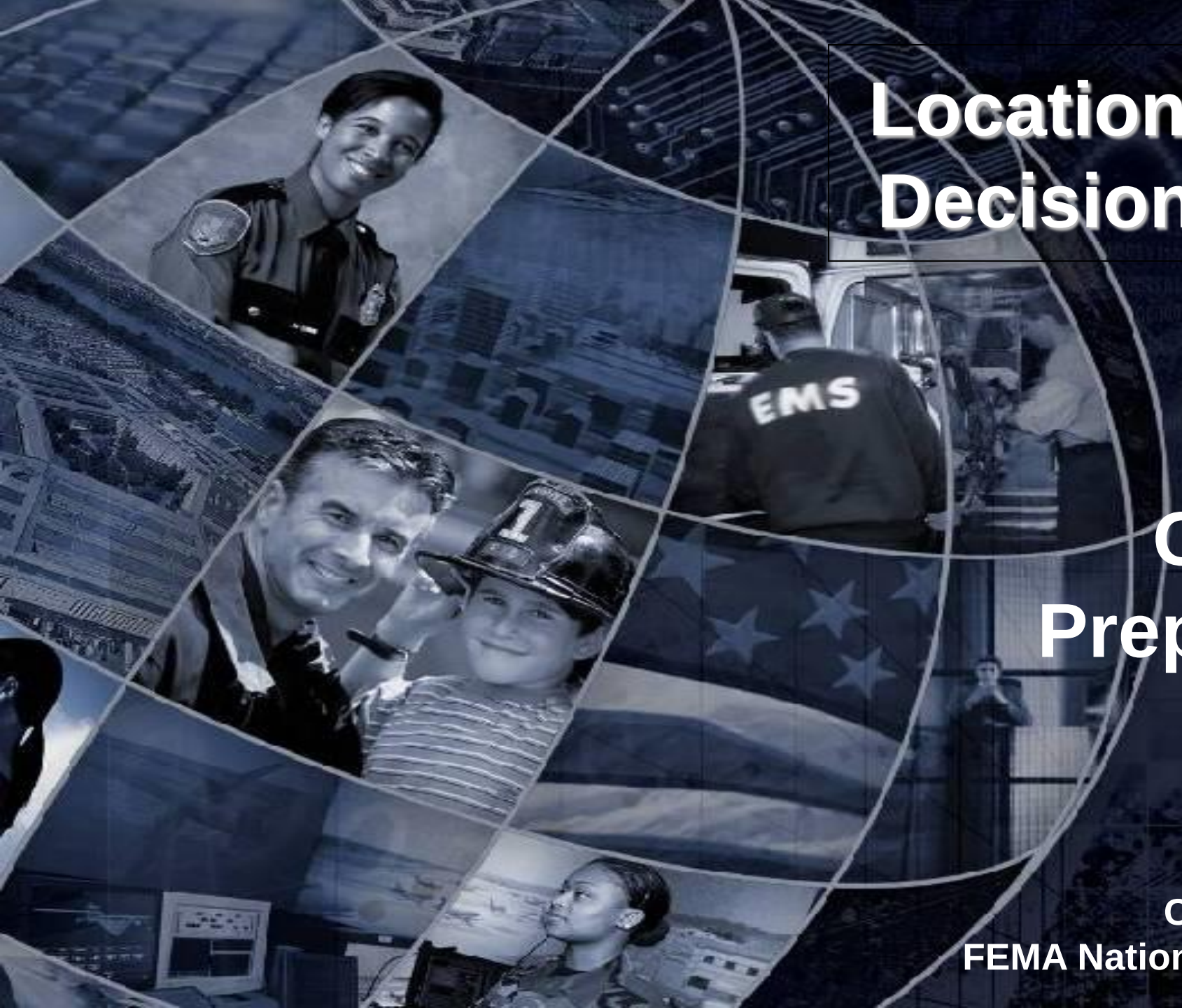
The Case for Location-Enabled Decision Support Tools for Preparedness and Operational Readiness

Carla Boyce, Director, National Exercise Division, FEMA



Location-Enabled Decision Support

National Geospatial Preparedness Summit 2015

Carla Boyce, Director
FEMA National Exercise Division

Lessons Learned – Preparedness

Recurring Theme

- Haiti
- Japan
- Joplin

Implementing A Common Frame of Spatial Reference For Homeland Security, Emergency/Disaster Response, Recovery, and Mitigation
The U.S. National Grid (USNG)

From the Hurricane Andrew GIS Coordinator's after-action report to the Center for Army Lessons Learned, 10/06/92

"General information type maps with no UTM grid, in an disaster environment without street signs, few recognizable landmarks with no response specific data were very nearly useless… An actual accounting of all the requests for emergency assistance that went without, or the delay encountered by the countless movements of personnel, food, and equipment will likely never accurately be tallied…."

