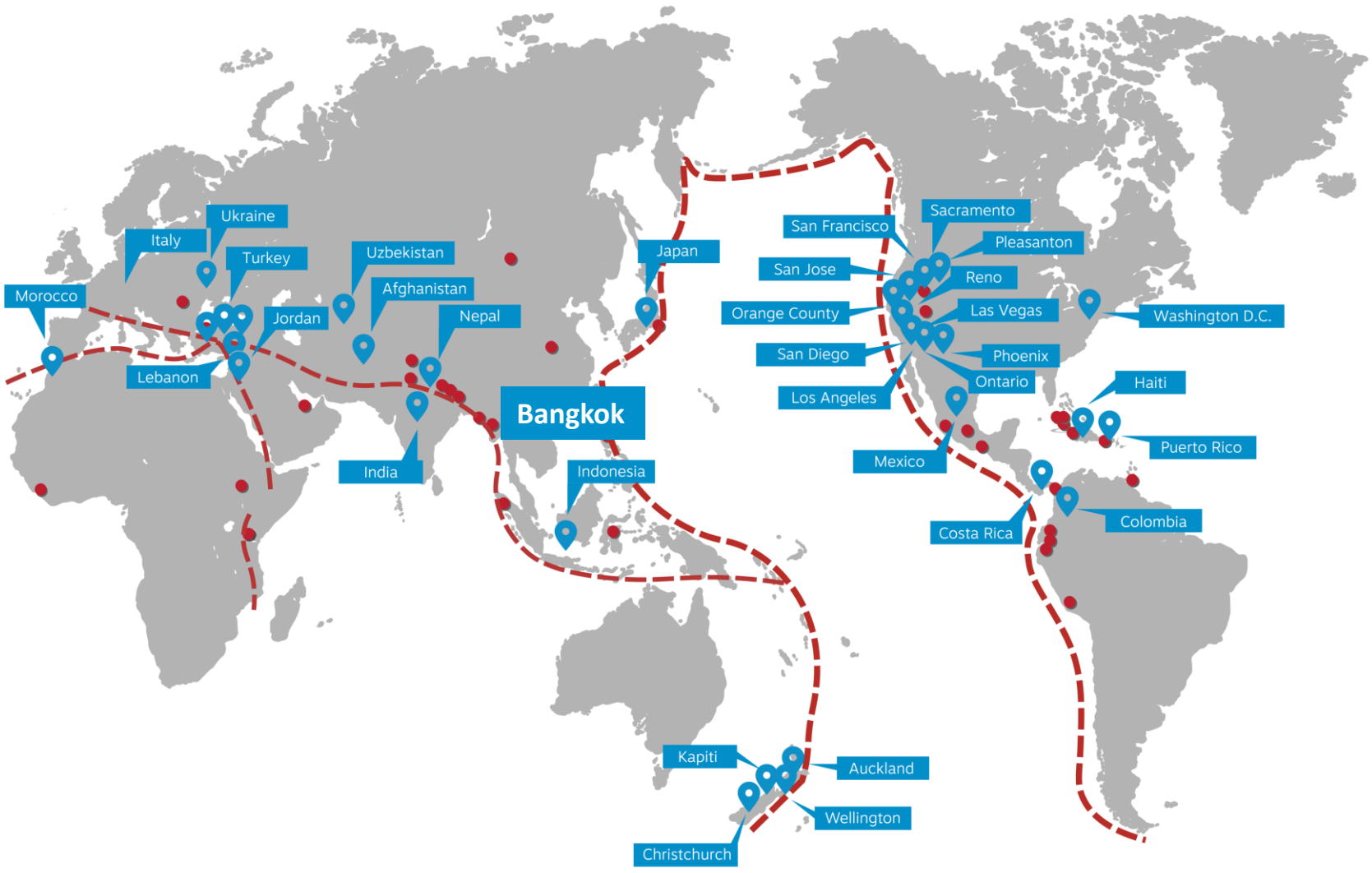
Impact of Myanmar Earthquake on Bangkok and Next Steps

Dr. Hideki Kit Miyamoto, S.E.
Global CEO

miyamoto.

