Hurricane Harvey

The U.T. System Preparation, Response, and Recovery

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The Story of Harvey

Tropical Storm – Thursday - August 17, 2017

Tropical Depression - Saturday 8/19

Remnants of - Saturday 11:00 pm

Tropical Depression Wednesday 8/23 10:00 pm

In Gulf and expected to strengthen and become a Cat 1 at landfall

Tropical Storm Thursday 8/24 7:00 am

In Gulf and expected to strengthen and become a Major hurricane at landfall

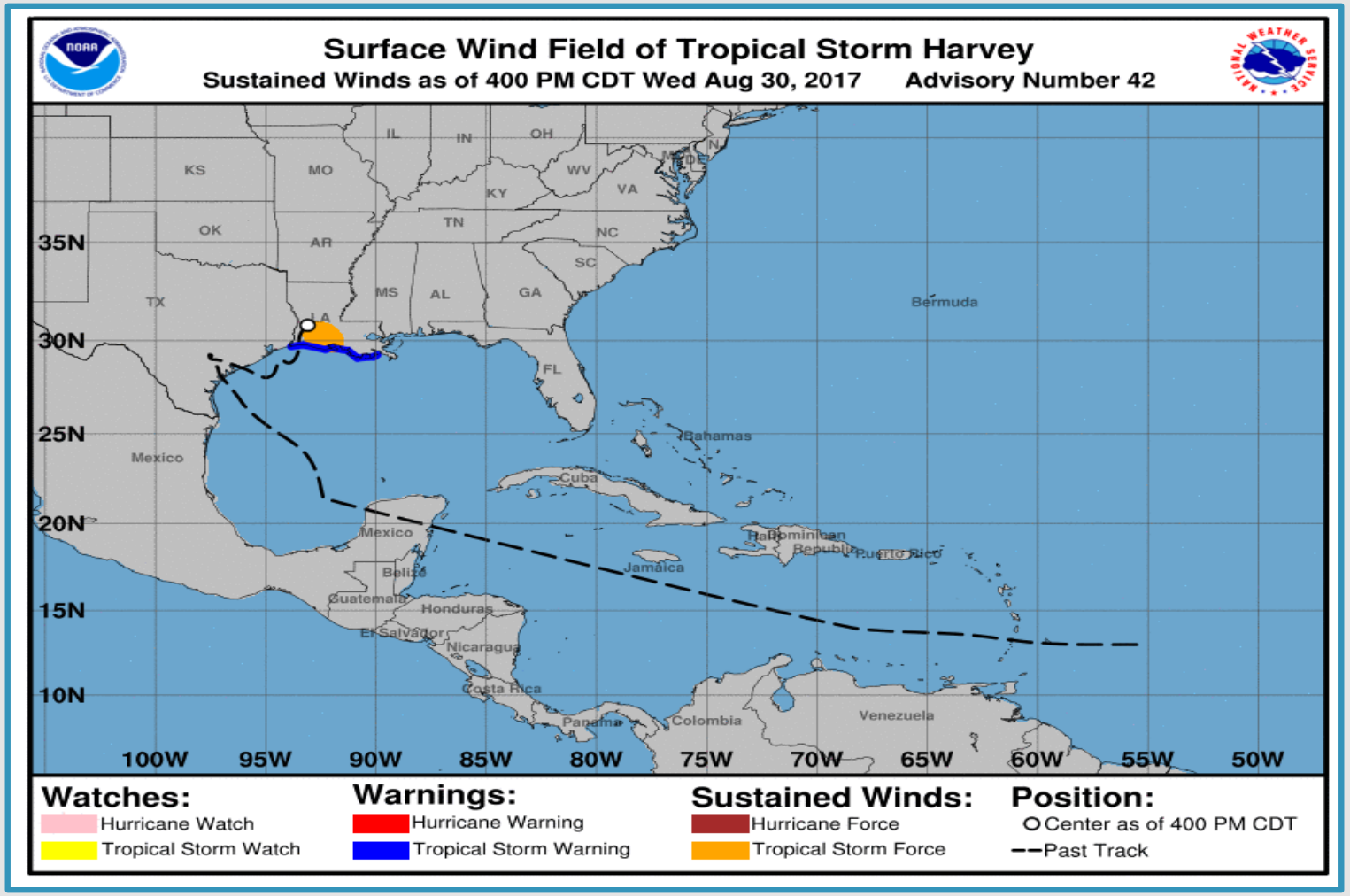
The Story of Harvey (cont.)

- Cat 1- Hurricane – Thursday 1:00 pm
  - Maximum Sustained Winds 85 mph
- Cat 2 - Hurricane – Friday 1:00 am
  - Maximum Sustained Winds 105 mph
- Cat 3 - Hurricane – Friday 4:00 pm
  - Maximum Sustained Winds 125 mph
- Cat 4 - Hurricane – Friday 10:00 pm - Landfall
  - Maximum Sustained Winds 130 mph

The Story of Harvey (cont.)

- Harvey on Land
  - Friday 8/26 10:00 pm – Monday 8/28 1:00 pm
- Re-enters Gulf
  - Monday 8/28 4:00 pm
- Second Landfall East Texas
  - Wednesday 8/30 4:00 am
- Harvey dissipates – Northern Louisiana
  - Wednesday 8/30 10:00 pm

The Story of Harvey (cont.)



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Texas Medical Center (TMC)

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TMC Flood - Maps

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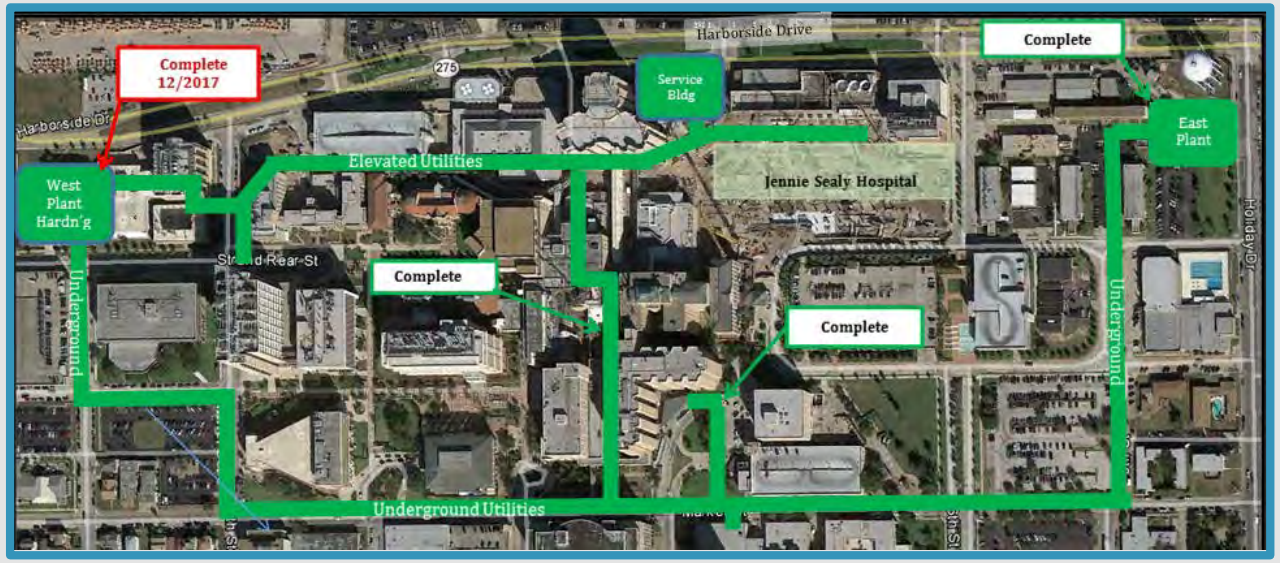
Mitigation