(USNG is based upon UTM.)

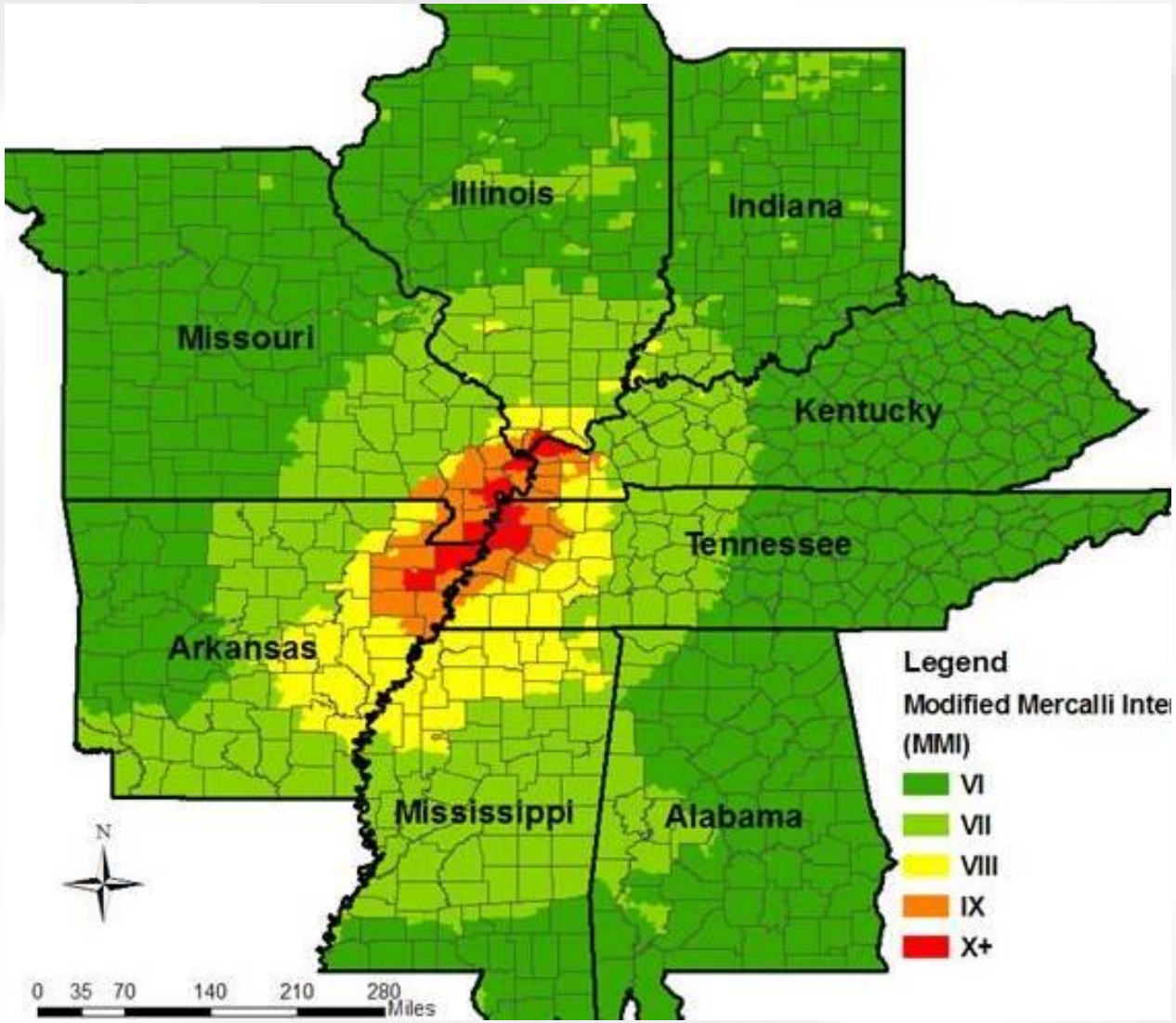
The Same (Map) Sheet of Music: Following the troubled 1992 Hurricane Andrew response, the U.S. Military in its 1993 "capstone doctrine" for domestic support operations (FM 100-19) termed the

