Facility Design Regulations and Designing for Disaster

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Regulations That Impact Facility Design

Adam Gill, JD, B.Arch., AIA, Duane Morris LLP
Acute Care vs. Post-Acute Care

Acute Care – Health care services where a patient is treated for an episode of immediate and severe illness or disability, such as the treatment of injuries after an accident or other trauma, or during recovery from surgery.

• Often short-term care.
• Includes: emergency department, intensive care, coronary care, cardiology, neonatal intensive care.
Acute Care vs. Post-Acute Care

Post-acute care (PAC) – Health care services provided after a stay in a hospital, but may be instead of a hospital stay.

- Typically longer in duration than acute care.

- Includes: long-term care facilities, CCR, rehabilitation or palliative services, either at home or in a facility.
Focus on Post-Acute Care

Why focus on PAC

Types of PAC:
• IRF – inpatient rehabilitation facility
• SNF – skilled nursing facility (Medicare)
• NF – nursing facility (Medicaid)
• ICF/IID – intermediate care facilities for individuals with intellectual disabilities
• Home Health Services
• Hospice
Sources of Regulations

- Federal certification to participate in Medicare and/or Medicaid
- State licensure (regardless of source of payment)
- Local building codes
- Certificate of Need
Recent Changes to Fed. Regulations

• On September 28, 2016, CMS issued emergency preparedness regulations

• On October 4, 2016, CMS issued reform of requirements for SNFs

• Sprinkler waiver has been eliminated

• Certificate of Need
DESIGN & CONSTRUCTION
Fed. Regulations on Design

CMS is focusing on person-centered and person-directed care. Core values are choice, dignity, respect, self-determination and purposeful living.

Residents have a right to a “comfortable and homelike environment”

“Culture Change” initiatives include: dining options; homelike design and décor; spas, fitness rooms, gardens, and other amenities; community integration; and flexible space.
Design – Certificate of Need

Arose as a result of Federal statute - Health Planning Resource Development Act of 1974

Three Goals
• Control or regulate health care costs
• Coordinate services and construction of facilities
• Prevent duplicative facilities
Certificate of Need States (2016)

CERTIFICATE-OF-NEED (CON) REGULATION IN THE UNITED STATES (Present)


Produced by Matthew Mitchell and Christopher Koopman, September 2016.
Certificate of Need States – Services

Certificate of Need Coverage Summary
By State, 2010

<table>
<thead>
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<th>State</th>
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**Source:** AHPA, 2011.
Design & Construction – Building Regulations

Three levels of code compliance

• Federal
  – NFPA 101

• State
  – FGI Design Guidelines

• Local building codes
  – International Building Code

CMS adopted NFPA 101 – 2012 in May 2016
  • Chapters 18 and 19 apply to long-term care

Significant changes:
  • Egress route – corridors
  • Equipment in corridors
  • Fixed furniture in corridors
  • Sleeping suite: egress & size
  • Max. travel distance – non-sleeping suite
NFPA 101 (2012) is based on “culture change” approach:

- Furniture in corridors
- Cooking facilities for residents
- Cooking facilities open to the corridor
- Fireplaces
  - Direct vent gas
  - Solid fuel
State Requirements

FGI Guidelines for Design and Construction of Health Care Facilities

• Not life safety issues
• Minimum requirements for health care buildings
  – Types of spaces needed
  – Not minimum square footage
• Ventilation
• Lighting
State Requirements – FGI Design Guidelines
Other Design & Construction Pitfalls

• Public vs. Private Projects
• Contract with the architect and General Contractor
• Who is the owner of the property / facility / property
• Payment
• Mechanics Liens
• HIPAA
• False Claims
DESIGNING FOR DISASTER:
TWO NEW ORLEANS HOSPITALS
VA HOSPITAL HOSPITAL

- Constructed 1952
- Level 1 Trauma Center
- 492 Beds
- >200k Total SF
- 1,000 car Parking Garage
NEW ORLEANS EAST HOSPITAL

Constructed 1968 – 1990
Level 1 Trauma Center
300 Beds

200k Total GSF
Original Methodist Hospital
OUR FRAGILE ENVIRONMENT
AUGUST 2005

END OF THE ROAD
On 4 a.m., August 20, floodwaters overflowed many of the city’s sections, including these eastern areas of downtown that had been blocked two days earlier during the evacuation rush. Some drivers were forced to abandon their cars on city streets and seek another route to safety.
VA HOSPITAL | Post-Katrina
HOW DID WE GET HERE?
WORKING WITH NATURE
“HARNESSING” NATURE