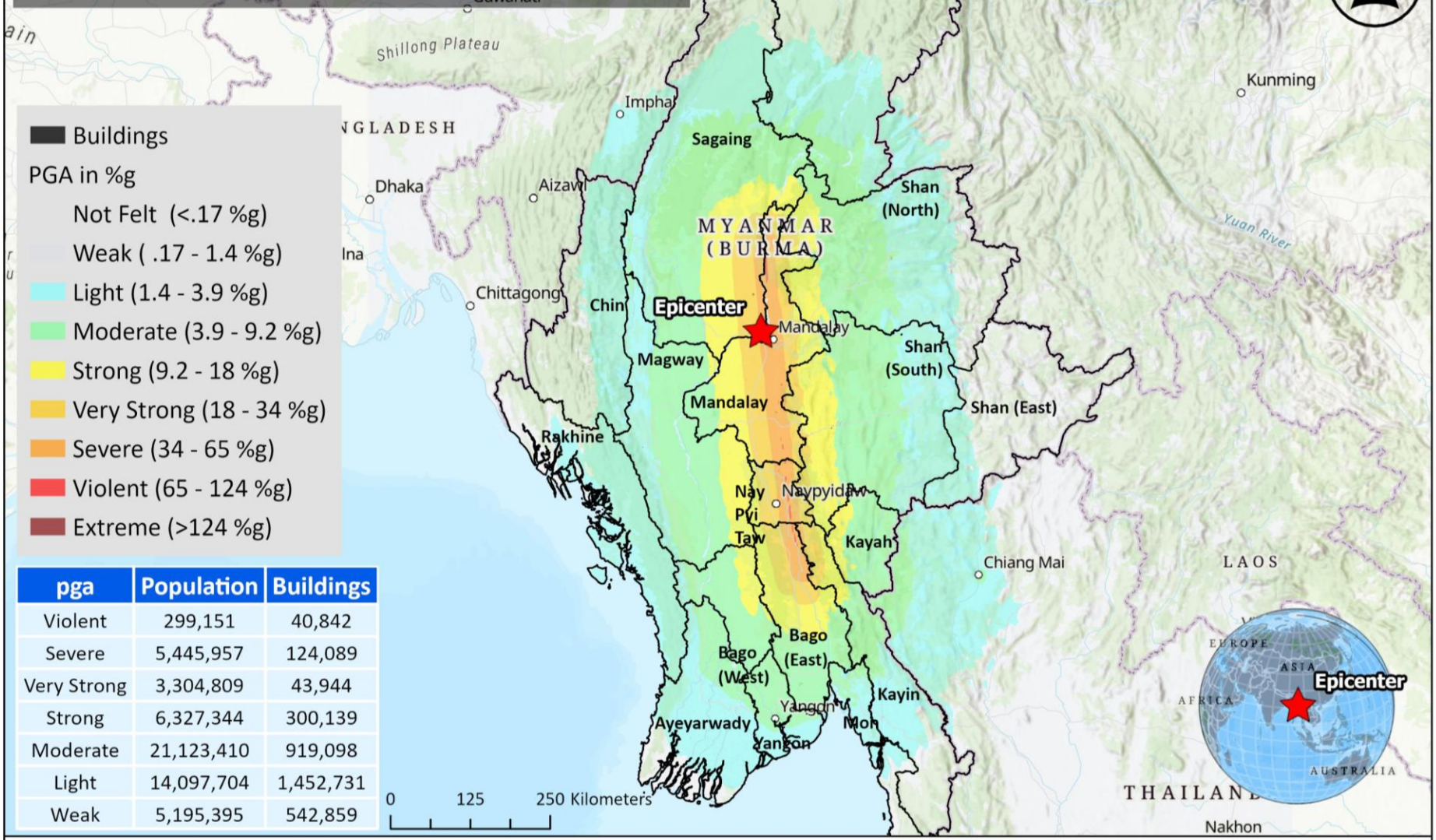
Save lives, **impact** economies.

