



# University of Houston

A Tale of Multiple Hurricanes at the  
University of Houston

## UH Campus

- Central Campus:
  - 14.5 Million Square Feet
  - 160+ Buildings
  - First responders all live within the impact zone
- Student housing results in students and staff riding out the storm on campus
- Bray's Bayou (major Houston floodway) literally feet from the edge of campus
- Urban Campus
- 40,000+ Students
- Flat topography, very little positive slope for drainage

“An Ounce of Prevention Equals a Pound of Cure” - Benjamin Franklin

- National Incident Management System (NIMS)
- UH Emergency Management Plan
- Hurricane Planning Guide
- Ride Out Team Guide

***Standing on the shoulders of giants...***

# Tropical Storm Allison

*AVC/AVP* Dave Irvin

# University of Houston

## Tropical Storm Allison Area wide

- Storm formed only 60 Miles off TX Coast
  - Struck Houston 4 times from June 1-15, 2001
  - Total of 42" Rain with 10" Rain in the first 3 hours
  - TX Medical Center, Downtown Theater District Devastated
  - 90,000 Research Animals, 25 Years Research Destroyed
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- Deadliest Tropical Storm in US History
  - \$8.5B in Damage, 41 Dead
  - 30,000 Homeless; 70,000 Homes Damaged



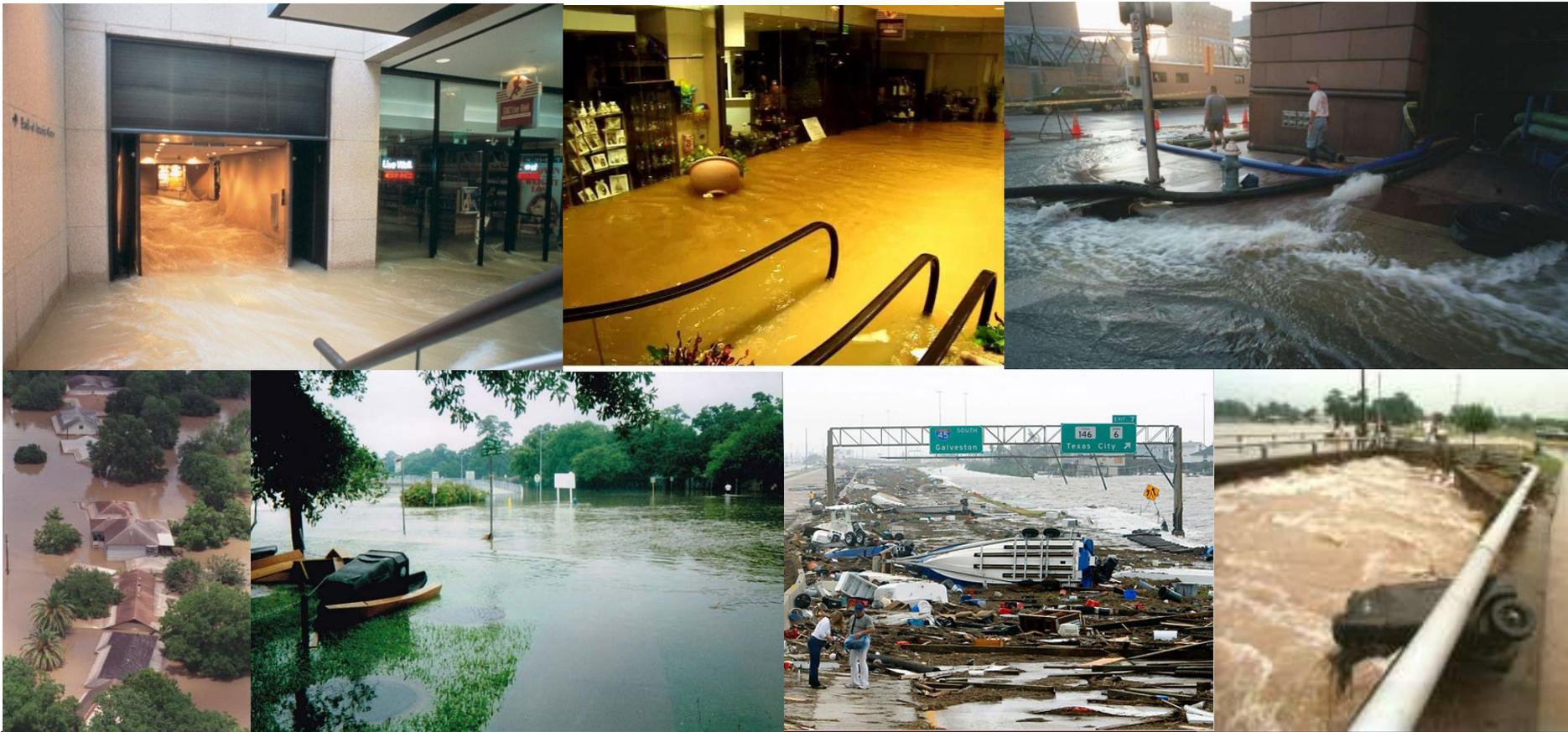
## Tropical Storm Allison UH System Impact

