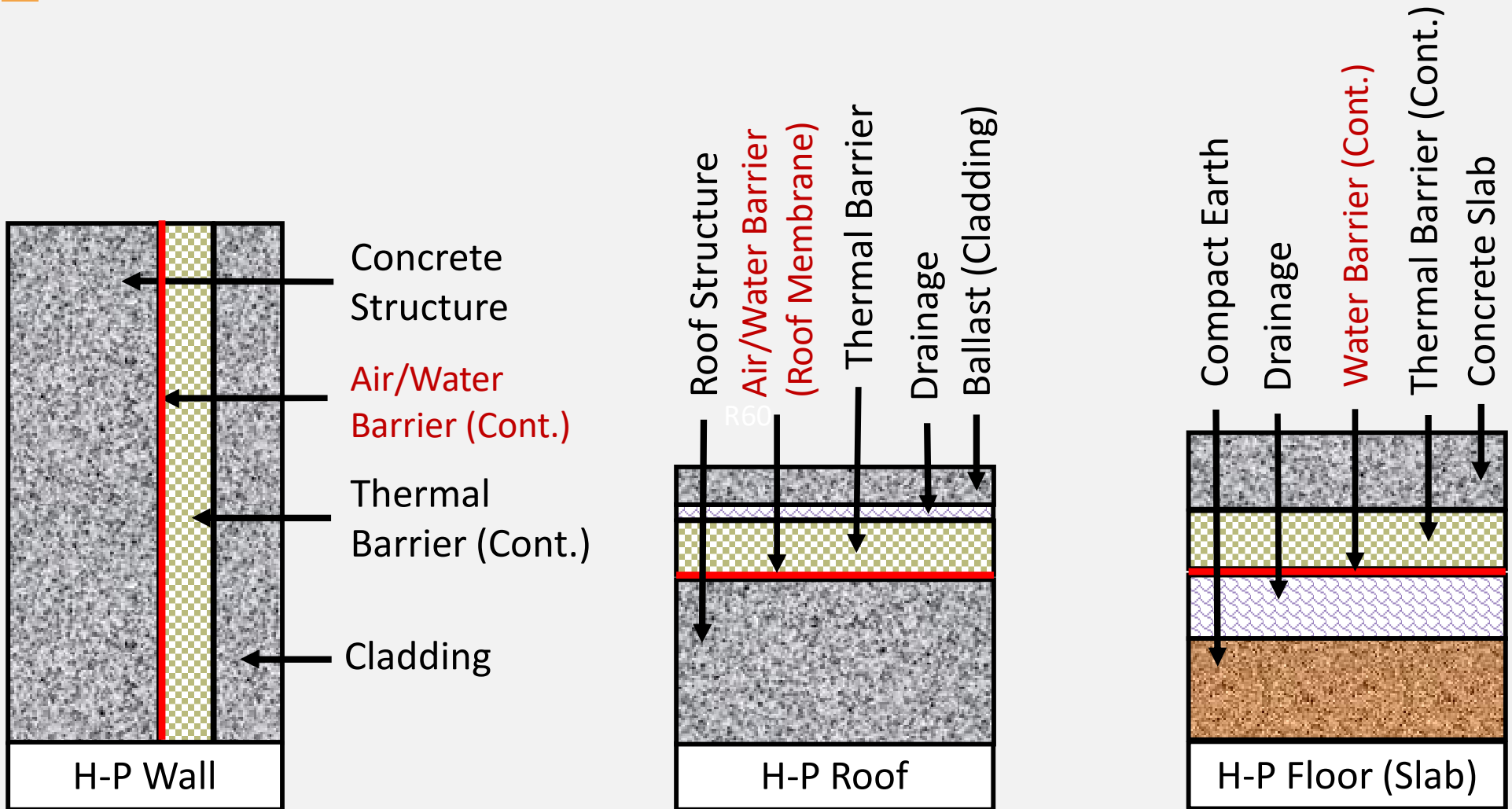
Fred Meyer Retail Center, Portland, OR



First Southern Baptist Church, OKC, OK

*Don't Assume Tilt-up Is Just For Big Box Buildings*

# RESILIENT INFRASTRUCTURE: *DURABLE BUILDING ENVELOPE*



**Key Features:** *Wind, Fire & Water-Resistive Concrete Structural Elements, Continuous Air/Thermal Barriers, and Protected Air/Water Barriers.*

