Resilience of Buildings: Downtime, Repair, and Recovery

Magnitude 7.1 Earthquake Impacts to School Functions and Recovery
• Majority of schools built in the 1970s, 1980s, and after 2000
• Over half of the district’s elementary schools fit in one of two building types
  • 5 “box” wood-frame buildings built in the late 1970s-early 1980s
  • 7 “ramp” reinforced CMU buildings built in the mid-1980s to mid-2000s
• Middle and high schools are mainly reinforced CMU or concrete shear wall and steel frame
MOST SIGNIFICANT DAMAGE - HOUSTON MIDDLE SCHOOL (HMS)

- Reinforced CMU and steel frame building constructed in 1985
- Consists of partially grouted, CMU shear walls laid in stack bond, with a flexible wood diaphragm at the roof
- Damage attributed to both obsolete design methods and some construction errors
- Inadequate reinforcing and grouting in CMU walls throughout
- Weak connection details between roof framing and CMU walls
HOUSTON JR/SR HIGH SCHOOL

- 13 portable classrooms installed Dec 2018 with two new portables constructed during the summer of 2019
- Opened for students January 7, 2019
- Houses approximately 800 students and staff
RE-OPENING & RECOVERY

- Staggered openings for staff and students
- Northern valley opened immediately
- 73% opened within 5 days
- 93% opened within 10 days
- Facilities cleared by structural engineer

Schools in Session

Meals, coats, backpacks, and personal belongings
BUILDING FOR THE FUTURE

- Retrofit and repairs
- Screenings and Assessments
- Capital improvements and mitigation
- Procedures

Houston Middle

FEMA P-154
ASCE 41-13
ATC-20

Reunification
Utility shutdown
Communications
QUESTIONS