- Storm Caused Extensive Damage on all UH Campuses
- UH Downtown, the Main Campus particularly hard hit
- Eye of the Storm Passed over Main UH Campus 3 times
- Estimated 32 Trillion Gallons Water Dumped on UH Campuses
- Water Damage from Bayous Flooding and from Roof Failures- 80% of Roofs Failed
- Minimum 12' Water in Majority of UH Main Campus Buildings



## Tropical Storm Allison- Main UH Campus Impact

- \$250+ M Damage to 115 Buildings and 85% of Main Campus
- 18 of 20 Main Feeders, 75% of Major HVAC Equipment Destroyed
- Major Campus IT Data and Communications Center Destroyed
- 3 Levels of Law Library Flooded- 500,000 Books and Rare Manuscripts Destroyed
- Rare Artworks, 3 Pipe Organ, Priceless Musical Instruments Destroyed



## Tropical Storm Allison- UH Main Campus Impact/Recovery

- Priority: Life and Safety- No injury to students, faculty or staff
  - loss of Research Animals even though 2 levels below grade with no power
- **UH Business Plan required the University be Operational within 2 weeks**
  - Instruction Became Prime Directive- Getting Trailers on Site became Job One
  - Quickly Triaged Buildings based on 1 week/month, 2-3 months and 8-12 months to restore
  - Relied upon Telecommuting, Satellite Sites, Alumni Offers, On Line Instruction
- Created New Spaces, IT and Communications Infrastructure in 6 Days
  - Created Critical Main Offices and Labs in Arenas, Corridors, Conference Rooms, Library
  - EX: Basketball Courts Became all of the Instructional Labs



## Tropical Storm Allison- Future Remediation

- Lloyd's of London would not Re-Insure UH without a Major Future Remediation Plan
- UH Spent over \$75M initially, \$150M Total on Remediation
  
- Relocated Library, Animal Research and other Critical Functions
- Basements Redesigned with Waterproof Construction and non-Critical Functions
- Redesigned Masterplan Based on Emergency Criteria
  
- Installed Earth berms, Passive and Mechanical Storm Doors around every Building
- Assessed Buildings Value to Overall Mission and Business Continuity
  - All Mission Critical Buildings Received Full Emergency Generator Backup
  - Added Fuel Storage Tanks and Pumps
- Relocated HVAC, IT and Communications Equipment
  - Remote IT Centers Established in 3 Different States
  
- Major Deferred Maintenance Corrections
  - All New HVAC Equipment on most Buildings
  - New Roofs on 75% of Campus