- Irene
- Sandy
- Colorado Floods
- Capstone 2014

Nearly every after action report, post any large scale or regional disaster clearly indicates the for location-enabled decision support

Preparedness – New Madrid Seismic Zone

- 8 States directly impacted
- 4 FEMA Regions
- ~12 Million ppl
- Mutual aid will be necessary from across the country



Location-Enabled Analysis

- **Identify potential missions within an area of operations (assigned grid cell)**
  - Demographics, infrastructure, hazards
  - Multi-disciplinary missions
- **Establish resource requirements**
  - Based on scenario and consequence analysis
  - Based on pre-incident forecasts
  - Revise based on post incident damage intelligence
- **Facilitates pre-arrival planning by command and staged or deployed resources**

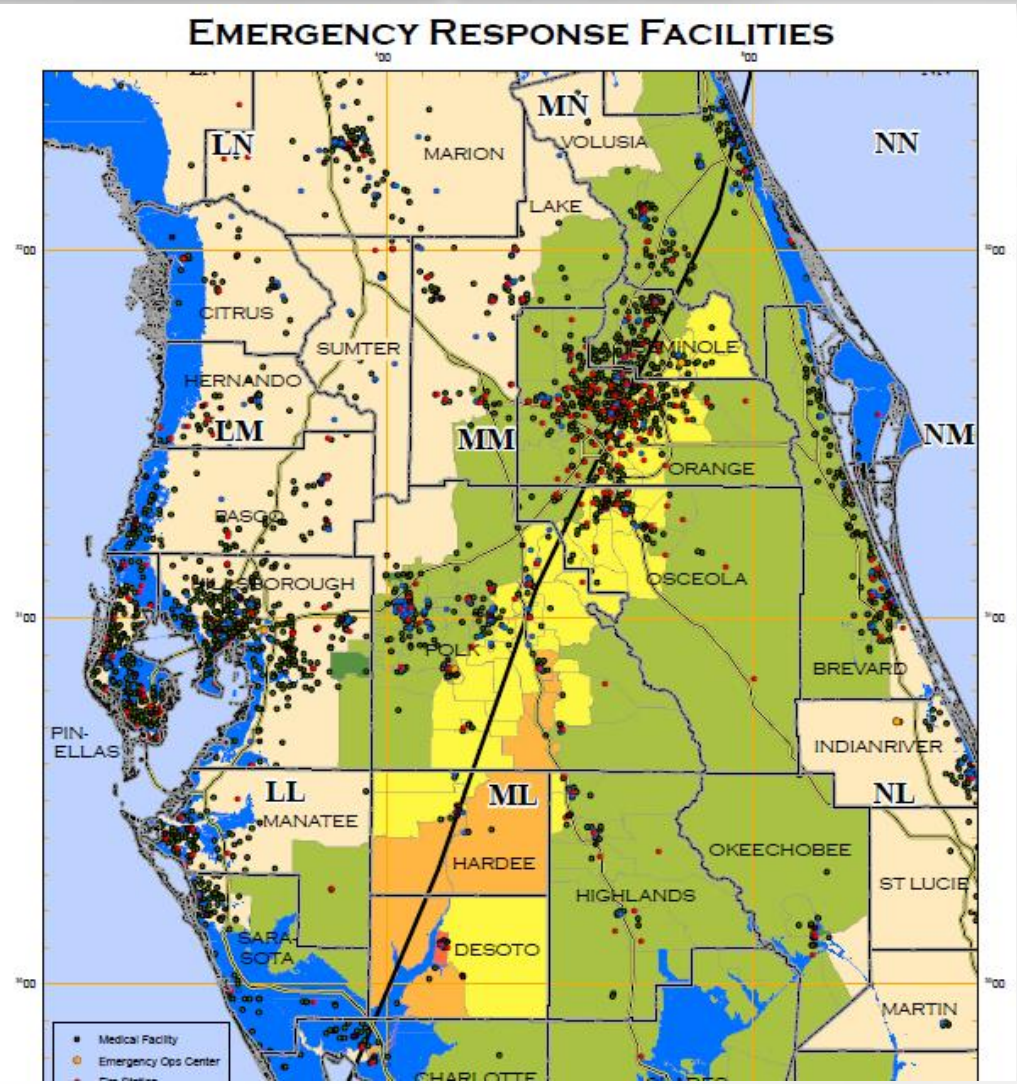
Pre-Scripted Mission: Data Analysis

Goal:

