

CHALLENGING THE STATUS QUO

SESSION # AAJ156LE

NEXT GENERATION OF EMERGENCY COMMUNICATION AND OPERATION CENTERS



2015 AIA ACADEMY OF ARCHITECTURE
FOR JUSTICE CONFERENCE

MIAMI
NOVEMBER 18-21, 2015

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Course Description

Now more than ever, the consolidated functions of emergency communication and operations centers are becoming critical to the individual states, Counties, Parishes as well as local municipalities throughout our nation. Continued weather trends as well as concerns for domestic and national threats have heightened the status of these facilities and has increased the number of services provided by these organizations. With this increased focus on Emergency preparedness the technical and communication connectivity of the various agencies supported within has challenged prior approaches to the design of these facilities. Further, increased requirements to staff, maintain and support these functions has brought these structures closer to the urban fabric. These multiple concerns have created a new breed of consolidated facilities capable of supporting the resilient function located within through the design of facilities that fit within or close to the urban context. This program will demonstrate recent design innovations developed to meet these concerns through presentation of a number of recently built consolidated emergency response facilities. The forces creating the need for these facilities will be discussed in depth.

Learning Objectives

1. Understand the challenges of the multiple client agencies required to be housed within the next generation of facility.
2. Discuss the code applications and recommendations utilized to develop contemporary emergency response centers .
3. Develop a sense of the hardening requirements and system redundancies required of a facility of this type.
4. Understand the forces driving the consolidation of these services with other municipal functions.



David L. Schrader, AIA / LEED™ AP

SCHRADERGROUP architecture

Philadelphia, PA

- Architect with 25 years of programming, planning, project management and office management experience
- National experience and expertise with mission critical facilities
- Mr. Schrader's background includes extensive work with public agencies melding complex building programs together
- Numerous design awards from various entities
- Licensed Architect in 14 states



Mallory Scott Cusenbery, AIA

RossDrulisCusenbery Architecture Inc.

Sonoma, CA

- 25 years of justice, public safety, community & youth projects
- Buildings in western U.S. and Canada
- Designed/master-planned over \$1 billion value in public safety essential facilities
- Reconciles security, sustainability, contextual and operational demands.
- Architect, State of CA
- Numerous design awards from private, editorial and governmental organizations
- Peer Professional, US GSA Design Excellence program, 2009



Amanda Chebalo, AIA

AECOM

Norfolk, VA

- Architect with 11 years experience
- Experienced in programming and planning public safety facilities
- Worked for local and state agencies around the country

discussion

- 1** MISSION CRITICAL FACILITY TRENDS
- 2** THE “HOW TO” FOR DESIGN
- 3** CATASTROPHE AND THE DERIVATION OF A PROJECT

“TRENDS”

1.0

EOC/911 OVERVIEW

911/Dispatch Centers

- Very structured environments.
- Repetition of common procedures
- Staffed 24/7/365
- Highly trained with clear chain of command.

Emergency Operations Centers

- Infrequent activations
- Staff have other 'jobs' 95% of the time.
- EM personnel spend fraction of time in EOC activations/exercises.
- No two EOC activations are the same, procedures understood by a fraction of EOC people

EOC/911 CONTINUING TRENDS

- New hardened, secure facilities
- Multi-agency co-location
- Redundancy
- Hardening
- Stand-alone capability
- Column-free/high-ceiling
- Flexible/accessible infrastructure
- Expansion
- Shared spaces
- Displays support situational awareness
- Lockers/showers/exercise
- WC & break rooms near operations floors
- Sleeping/rest-areas/quiet-rooms
- Commercial kitchen/food storage
- Secure staff parking
- Segregated public/training/activation parking
- Multi-use of EOC

EOC/911 EMERGING TRENDS

- Transparent "bunker-less" site security
- Stress mitigation
- Back-up Dispatch in disaster-hardened equipment room
- Standing workstations
- The "hybrid" terrace/pod EOC
- Reconciling LEED & redundancy
- Alternative energy redundancy
- Extensive charging stations
- User-control floor HVAC systems
- "Cold aisle" server room cooling
- Fusion Centers/EOC collaborations
- Text-to-911
- Real-Time Crime Fighting Center
- Taking better advantage of EOC/911 co-location
- FirstNet broadband network

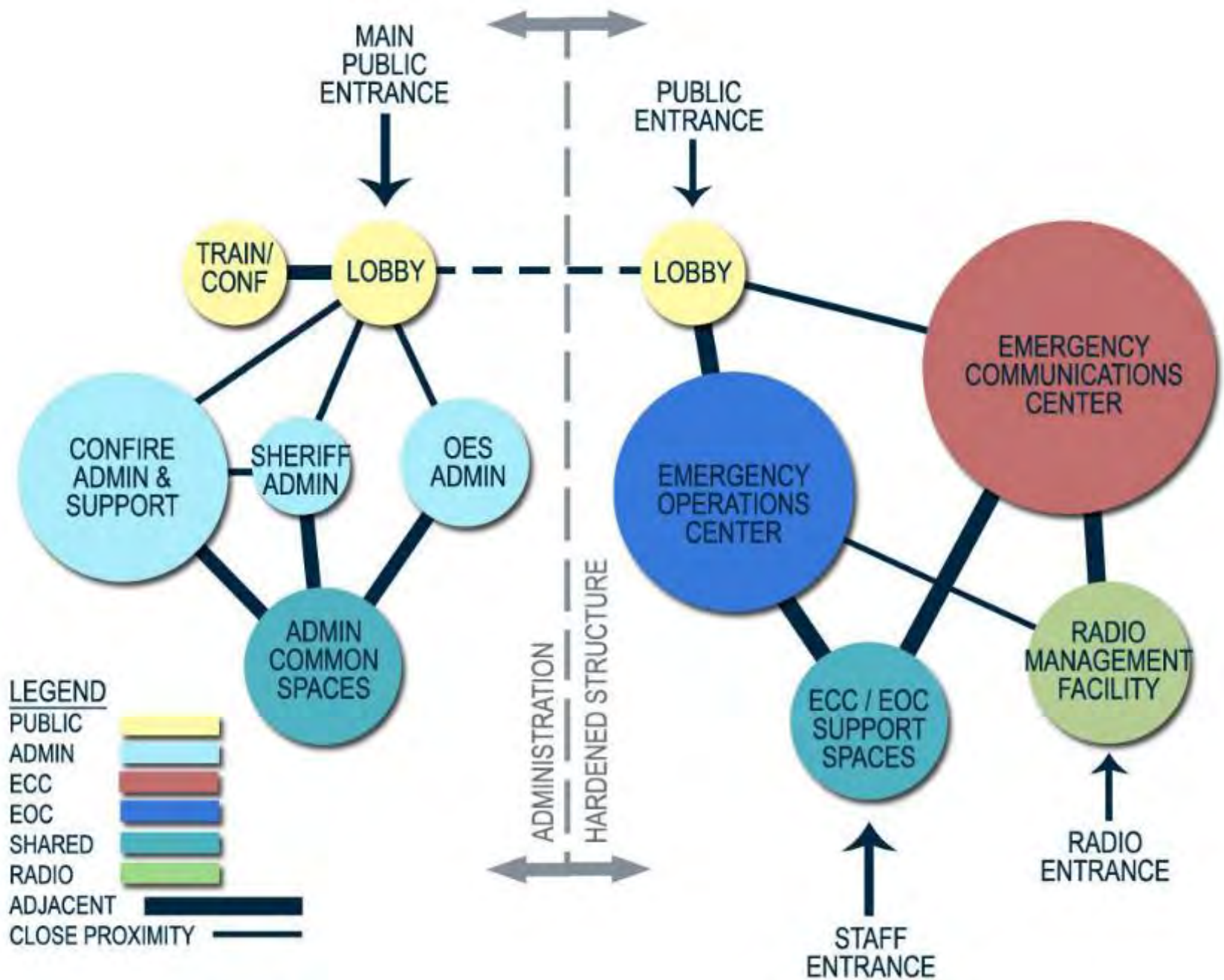
“HOW TO”

2.0



MULTIPLE USE GROUPS

2.1



SOCIAL FACTORS

2.2





PROVIDE SECURITY WITHOUT FORTRESSING

*A welcoming
image and a
secure building
are not mutually
exclusive.*



REDUCE STRESS FOR CRITICAL DECISION- MAKING

A peace of mind comes from a secure environment with ample daylight and views.



