

Building Codes Work!

Survived
Michael!

Built to code in
2016

Feet from
the beach!



...At Least The Current Ones Do





FEMA
REGION VIII



What earthquakes? Don't you mean...

- Flood
- Wildfire
- High wind
- Winter storms
- Terrorism & Active shooters
- Data breaches
- Dam breaches
- Pandemics
- Election security



MOTHER NATURE DOESN'T FOLLOW OUR PLANS



FEMA

Making Mitigation Work



NO GEOLOGY DEGREE REQUIRED!



**Wasatch
Fault**



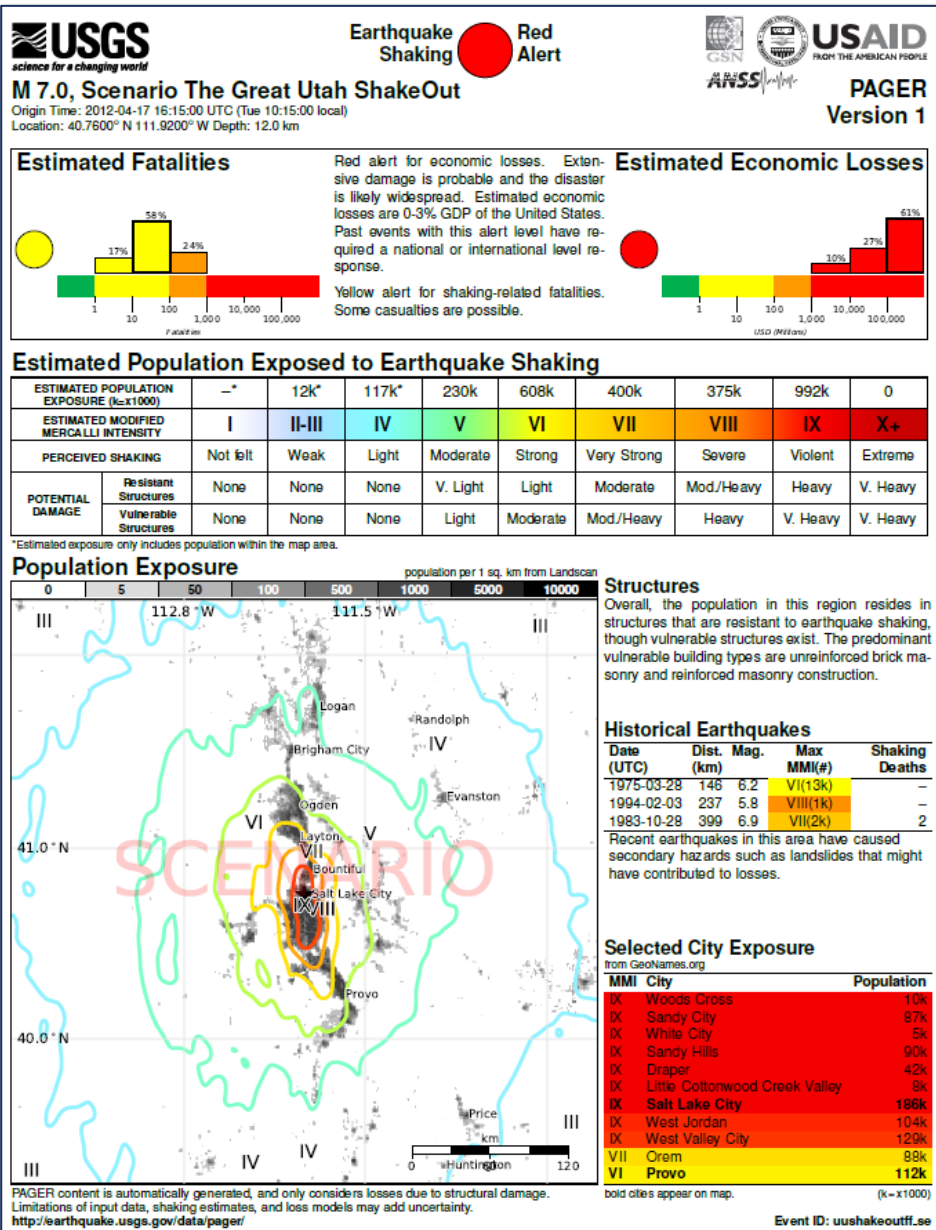
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Wasatch Fault Magnitude 6.75+ Next 50 Years