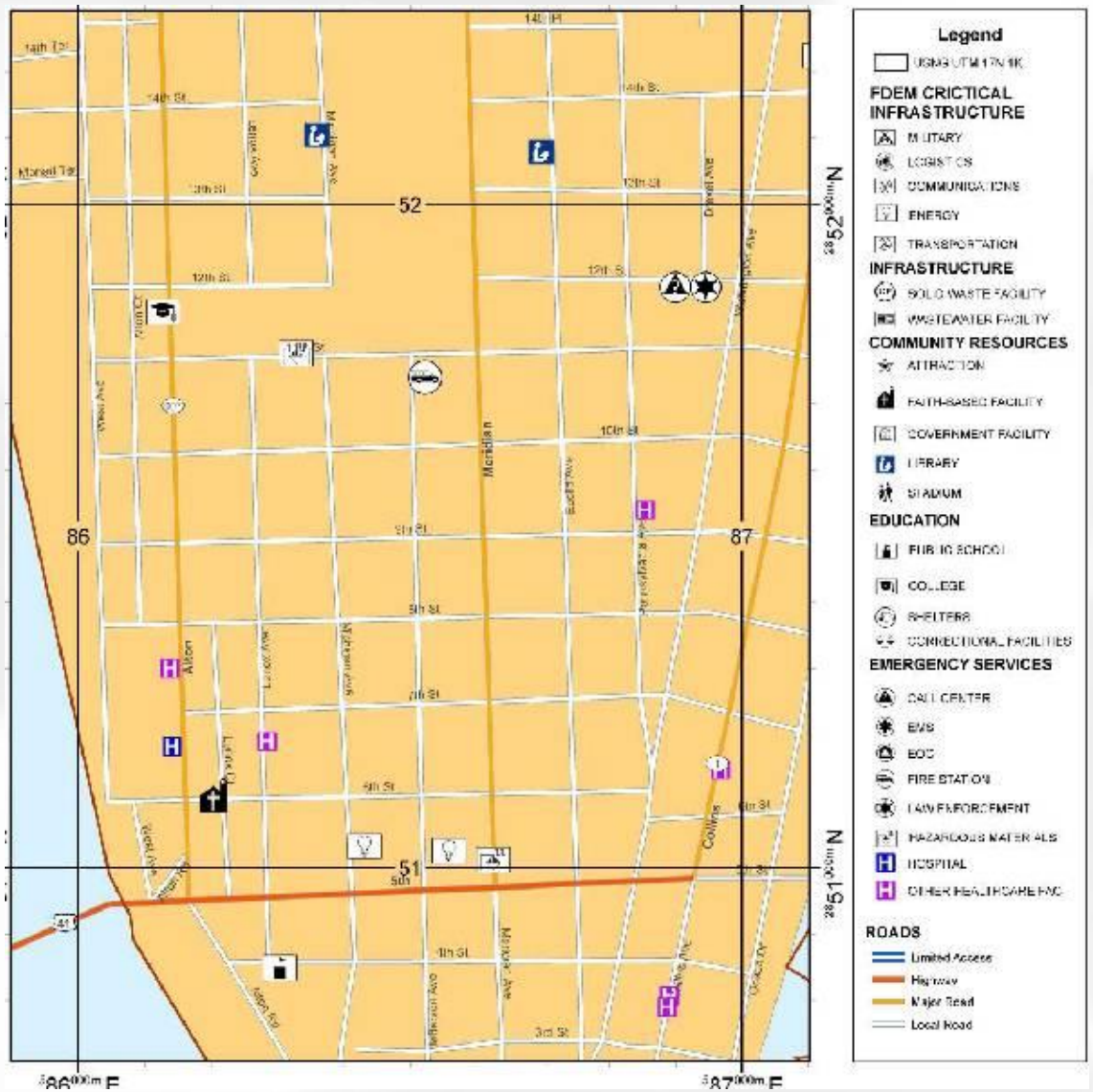
Determine mission based requirements and pre-script missions based location-enabled analysis

- **Give "context" to basic data layers**
  - Scenario data/forecasts
    (storm track, spread of disease, plume/blast, threat streams)
  - Demographics
  - Community lifelines
    (transportation, communications, energy)
  - Critical Facilities
    (Police, Fire, Medical, Schools)