INSPIRE CHANCE ENCOUNTERS

*Staff
“crossroads”
support
collegiality,
interaction and
shared
information*



INSPIRE CHANCE ENCOUNTERS

*Staff
“crossroads”
support
collegiality,
interaction and
shared
information*

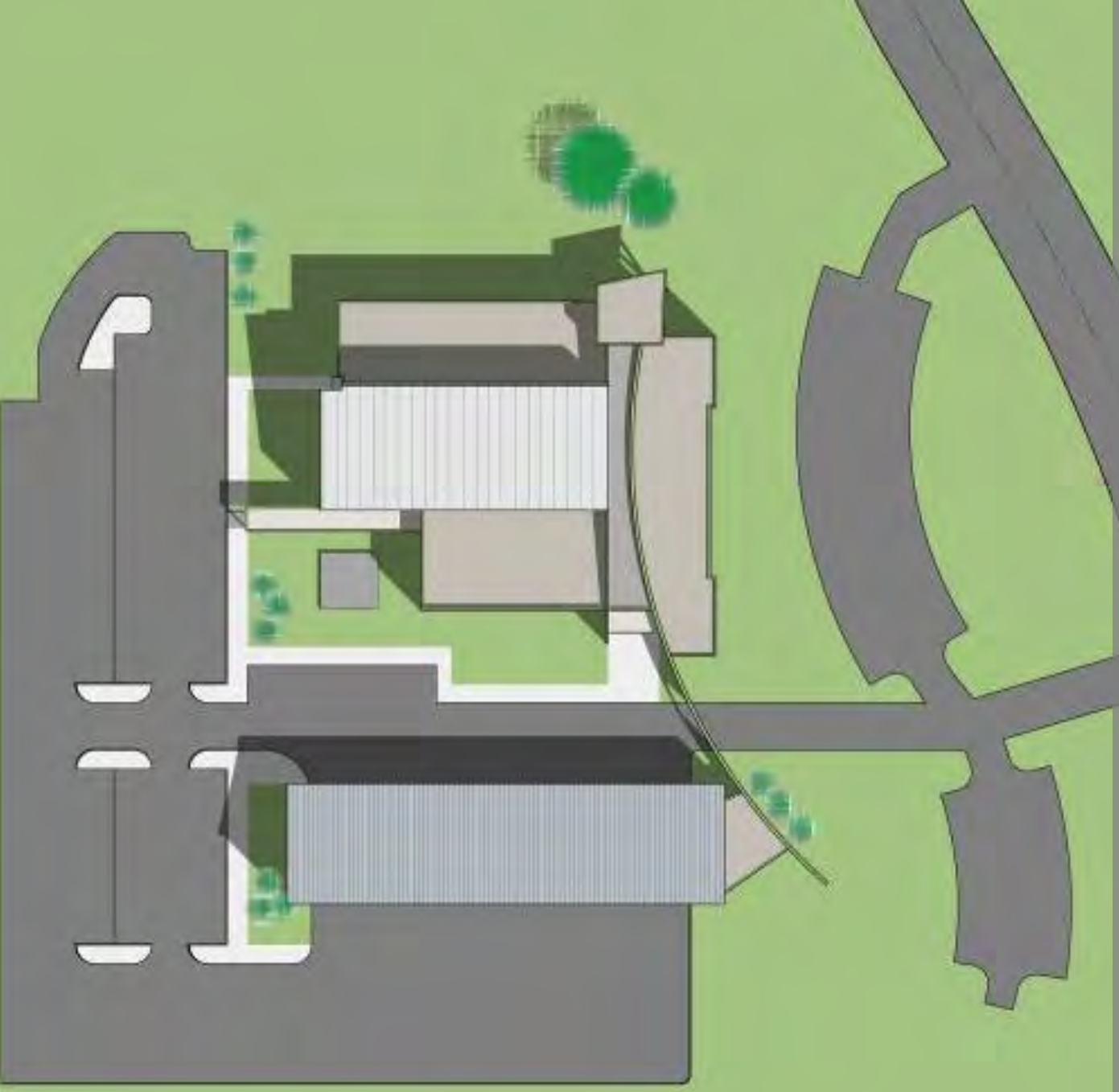


BENEFIT THE WORKPLACE WHILE BENEFITTING THE ENVIRONMENT

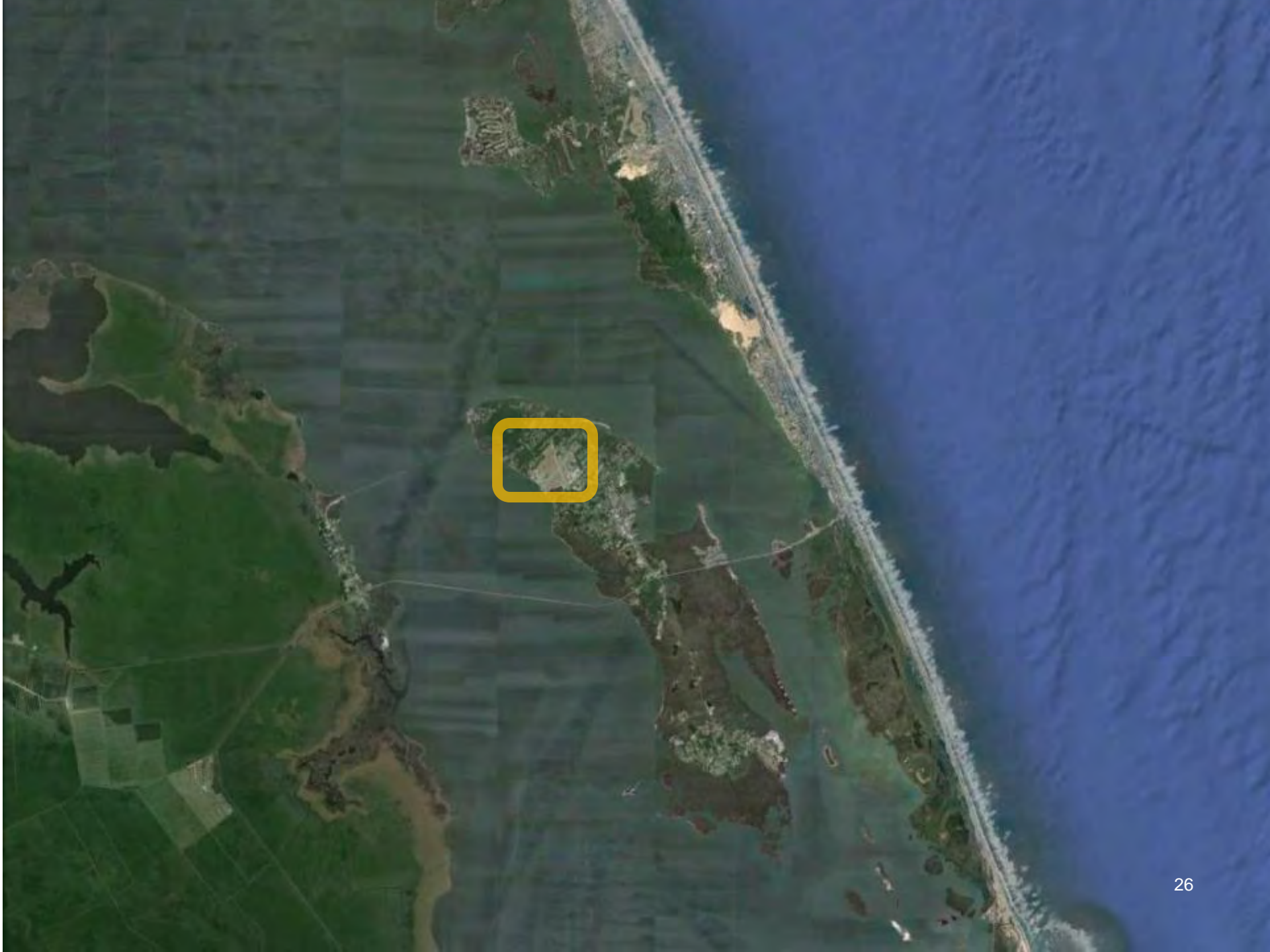
*Sustainable
design strategies
can do double
duty*