A Global Engineering Firm with a Humanitarian Focus



Experience: More than 100 Disasters, 1971 - 2025

1971 San Fernando, CA (M6.5)
1972 Managua, Nicaragua (M6.3)
1973 Point Mugu, CA (M5.9)
1973 Managua, Nicaragua (M5.8)
1975 Ferndale, CA (M5.5)
1975 Lice, Turkey (M6.8)
1976 Friuli, Italy (M6.5)
1977 Vrancia, Romania (M7.4)
1978 Izu Peninsula, Japan (M6.7)
1978 Miyagi-Ken-oki, Japan (M7.4)
1978 Santa Barbara, CA (M5.1)
1979 Bishop, CA (M5.8)
1979 Gilroy, CA (M5.5)
1979 Imperial Valley, CA (M6.6)
1980 Livermore, CA (M5.5 and 5.8)
1980 Eureka, CA (M7.0)
1980 Mammoth Mt., CA (M6.5, 6.5, 6.7)
1981 Brawley, CA (M5.6)
1983 Coalinga, CA (M6.7)
1983 Borah Mt., Idaho (M6.9)
1984 Morgan Hill, CA (M6.2)
1985 Santiago, Chile (M7.8 and 7.2)
1985 Mexico City, Mexico (M8.1 and 7.5)
1986 Painesville, Ohio (M5.0)
1986 Adak Island, Alaska (M7.7 and 6.5)
1986 North Palm Springs, CA (M6.0)
1986 Chalfant Valley, CA (M6.0 and 5.5)
1986 San Salvador, El Salvador (M5.4)
1986 Northern Taiwan (M6.8)
1987 Cerro Prieto, Mexico (M5.4)
1987 Bay of Plenty, New Zealand (M6.2)
1987 Whittier, CA (M5.9)
1987 Superstition Hills, CA (M6.3)
1988 Gorman, CA (M5.2)
1988 Alum Rock, CA (M5.1)
1988 Saguenay, Quebec (M6.0)
1988 Armenia, USSR (M6.9)
1989 Acapulco, Mexico (M6.8)
1989 Loma Prieta, CA (M7.1)
1989 Newcastle, Australia (M5.5)
1990 Upland, California (M5.5)
1990 Bishop's Castle, Wales (M5.4)
1990 Manjil, Iran (M7.7)
1990 Central Luzon, Philippines (M7.7)
1991 Valle de la Estrella, Costa Rica (M7.4)
1991 Sierra Madre, CA (M5.8)
1992 Erzincan, Turkey (M6.8)
1992 Roermond, Netherlands (M5.8)
1992 Desert Hot Springs, CA (M6.1)
1992 Cape Mendocino, CA (M7.0, 6.0, & 6.5)
1992 Landers-Big Bear, CA (M7.6 and 6.7)
1992 Cairo, Egypt (M5.9)
1993 Scotts Mill, OR (M5.3)
1993 Nansei-oki Hokkaido, Japan, (M7.8)
1993 Agana, Guam (M8.2)
1993 Klamath Falls, OR (M5.7)
1994 Northridge, CA (M6.6)
1994 Tohoko-oki, Hokkaido, Japan (M8.1)
1995 Great Hanshin (Kobe), Japan (M7.2)
1995 Pereira, Colombia (M6.5)
1995 Sakhalin Islands, Russia (M7.2)
1995 Antofagasta, Chile (M7.4)
1995 Manzanillo, Mexico (M7.6)
1996 Duvall (Seattle,), WA (M5.3)
1997 Calico, CA (M5.0)
1997 Umbria, Italy (M5.5)
1998 Adana-Ceyhan, Turkey (M6.2)
1999 Armenia, Colombia (M5.0)
1999 Puerto Escondido, Mexico (M7.5)
1999 Western Washington (M5.8)
1999 Izmit, Turkey (M7.4)
1999 Duzce, Turkey (M7.2)
1999 Central Taiwan (M7.6)
1999 Athens, Greece (M5.9)
1999 Algeria (M5.5)
1999 Hector Mine, California (M7.1)
2000 Napa, CA (M5.2)
2000 Tottori, Japan (M6.7)
2001 Gujarat, India (M7.6)
2001 Seattle, WA (M6.8)
2002 San Simeon (Paso Robles), CA (M6.5)
2007 West Sumatra, Indonesia (M6.3)
2007 Niigata (Kashiwazaki), Japan (M6.8)
2008 Mexicali, Mexico (M5.1)
2008 Wells, Nevada (M6.3)
2008 Sichuan, China (M8.0)
2008 Chino Hills, CA (M5.4)
2009 L'Aquila, Italy (M6.3)
2010 Eureka, CA (M6.5)
2010 Haiti (M6.9)
2010 Chile (M8.8)
2010 Baja California, Mexico & CA (M7.2)
2010 Christchurch, New Zealand (M7.2)
2011 Christchurch, New Zealand (M6.3)
2011 Honshu, Japan (M9.0)
2011 Van, Turkey (M7.2)
2012 Finale Emilia, Italy (M6.0)
2013 Philippines (M7.1)
2014 Napa, CA (M6.0)
2015 Nepal (M7.8)
2016 Ecuador (M7.8)
2016 Norcia, Italy (M7.0)
2017 Central Mexico (M7.1)
2018 Indonesia (M6.9 and M7.5)
2019 Ridgecrest, CA (M7.1)
2020 Puerto Rico (M6.4 and M5.8)
2022 Humboldt, CA (M5.4)
2023 Paktika, Afghanistan (M6.5)
2023 Ukraine Reconstruction
2023 Gaziantep, Türkiye (M7.8 and 7.5)
2023 Marrakech, Morocco (M6.8)
2024 Noto, Japan (M7.5)
2025 Myanmar (M7.7)