Location-Enabled Preparedness

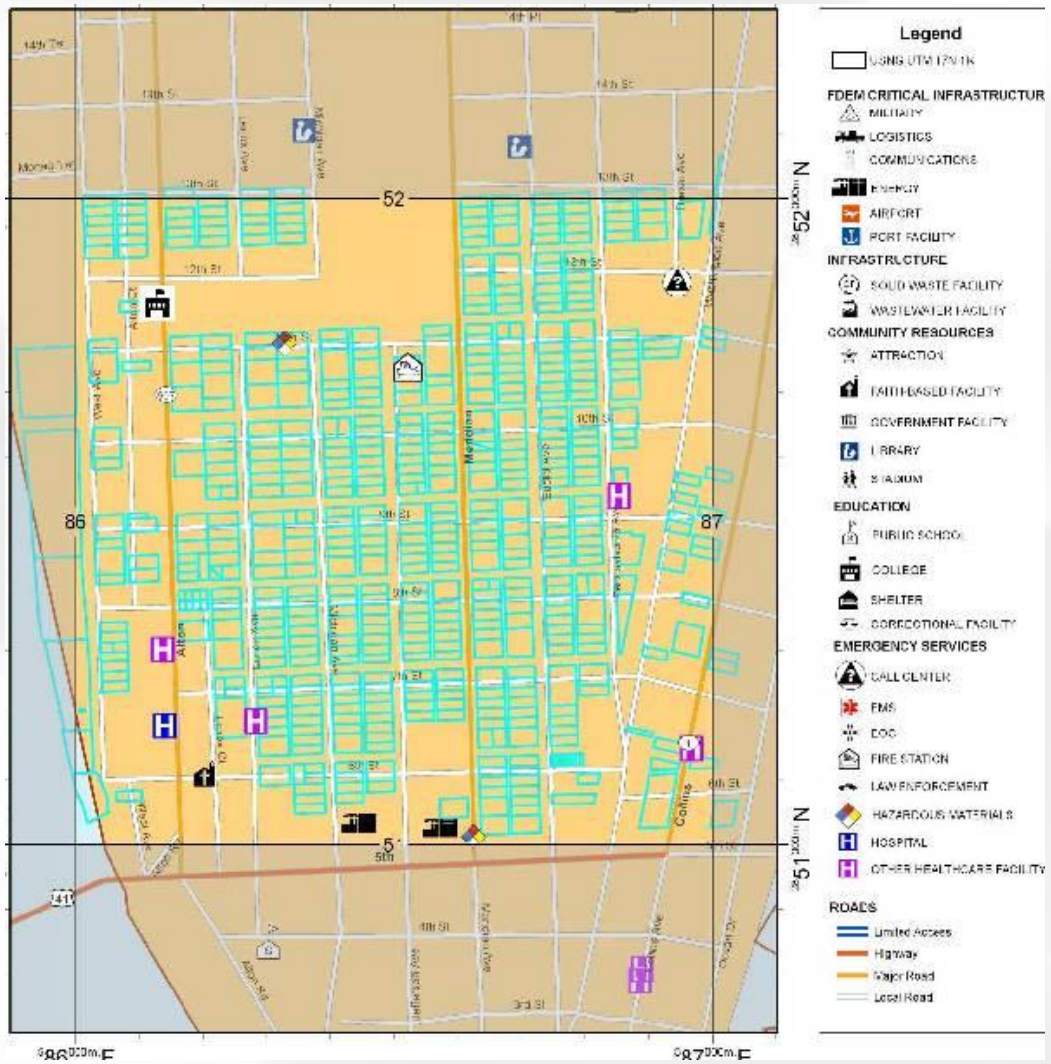


Building Location-Enabled Context



Growing Location-Enabled Context

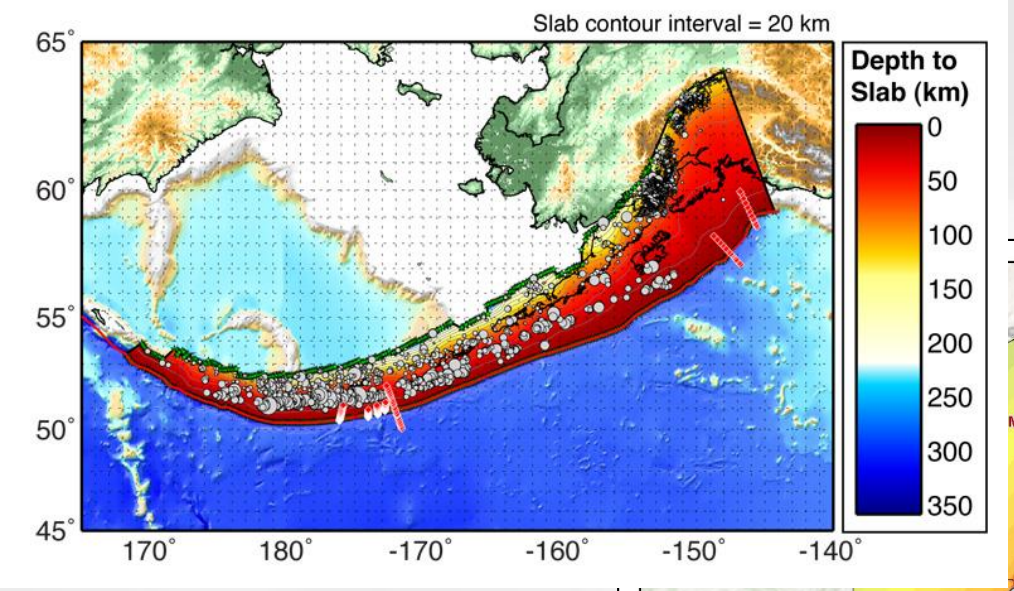
1,000 m grid square overlaid with selected features