SITE SELECTION/ THREAT

2.3













LAYOUT CONSIDERATIONS

2.4

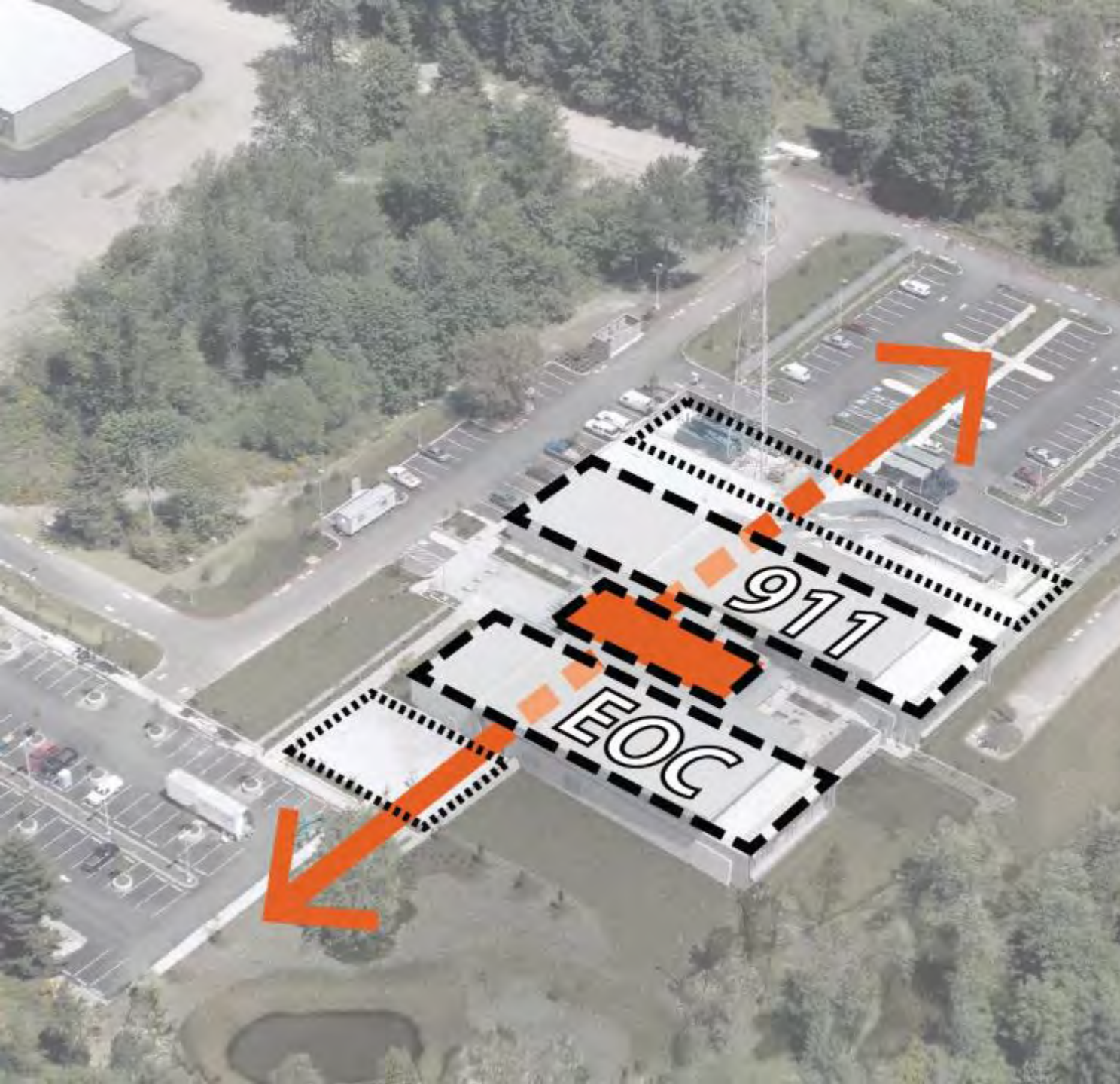


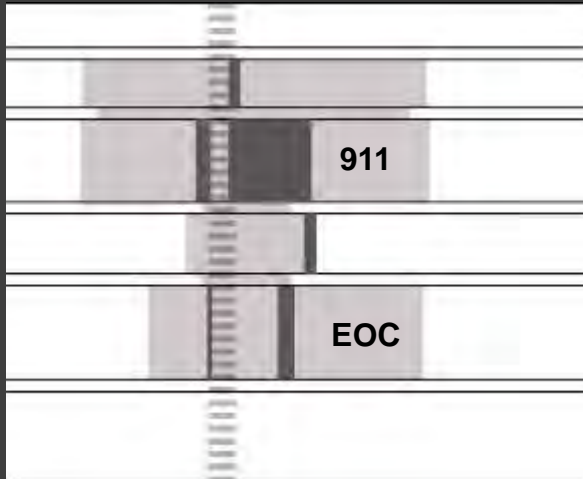
DESIGN THE SITE USING “CPTED” STRATEGIES

*Landscape
barriers,
topography,
sightlines all
contribute to a
subtle and
transparent site
security
approach*

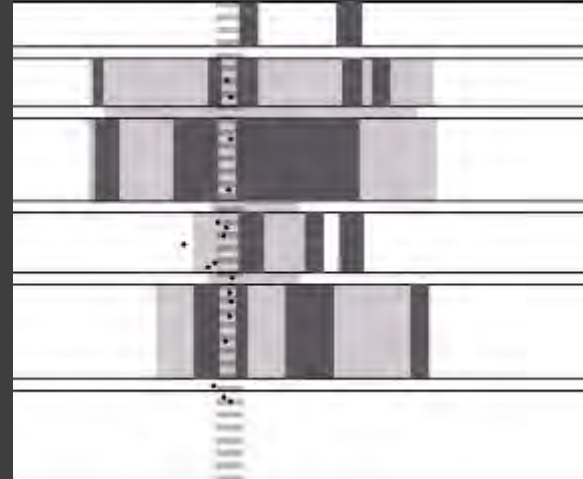
BUILD FOR CHANGE

*Inspire
confidence by
planning for
expansion from
the beginning*

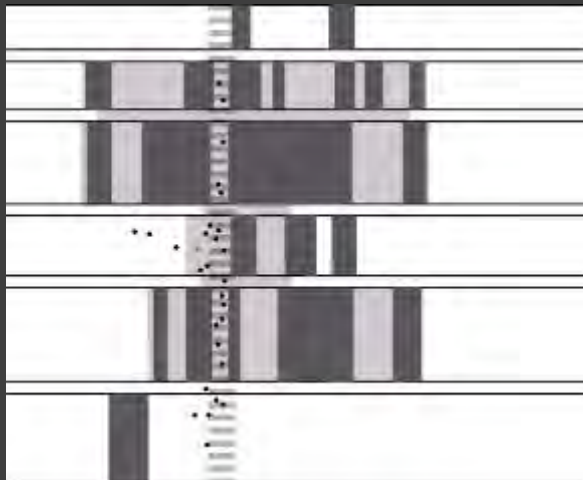




day-to-day



level one



level two



level three

**THINK OF
ACTIVATIONS
LIKE A
“TIDEPOOL”**

*A simple flexible
organizational
structure can
accommodate
the “waves” of
operational
activities*



SURVIVABILITY/
SUSTAINABILITY

2.5

Hardened Facility

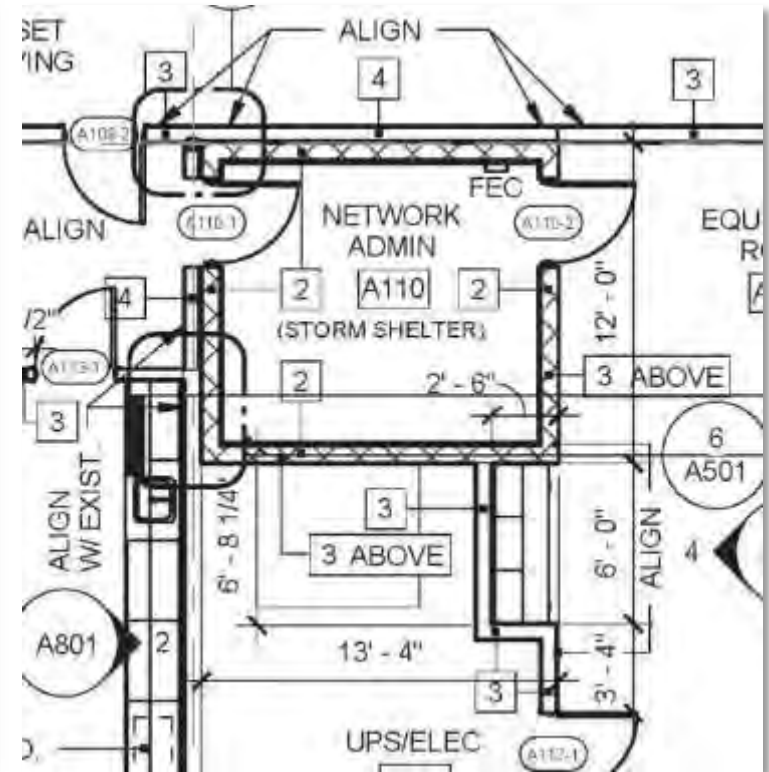
A ***Hardened Facility*** is a secure operational space designed to protect its occupants, contents, and functional status from the worst of both natural and man-made threats and disasters.

International Building Code (IBC)

Hardened Facilities shall be designed and constructed in accordance with the International Code Council's Standard 500 (ICC 500), and designated for use during tornado or hurricane events.