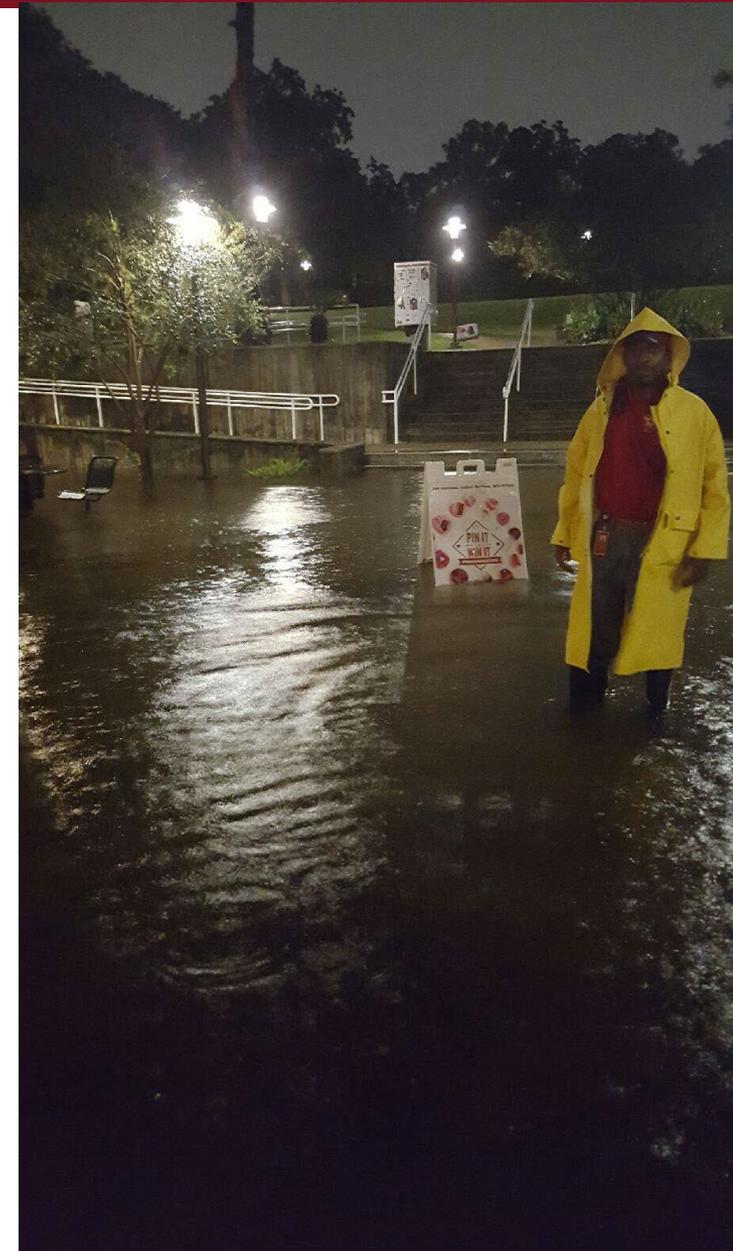
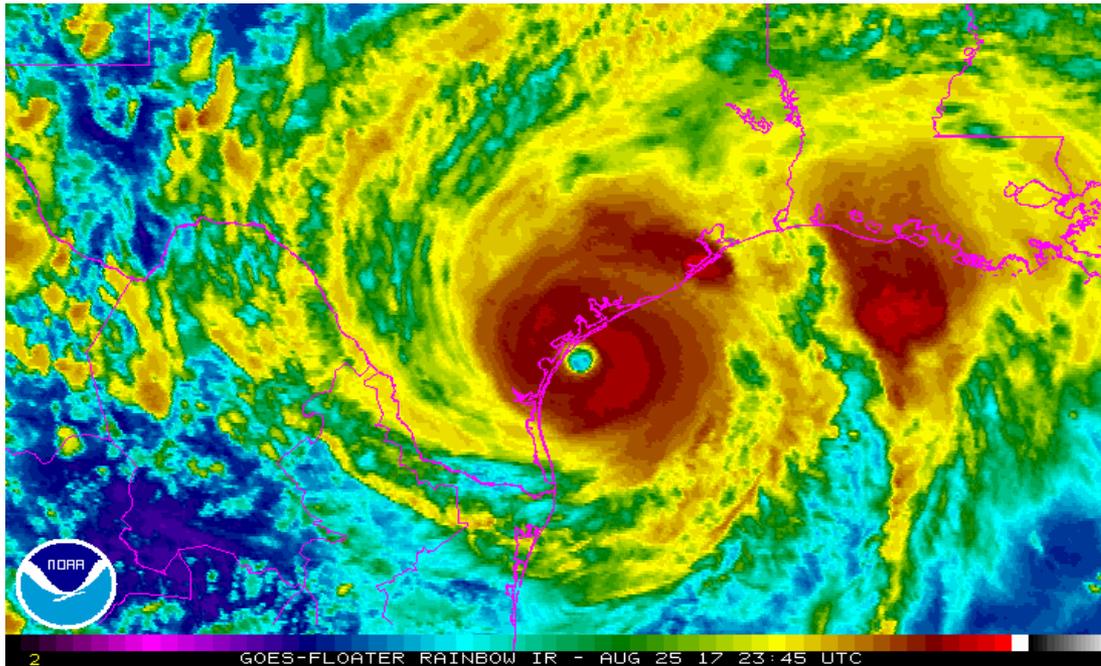