# RESILIENT INFRASTRUCTURE: *VERSATILE TILT-UP CONCRETE*

Offices



Multi-family (112' tall)



K-12 Educational



Retail



Industrial



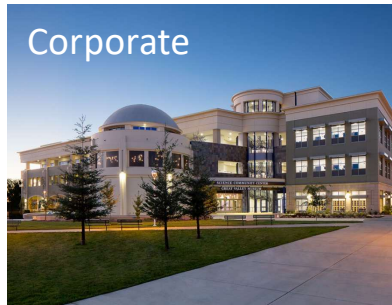
Religious



Higher Education



Corporate



Medical



Residential



*Tilt-Up Is Good for Any Hazard, Occupancy, Location, or Climate*



## **KEY STRATEGY 2:** *RESOURCE EFFICIENCY*

*Greensburg, Kansas: 2007 EF5 Tornado Impact & Recovery.*

- Water
- Energy
- Materials
- Operations



***Resource Efficiencies Reduce Risk, Waste, Costs, & Global Warming Potential.***



**RESOURCE EFFICIENCY:**  
***RAINWATER HARVESTING***

*Pitched & Low-Slope Roofs  
Above/Below Ground  
Storage*



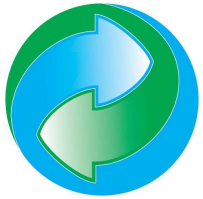
**RESOURCE EFFICIENCY:**  
*PAVING AS SW BMP*

*Pervious Concrete & Pavers  
LID Stormwater Harvesting*



**RESOURCE EFFICIENCY:**  
*SITE ENERGY & HEAT ISLAND*

*Power, Shading, Reflective  
Paving & Infiltration Utility  
Trenches*



## KEY STRATEGY 3:

### *ADAPTIVE ARCHITECTURE*

- Modular Systems
- Dynamic Devices
- Shelter In Place
- Multi-Use Planning

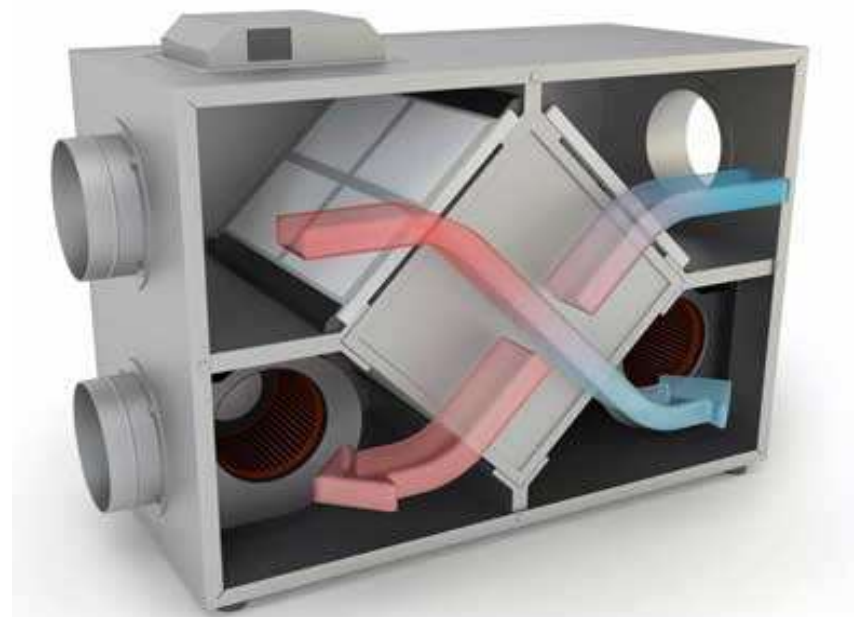


*Adapting To Changing Conditions Minimizes Disruptions, Saves Lives, Time, & Money*