~1 in 5 chance



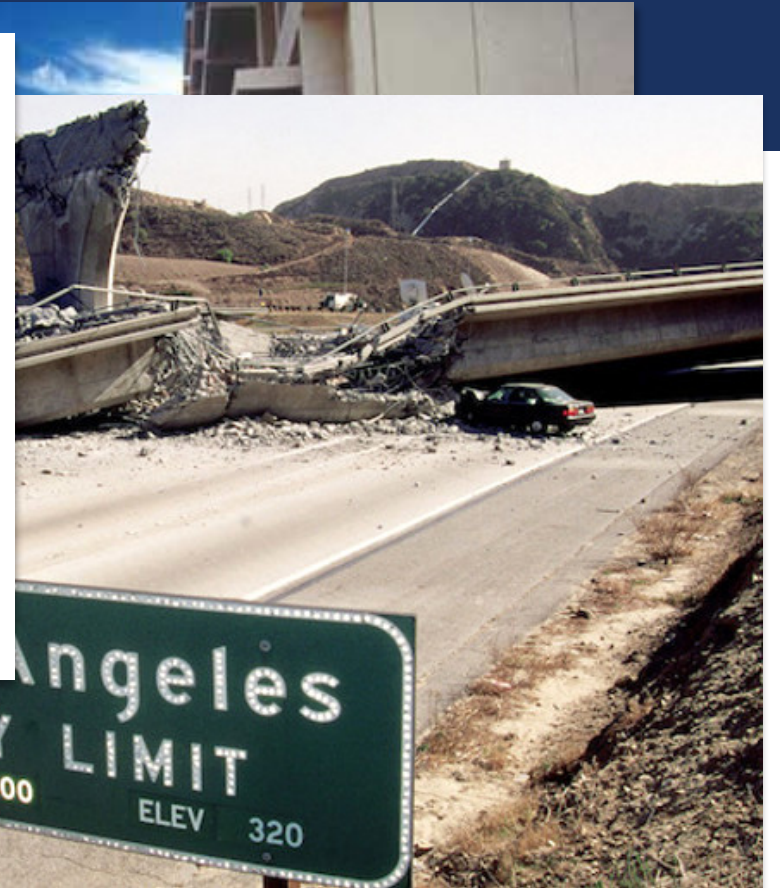
Red Alert: catastrophic losses

Significant damage to utilities and critical infrastructure

\$50+ Billion economic losses

2500+ anticipated fatalities

DISASTER MOVIE-LEVEL LOSSES



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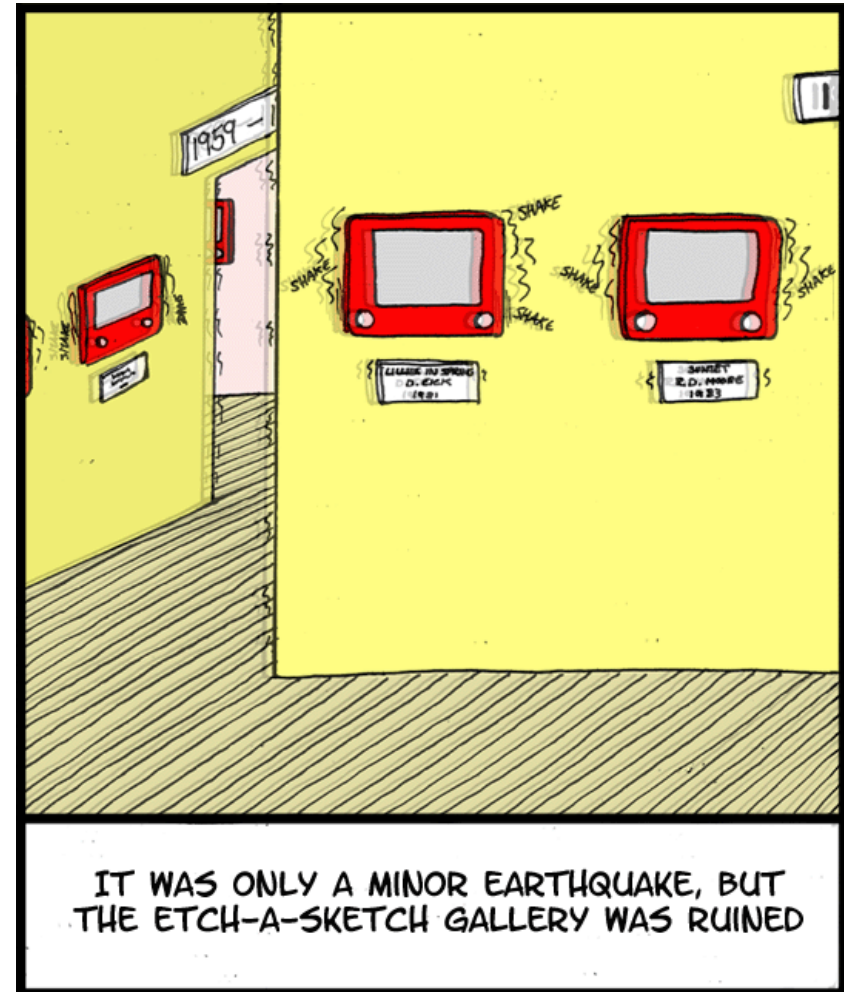
Making Mitigation Work



Unreinforced Masonry

Unreinforced Masonry (URM) Buildings don't have any steel holding the brittle bricks together.

URMs experience **life-threatening damage** at **low levels of shaking**.



URM Impacts on the Public

URM walls can often collapse outwards

Falling bricks are common killers during earthquakes

Endanger pedestrians and undamaged adjacent buildings

→ Makes a private risk a public one



Killer Buildings



High concentration of URM

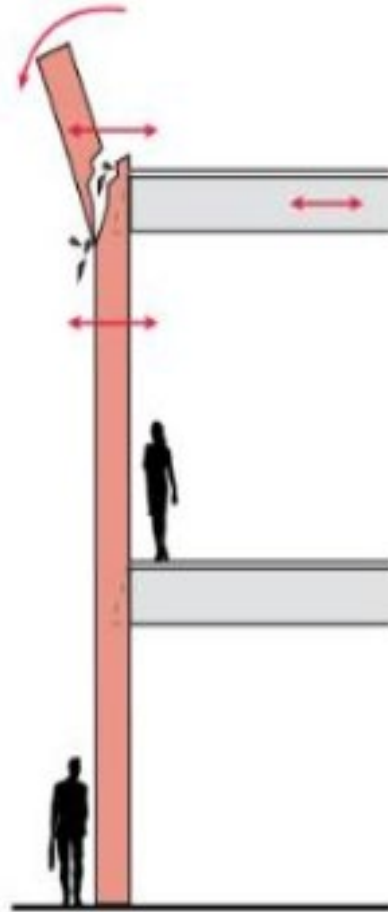
- ⑩ 30,000+ in Salt Lake City
- ⑩ 147,000 in 12 county Wasatch Front

~440k people at risk!