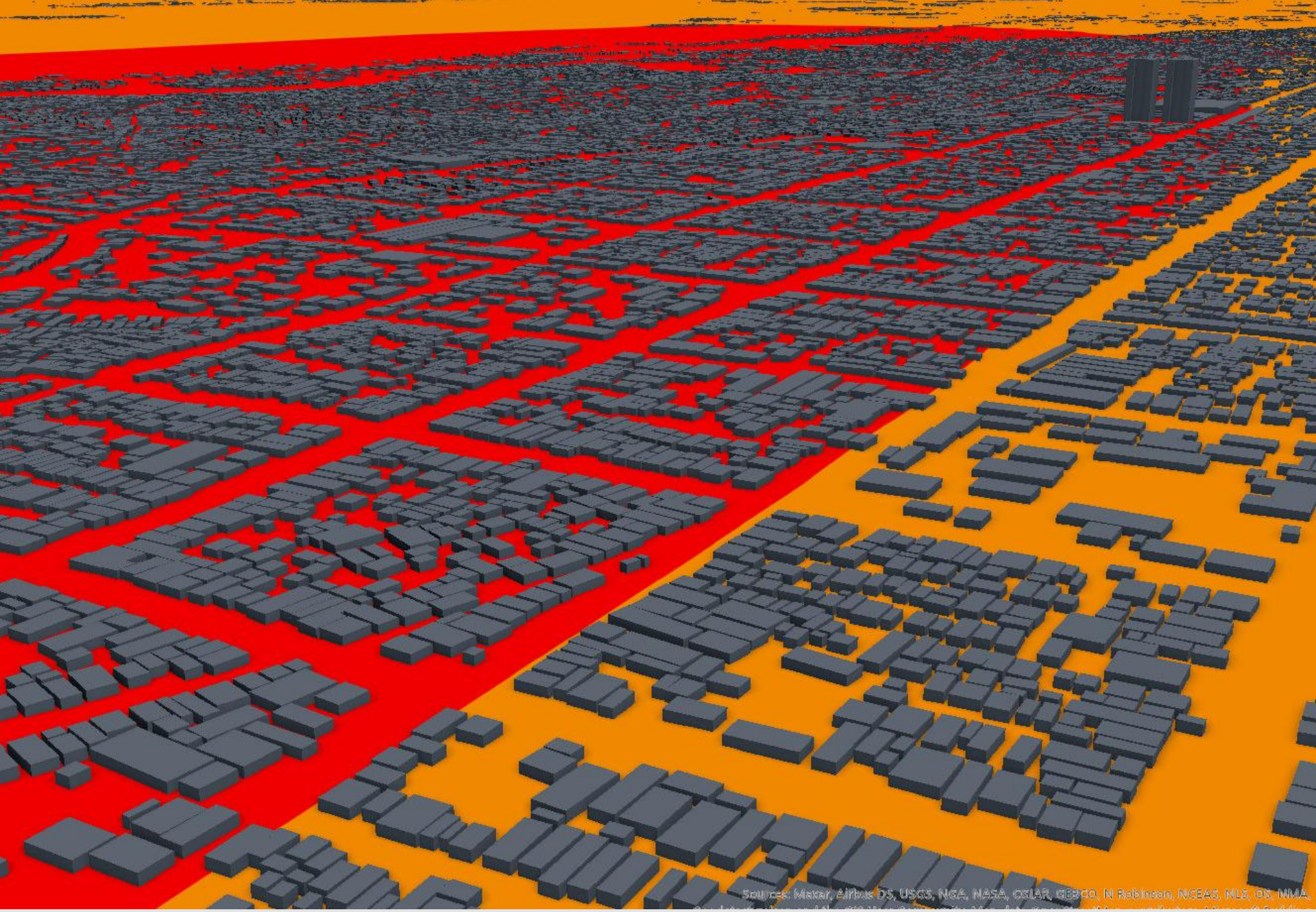
pga	Population	Buildings
Violent	299,151	40,842
Severe	5,445,957	124,089
Very Strong	3,304,809	43,944
Strong	6,327,344	300,139
Moderate	21,123,410	919,098
Light	14,097,704	1,452,731
Weak	5,195,395	542,859

M 7.7, 2025 Mandalay, Myanmar Earthquake

Location: 22.0128◦ N 95.9216◦ E Depth: 10.0 km
Origin Time: 2025-03-28 00:20:54 UTC (Fri 06:50:54 local)

Reference: PGA information taken from USGS of 29th March. We used OpenStreetMap map building footprint and Landscan Global 2023 for population to calculate exposure.

miyamoto.


Sources: Maxar, Airbus DS, USGS, NGA, NASA, OEIAR, GEBCO, N Robinson, NCEAS, NLS, OS, NMA,

2025 M 7.7 Myanmar Earthquake

- Affecting 15 million people.
- 500,000 buildings are exposed to strong motion
- Unreinforced masonry and older concrete structures
- 30% of these buildings (150,000) could be severely damaged or collapse
- Additionally, 30% may sustain moderate damage
- 10 million people may be IDP
- 10,000 to 100,000 fatalities with a 35% probability

2025 M 7.7 Myanmar Earthquake Next Steps

- Critical infrastructure (healthcare and schools) assessment
- Residential structures assessment and communication campaign
- Local teams deployed