UTMB Mitigation



Flood Gate/Door Deployment

Preparations

U.T. MSI

Main Campus Pre-Storm

U.T. MSI

Main Campus Post-Storm

U.T. MSI

Fisheries and Mariculture Lab (FAML) Pre-Storm

U.T. MSI

Fisheries and Mariculture Lab (FAML) Post-Storm

U.T. System


POLICE


EMERGENCY
RESCUE
THE UNIVERSITY OF TEXAS SYSTEM
POLICE

Sister Institution Assistance

- UTSWMC sent nurses and staff to relieve M. D. Anderson
- University of Texas Police Department (UTPD) and Environmental Health and Safety from U.T. Austin responded to U.T. MSI
- Law Enforcement – UTPD from UTA, UTSA, and UTHSC-SA provided relief to officers in Houston
- UTPD Officers from UTMB assisted Lamar University
- TAMU Corpus Christi currently providing lab and office space for researchers and graduate students displaced from U.T. MSI

Hurricane Harvey Impacts

University of Houston

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Welcome to the University of Houston

- 43,500+ students
- 2,600+ faculty
- 15 Colleges
- 180+ Buildings
- Tier One Research University
- 25 Research Centers
- $162 Million – Research Expenditures

UH Office of Emergency Management (OEM) Overview

Who we are:

- A component of the Campus Safety Department
- Office created in March 2011
- 4 full time staff

What we do:

- Emergency Planning Programs
- Continuity Planning
- Training, Drills & Exercises
- Disaster Preparedness Outreach
- Incident Action Planning for major Special Events
- Response to major campus emergencies – through Emergency Operations Center (EOC) activation

Hurricane Harvey - Harris County

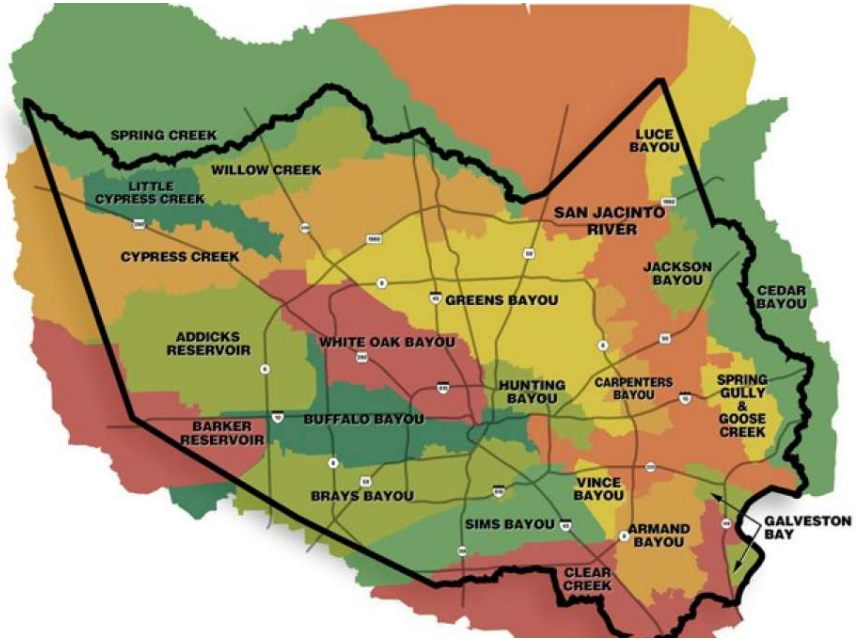
1 trillion Gallons of water that fell over Harris County during the storm

33 inches How high the water could cover the whole county

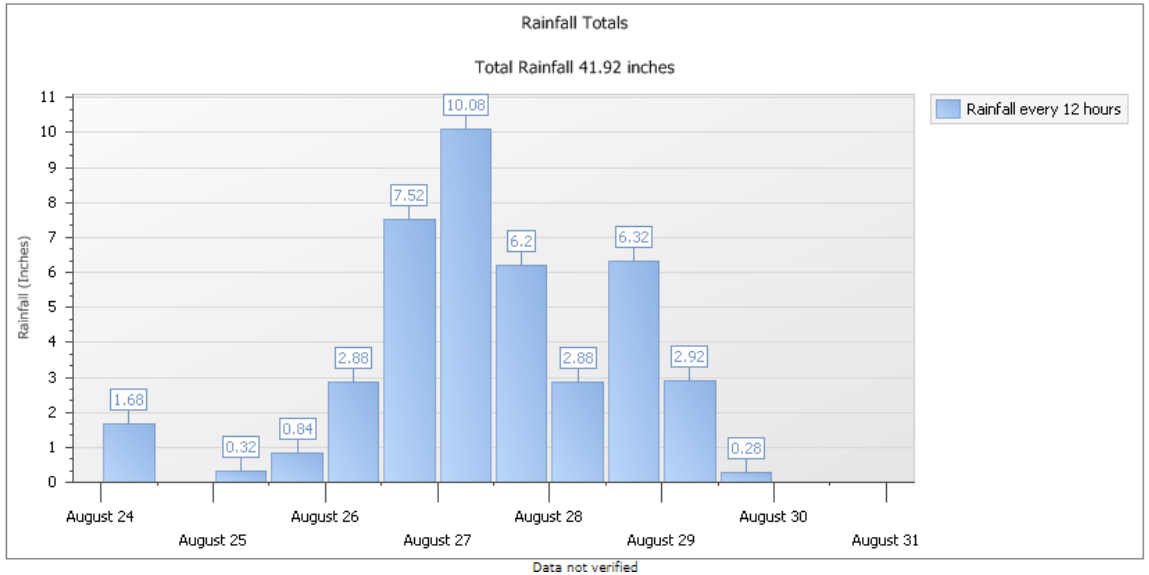
22 bayous Number of bayous (all) in the county that spilled over their banks