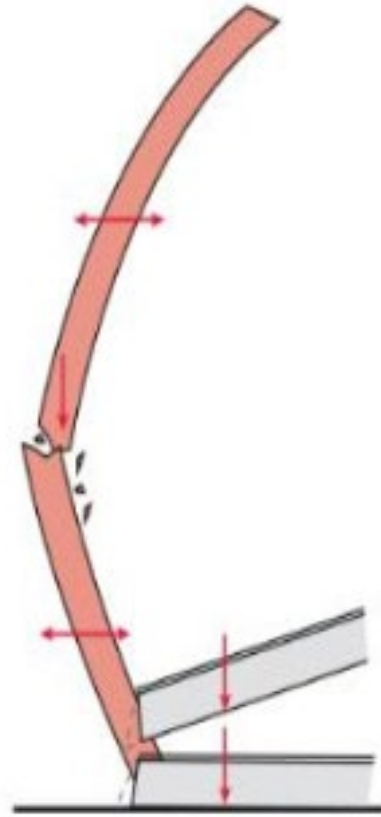
It's Not All Bad News!



Parapet breaks off (URM)



Building collapses (URM)



Building stays intact (retrofit)

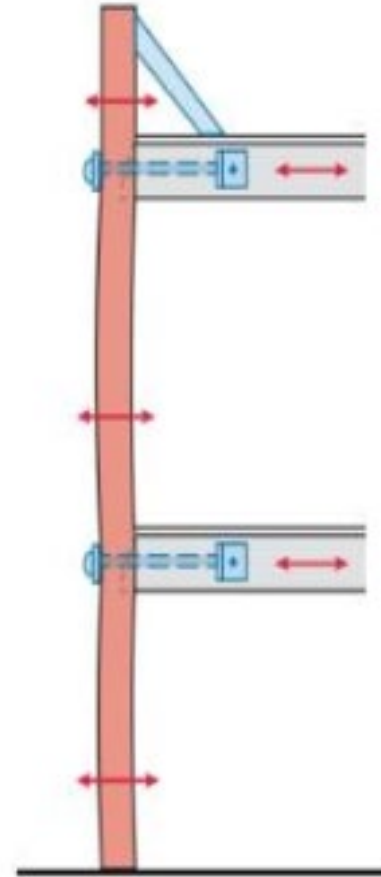


Image credit: LA Times

Economics

URMs persist because they are economically viable. Victorian, Tudor, Georgian, and brownstone style buildings are sought after as homes and workplaces.



Solutions

Many of the deaths we expect during a Wasatch earthquake are preventable through a combination of solutions, some of which have been tested in other cities.



POLICY



ECONOMIC



ENGINEERING

Utah Unreinforced Masonry Summit

- Strong engagement from ~100 attendees: emergency managers, building officials, local officials, press, & U.S. Congressional staff
- URM Summit + 2021 National Exercise are raising awareness of the threat in Utah



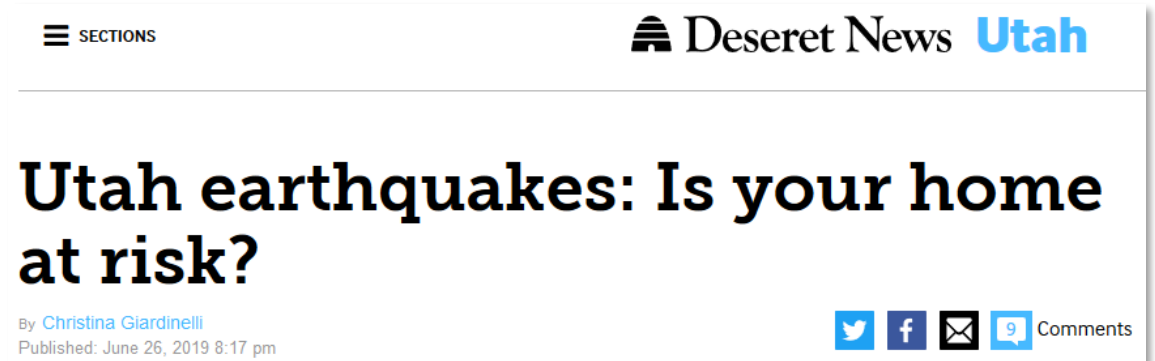
2021 National Exercise: *The Great Salt Shake*

- National-scale State/FEMA earthquake exercise
- Great opportunity to leverage a response-focused activity to promote mitigation priorities
- Draw attention to damage/casualty projections; emphasize URM risk
- Highlight new and ongoing mitigation efforts