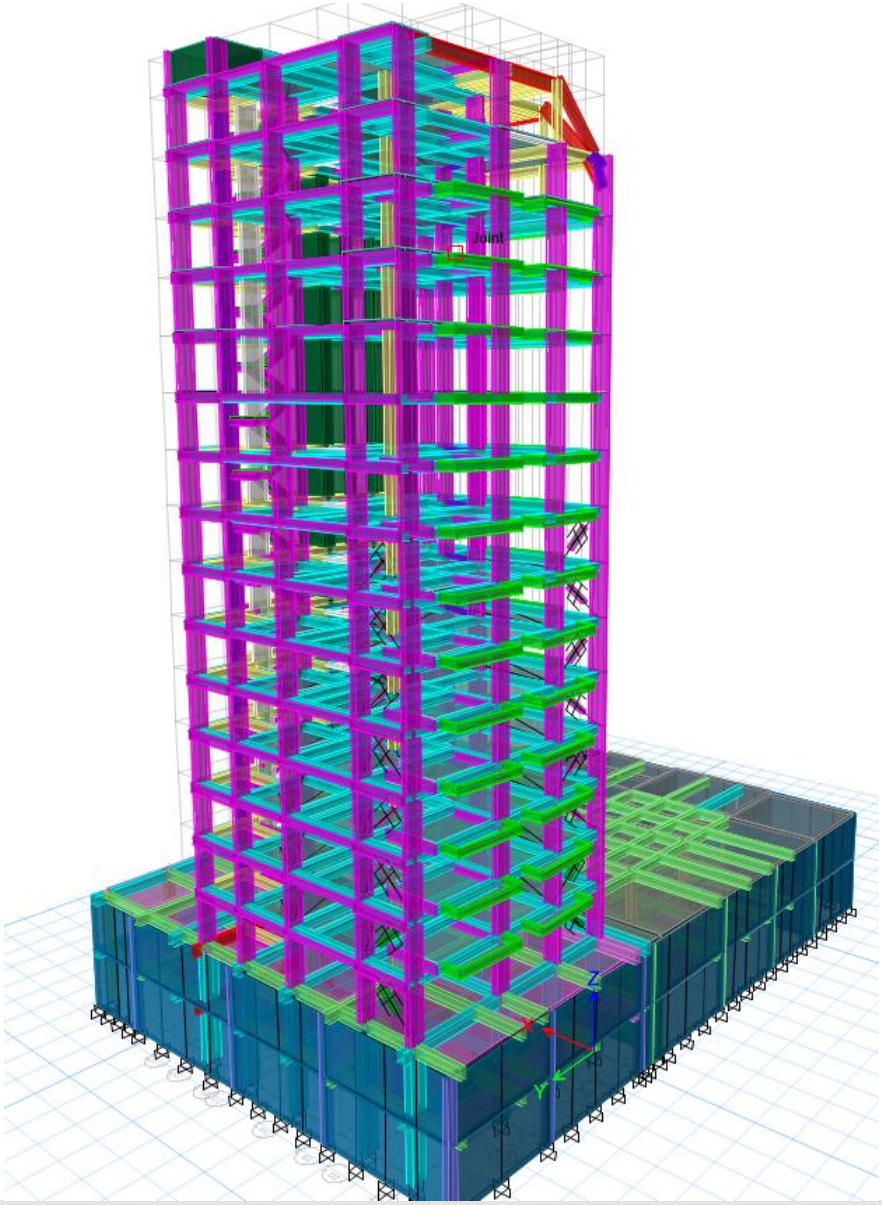
Impact of Myanmar Earthquake on Bangkok

- Code changes 2007/2017
- Long distance earthquake affecting tall buildings on soft soil
- Widespread damages and a collapse
- Uncertainty in commercial residential investment. Commercial banking finance stopped.