Baldwin Wood Pump
Mississippi River Channelization
New Orleans Flood Walls
THE CONDITION

- Mississippi River: 14 feet above sea level
- Levee and flood wall: 21.4 feet above sea level
- Metairie Ridge: 3.9 feet above sea level
- Levee and flood wall: 14.5 feet above sea level
- Lake Ponchartrain: 1 foot above sea level
- Lakeview area: Up to 4.8 feet below sea level
- Mid-City area: Up to 1.8 feet below sea level

NOT TO SCALE
NATURAL VS. MAN-MADE INFRASTRUCTURE
LAST LINE OF DEFENSE: HOPING THE LEVEES HOLD

Army Corps of Engineers officials say hurricane levees in the New Orleans area will protect residents from a Category 3 hurricane moving rapidly over the area. But computer models indicate even weaker storms could find chinks in that armor.

BARRIERS OF EARTH AND CONCRETE

Levees and floodwalls that protect against flooding from both the Mississippi River and hurricanes are built by the Army Corps of Engineers and are maintained by local levee districts. The corps and the local districts share the construction cost of hurricane levees, while the Mississippi River levees are a federal project. Local levee districts also build and maintain nonfederal, lower-elevation levees with construction money from each district’s share of property taxes and state financing.

HEIGHT ISN’T EVERYTHING

Different factors permit Lake Pontchartrain levees of varying elevations to withstand an 11-foot storm surge plus several feet of waves.

Levees on higher ground and separated from the water by 5 miles of marshland need be only 12½ feet tall.

Levees fronted by boulders and concrete rubble breakers can be about 14 feet high.

Levees without any breakers need to be about 17 feet tall or taller.

Seawalls on the water must be 22 feet high.

Note: The height and shape of a levee is based on the roughness of the area into which the levee joins to reduce the impact of wave impact on top of the levee wall.
“For most of us, design is invisible. Until it fails.”

- Bruce Mau
1. Nature will cooperate.
2. Manmade systems can be failsafe.
3. We are addressing a static condition.
Climate Risk is Not a Static Condition
A DYNAMIC CONDITION | Wetlands Erosion

1930

http://www.lacoast.gov/LANDLOSS/NEWHISTORICALLAND.PDF
A DYNAMIC CONDITION | Wetlands Erosion

http://www.lacowt.gov/LANDLOSS/NEWHISTORICLAND/PDF
A DYNAMIC CONDITION  | Wetlands Erosion
RESILIENCE: AT WHAT COST?
CAN WE LIVE WITH NATURE?
Rather than fighting against it?
THINKING ABOUT INFRASTRUCTURE

Monotechnic Infrastructure

“The problem with infrastructure is that it only does one thing.”

- Marion Weiss “Public Natures: Evolutionary Infrastructures”
THINKING ABOUT INFRASTRUCTURE

Polytechnic Infrastructure

CULTURE
ENVIRONMENT
PROGRAM
TECHNOLOGY
THINKING ABOUT INFRASTRUCTURE

Community Infrastructure

- CULTURE
- ENVIRONMENT
- TECHNOLOGY
- PROGRAM

“BIGU” by Bjarke Ingels Group (BIG)
POST-KATRINA QUESTIONS:

Will they return?
Should they return?
Who pays?
Shrink the footprint?
Plan for another 1,000 year storm?
How resilient do we need to be?
PROGRAM REQUIREMENTS: NEW ORLEANS EAST HOSPITAL

PROGRAM TOTAL: 200,000 GSF, 80 Beds

- 14 Beds ICU
- 10 Beds Intermediate Care (step down)
- 26 Beds Medical Surgical
- 10 Beds Pediatric Unit
- 20 Beds LTAC

- Short Stay Unit - 15 Rooms
- Emergency Department - 20 Exam Rooms
- Imaging Suite – MRI, CT, Radiology
- Surgery Suite – 4 OR’s, 1 Cath Lab
- PT / OT / Cardiac Rehab Suite
- Kitchen & Dining Areas
PROGRAM REQUIREMENTS: VA HOSPITAL

PROGRAM TOTAL: 1,700,000 GSF

- 200 Beds    Inpatient Beds
- 370 Beds    Outpatient Exam Rooms
- 21          Procedural Suites

- Ambulatory clinics
- Emergency & Imaging Departments
- Mental Health Services
- Transitional Living & Outpatient Rehabilitation
WHAT IS MANDATED?