50 inches Average annual rainfall in Harris county

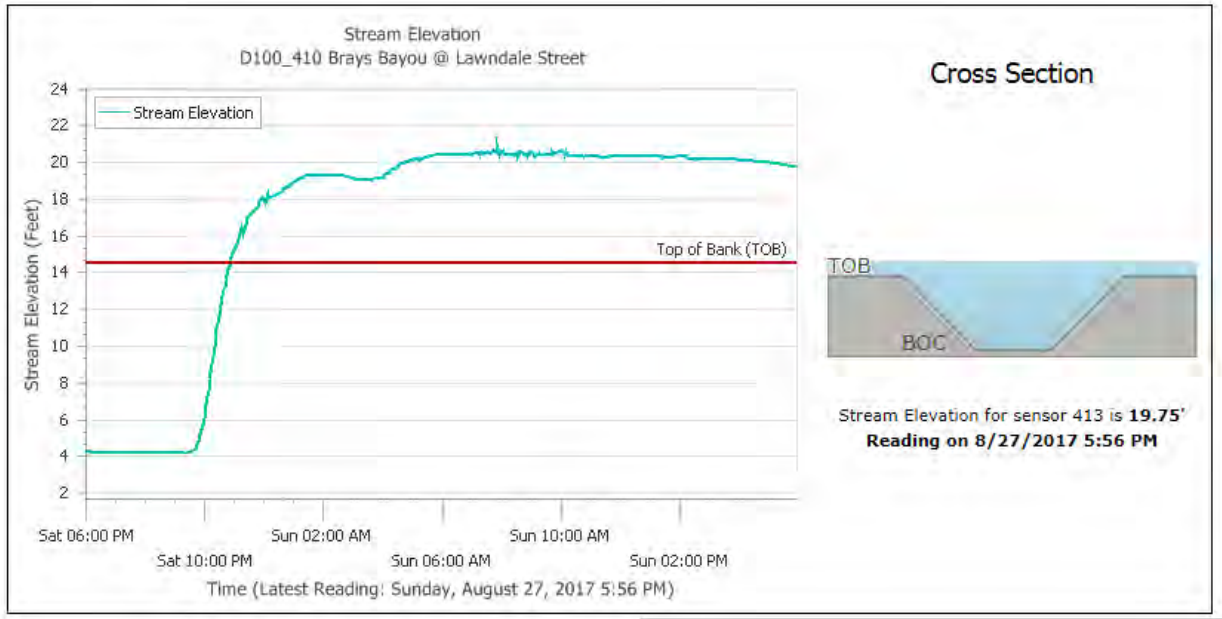
40 inches Amount of rainfall at adjacent gauge to UH campus received in 4 days



Showing rainfall totals from 8/24/2017 12:00 AM to 8/31/2017 12:00 AM CDT



Brays Bayou

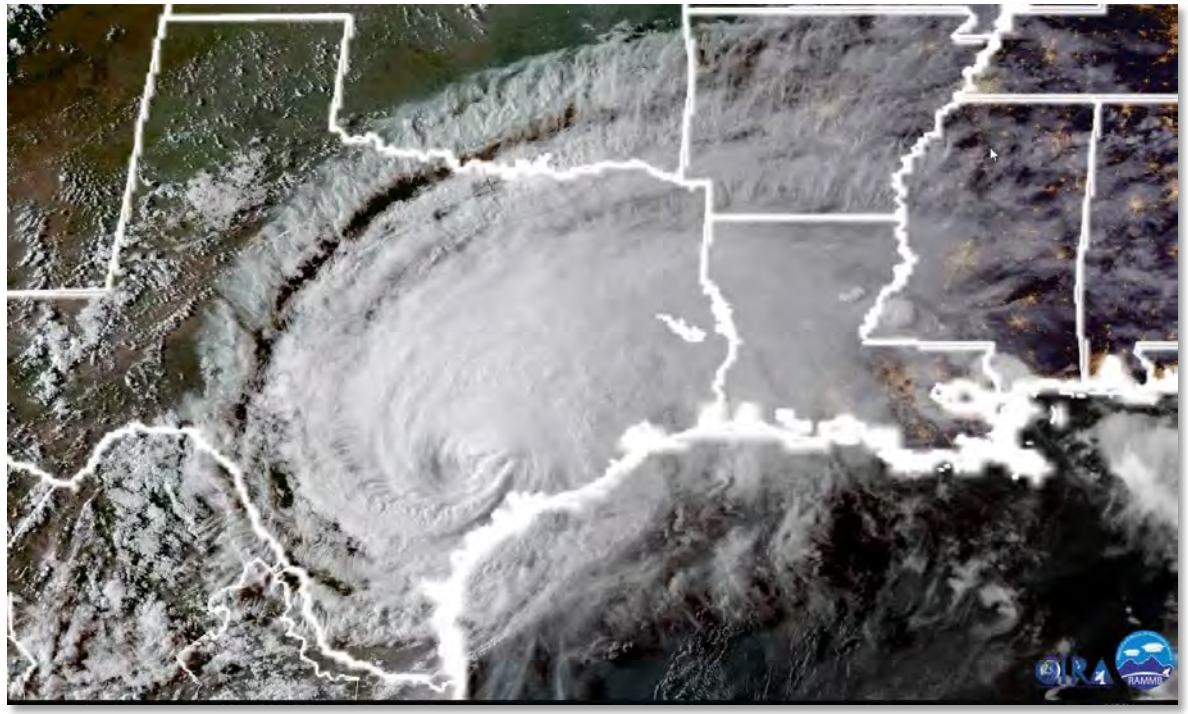

Stream Elevation
D100_410 Brays Bayou @ Lawndale Street
Stream Elevation
Stream Elevation (Feet)
24
22
20
18
16
14
12
10
8
6
4
2
Top of Bank (TOB)
Sat 06:00 PM
Sat 10:00 PM
Sun 02:00 AM
Sun 06:00 AM
Sun 10:00 AM
Sun 02:00 PM
Time (Latest Reading: Sunday, August 27, 2017 5:56 PM)
Cross Section
TOB
BOC
Stream Elevation for sensor 413 is 19.75'
Reading on 8/27/2017 5:56 PM

Hurricane Harvey Timeline

Tuesday, August 22	• First National Weather Service (NWS) Conference Call for regional Emergency Managers • 2nd day of Classes
Friday, August 25	• UH Closes at 1p.m. • Emergency Operations Center (EOC) Activated • Ride Out Teams report to Campus
Aug. 26 - 30	• 2,000 students reside on campus in residence halls • Ride Out Teams maintain essential functions • Evacuation of Residence Hall (200 students) – Aug. 27

UH Ride Out Teams

- Role is to maintain continuity of operations for critical university essential functions
- Remain on campus during the storm



Teams:

- Police
- Facilities
- Information Technology
- Student Housing and Residential Life
- Environmental Health & Life Safety
- Emergency Management
- Dining Services
- Animal Care Operations
- Media Relations

UH Emergency Operations Center (EOC)

EOC

Physical location at which the coordination of information and resources to support incident management activities takes place.