Other Provisions of ICC 500

BUILDING SITING
FLOOD CRITERIA
MEANS OF EGRESS
ACCESSIBILITY
DEBRIS HAZARD
OCCUPANCY
ACCESSIBILITY
FIRE SAFETY



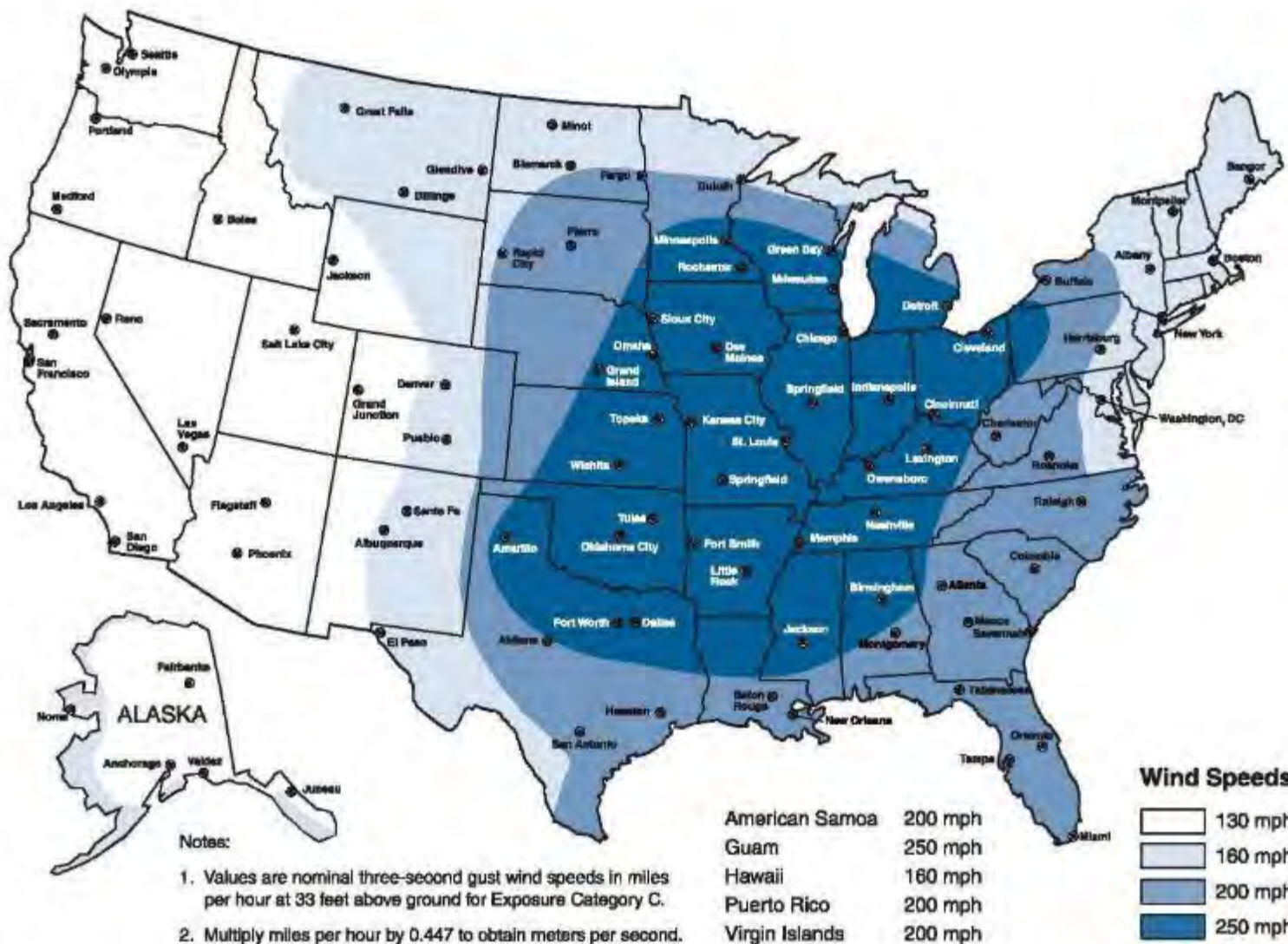
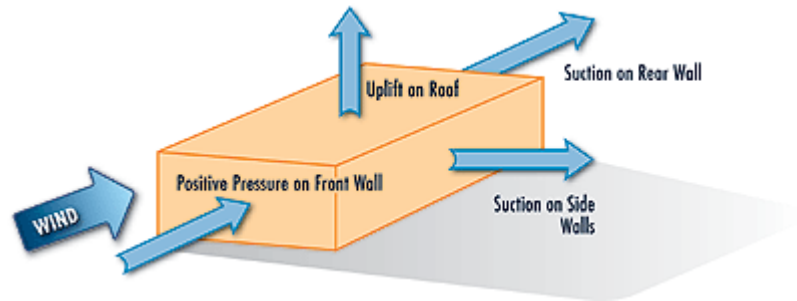
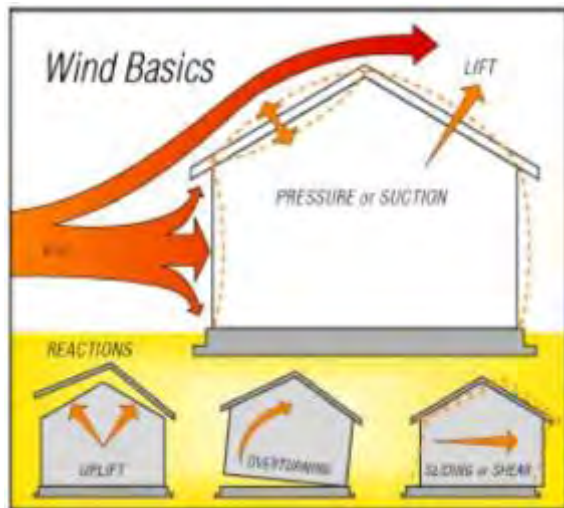
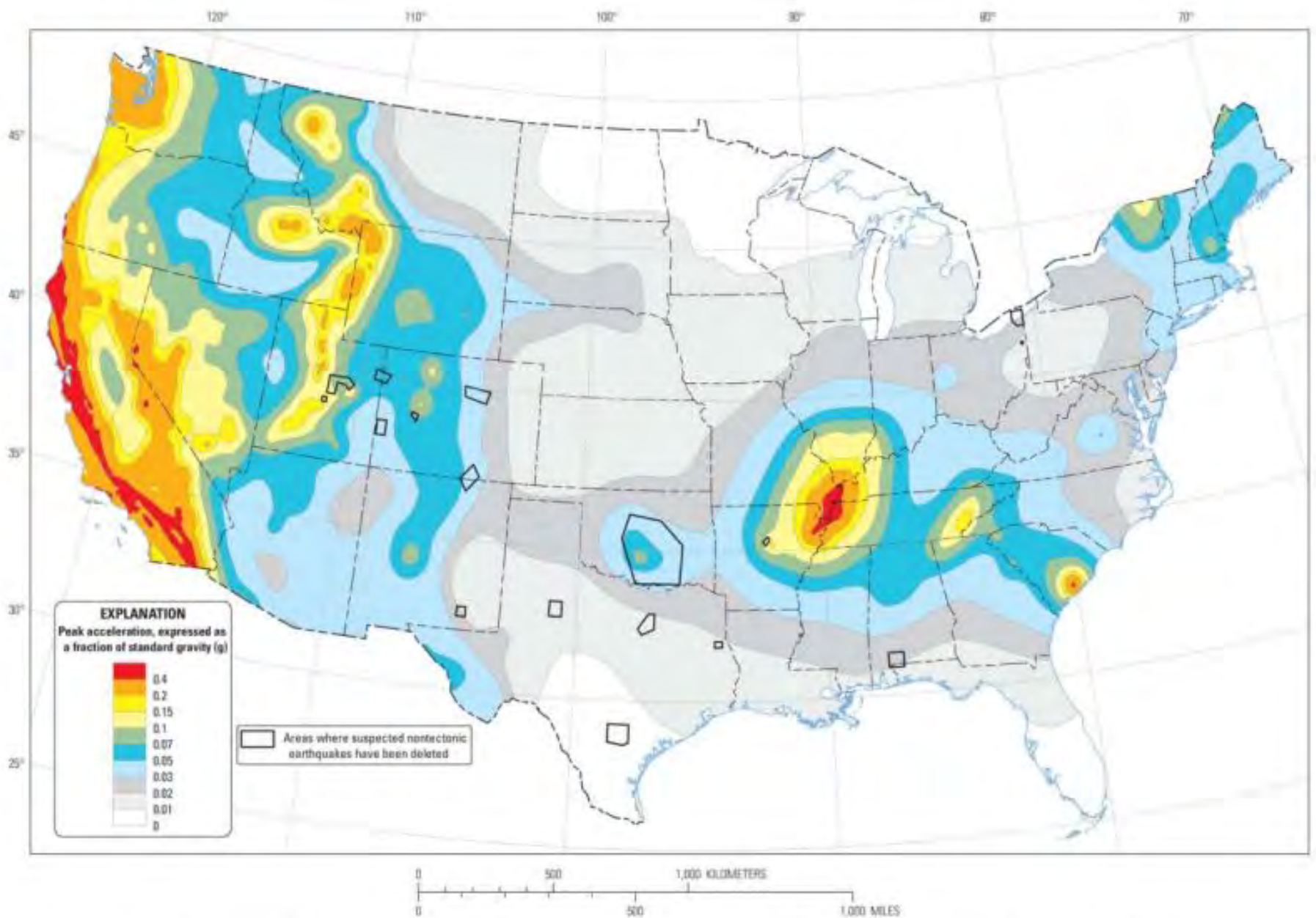


Figure 3-1. Tornado Safe Room Design Wind Speed Map (consistent with ICC-500 Tornado Hazard Map)





Ten-percent probability of exceedance in 50 years map of peak ground acceleration

GUIDELINES AND CRITERIA

- ***National Fire Protection Association (NFPA)***
 - *NFPA 1221: Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*
- ***State and National Building Codes***
 - *Critical Facility Guidelines*
- ***ICC-500***
 - *Standard for the design and construction of storm shelters*
- ***National Emergency Number Association (NENA) Technical Information Documents (TID)***
 - *Various facility guidelines*
- ***Federal Emergency Management Agency (FEMA) Facility Guidelines 361, 426, 452***
 - *72-hour, location, weather etc.*

GUIDELINES AND CRITERIA (cont.)