URM Summit: Media Interest

- Print and TV media in attendance
- FEMA R8 and Utah Div. of Emergency Management met with Salt Lake Tribune & Deseret News Editorial Boards to highlight URM risk.
- Example headlines:
 - *Utah earthquakes: Is your home at risk?*
 - *Christchurch earthquake survivor warns Utahns about falling bricks*
 - *California earthquakes are Utah's wake-up call for emergency preparedness (Editorial)*

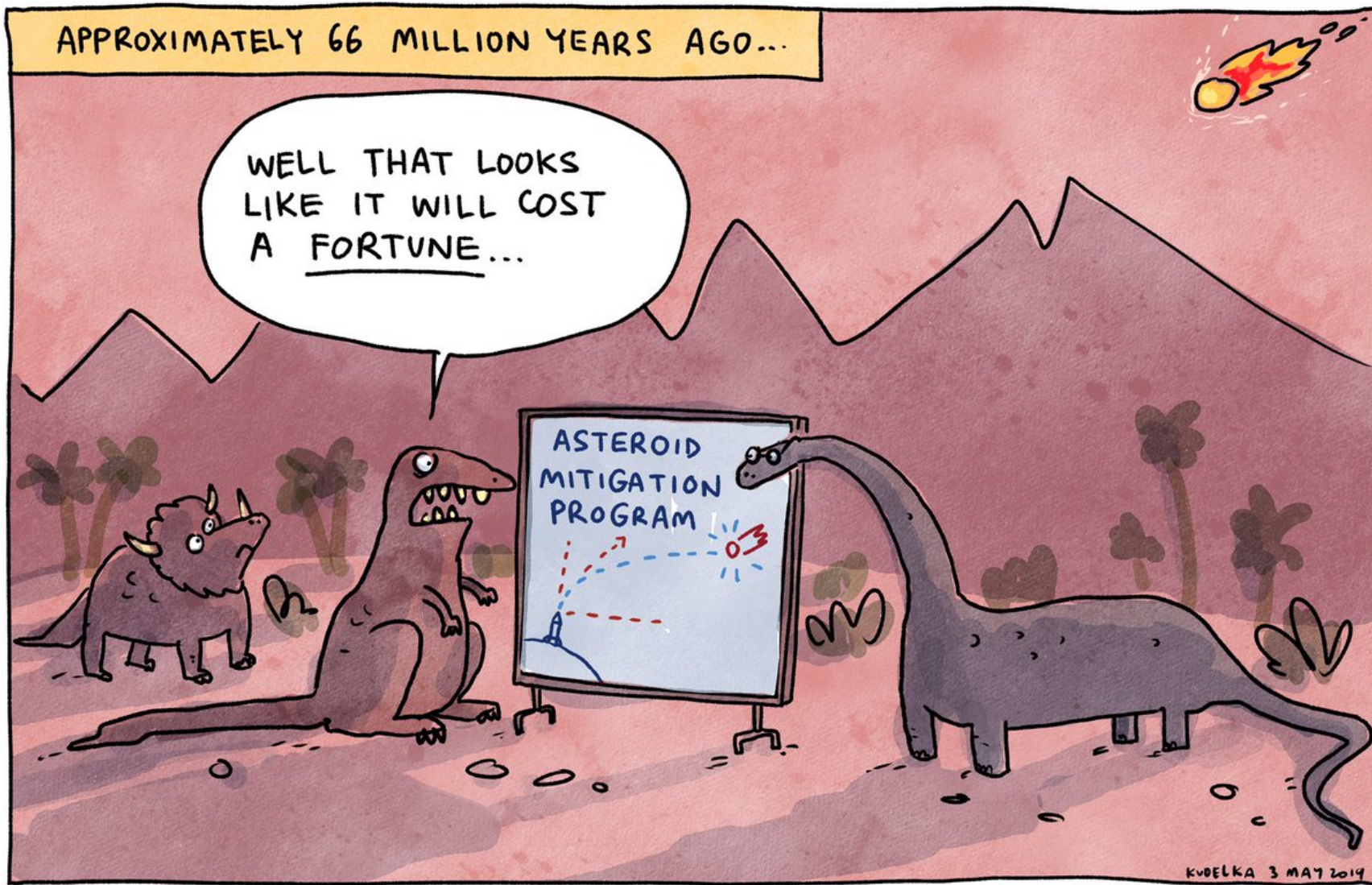


APPROXIMATELY 66 MILLION YEARS AGO...

WELL THAT LOOKS
LIKE IT WILL COST
A FORTUNE...

ASTEROID
MITIGATION
PROGRAM

KVDELKA 3 MAY 2019



National Mitigation Investment Strategy

- Post-Sandy, Government Accountability Office urged national coordination of mitigation investment to reduce future disaster losses
- *National Mitigation Investment Strategy* recommends setting resilience & mitigation investment priorities to benefit whole community.



National Mitigation Investment Strategy

**Show How Mitigation
Investments Reduce
Risk**



**Coordinate Mitigation
Investments to
Reduce Risk**

**Utah is the
first Pilot!**

**Make Mitigation
Investment Standard
Practice**

What Are Utah's Priorities Going Forward?