Primary functions of an EOC

- Information Gathering and Sharing
- Coordination
- Communication
- Resource Tracking/Incident Documentation

Daily activities during Harvey

- Various Conference Calls (UH Ride Out Team, NWS, University Leadership, City/County, etc.)
- Situation Reports due to EOC 2x daily
- Support any emergency responses or life safety issues

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Video Courtesy: Marco Luzuriaga

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Hurricane Harvey Timeline

Aug. 31-Sept. 4

- Preliminary damage assessments/Recovery phase
- 31 buildings identified as needing significant repair/remediation

Tuesday, Sept. 5

- UH Reopens
- 2 buildings – Not Operational
- 12 buildings – Partially Operational
- All others – Operational

Lessons Learned Pre-Harvey

Catalysts:

- Tropical Storm Allison (2001)
- Hurricane Ike (2008)

Mitigation Projects:

- Generators
- Submarine doors on utility tunnels
- Pumps
- Hurricane shutters
- Diesel Fuel Farm
- Relocated critical operations from basements
- Disaster Restoration Contracts

Planning & Preparedness:

- Ride Out Team Program
- Emergency Operations Center (EOC)
- Continuity of Operations Plan (COOP)

Continuity of Operations Planning

Achieving the Goal of Continuity

Identify the organization's essential functions & ensure that those functions can be continued throughout, or resumed rapidly after, a disruption of normal activities.

Benefits:

- Enables the organization to continue their essential functions
- Protects the fundamental mission
- Saves lives
- Minimizes against property loss
- Identifies threats and mitigates risk

Essential Functions Examples:

Public/Life Safety

Student Housing

Communications

Basic Services

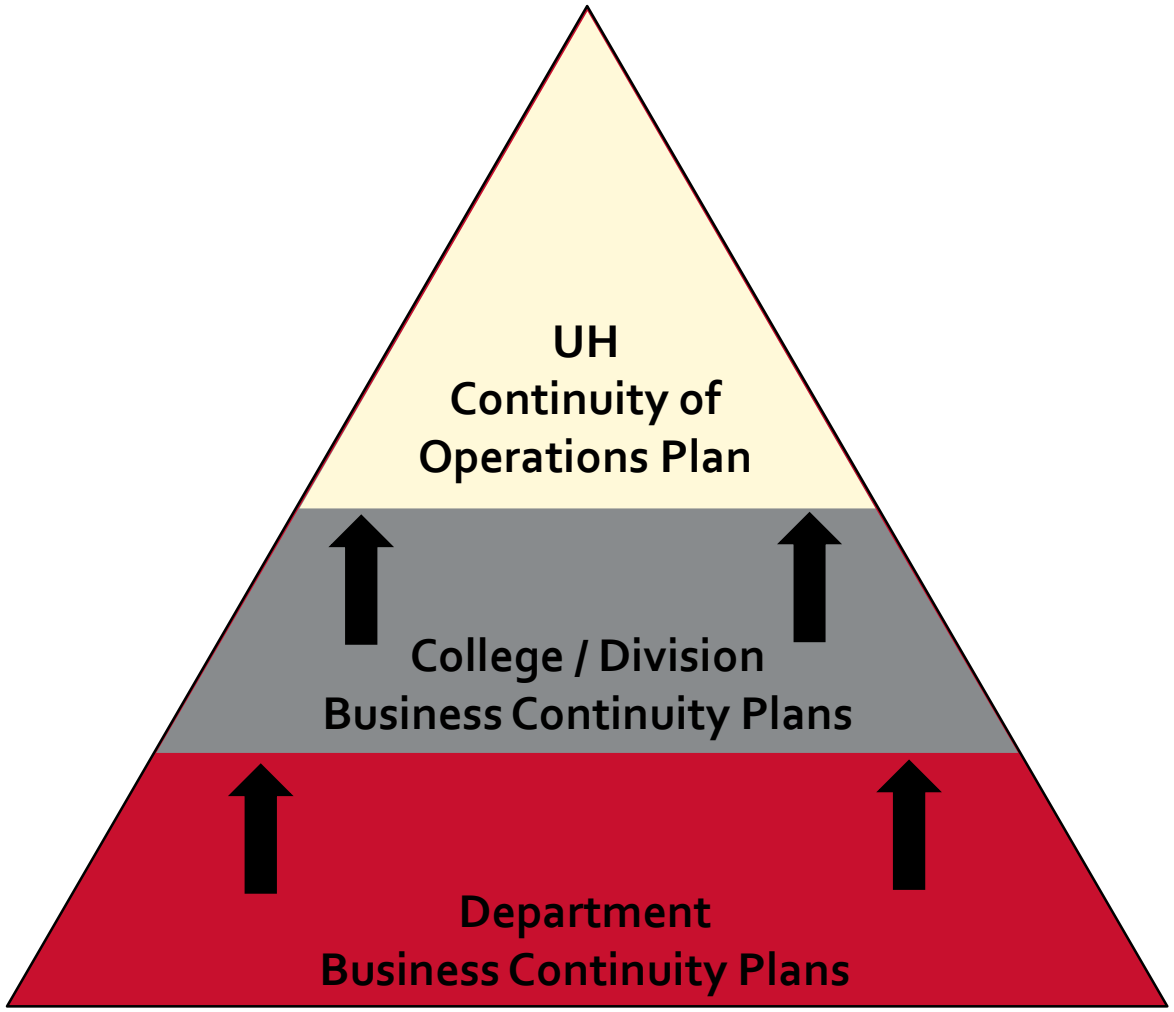
Fiscal Operations

Academic Continuity

What is needed to perform these essential functions?

- Personnel
- Facilities
- IT Systems or Programs
- Access to critical records
- Resources/Supplies/Vendors

Continuity of Operations Planning



Department-Level Template

- Orders of Succession
- Essential Functions
- Dependencies
- Essential Personnel
- Access to Data/Information Systems
- Vulnerability Assessment & Mitigation Strategy
- Department Communication Strategies
- Emergency Relocation

Key Takeaways/Lessons Learned

Strengths:

- Established structure & relationships between:
  - Campus Leadership & CFO
  - Campus Emergency Manager/EOC
  - Ride Out Teams
- The Importance of coordination with external agencies (especially locally)
  - Local NWS Office
  - City/County OEM Offices
- Importance of Continuity Planning at all levels of the University

Areas of Improvement:

- Think outside of the "72 hour" box (personnel, supplies, laundry, etc.)
- Refine relocation/evacuation plans for residence halls
- Evaluate and assess back-up communication channels (for campus-wide as well as internal communications)

Lessons Learned

About M.D. Anderson

- Largest cancer center in the world
- Focus is exclusively on treatment of cancer
- More nurses per patient than any hospital in the country
- MD Anderson ranks first in the number and amount of research grants awarded by the National Cancer Institute.
- MD Anderson provides cancer care at several convenient locations throughout the Greater Houston Area and collaborates with community hospitals and health systems nationwide through MD Anderson Cancer Network®.