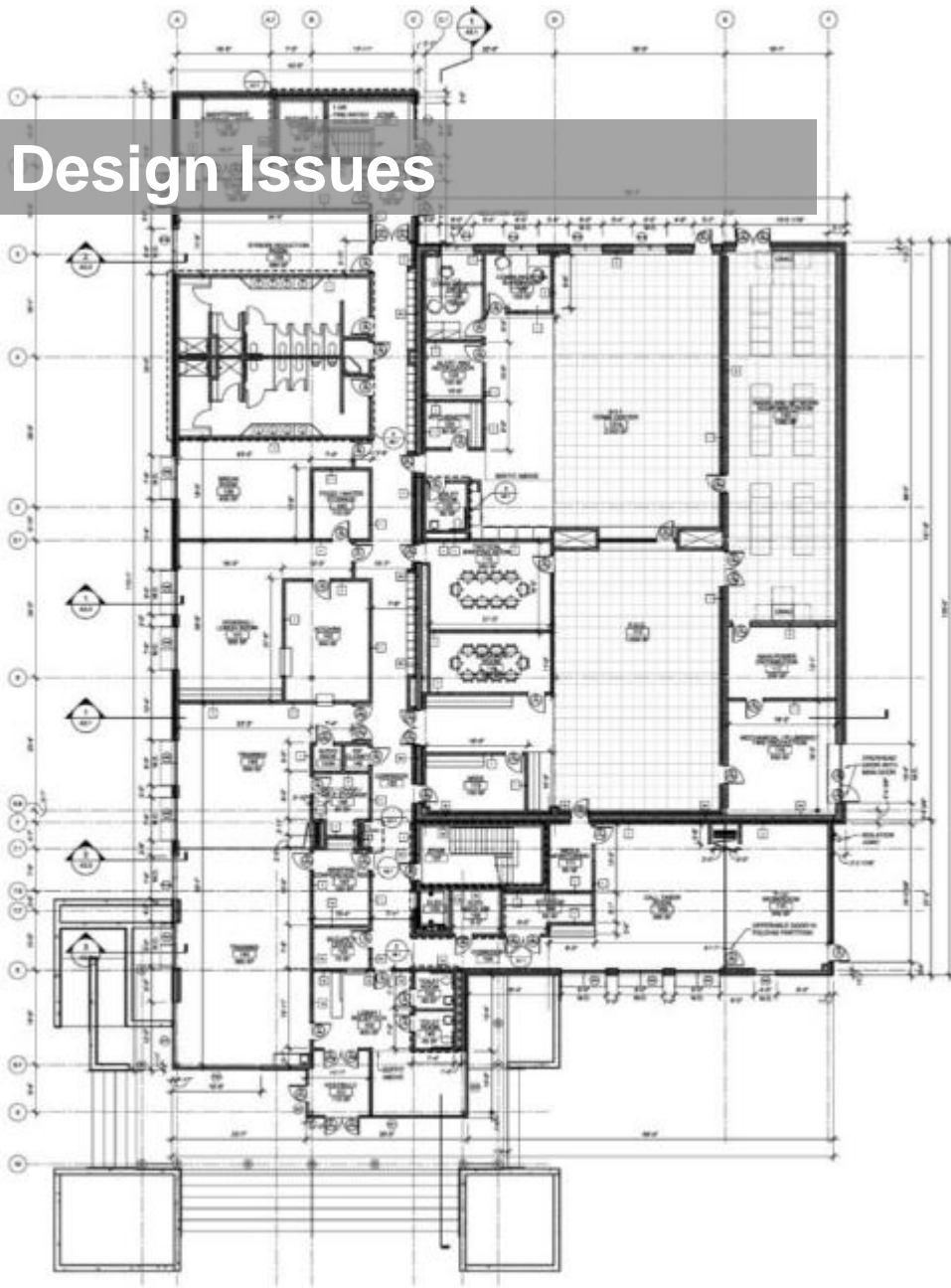
- ***Other FEMA Guidelines***
 - *FEMA regional 4 Recovery Advisories*
 - *FEMA CGC 1 and 2*
- ***General Services Administration (GSA) Facility guidelines***
 - *Threat and Security Recommendations*
- ***Department of Defense (DoD) Facility Guidelines***
 - *Uniform Facilities Criteria (UFC)*
- ***CALEA – Commission on Accreditation of Law Enforcement Agencies***
- ***National Security Presidential Directive-51***
- ***Homeland Security Presidential Directive-20***
- ***National Continuity Policy Implementation Plan***
- ***NIOSH Standards***
- ***NIMS – National Incident Management System***

Design Issues

BUILDING SYSTEMS DESIGN

- ***Communications Redundancy***
 - 2 separate power grids
 - 2 separate telephone CO's
 - Diverse fiber connectivity
 - Generator Power
- ***Critical Power Systems***
 - Generator & UPS power
 - Stand-by lighting
- ***Critical Mechanical Systems***
 - Multiple chillers or module chillers
 - Hardened Systems
 - Protect ventilation intakes

Design Issues



ARCHITECTURAL CONSIDERATIONS

- *Antennae locations and connections*
- *Detailed Security requirements & component integration*
- *Parking*
- *Adequate area & Infrastructure for systems*
- *Integral central vacuum systems*
- *Appropriate, comprehensive grounding system(s)*
- *Layout & Detailing addressing expansion needs*



TECHNOLOGIES

2.6

Design Issues

AUDIO VISUAL

- *Audio Visual Systems*
 - Large screen AVL
 - Monitors
 - Cable TV
 - Weather/Events
- *Smart Traffic Feed*
- *Security Systems and Monitors*
- *Media Feeds*
- *Amateur Radio*
- *Satellite*

Design Issues

SECURITY CONSIDERATIONS

- *Who is doing the viewing?*
(central monitoring or supervisors/ watch commanders)
- *PTZ cameras etc.*
- *Security of wireless WANs?*
- *What are other agencies within the Government entity using?*
- *Digital vs. Analog*
- *Information Systems*

Design Issues

TELECOMMUNICATIONS

- *Define systems being retained vs. replaced*
- *Design Inside Plant Infrastructure*
- *Diverse Paths and Redundancies*
- *Connectivity to other sites*

“CATASTROPHE & THE DERIVATION OF A PROJECT”

3.0

An aerial photograph of the Hennepin County Communication Center. The building is a large, modern structure with a flat roof and multiple wings. It is surrounded by several parking lots filled with vehicles. The facility is situated in an open area with some trees and landscaping. The text "HENNEPIN COUNTY COMMUNICATION CENTER" is overlaid in large, bold, white capital letters, and "Hennepin County, MN" is overlaid in a smaller, white sans-serif font below it.

HENNEPIN COUNTY COMMUNICATION CENTER

Hennepin County, MN















GEOTHERMAL CENTRAL PLANT

- Modular geothermal central plant capable of simultaneous heating and cooling to match building loads

DISPATCH AIR HANDLING ROOM

- Redundant Air Handlers serving the dispatch center, under floor supply with air-adjustable diffusers

BOILER ROOM

- Back up heating source for the geothermal system via dual fuel oil/gas boilers

RADIO SYSTEMS OPERATIONS AND TECHNICAL SERVICES AIR HANDLING EQUIPMENT

- Air Handlers serving the Radio Systems Operations and Technical Services, Radio Installation/ Electronic Repair Garage and Overstated Vehicle Electronics Repair Garage Emergency Response Apparatus Bays

BACKUP FUEL SOURCE

- Underground Fuel Oil Tank to serve boiler heating system and generators

BACKUP COOLING ENCLOSURE

- Condensing Units for direct expansion cooling system as a backup to the geothermal cooling system within a hardened enclosure

ONE STORY BUILDING

Building HVAC Systems

- Heating/ Cooling distribution through the building

TWO STORY BUILDING

MAIN ELECTRICAL ROOM

- 480/277V, 3ph, 3,000 amp, 4w service provided by Xcel will power the three branches of power systems (Emergency, Optional Standby and Critical Operations Power Systems)

DATA NETWORK CENTER

- Three computer room cooling units sized to provide 100% redundancy for initial equipment. Each unit served by geothermal chilled water with back-up direct expansion cooling
- Space planned for future computer room units to be installed as equipment build out occurs

TRANSFORMER

- Pad mounted utility service transformer

ICE BRIDGE

- Steel super structure that protects the technology connections from the tower into the building

EXISTING COMMUNICATIONS TOWER

UPS/ BATTERY BACK-UP ROOM

- Dual Uninterruptible Power Supply units with a power load to each equipment rack frame capable of power the equipment for 15 minutes

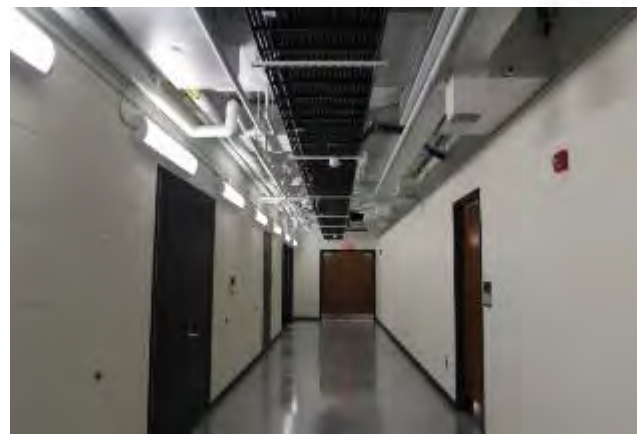
GENERATOR ENCLOSURE

- Three 500KW diesel generators with space planned for a future additional generator. Three generators were chosen due to lowest first costs and operations cost for providing backup power. Fuel storage for a 72 hour runtime will be provided

FLUID COOLERS

- Fluid coolers to supplement geothermal wells
- Provides peak shaving to the geothermal cooling system