1. Developing a URM risk reduction strategy
 - Strategy development kickoff in Utah Feb 13th
 - Finalized strategy by Fall 2020
2. Outreach & engagement campaign targeting:
 - Public
 - Key decisionmakers



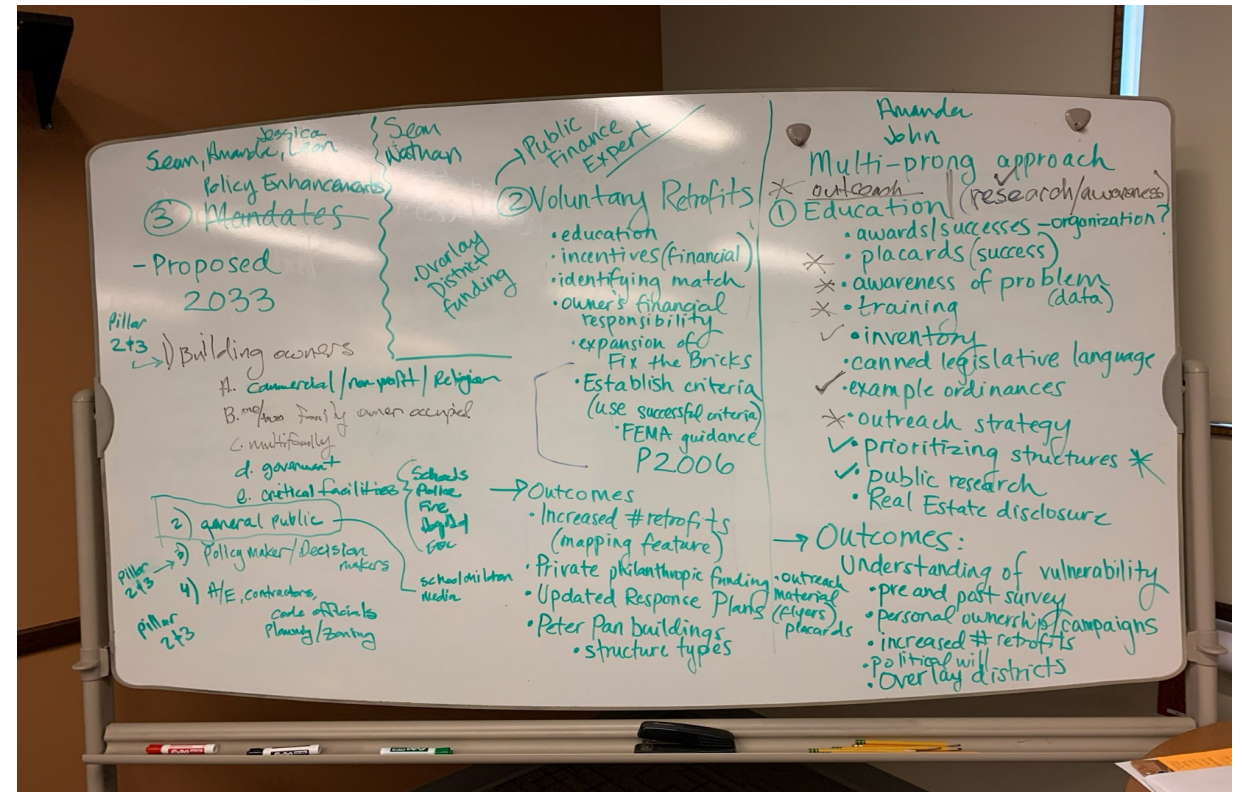
URM Risk Reduction Strategy

- URM Risk Reduction Strategy development is underway
 - Outreach & Engagement
 - Voluntary retrofits
 - Significant financial incentives & technical backup
 - Mandatory retrofits (as appropriate)



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Partnerships: Utah Seismic Safety Commission

- Utah Division of Emergency Management
- Utah Geological Survey
- University of Utah Seismograph Stations



Utah Seismic Safety Commission

a volunteer, multidisciplinary state commission focused on reducing Utah's earthquake risk

Partners

mission

25+ years of
collaboration!



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National Earthquake



FEMA



Partnerships: State level

- Earthquake Engineering Research Institute - Utah Chapter
- Envision Utah
- Structural Engineers Association of Utah
- Utah Division of Facilities Construction and Management
- Utah Association of Building Officials

Private sector, local, & nonprofit organizations represented!



Partnerships: Federal level

- FEMA Region 8 (Denver)
- FEMA HQ (Washington, D.C.)
- FEMA Region 10 (Seattle)
- Housing and Urban Development (Denver)
- Small Business Administration