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Patient Care by the Number · FY16

- Nearly 135,000 people sought the superior care that has made M.D. Anderson so widely respected – more than 41,000 of whom were new patients.
- Over 7,500 participants were enrolled in 1,200-plus clinical trials exploring innovative treatments; M.D. Anderson's cancer clinical trial program is one of the largest of its kind.

Patient Care by the Number · FY16

Hospital Admissions	27,391
Average Number of Inpatient Beds	661
Outpatient Clinic Visits, Treatments, and Procedures	1,404,329
Pathology/Laboratory Medicine Procedures	12,073,679
Diagnostic Imaging Procedures	524,044
Surgery Hours	67,936
Active Clinical Research Protocols	1,202

Our Locations

Houston reach

MD Anderson locations

- Houston-area care centers
- Texas Medical Center (including Proton Therapy Center)
- Diagnostic imaging clinics
- Memorial City (surgery)

Collaborative relationships

- MD Anderson Breast Care with Memorial Hermann
- Lyndon B. Johnson Hospital in Harris Health System (cancer care)

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How We Decide What to Plan For:

Hazard Vulnerability Assessment (HVA)

Event	PROBABILITY	ALERTS	ACTIVATIONS	SEVERITY - (MAGNITUDE - MITIGATION)						RISK
				HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPAREDNESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	
	Likelihood this will occur			Possibility of Death or Injury	Physical Losses and Damages	Interruption of Services	Preplanning	Time, Effectiveness, Resources	Community/ Mutual Aid Staff and Supplies	*Relative Threat
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	Number of Alerts	Number of Activations	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 - 100%
Active Shooter	2	1	0	3	1	3	2	2	2	36%
Acts of Intent	1	0	0	3	3	3	2	2	2	17%
Bomb Threat	2	0	0	3	3	3	2	2	2	33%
Building Move	2	0	0	1	2	1	2	2	2	22%
Chemical Exposure, External	1	0	0	2	2	1	2	2	2	12%
Civil Unrest	2	0	0	2	2	2	2	2	2	27%
Communication/Telephony Failure	3	0	0	1	1	2	2	2	2	33%
Dam Failure	0	0	0	2	3	2	3	3	3	0%
Drought	2	0	0	1	1	1	2	2	2	20
Earthquake	3	10	6	3	3	3	1	1	1	60%
Epidemic	3	0	0	3	1	2	2	2	2	40%
Evacuation	2	12	8	1	1	2	2	2	2	49%
Explosion	2	2	2	2	3	2	2	2	2	48%
External Flood	3	0	0	1	2	2	2	2	2	37%
Fire	3	4	2	2	3	3	2	2	2	64%
Flood	3	12	8	2	2	3	2	2	2	66%

Hazard Vulnerability Assessment

Top Hazards Based on HVA	Top Actual Events (since 2011)
Severe Weather (Hurricane)	Severe Weather (Storms/Flooding)
Severe Weather (Storms/Flooding)	Building Evacuation (Odor at South Campus)
Utility Failure (Water Leak/Flood)	Utility Failure (Loss of Water, Water Leaks, Unplanned Electrical Outages, AHU Failure, Low TECO Steam Pressure)
Active Shooter	Supply Issue (Liquid Nitrogen Delivery, Disruption of Piped Oxygen, IV Bags Shortage)
Violent Behavior	Fires (Smithville [2011, 2015], Car Fires, Cooking-related Fires)
Information System Failure	Information System Failure (Building Automation System, Cerner Outage, EPIC Downtime)

* Smithville HVA continues to show wild land fires as a top hazard

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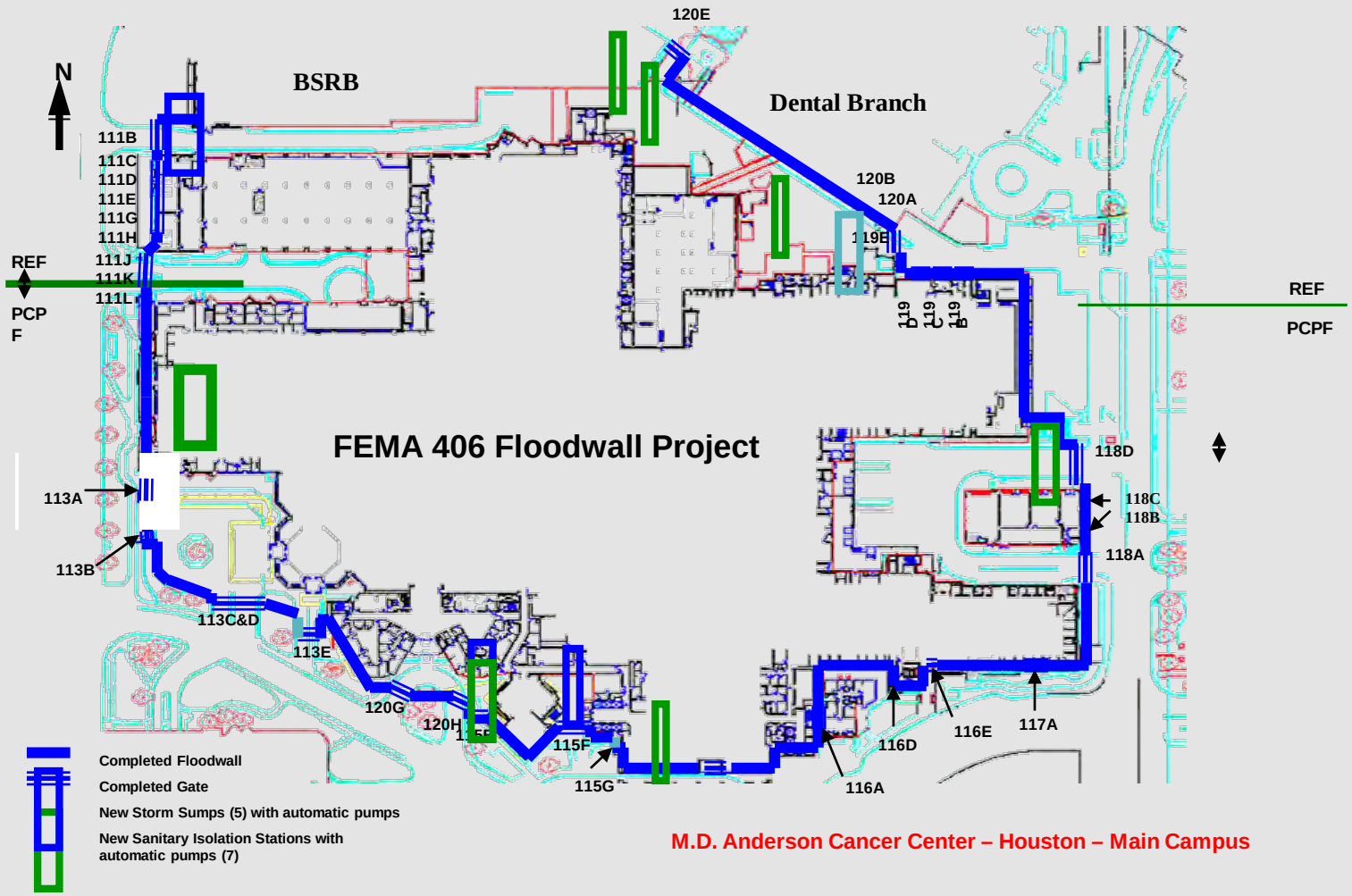
Mitigation Measures at M.D. Anderson's Main Campus