• FEMA Base Flood Elevation
• Wind Load Requirements
  – New and rehabbed facilities
• Large Missile Impact Criteria for Envelope
• Stormwater Mitigation
• Systems Backup and Redundancy
MAJOR PLANNING & DESIGN ISSUES

• RESILIENCY / HARDENING
• DISASTER MITIGATION / SURVIVABILITY
• ISSUES:
  – What are “critical facilities”?
  – How high to build?
  – Levels of resilience
  – Reliability of municipal utilities
  – Ability to stabilize/evacuate/shut down
  – “Refuge of Last Resort”
### DISASTER LEVELS

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<tr>
<th>LEVEL 1</th>
<th>Short-term Event (0-24 Hours)</th>
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<td><strong>Example:</strong> Short-term Power Failures, Utility Issues, etc.</td>
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<td><strong>Solution:</strong> System Redundancy</td>
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<th>LEVEL 2</th>
<th>Medium-term Event (24-72 Hours)</th>
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<td><strong>Example:</strong> Mandatory hurricane evacuation but “near miss”</td>
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<td><strong>Solution:</strong> System Redundancy &amp; Space Capacity</td>
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<th>Long-term Event (&gt; 72 Hours)</th>
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<td><strong>Example:</strong> Another Katrina-type Event</td>
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<td><strong>Solution:</strong> Provide facilities to support an “orderly evacuation and shutdown” over a specific period</td>
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<th>LEVEL 4</th>
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<td><strong>Provide long-term “defend in place” systems</strong></td>
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<tr>
<td><strong>Prepare for possibility of “Refuge of Last Resort”</strong></td>
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New Orleans East Hospital
*Orderly Evacuation & Shutdown*

VA Medical Center
*Defend-in-Place*
HOW HIGH TO BUILD?

- **Diesel Fuel Tank**
  - 20,000 gallons
  - 96 Hrs Service

- **Category 5 Storm Surge**
- **EL 20'-0" MIN. ELEVATION - "CRITICAL FACILITIES"**
- **500 Year Flood Level**
- **EL 5'-0" MIN. VA FLOOR ELEVATION**
- **EL 3'-0" 100 Year Flood Level (Base Flood Elevation)**
- **EL 0'-0" SEA LEVEL**
- **EL -2'-0" BELOW SEA LEVEL**

**“KATRINA LINE”**
CHALLENGES / OPPORTUNITIES

- “Critical” Services Above First Floor
- ED and Access Ramp at Second Floor
- Elevation of Central Plant
- Repurposing of Old Central Plant
- Hardening of Emergency Systems
WATER INFORMING LANDSCAPE

EXISTING OUTFALL CANAL

WET DETENTION POND

DRY DETENTION POND

WATER COLLECTION
WATER INFORMING LANDSCAPE

Existing Canal

Flood Event

Pedestrian Amenity

Proposed Canal Design
VA MEDICAL CENTER

Joint Venture between Eskew+Dumez+Ripple and NBBJ
THE "UPSIDE DOWN HOSPITAL"
1. Rooms: Single --> Double Occupancy
2. Category 3 Store – Resilient Envelope
3. “Mission Critical” Above First Floor
4. Emergency Department Ramp as Emergency Boat Launch
5. Million-Gallon Rainwater Reservoir
6. Blackhawk Helicopter-Landing
7. One Week Full Operation
8. 320,000 Gallon Fuel For Generators
9. Utility Spine on Fourth Floor
10. 6,000 SF Emergency Supply Building
11. Provisions and Accommodations for Over 1,000 Staff & Patients
OPERATIONAL

– Increased standards for self-sustainability (96 hrs)
– More robust communications and evacuation plans in place
– Hospital “teaming”, partnership, alternative care sites, etc.

SIX CRITICAL AREAS OF FOCUS

– Communications
– Supplies
– Security

– Staff
– Utilities
– Clinical Activities
RESILIENCE – THE PHYSICAL PARAMETERS

SITE RESPONSE
Green Infrastructure

HARDENING

SYSTEM REDUNDANCY

OPERATIONS

“SITES PROTECT BUILDINGS”

“SITES PROTECT COMMUNITIES”

“BALANCE BEAUTY + BRAWN”

“DEFENSE IN DEPTH”
THANK YOU!
Q&A