**Complementary skillsets
and scopes**



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Making Mitigation Work



Why Utah Will Be a Successful Pilot

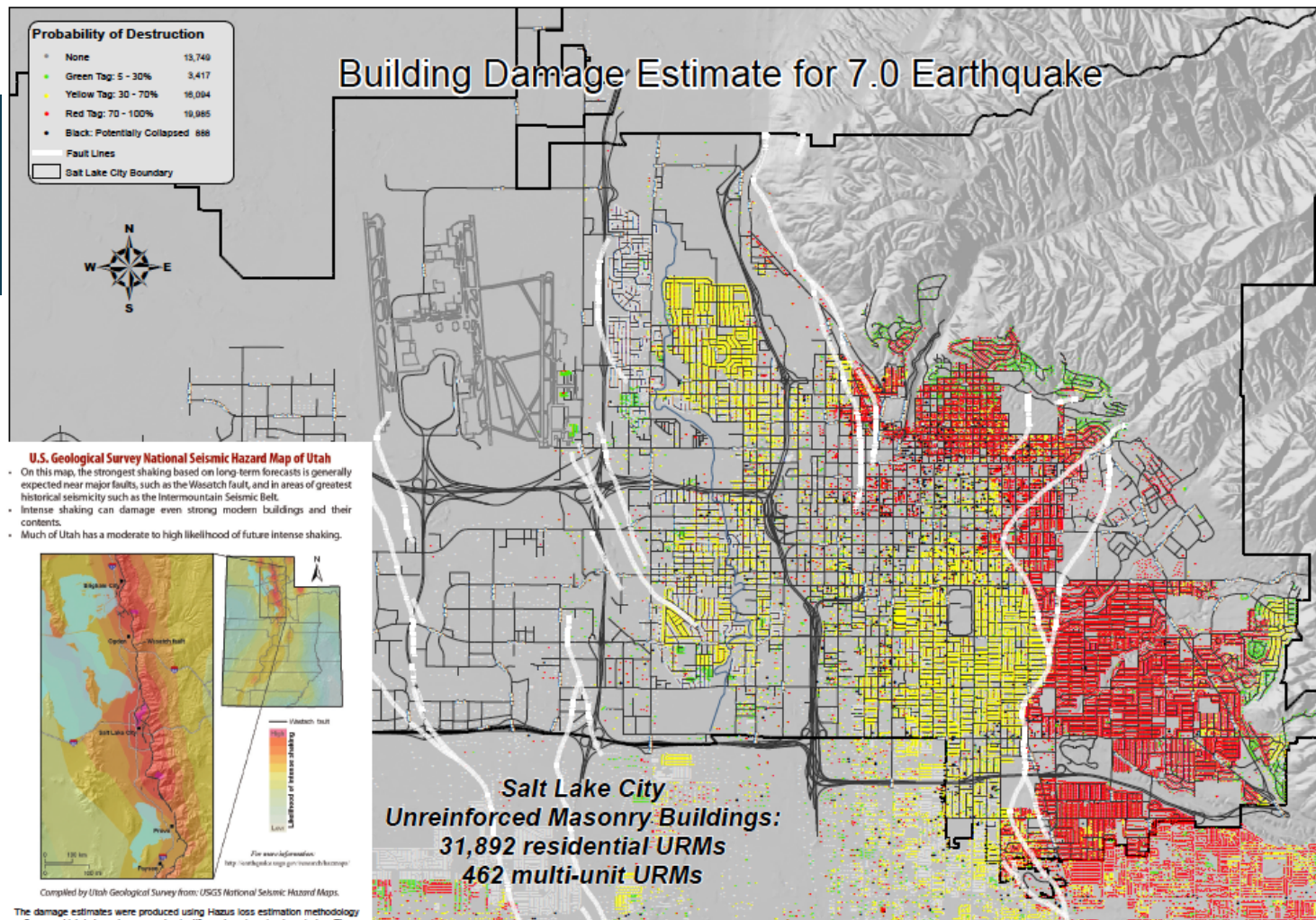
- Leadership at the State, FEMA Region, and FEMA HQ is aligned behind priority
- Strong foundation to build upon
- Timing is perfect to coincide with National Exercise
- Lives are at stake: this is our chance to put our words and ideas into action



All Along the Wasatch Fault

Making Mitigation Work NHC
March 10, 2020

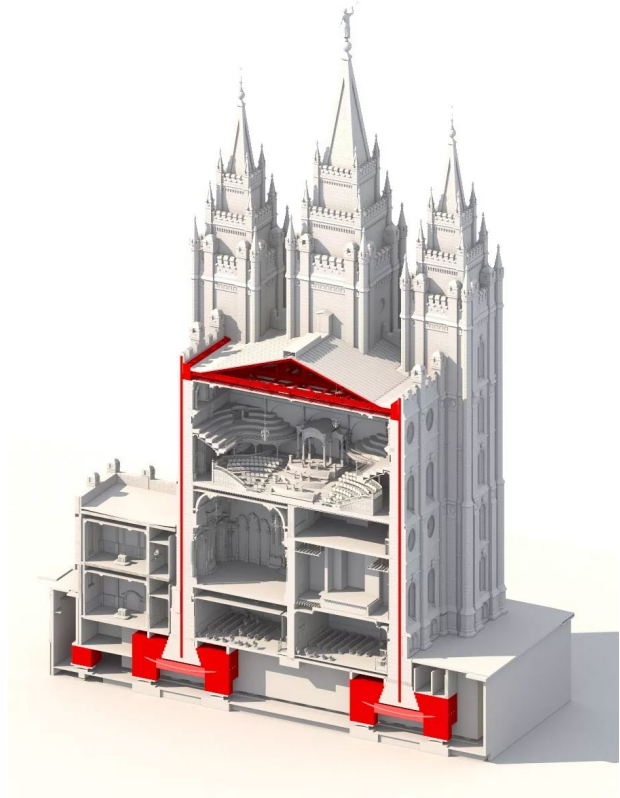
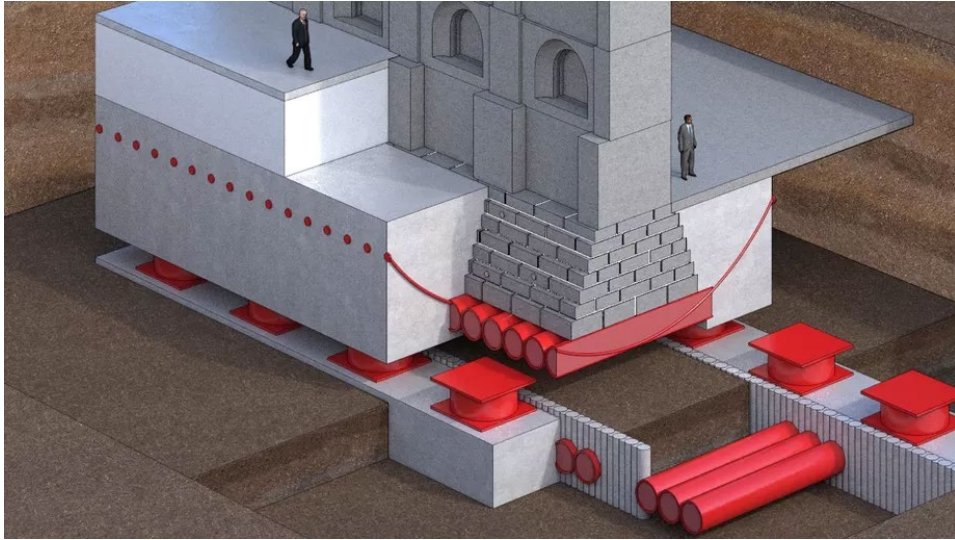