# Hurricane Harvey

*AVC/AVP* David Oliver

# Hurricane Harvey

- Category 4 Hurricane
- Hit August 25, 2017
- Stalled for days over South Texas
- Dropped 50' of rain in the Houston area
- Created a 1000 year flooding event



# Facilities Preparedness

- Preparedness begins long before the storm
  - Facility design standards (i.e. storm doors)
  - Preventive maintenance program (flood gates)
- If key infrastructure is poorly designed, broken or poorly maintained, it will fail you in an emergency
- One = None

# Pre-Storm Preparations

- Review the Plan
- Implement the Plan
- Make necessary adjustments to the plan
- Make new plans as necessary (sometime on the fly)

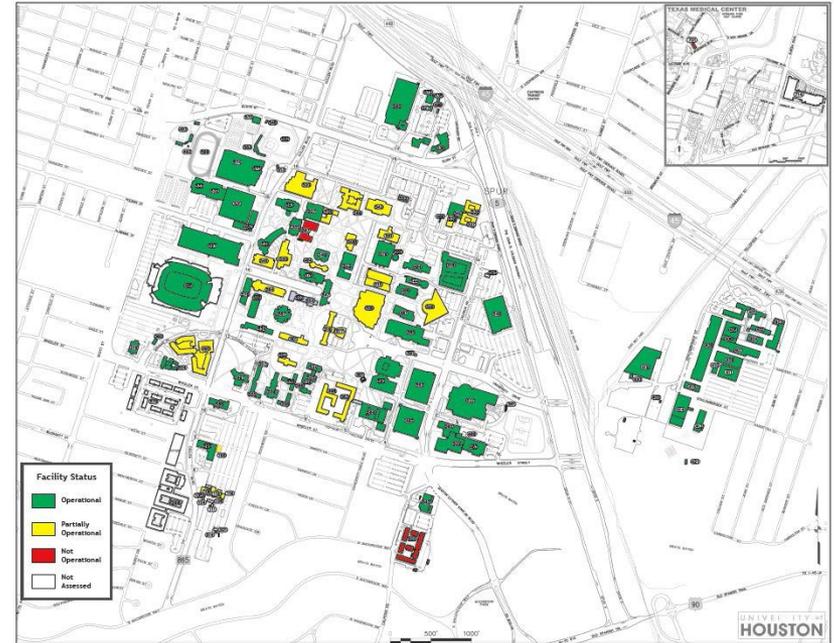
“Plans are worthless, planning is indispensable”  
- Dwight D. Eisenhower

“Plans are only good until first contact with the enemy”  
- attributed to Helmuth Karl Bernhard Graf von Moltke