M.D. Anderson Cancer Center – Houston – Main Campus

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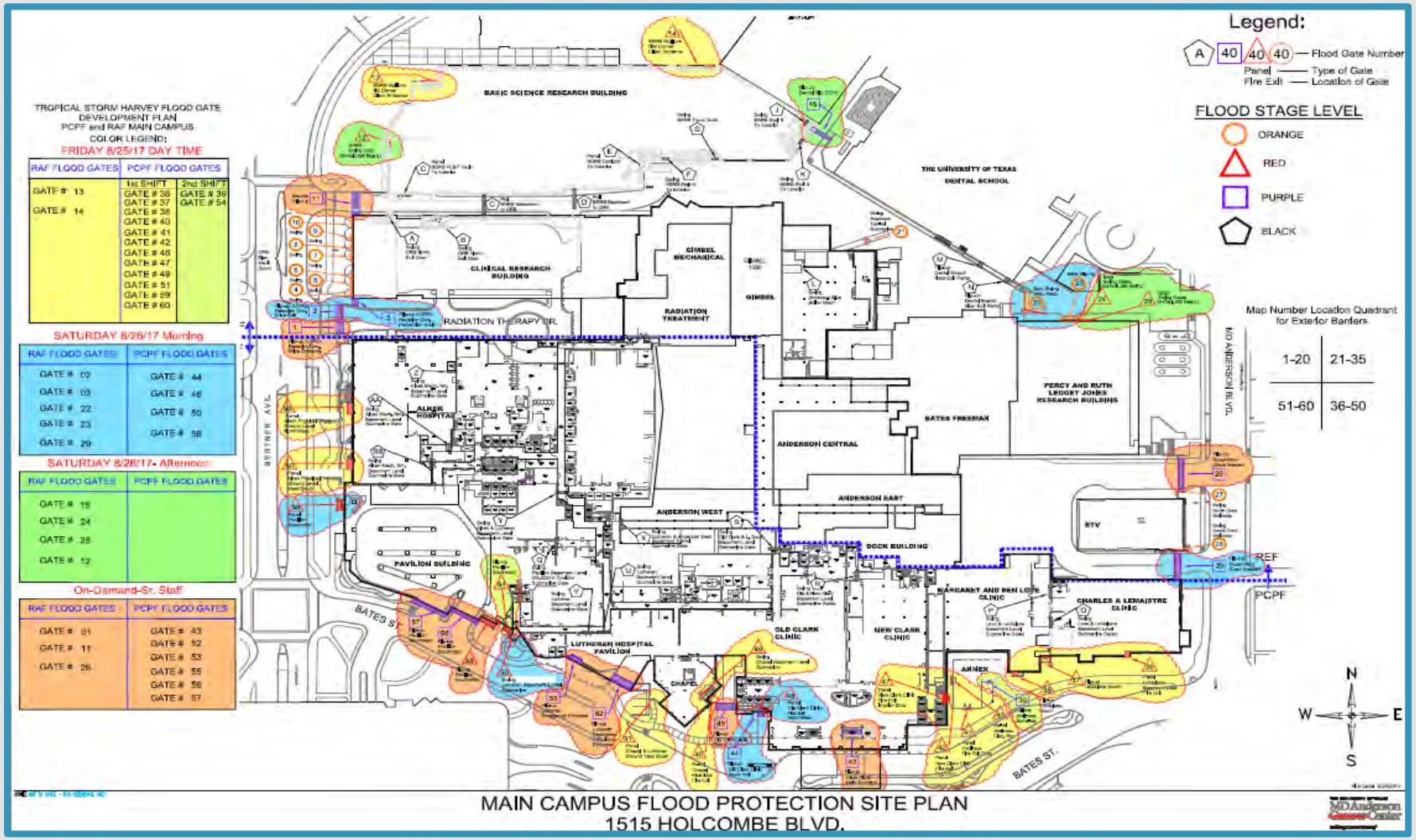
Current Flood Gate Deployment Plan