MECHANICAL & ELECTRICAL SYSTEMS DIAGRAM



U.S. Chemical Stockpile Demilitarization Map

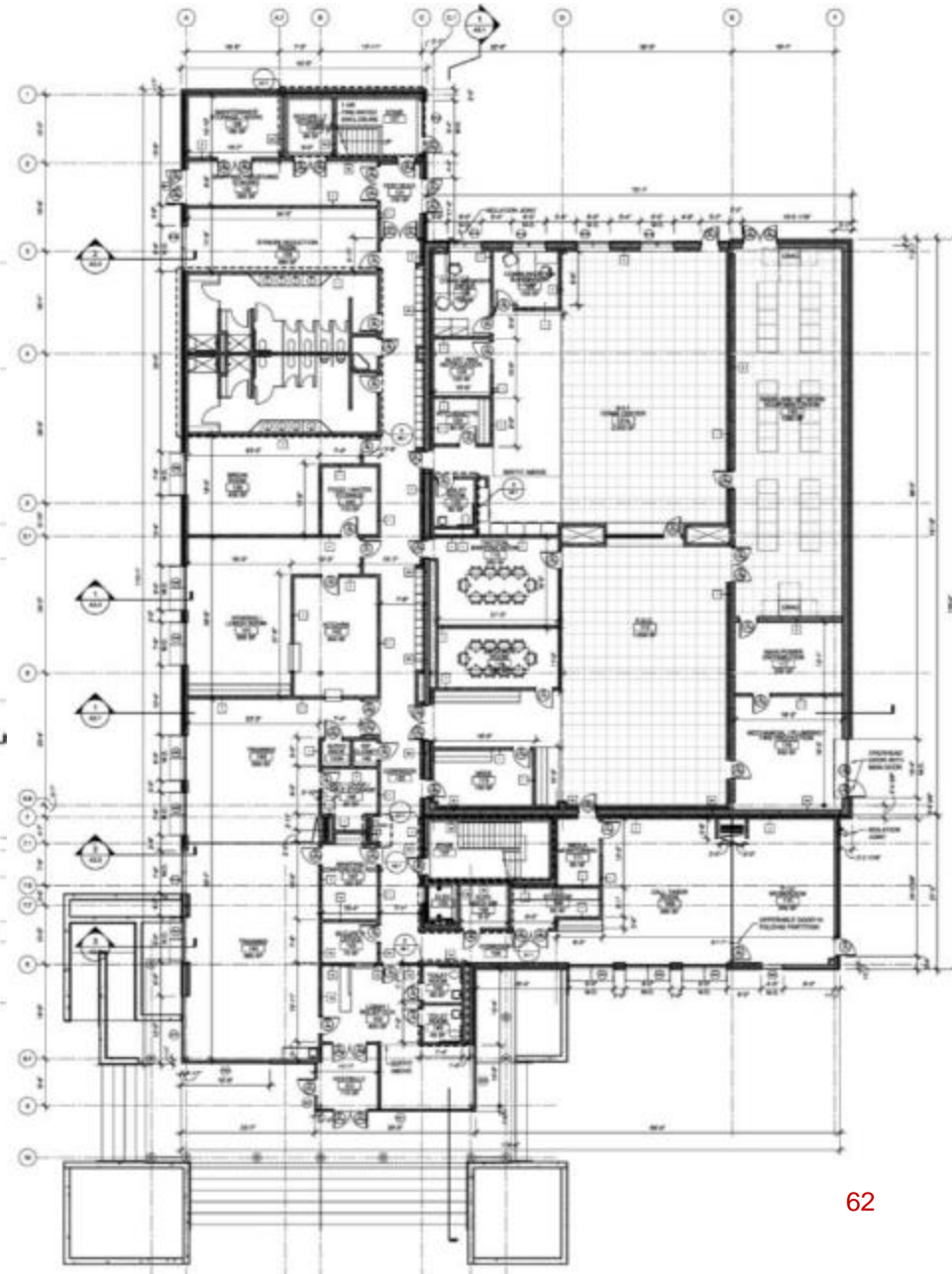




PUEBLO COUNTY EMERGENCY SERVICES CENTER

Pueblo, Colorado















2003 Seattle Election Information

General Election Voters' Guide

Prop 1 - Fire Facilities & Emergency Response Levy

AN ORDINANCE relating to additional regular property taxes for firefighting, life-safety and other emergency responses; providing for the submission to the voters of the City, at an election to be held therein on November 4, 2003, in conjunction with the state general election to be held on the same date, of a proposition authorizing the City to levy additional regular property taxes in excess of the limitation on levies in Chapter 84.55 RCW for the purpose of paying all or a part of the cost of neighborhood stations, support facilities, marine apparatus, emergency preparedness improvements and other emergency response facilities; providing for interim financing pending tax receipts; and creating a levy oversight committee.

WHEREAS, the City of Seattle, with many critical facilities that house companies, and emergency medical units to mitigate loss of life and medical emergencies, and other

WHEREAS, the City operates 33 fire stations since 1928 and 1977; and

WHEREAS, the City generally maintains emergency facilities in satisfactory condition, not significantly upgraded, except for facilities since the voter-approved 1984; and

WHEREAS, fire and other emergency services have evolved over the last 20 years in response to changing professional standards, legal mandates, and newly recognized risks from terrorism and hazardous materials; and

WHEREAS, the Loma Prieta earthquake in California on October 17, 1989, the Northridge earthquake in California on January 17, 1994, the Kobe earthquake in Japan on January 15, 1995, and the Nisqually Earthquake in Seattle on February 28, 2001 highlighted the potential for seismic damage in Seattle and the need for the City to continue to prepare for future earthquakes and to reevaluate the structural conditions of essential public safety facilities; and

WHEREAS, since 1996 various studies identified significant seismic vulnerabilities at 32 of the City's 33 fire stations, culminating in a study completed in 2003 that produced a range

2003 Prop 1: Fire Facilities & Emergency Response Levy

WHEREAS, the Loma Prieta earthquake in California on October 17, 1989, the Northridge earthquake in California on January 17, 1994, the Kobe earthquake in Japan on January 15, 1995, and the Nisqually Earthquake in Seattle on February 28, 2001 highlighted the potential for seismic damage in Seattle and the need for the City to continue to prepare for future earthquakes and to reevaluate the structural conditions of essential public safety facilities; and

General earthquake preparedness concerns

CITY OF SEATTLE

Fire Communications

Seattle, WA

















Fay marching westward toward Alabama

TALLAHASSEE, Florida (CNN) – Tropical Storm Fay was in no hurry as it made its way across the northern Florida peninsula Friday, its torrential rains and fierce winds leaving a trail of destruction behind and portending the future for areas in its path.




A nursery worker builds a berm to control flooding Thursday in New Smyrna Beach, Florida.

[more photos »](#)

The National Hurricane Center discontinued a tropical storm warning that had been in place on the northern part of Florida's Atlantic coast, but its central and northeast coast were left to deal with raging floodwaters that have caused millions of dollars in damage.

By Friday afternoon, rainfall amounts included 26.65 inches in Melbourne, 22.83 at Cape Canaveral and 20.75 at Palm Shores. The St. Johns River overflowed in Jacksonville, which felt the brunt of the storm early Friday afternoon.

"Tropical Storm Fay has produced excessive rainfall because it has always been near or over very warm water. The state of Florida is too skinny east to west to have ever cut the moisture off from Fay completely," CNN meteorologist Chad Myers said.

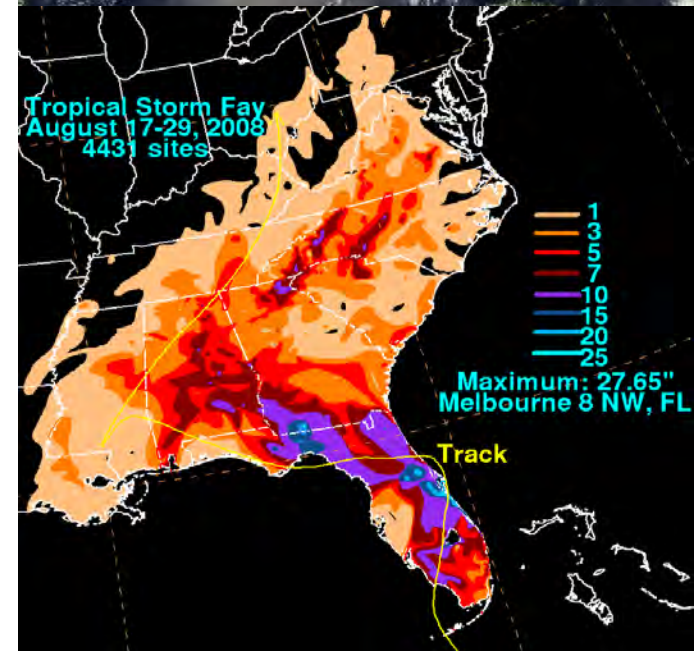
 **Watch flooding drive people from their homes »**

Heavy rain also was reported in parched southern Georgia and southeast Alabama, the National Hurricane Center said.

Seven deaths in Florida were blamed on the storm. The storm claimed at least 10 lives in Haiti as it passed through the Caribbean last week.

Gov. Charlie Crist announced six of the deaths: two by drowning, three in traffic accidents and one by carbon monoxide poisoning.