Consequences in Context

17S NJ 8651 with Storm Surge Inundation Depths

Not if…When



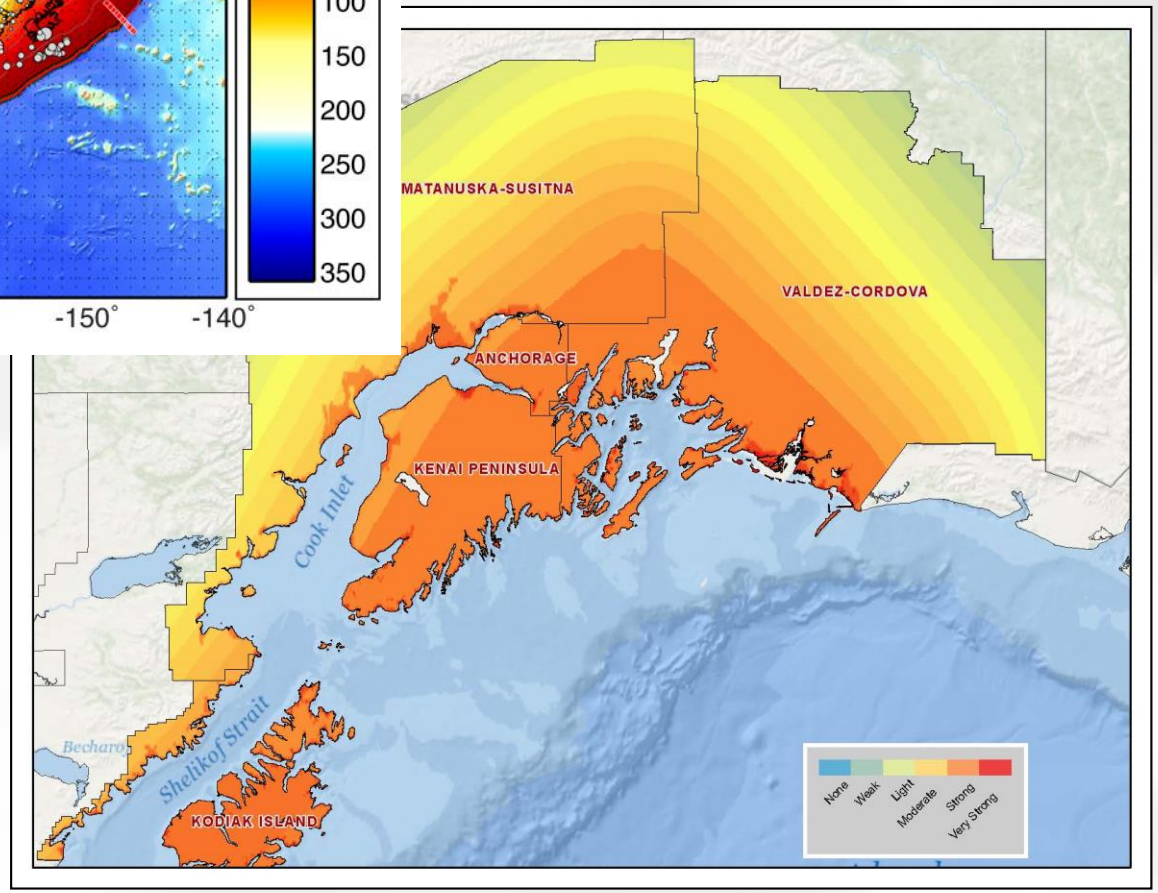


Image via: earthquake.usgs.gov

Scenario – No Notice Event

- At 10:10 a.m. Alaska Daylight Time, a 9.2-magnitude earthquake occurs
- The epicenter is approximately 70 miles east of Anchorage and 50 miles west of Valdez
- At 10:15 Alaska Daylight Time, the National Tsunami Warning Center issues a tsunami warning to all coastal areas in Southeast Alaska, Southcentral Alaska, the Aleutian Islands, British Columbia, Canada, the Northwestern United States, Hawaii, and the Pacific Rim countries