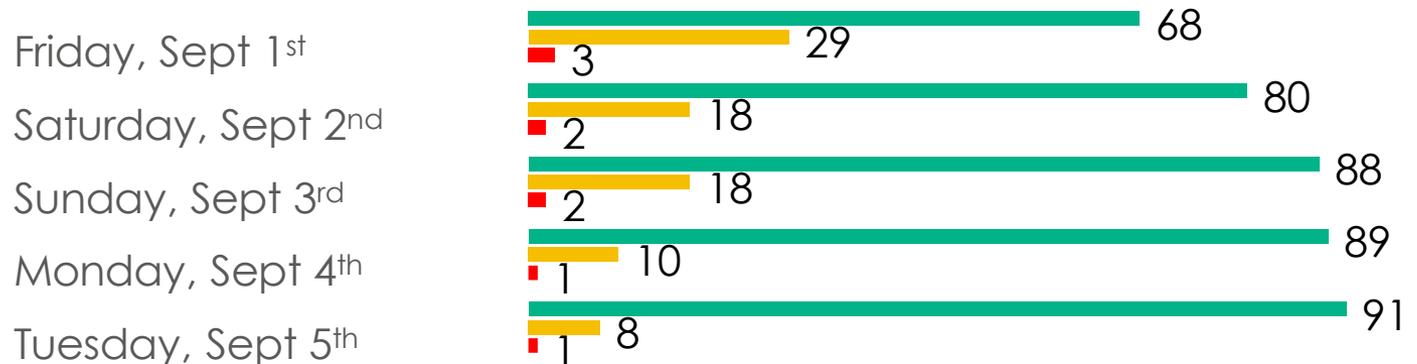
# HURRICANE HARVEY HITS HARD



- **Chancellor committed to opening on 5 September**
  - **Achieved (mostly)**
- **98 % Classroom availability**



■ Ready for occupancy   ■ Some remediation required   ■ Not Ready for Occupancy



# Communications

- Governed by NIMS
- Key decision makers should be in the EOC
- Senior Leaders want, need and expect information
- Facilities Leaders become the one of the most important people at the table

## Hurricane Allison Lessons Learned

- The University will become the Center of Regional Response and Recovery- AND SHOULD BE!
- Business Continuity/ Resumption are IMPERATIVE! Otherwise you won't have funds to recover
- Make sure you know the Emergency Plans for every University Department.
  - You'd be surprised how many automatically assume Facilities will Solve All their Problems (EX: 2001 UH Academic Plan)
  - You'd be surprised how many automatically plan on Facilities Personnel filling Key Roles (EX: TN Active Shooter and Free Speech Plans)
- Enter into as Many Pre-Existing Contracts as Possible
  - FEMA and State Reimbursement Occurs Much Faster with Pre-Emergency Contracts
  - Don't assume any one Contract or Supplier will be Available- Have Duplicates
  - Think of Critical Supplies- Fuel, Generators, Pumps, Trailers
- Use these contracts and procedures as often as possible. Don't wait until there is an emergency
- Make Sure Academic and Research Plans Emphasize On Line, Telecommuting Options
- No Space, Resource or Program is sacred in an Emergency

## Hurricane Allison Lessons Learned

- Press, Politicians, Alumni and Friends of the University will all come forward to help. LET THEM!
- Communications and IT are VITAL- and WILL Fail
  - Redundancy of Cell Companies and Alternate Communications Required.
  - Plan on twice daily Press and Team Briefings- Nothing beats hearing it in person
  - If Possible have Graphics. It allows people to remember the point and Media will demand it.
- **First take care of People- particularly your Facilities Team!**
  - Meals and Praise are Critical and go a long way (ex: Refreshment Carts)
  - Your team will have good ideas- LISTEN, DELEGATE, REWARD
  - Remember your team is also dealing with their Own Personal Emergencies
- **You need to be Front and Center- FULLTIME, ALL THE TIME**



## Hurricane Harvey Lessons Learned

- Be ready for impossible questions from above:
  - When can we open
  - How much damage
  - \$\$\$\$ amounts
- All personnel are essential
  - Custodial, 80% show rate and were vital
  - Planning, reporting gurus
  - Administrative staff, kept everyone organized
- Ride Out Plan anticipated 24 hour event, Harvey lasted 5 days
- Expectations of Ride Out team quickly changed
- Response was heavily impacted by personal situations
- High bar set for recovery (Classes resumed 6 days after all clear)
- I'll take luck over skill any day (campus never lost power!!!!)

# STAFF COMMITMENT

## HARVEY HEROES



UNIVERSITY of  
**HOUSTON**



**Thank You**