The damage estimates were produced using Hazus loss estimation methodology software, which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results and the actual social and economic losses following a specific earthquake. These results are improved by using enhanced inventory, geotechnical, and ground motion data.



Church of Jesus Christ of Latter -Day Saints





**Salt Lake City
City & County Building**

**1989 - Retrofit & Base Isolators
Currently updating retrofit**

State of Utah Capitol Building

**2001 - Retrofit & Base
Isolators**



Retrofit Projects

UTAH HMA

2003 to 2018

90 Projects and Plans

\$50 Million in Federal

Funding

Seismic Projects

\$25 Million Federal Funding

<https://hazards.utah.gov/mitigation-strategies/#>



Utah Seismic Projects Funded Through Hazard Mitigation Assistance Grant Programs

Projects From 2003 - Present

Grant programs include: Pre-Disaster Mitigation - Competitive (PDM-C), Legislative Pre-Disaster Mitigation (LPDM) and the Hazard Mitigation Grant Program (HMGP).

1. University of Utah Marriott Library Retrofit

- Project Number: PDMC-PJ-08-UT-2003-001
- Grant Program: PDM
- Total Project Cost: \$15,513,149
- Federal Share: \$2,994,037.76



Marriott Library 2003



Total Renovation:

Nearly \$100 million

Total Seismic \$15,513,149

Federal \$2,994,038

Local \$12,519,111



Jordan Valley Water Conservancy District



**2003 Participation in State
Hazard Mitigation Plan**

**2006 - Filter Gallery & Chemical
Control Buildings**

**Federal Share \$1,707,750
Local Match \$569,250**

2007 - Headquarters Complex

**Federal Share \$2,040,000
Local Match \$680,000**

Weber Basin Water Conservancy District



2008 - Hazard Mitigation Plan

2010 - PDMC - Water Filter Building #4

Federal Share \$767,399.25

Local Match \$255,799.75

PDMC - NonStructural Seismic Project

Federal Share \$91,650

Local Match \$30,550

2011- PDMC - Culinary Wells

Federal Share \$208,457.25

Local Match \$69,485.75

2012 - HMGP DR- 4011- 12MG Tank

Federal Share \$70,515

Local Match \$23,505

2013 - HMGP DR- 4088 - WTP Backwash Tanks

Federal Share \$221,420.25

Local Match \$77,536.75

2018 Hazard Mitigation Plan

2019 \$9 Million Resilient Infrastructure PDMC

Murray School District



2014 - Mitigation Plan

2012 - HMGP DR - 4011 Riverview Jr High Retrofit
Federal Share \$910,516
Local Match \$303,505

2014 - PDMC - McMillan/Parkside Retrofit
Federal Share \$990,000
Local Match \$1,013,451

2015 - PDMC - Horizon/Viewmont Retrofit
Federal Share \$994,301
Local Match \$935,201

4/7 Elementary Schools
1/2 Jr. High Schools

Fix The Bricks Inception



+



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Where do we start...