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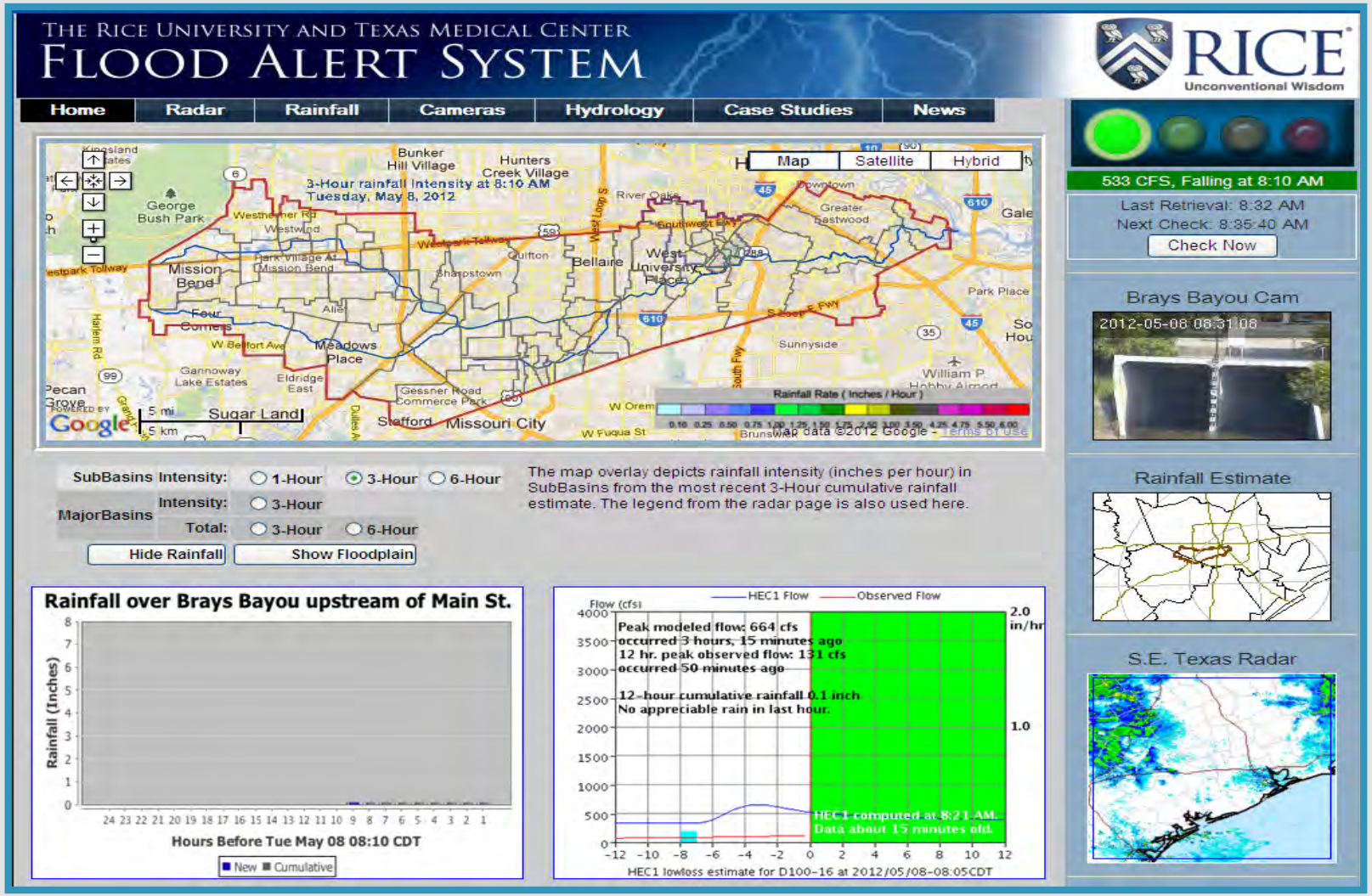
How We Predict and Plan for Flooding



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Harvey Time Line

Wednesday August 23rd – Incident Command activation and briefing

Thursday – Saturday August 24th, 25th, 26th – ICS briefings

Thursday August 24th - Started installing flood gates

Saturday August 26th - Finished flood gate installation

Monday August 28th - Some roads open to access Medical Center

Tuesday August 29th – Started seeing critical patients

Wednesday August 30th – Flood gates removed

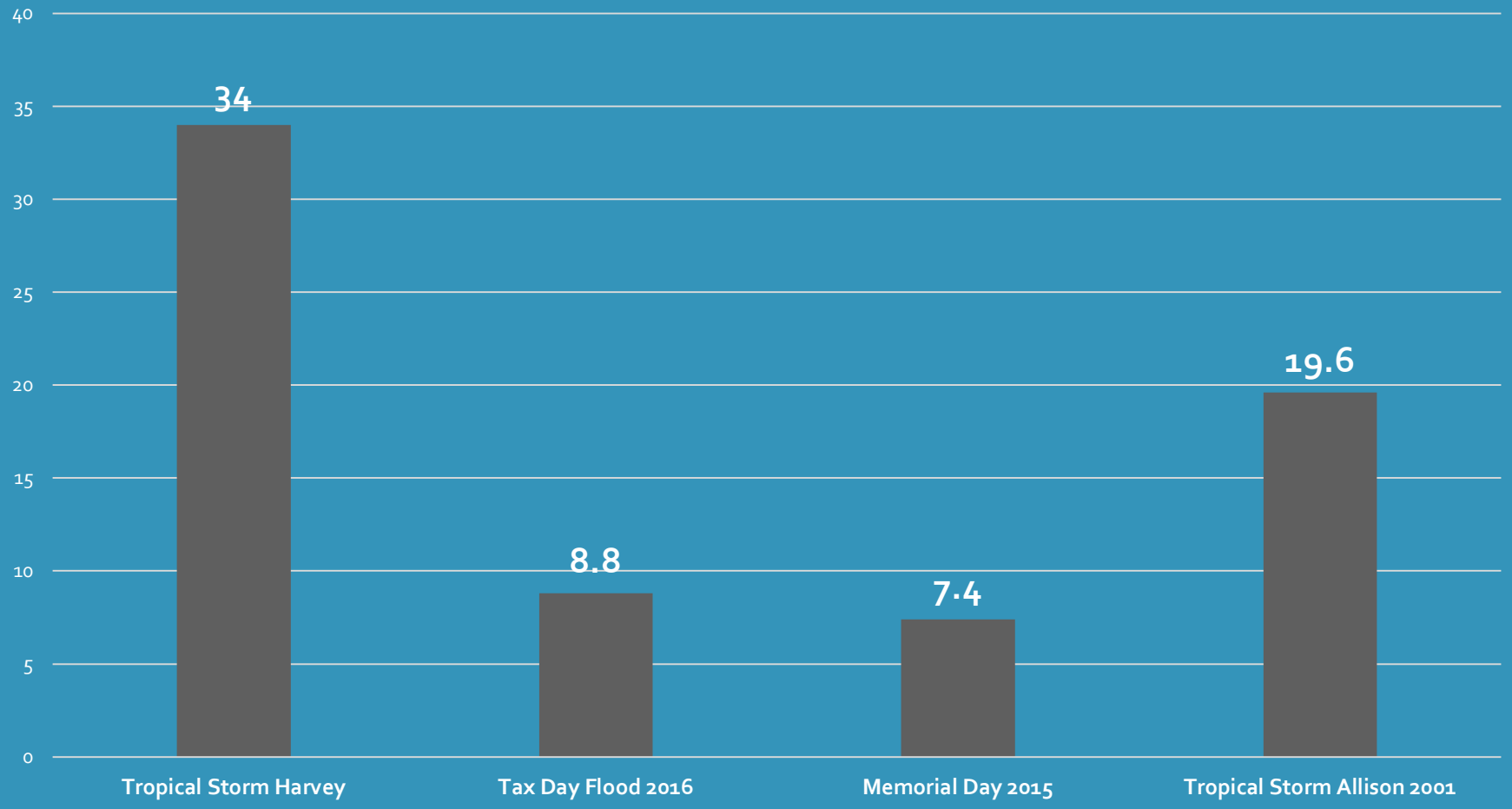
Thursday August 31st – 15 surgeries scheduled post storm