Scenario – No Notice Event (continued)

- **Many coastal communities are hit by major tsunamis**
  - A 20’ tsunami hits Valdez, AK
  - A 27’ 3” tsunami hits Seward, AK
  - A 19’ 8” tsunami hits Homer, AK
  - A 16’ tsunami hits Cordova, AK
  - A 22’ 7” tsunami hits Kodiak, AK
- **Over the next several days, Alaska will experience 13 aftershocks ranging from 5.1 magnitude to 7.8 magnitude**

Medical Care

- The earthquake has caused an estimated 9,640 injuries (Severity Level 1 to Severity Level 3) throughout Southcentral Alaska
- There are approximately 6,360 injured citizens requiring medical attention and/or hospitalization in Anchorage
- The earthquake has impacted health care facilities throughout Anchorage
- The four hospitals in the city – Providence Alaska Medical Center, Alaska Regional Hospital, Alaska Native Medical Center, and St. Elias Specialty Hospital with a combined patient capacity of 788 beds – have sustained structural damage and damage to their power systems.

Evacuation and Sheltering

Requirements (without location-enabled context)

- 72,130 people in need of short term sheltering
- 33,260 pets in need of short term sheltering
- 209,340 people in need of basic commodity support
- 96,530 pets in need of basic commodity support

Health & Medical Projections

Medical projections

- 1,420 deaths
- 9,780 injuries
  - 6,950 Severity Level 1 (medical care required)
  - 2,390 Severity Level 2 (hospitalization required)
  - 500 Severity Level 3 (life threatening injury)