## **KEY STRATEGY 4:** *HEALTH & WELL-BEING*

- Indoor Air Quality
- Daylighting & Views
- Thermal & Acoustic Comfort
- Safety & Security
- Safe Water & Food
- Biophilic & Flexible Design



Energy Recovery Ventilator (ERV)



TOOLS FOR  
PROJECT  
CONSULTANTS



*STRATEGIC  
ADVISORS*

## A PERSONAL STORY:

*A Lesson Learned From My  
Three-Year-Old Grandson, T.J.*



***Always Understand The Client's Expectations Before Offering Solutions***

# COLLABORATION



Phillip Johnson & Dr. Robert Schuller

Result: The Crystal Cathedral

Schuller: *"I envisioned a glass building."*

Johnson: *"But you're on a fault line!"*

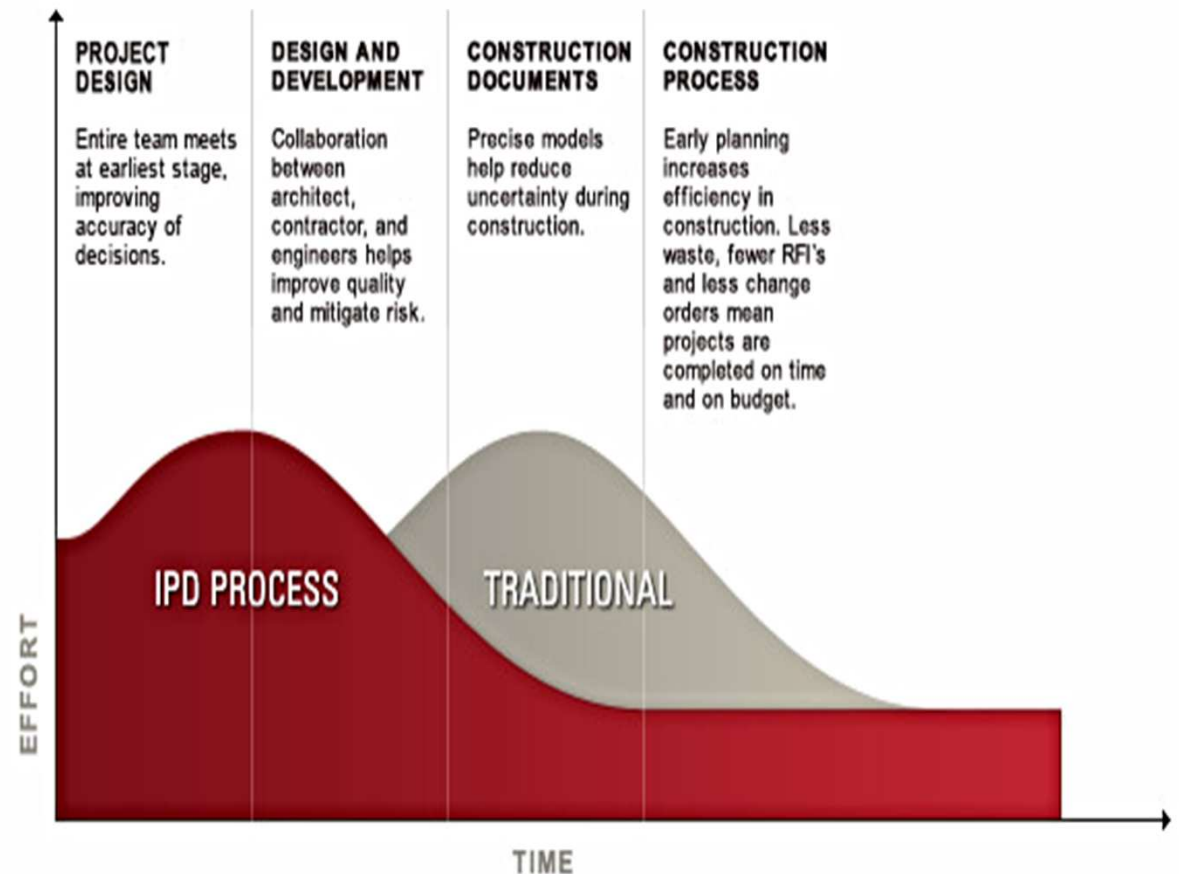
Schuller: *"Who am I to question one of the greatest architects, but I thought you could do it."*