Nassau County Sheriff Tommy Seagroves said the seventh fatality was a man who died Friday after his car struck a tree on U.S. 1. The man's companion was in critical condition, Seagroves said. [iReport.com: Watch a mail truck forge through floodwaters](#)



LEON COUNTY AND TALLAHASSEE CITY Public Safety Complex Tallahassee, FL











Fire in Oakland Ranks as Worst In State History

By ROBERT REINHOLD,
Published: October 22, 1991

OAKLAND, Calif., Oct. 21— Firefighters succeeded today in containing the wind-driven fire that swept the parched hills above Oakland and Berkeley on Sunday, but not before it caused enough death and damage to rank as the worst fire in California history.

The Alameda County coroner confirmed 14 people lost their lives in the fast-moving blaze, including a 49-year-old Oakland fire battalion chief, who died while battling the flames. There were fears the death toll could go still higher, and investigators today began searching the 1,800 or so burned houses, condominiums and apartment buildings for more victims.

Officials said that about 2,000 vehicles were destroyed and that firefighters were checking to see if they contained bodies. 1,000 Families Left Homeless

Hospitals reported treating 148 people for burns, smoke inhalation and other injuries. Many of the families left homeless by the fire were taken to four shelters, three in Oakland and one in Berkeley.

This morning, 7,800 homes and businesses were without electric power and 8,000 without gas service. Authorities put the total damage to property at \$1.5 billion.

Chief George T. Hart of the Oakland Police Department, said at a news conference this evening that the area affected by the fire had been closed off and that several people had been arrested for looting. 1,800 Blackened Acres

After viewing the blackened 1,800-acre area by helicopter this morning, Gov. Pete Wilson pronounced the disaster worse than the devastating fire in Santa Barbara County last summer, which leveled about 500 homes. He asked President Bush to declare a Federal emergency.



Photo: Bruce Ward, The Chronicle

1991 Oakland Hills Firestorm

An aerial photograph of the State of California State Operations Center in Sacramento, CA. The image shows a large, modern building complex with a central circular feature. The building is surrounded by extensive parking lots filled with cars. A multi-lane highway runs along the left side of the property. The surrounding area includes other commercial buildings and green spaces.

STATE OF CALIFORNIA

State Operations Center

Sacramento, CA









Ky. weapons depot confirms mustard gas leak

By Jeffrey McMurray
The Associated Press

Jul. 29, 2008 - 04:32PM | Last Updated: Jul. 29, 2008 - 04:32PM | 0 Comments

LEXINGTON, Ky. — The first mustard gas leak in three years was confirmed Tuesday at a chemical weapons stockpile in Kentucky, less than a month after workers there found a leak inside a separate storage igloo housing a deadly nerve agent. But officials said the latest leak poses no danger to the community nor the surrounding atmosphere.

Richard Sloan, public affairs officer for the [chemical storage site at Blue Grass Army Depot in Richmond](#), said trace amounts of mustard gas vapor were detected during a routine inspection of a storage area this week. Army workers won't know whether there is also a liquid leak until a closer inspection inside the igloo.

Because the igloo is full of artillery weapons containing [mustard agent](#), the biggest chore in cleanup efforts is to pinpoint which one is leaking, he said.

"If they could walk in there and find a puddle, that would be great," Sloan said. "What they're probably going to do is find several thousand gallons of vapor through."

Another concern is the summer heat, which could raise the risk of additional leaks. Once the leak or leaks are identified, workers will use air conditioning to limit the risk of future leakage.

Mustard agent is among the least lethal of the Cold War era chemical weapons. It causes severe blisters over the body of anyone coming in contact with it. The Army is planning to use a mobile destruction unit to destroy the agent elsewhere by 2017 to comply with an international treaty.

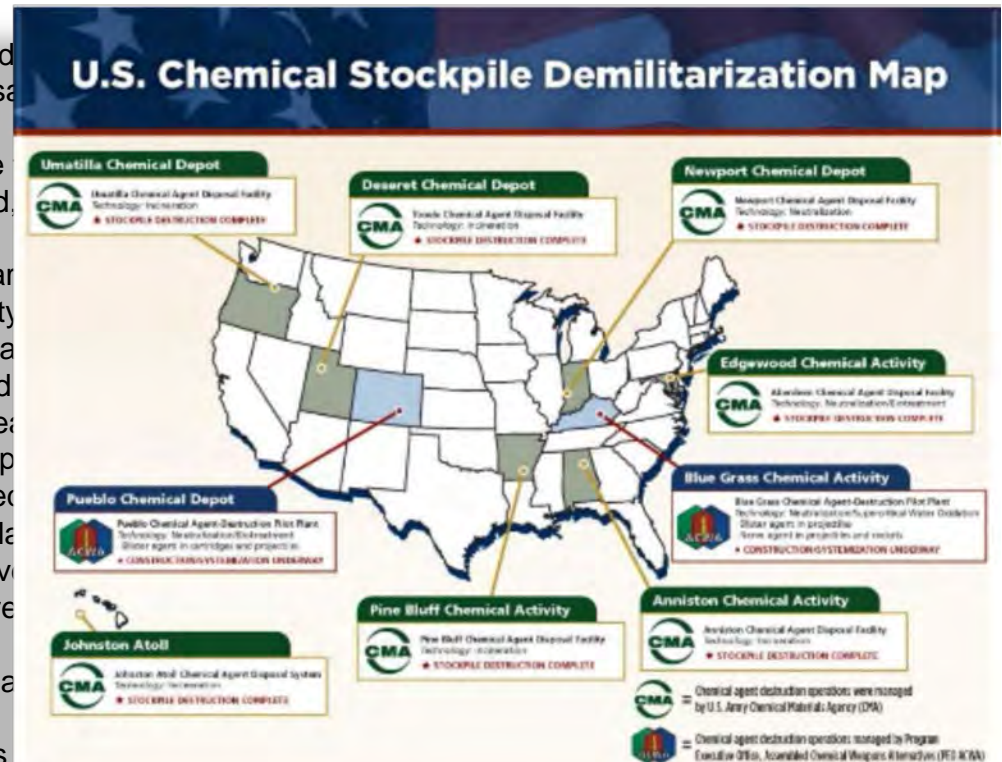
Earlier this month, the depot announced it had detected a leak of mustard gas from a weapon housed in the storage igloos. While the sarin leak was the first, the Army is planning to use a mobile destruction unit to destroy the agent elsewhere by 2017 to comply with an international treaty.

Craig Williams, executive director of the Kentucky-based Center for the Study of Chemical Warfare, said the Army for its handling of the first [sarin leak](#), particularly in the case of the mustard gas leak.

"The diligence shown out there in finding these things really is commendable," Williams said.

He added, "In the bigger picture, the only way to eliminate the risk of chemical weapons is to destroy them themselves."

The timetable for destroying the chemical weapons has not yet been set. The timetable for destroying the chemical weapons has not yet been set. The Kentucky site is to use a chemical neutralization procedure to destroy its [523 tons of agent, including mustard gas and the nerve agents GB and VX](#).



Deadly March Tornadoes Were First Billion-Dollar Disaster of 2012

The swarms of March caused more than \$1.5 billion in damage and killed 40. The drama is difficult to qualify, however, because tornadoes are "atypical events" by nature

By Andrea Mustain and OurAmazingPlanet | April 10, 2012

A swarm of tornadoes that tore through the Midwest and Southeast in early March has earned the grim title of the nation's first billion-dollar weather disaster of 2012.

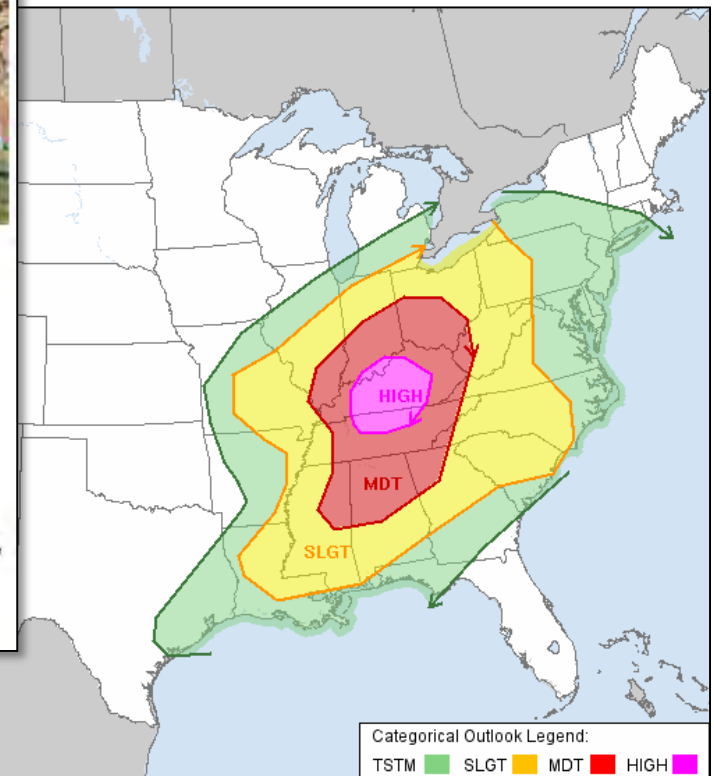
From March 2 through the early hours of March 3, 132 tornadoes were reported across nine states. Although those numbers are preliminary, and will undoubtedly decrease once overlapping reports are eliminated, their aftermath was devastating, causing more than \$1.5 billion in damage and killing 40 people.