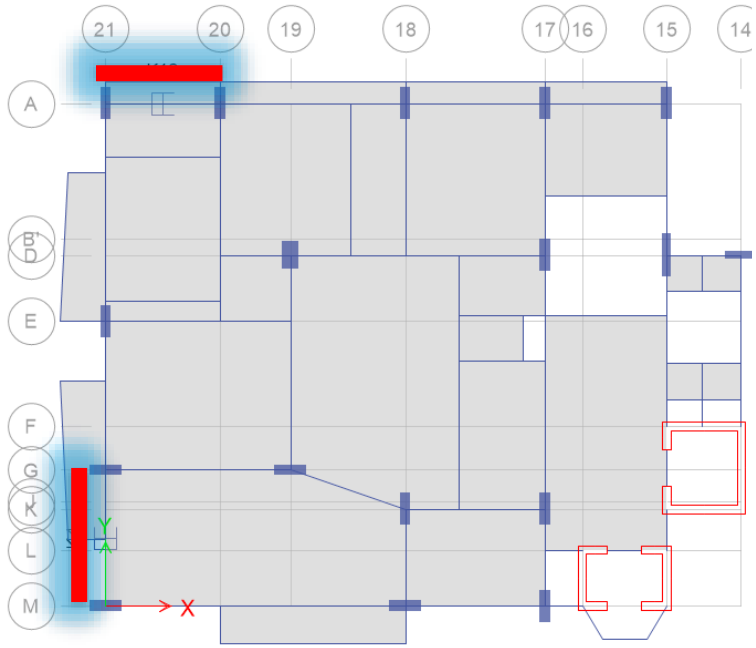
Bangkok Seismic Risk Reduction

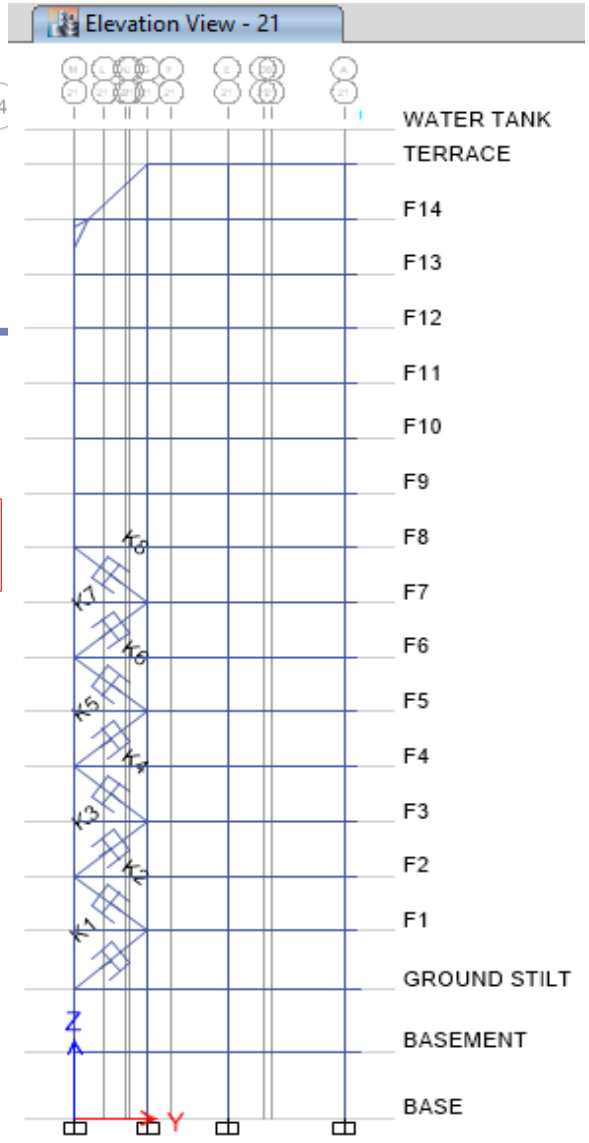
- Resk reduction program
- Make private sector investment feasible by creating liquidity in market
- Innovative cost-effective technology