Steering Committee Meetings

Outreach

Mayor's Press Conference

Program implementation



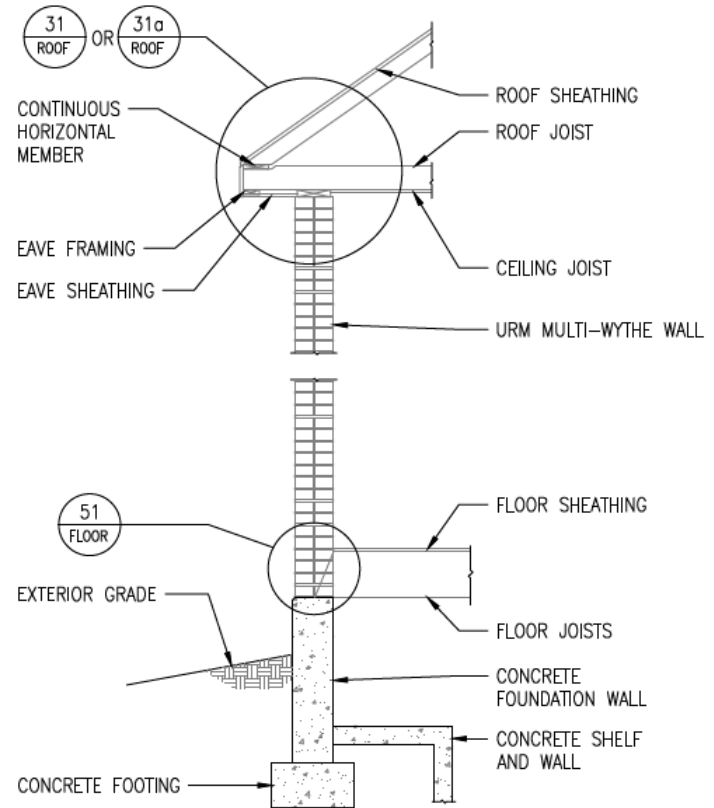
THE UTAH GUIDE FOR THE SEISMIC IMPROVEMENT OF UNREINFORCED MASONRY DWELLINGS



FEMA



Utah Seismic Safety Commission
Existing Buildings Committee
Second Edition
2016



3
SECTION

SECTION W/ JOIST FRAMING
PERPENDICULAR TO WALL

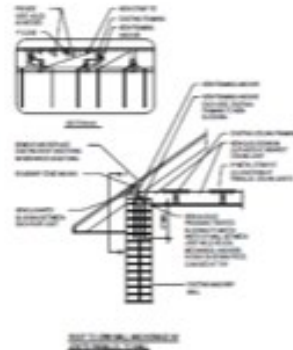
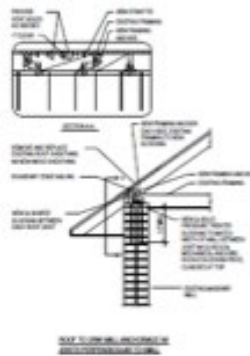
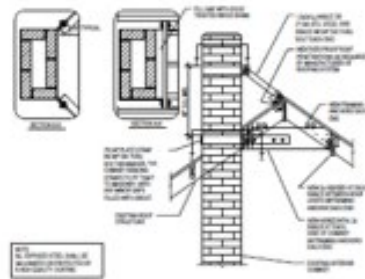
Model Home Seismic Deficiencies	HOME TYPE: MODEL B	Exterior Wall Sections	DETAIL: 3
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Seismic EHP

- Go through planning division to get certificate of approval
- Local historic preservation board has accepted details as outlined in SHPO agreement although approved separately
- Requires extra documentation
- Go through housing and neighborhood development
- Details reviewed against are based on SHPO agreement with state

Pre-Application

- SLC RESIDENTS SUBMIT REQUEST TO PARTICIPATE IN PROGRAM VIA WEBSITE
 - DURING CERTAIN TIMES OF THE YEAR, APPLICATIONS PEAK
 - EARTHQUAKE OCCURRENCE (UTAH OR WORLD)
 - NATIONAL PREPAREDNESS AWARENESS MONTHS
APRIL/SEPTEMBER
- APPLICANTS NOT IN SLC BOUNDARIES ARE MAINTAINED FOR OTHER CITY'S IF THEY CHOOSE TO IMPLEMENT PROGRAM
- APPLICANTS NEVER DELETED
- MAINTAIN LISTS FOR APARTMENTS AND COMPLEXES



Bids and Contracts

City notify participants when they can begin looking for bids

Contractors competitively bid on homes

Homeowner picks contractor

Contractor bid compared to our formulated bca

Construction & Documentation

- Once required documentation submitted, homeowners move forward with construction
- Contractors documentation requirements
- Photos of seismic work during and after construction
- Stamped engineered drawings
- Building permits
- Invoicing
- Lien release

Closeout & Reimbursement

- City, homeowner and contractor conduct closeout meeting
- City check given to homeowner
- Homeowner signs check over to contractor
- Exchange of invoices, receipts and lien release





68% of Single Family Homes in SLC are URM

Chimney Bracing
Average \$1,800 per chimney



Roof to Wall
Average \$12 a square foot



Fix The Bricks

2016

27 Homes

Total \$707,024

Federal \$507,500

2017

100 Homes

Total \$2,555,194

Federal \$1,916,395

2018 -

250 Homes

Total \$5,558,799

Federal \$4,169,100



Takeaways

Partnerships are key

- Local/nonprofit/private sector - to - State
- State - to - Federal
- Federal - to - Federal
- Foundation needs to be established *before* the project
- Ask who's missing
- Be honest about blind spots
- Ours: vulnerable populations, financial/tax experts, Native American Tribes
- Bring in experienced, representative groups to give voice to the voiceless
then also ask *them* who's still missing

—

Takeaways

Buy - in from State/Federal agency leadership is essential

- Be vocal about the importance of mitigation
- Balance “doom & gloom” with reasons for optimism – provide a roadmap to success
- If management asks “what do you need?” have an answer ready
- ...if management doesn’t ask, have an answer ready anyway



Takeaways

Identify key windows of support for mitigation

- After a disaster (“How could this have happened here?”)
- Anniversaries of disasters (“We can’t let that happen again!”)
- Tie to larger, related efforts (National Exercise, major conference, etc.)





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