Tuesday September 5th - First day of normal staffing/operations

Emergency Exercises

Summary of Rainfall

Harris Gully at South McGregor Way Rain Fall Total of 7 Days (inches)



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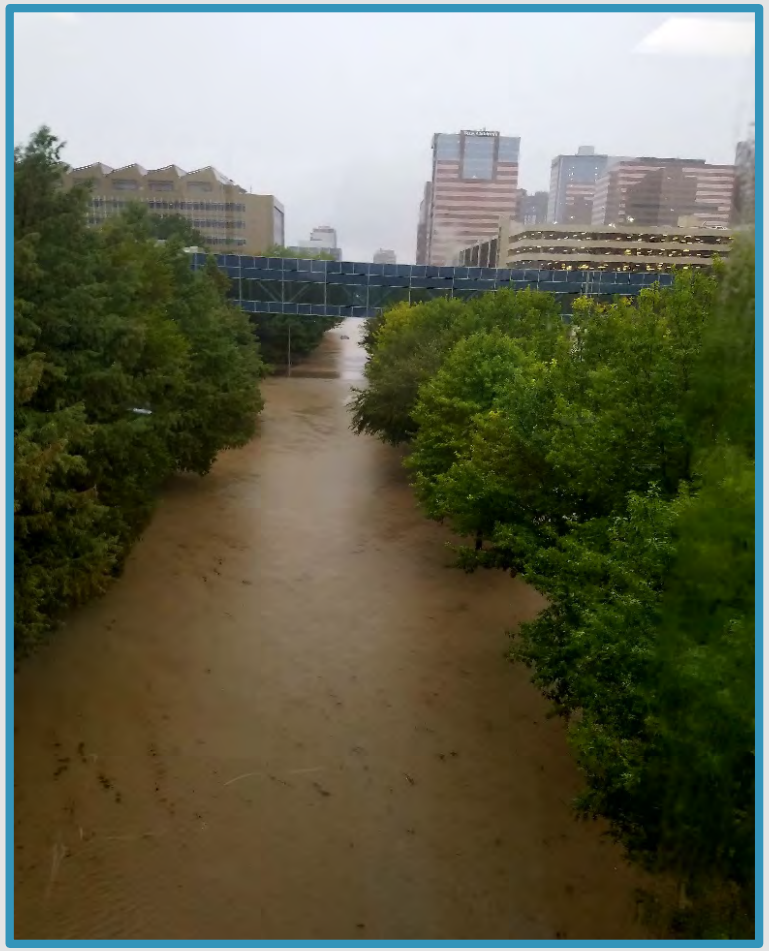
Our Campus


THE UNIVERSITY OF TEXAS
MD ANDERSON CANCER CENTER
Houston, TX



Our Buildings

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Our Leadership (Incident Command)

Our People

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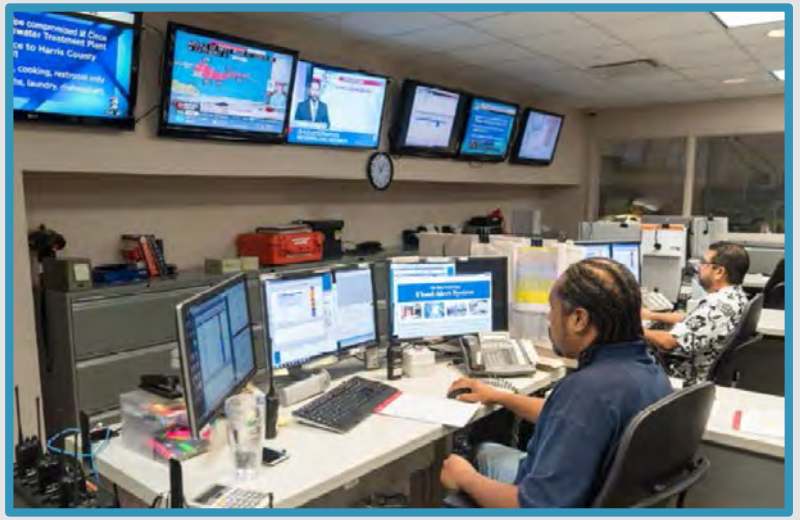
Our People



After the Rain

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We Have Never Done This Before

- We received help from our peers at UT Southwestern and several other organizations – healthcare providers
- Set up day care and adult care for our staff
- Agreement with Lyft to help employees get to work
- Shuttle buses sent to outlying locations
- Employee volunteers came in to help fill in the gaps

What We Learned

- Using the incident command system is key to an effective response
- Automating more of our floodgates will allow us to spend time in other areas
- High water vehicles are useful
- Having enough food is important but so is having enough cooks
- If you have a complicated system, clear communications are critical and not always easy
- Storm sewer back pressure evaluation

Why Do We Do What We Do?

Hurricane Harvey
MD Anderson Ride-Out and Recovery

530+ inpatients

1,000+ employees on site for Ride-Out

2,000+ employees on site for Recovery

35% EMPLOYEES AFFECTED by Hurricane Harvey (estimated)

120+ clinical volunteers from other organizations

251 blood donors

7,000+ meals served per day during Ride-Out

1,994 facilities reports to 3-5000

79 flood gates deployed

Hours spent to prepare to keep our patients, our people and our facilities safe: Too many to count!

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Impact on the Insurance Market

$130 Billion Insured Loses to the Catastrophe Market

- Hurricane **H**arvey
- Hurricane **I**rma
- Hurricane **M**aria
- California Wild Fires
- California Mudslides
- Mexico Earthquakes

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Pearls of Wisdom

- Mitigation Works
- Coordination with Local Partners is Essential
- Drill, Drill, Drill
- Effective Incident Command is Critical
- High Water Vehicles are Essential
- Pre-negotiated Contracts Eliminate Last Minute Procurement Issues
- You Need A Little Help From Your Friends
- Expect the Unexpected

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Shameless Plug

The 2018 Higher Education Risk Management Conference will be held from March 25th through March 28th, 2018 at the Hyatt Lost Pines Resort in Lost Pines, Texas.

We understand the many challenges that are faced by risk management professionals, and this conference enables us to offer timely information to help prepare for any adverse events impacting our universities, employees, students, patients, visitors, and surrounding communities.

This conference offers comprehensive educational opportunities for professionals working in the areas of risk finance and insurance, compliance, information security, environmental health and safety, emergency management, legal affairs, law enforcement, international travel, human resources, workers' compensation, construction, and much more. Anyone involved in the risk management process will benefit from this conference and is welcome to attend.

http://www.cvent.com/d/9tqzkk

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University of Houston

The University of Texas MD Anderson Cancer Center

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