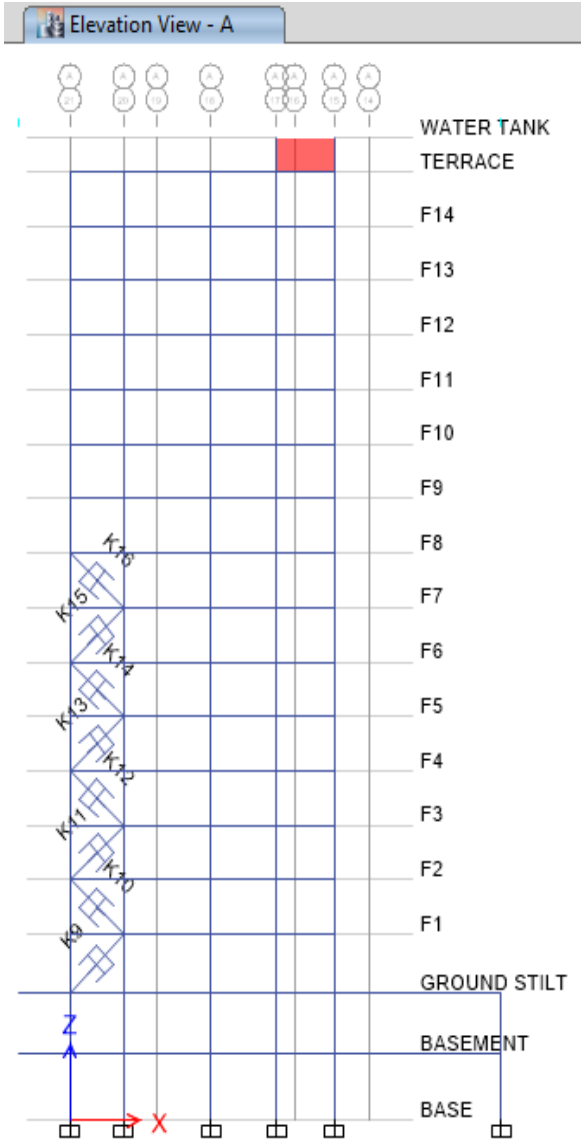
Innovative cost-effective technology

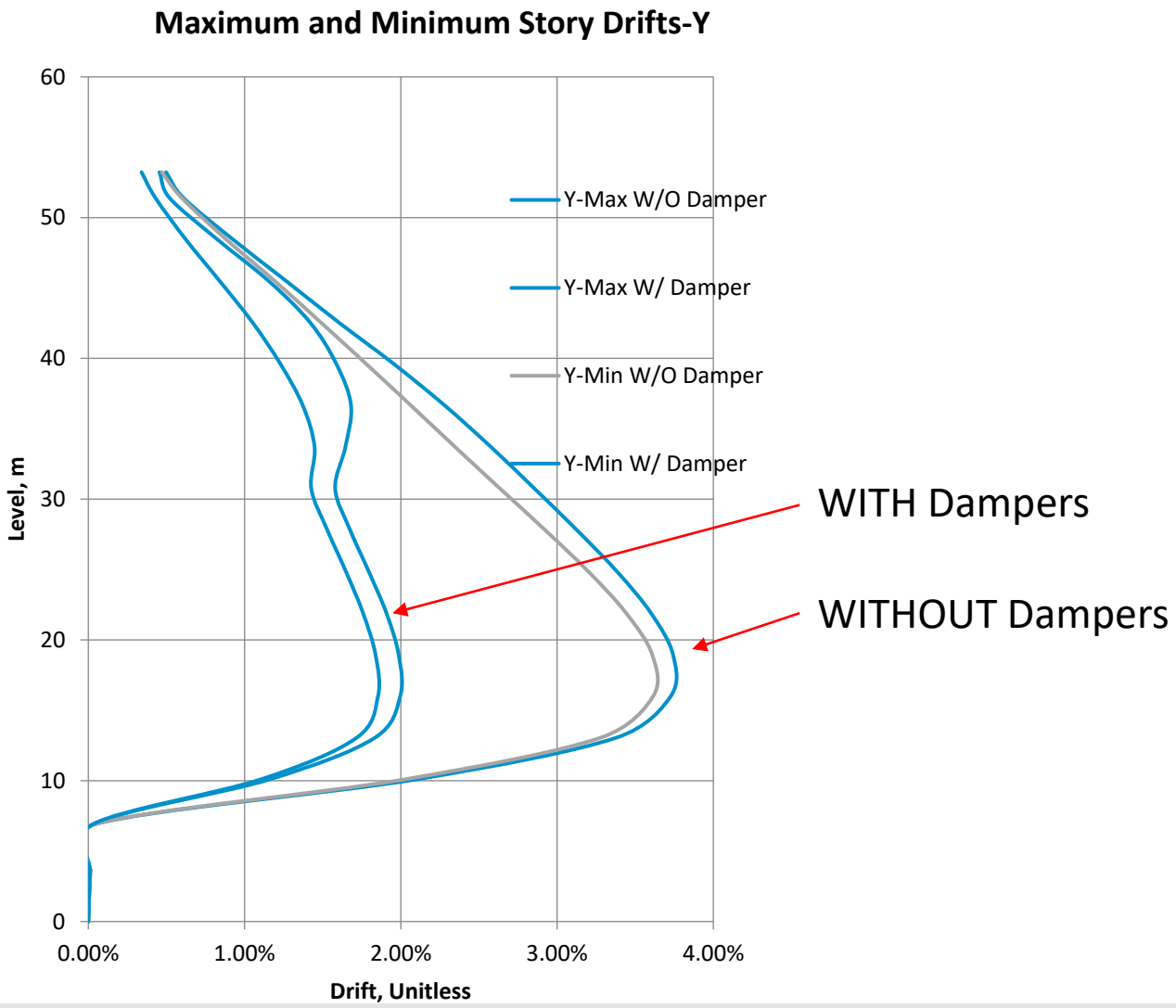


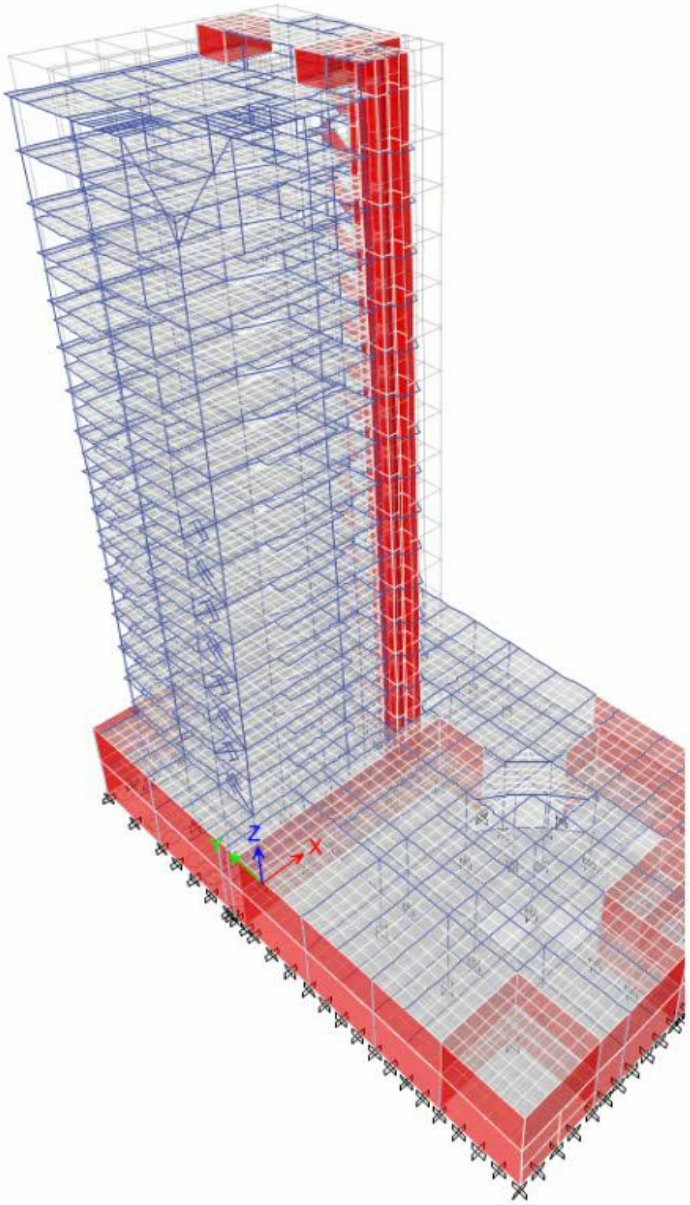
Japanese Developed- Seismic Energy Dissipation Devices