The storms killed four people in Ohio, but they took the greatest toll in Indiana, killing 13, and Kentucky, where 23 people died.

The costly disaster follows on the heels of a record-breaking year for devastation wrought by the vagaries of the weather and longer-term climate conditions. Last year, the United States experienced 14 separate events that caused \$1 billion or more in damage. Five of those events were tornado outbreaks.



Michael Raphael/FEMA



STATE OF KENTUCKY Emergency Operations Center Frankfurt, KY



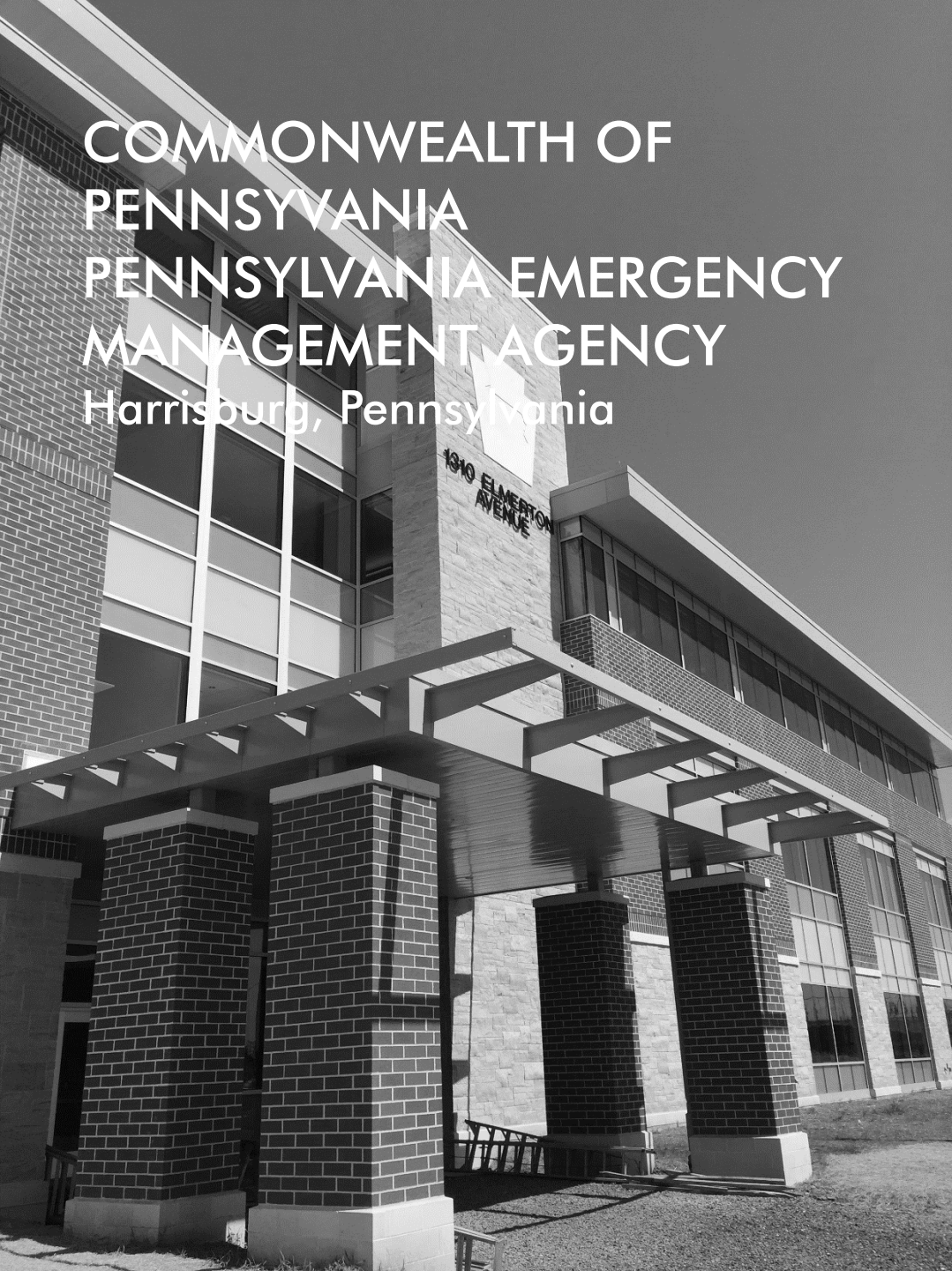








[illegible]

A black and white photograph of a modern, multi-story building with a brick and stone facade. The building features large windows and a prominent entrance with a covered walkway supported by brick pillars. The text "1910 ELMERTON AVENUE" is visible on the building's exterior. The sky is clear and dark.

COMMONWEALTH OF PENNSYLVANIA PENNSYLVANIA EMERGENCY MANAGEMENT AGENCY Harrisburg, Pennsylvania







DEPARTMENT AREA

- 1.0 PEMA DIRECTOR'S OFFICE
- 2.0 PEMA OPERATIONS
- 3.0 PEMA ADMINISTRATION
- 4.0 HOMELAND SECURITY
- 5.0 OFFICE OF THE STATE FIRE COMMISSIONER
- 6.0 OFFICE OF RADIO OPERATIONS
- 7.0 PENNDOT OPERATIONS
- 8.0 DEPARTMENT OF HEALTH OPERATIONS
- 9.0 GOVERNOR'S SUITE
- 10.0 BUILDING COMMON SPACES
- 11.0 OUTBUILDING
- 12.0 CIRCULATION



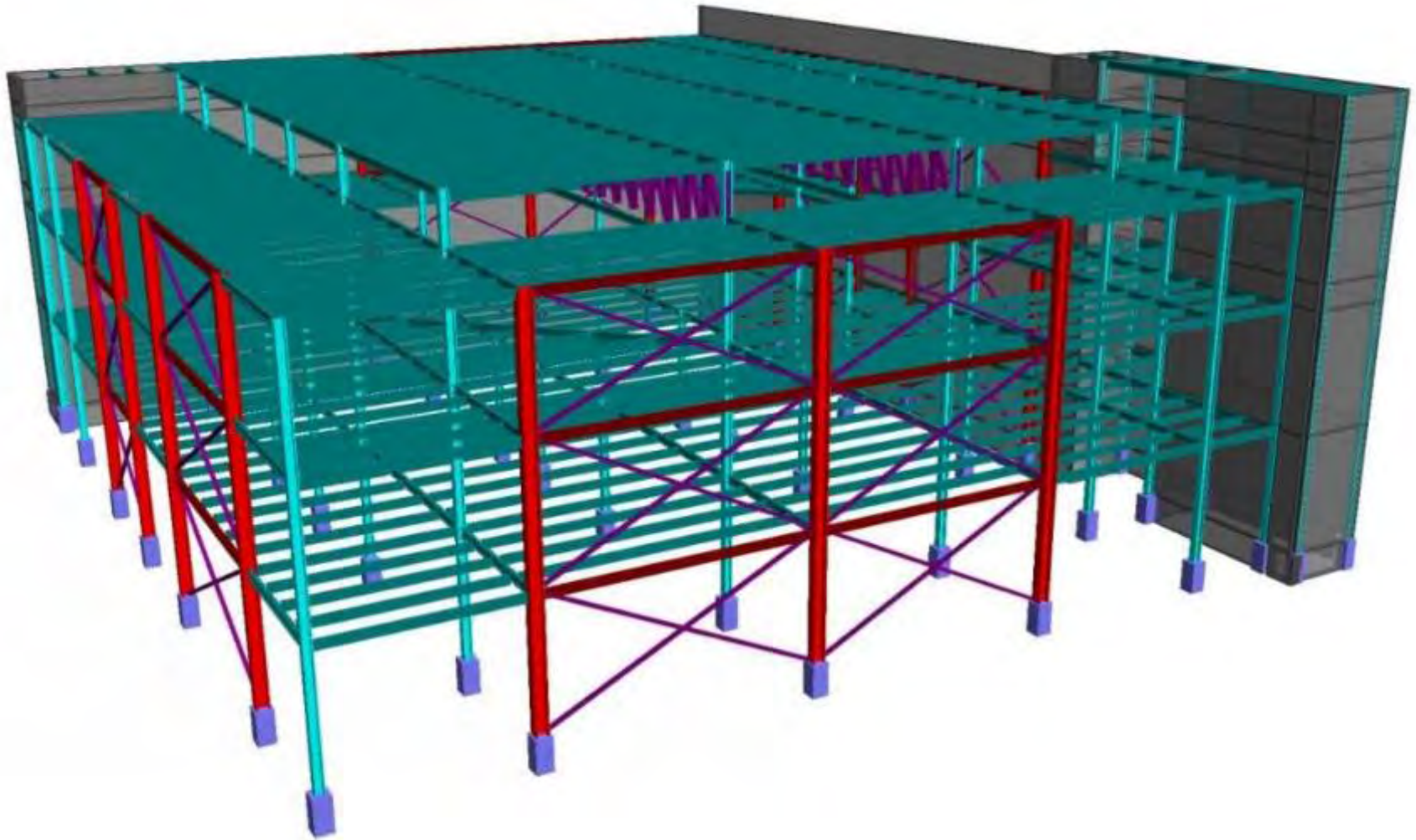
















THANK YOU