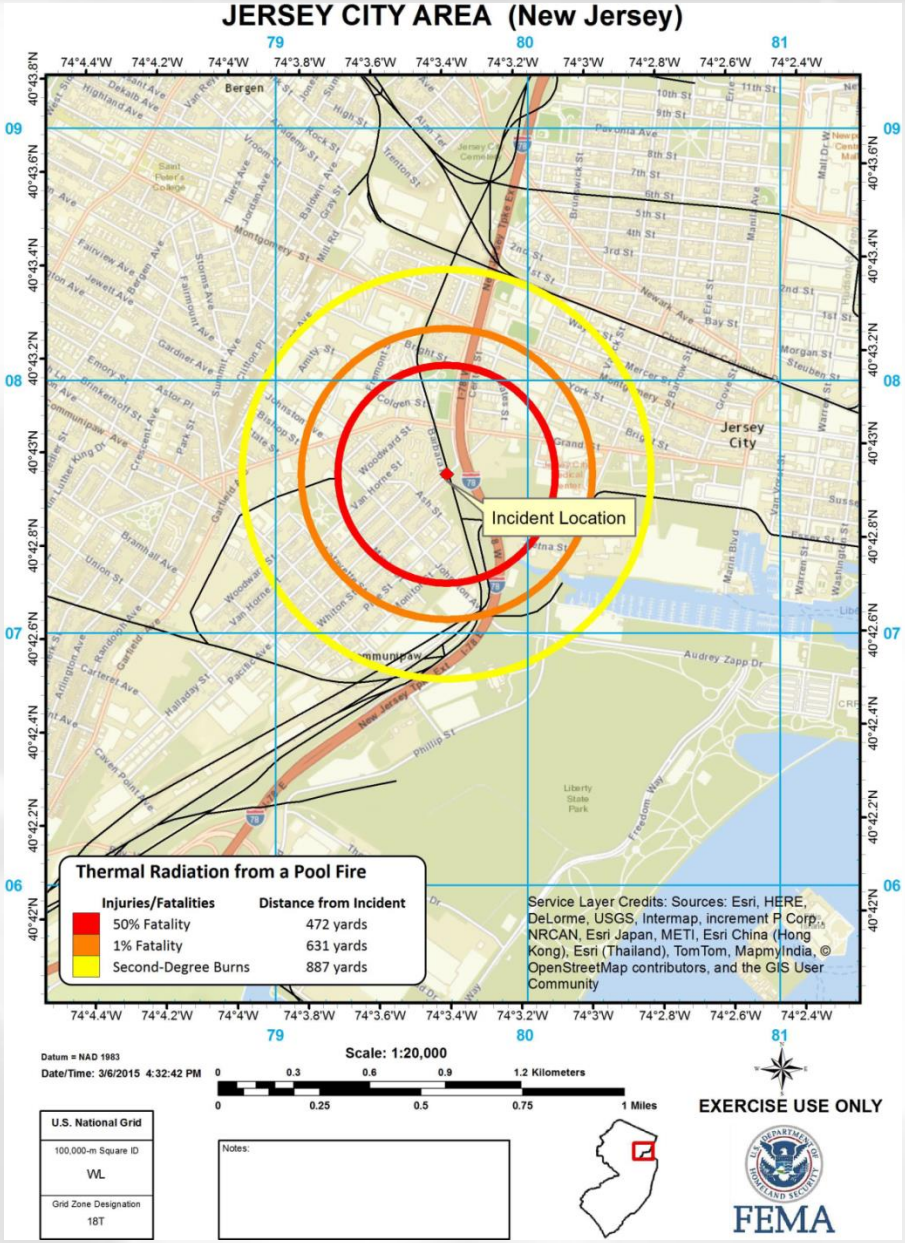
Earthquake and Tsunami Effects

- **Roads and bridges**
  - Extensive damage throughout South Central Alaska
  - Will require inspection after initial earthquake and subsequent aftershocks
- **Airports**
  - Damages to runways, taxiways, ramps, air navigation aids and lighting will limit airport operations and capacity

Earthquake and Tsunami Effects

- **Ports**
  - In addition to damages to port facilities, the shipping channels require surveying before being opened to shipping traffic
- **Electrical power**
  - Widespread power outages throughout the region
  - 70% of Anchorage is without power

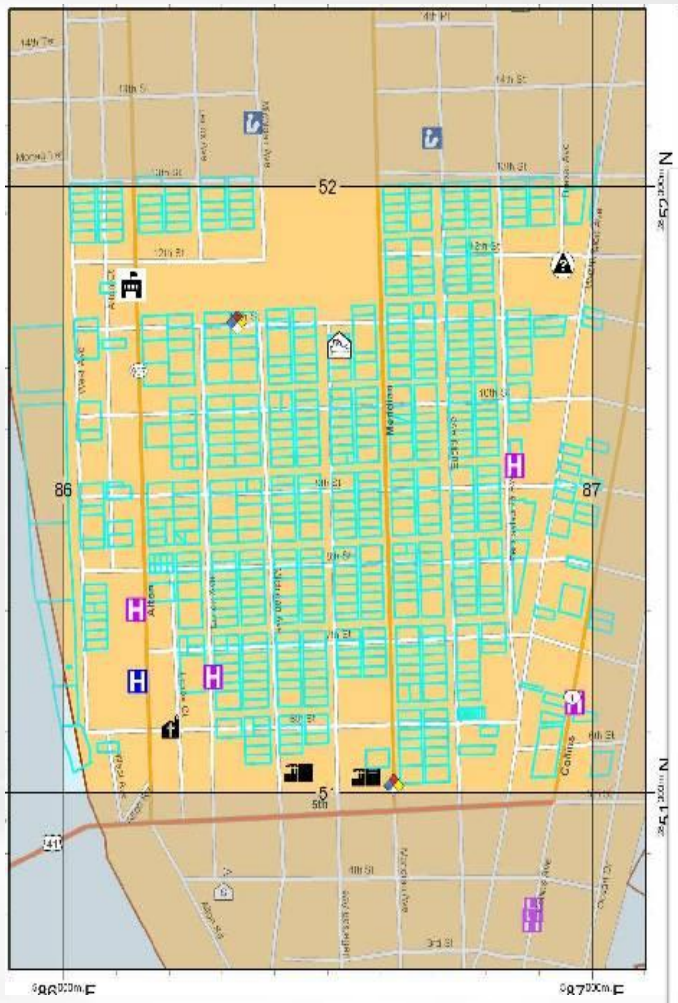
Location-Enabled Preparedness



Affected Population Estimates for Initial Pool Fire Damage Zones (Based on 40-Second Exposure Time)

- **(1,923) Potential 50 Percent Fatality Rate, Second- and Third-Degree Burns for Unprotected Individuals**
- **(3,299) Potential One Percent Fatality Rate, Second- and Third-Degree Burns for Unprotected Individuals**
- **(9,299) Potential Second-Degree Burns for Unprotected Individuals**

Location-Enabled Pre-Planning



QUESTIONS?