Johnson: *"Architecture is too important to be left only to the architect. Let me try again."*

***Great Architecture Results From Meaningful Collaboration Between Inspired Clients and Talented Architects***

# STAKEHOLDER ENGAGEMENT

- Integrated Project Delivery (IPD)
- 90/10 Rule
- Discovery Workshops
- Scenario Planning
- Reconcile Goals & Budget
- Professional Standard of Care



INTEGRATED PROJECT DELIVERY: EARLY EFFORT REDUCES COST & RISK

***Early Stakeholder Engagement Saves Time, Money & Reduces Risk!***

# BUDGET APPROVAL

Prioritize DRR  
Performance  
Goals.

80% of projects run  
over budget and 20%  
behind schedule.

## Budget Approval Talking Points

- Realistic schedule (costs, timeline, resource requirements)
- Cost tolerance and expectations
- Return on investment and business benefits
- Appetite for change
- Availability of funding
- Prioritization compared to other competing initiatives
- Clarity on who has authority to approve (or cancel) the budget

*If Cost Remains The Obstacle, You May Be Having The Wrong Discussion*

## A LESSON FROM 1986

Ukraine (USSR) April 26, 1986:  
Nuclear power plant explodes.

- ❑ Flawed Reactor Design
- ❑ Inadequately Trained Personnel
- ❑ Widespread Radioactive Contamination (Still No-go)
- ❑ 500,000 Response Personnel
- ❑ 100,000 Deaths From Radiation
- ❑ Cost \$84.5B
- ❑ Contributed to Collapse of USSR

Admitted Reason  
for Faulty Design:  
“IT WAS CHEAPER!”





# A RESILIENT EXAMPLE



*Babcock Ranch, Florida*

<https://www.youtube.com/watch?v=sj8tmBTQsSM>



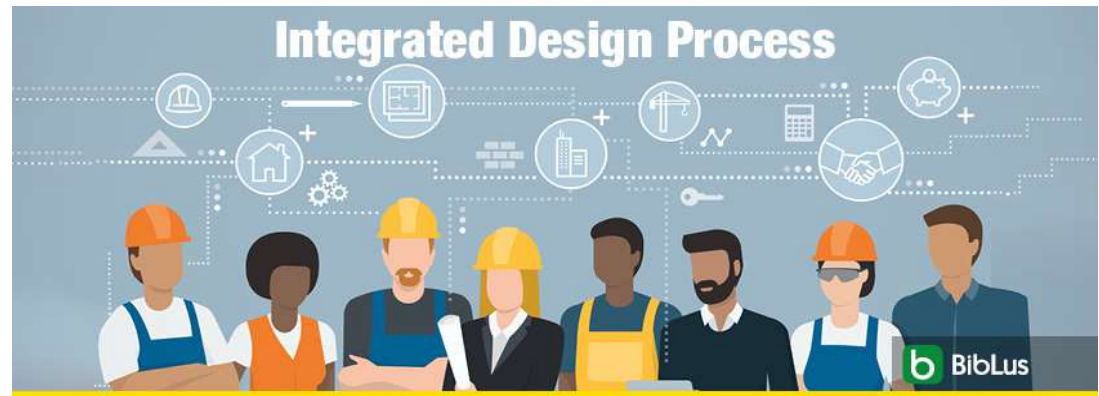
***Resilience By Design Prevents Disasters and Maintains Continuity! PERIOD!***

A CALL  
TO  
ACTION



# I CHALLENGE YOU!

1. Embed DRR as a Priority
2. Integrate DRR as a Core Value
3. Build Resilient Design Expertise
4. Promote DRR via IDP
5. Create a Sense of Urgency
6. Include DRR in Marketing Efforts
7. Promote the Triple Bottom Line
8. Seek Community Engagement



*If Not You, Then Who? If Not Now, Then When?*

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Our communities are not sustainable if they are not both green and resilient.

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