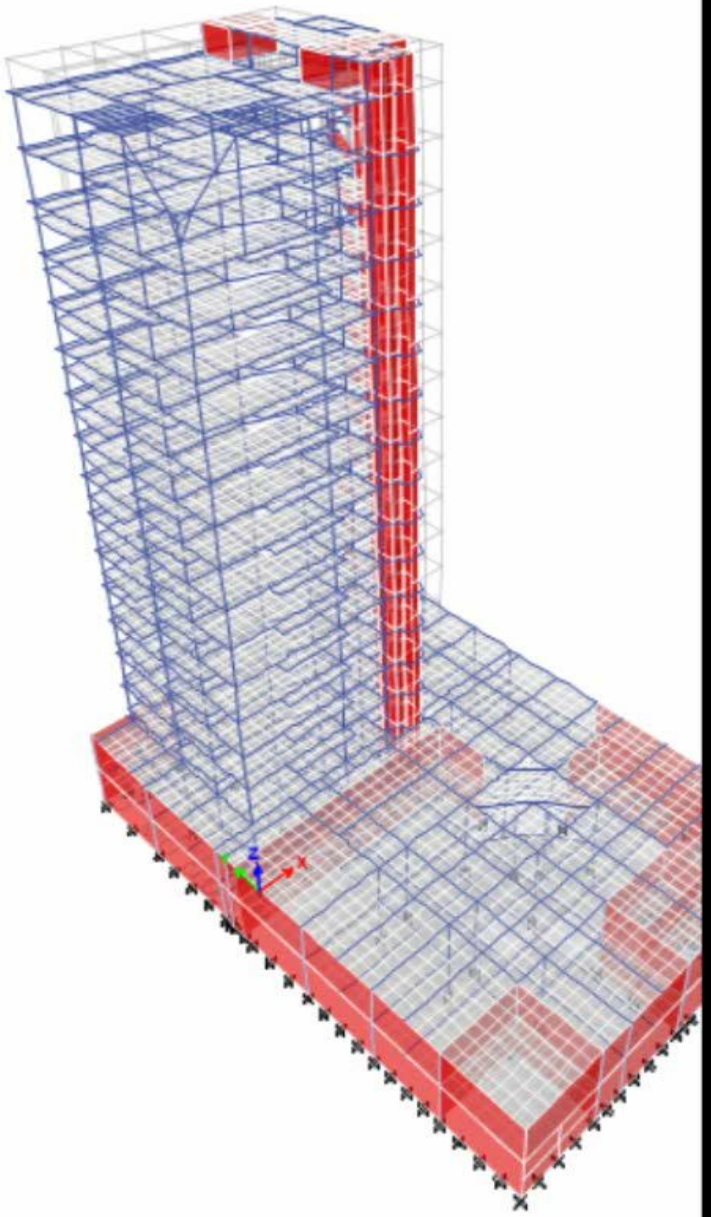

21
20
19
18
17
16
15
14
A
B
D
E
F
G
K
L
M
Y
X


Elevation View - 21
WATER TANK
TERRACE
F14
F13
F12
F11
F10
F9
F8
F7
F6
F5
F4
F3
F2
F1
GROUND STILT
BASEMENT
BASE
K8
K7
K6
K5
K4
K3
K2
K1
Z
Y


Elevation View - A
WATER TANK
TERRACE
F14
F13
F12
F11
F10
F9
F8
F7
F6
F5
F4
F3
F2
F1
GROUND STILT
BASEMENT
BASE
K16
K15
K14
K13
K12
K11
K10
K9
Z
X


Maximum and Minimum Story Drifts-Y
60
50
40
30
20
10
0
Level, m
0.00%
1.00%
2.00%
3.00%
4.00%
Drift, Unitless
Y-Max W/O Damper
Y-Max W/ Damper
Y-Min W/O Damper
Y-Min W/ Damper
WITH Dampers
WITHOUT Dampers


Z
X


Z
X


EXIT

Bangkok Next Steps for Existing Commercial Buildings

- Not performance base design only but investment base design
- Limit seismic strengthening cost to less than 5% of market value
- International funds to provide liquidity
- Property tax forgiveness

Bangkok Next Steps for New Construction

- Capture Long distance earthquake demand
- Innovative cost-effective technology
- Gain back confidence from public, market and banking industry

Make the World a Better, Safer Place.