

THE UNIVERSITY OF TEXAS MEDICAL BRANCH (UTMB) AT GALVESTON vs. HURRICANE HARVEY



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IDEA
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Lynn Crawford, PE
Bryan Bagley, PE
Affiliated Engineers, Inc.
lcrawford@aeieng.com
bbagley@aeieng.com

Agenda

- Hurricane Ike
- A Three Step Solution
- Hurricane Harvey
- Thermal Storage Operations



Hurricane Ike, September 13, 2008

Water/Storm Surge –

Approximately 17 ft to 18 ft based on the information gathered to date. NOAA



Image courtesy: noaa.gov

Hurricane Ike, September 13, 2008



Image courtesy: noaa.gov

Impact of Ike

- Cost of stabilization: **\$14,000,000**
- Unable to operate hospital: **over 90 Days**
- Lost business revenue: **\$2,000,000/day**
- Cost of evacuation **unknown**
- Underground steam distribution system a **complete loss**
- Over 1 million sf of campus buildings damaged estimated over **1 billion dollars in damages**
- Lost research materials **priceless**

A Three Step Solution

- Convert most buildings to heating hot water
- Distribute steam overhead to research buildings



- New elevated East Plant

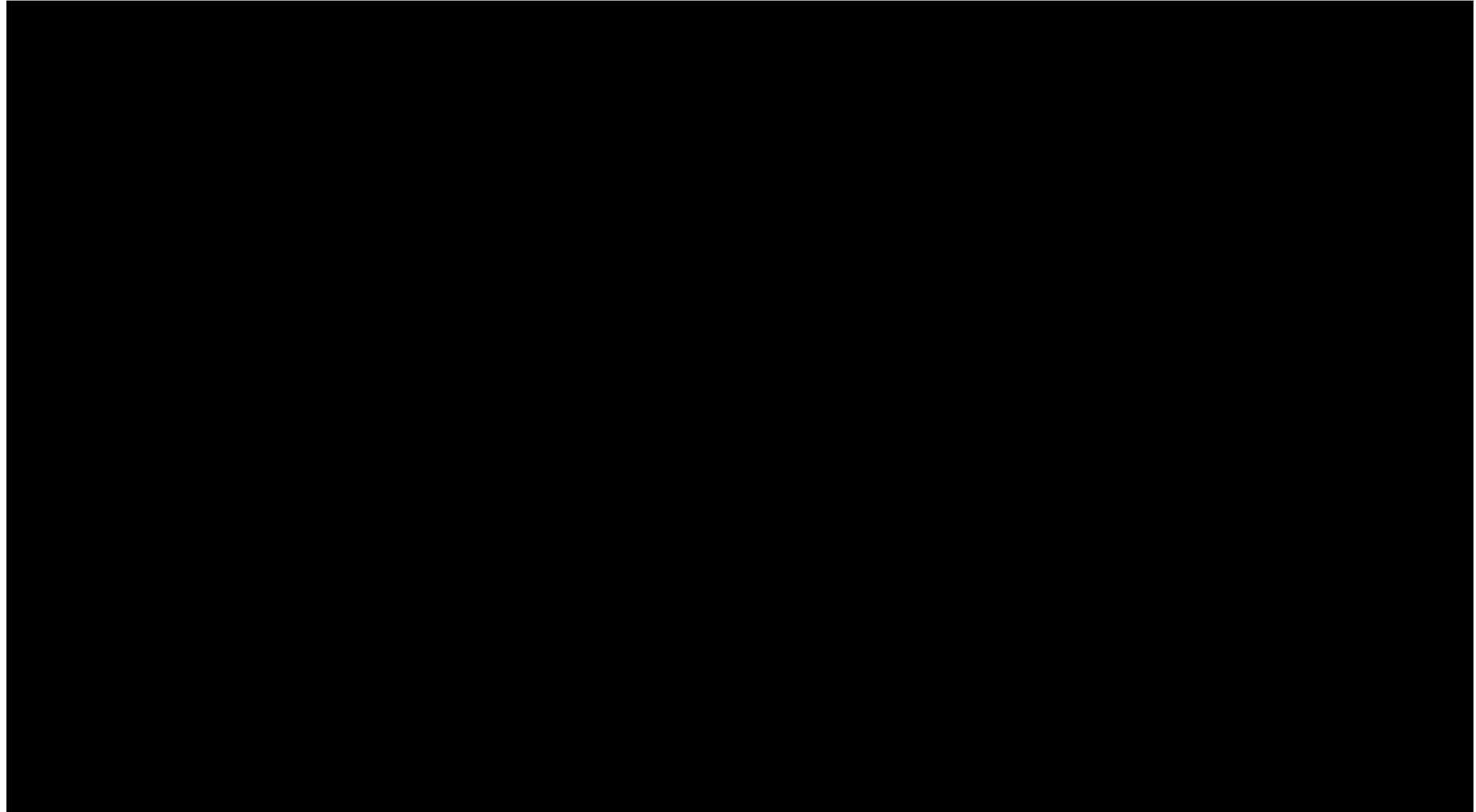


- New floodwall protects West Plant

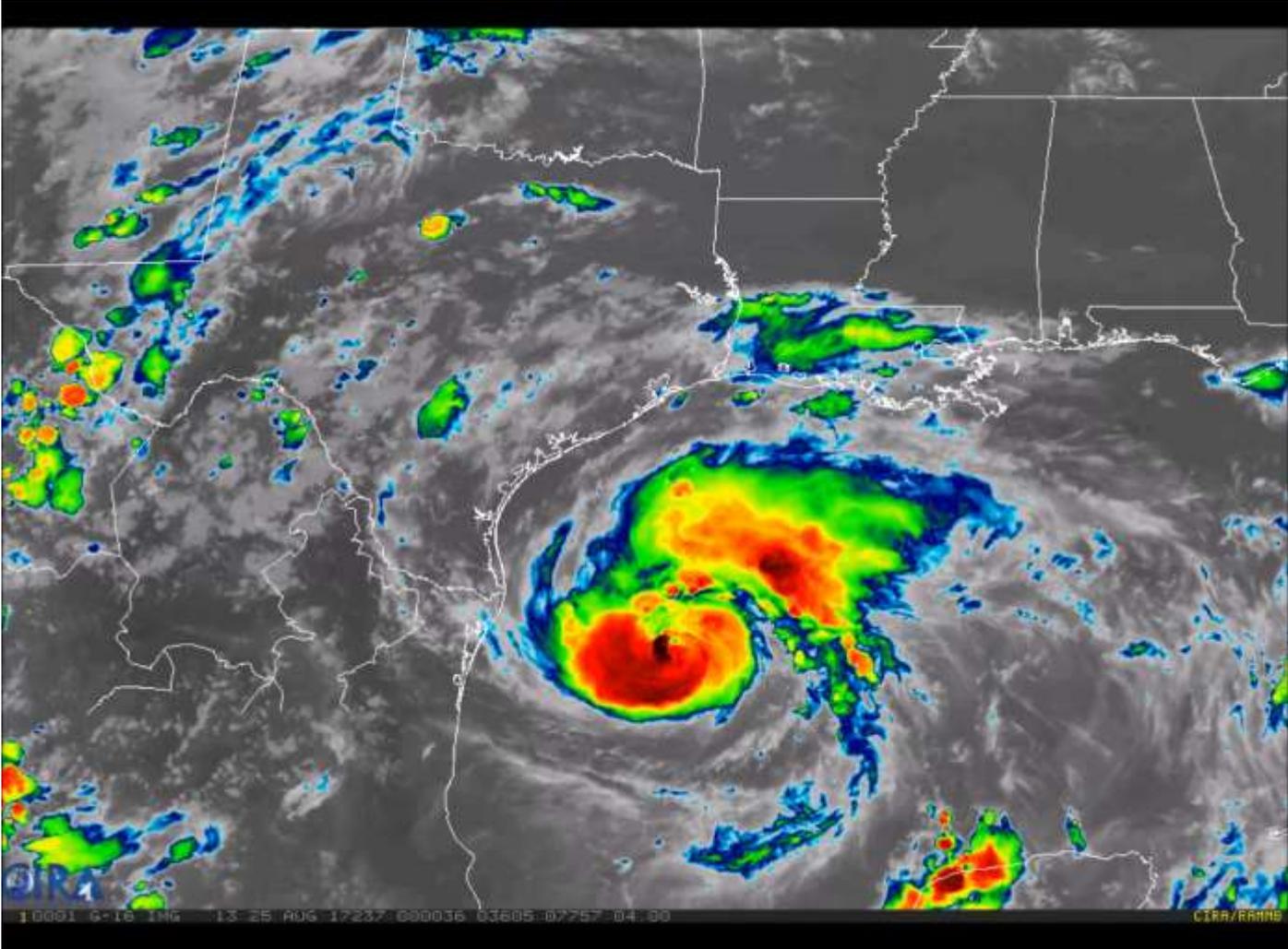


- 15 mW of on-site CHP

Ike Recovery - An Approach to Resilience



The Next Storm – Hurricane Harvey



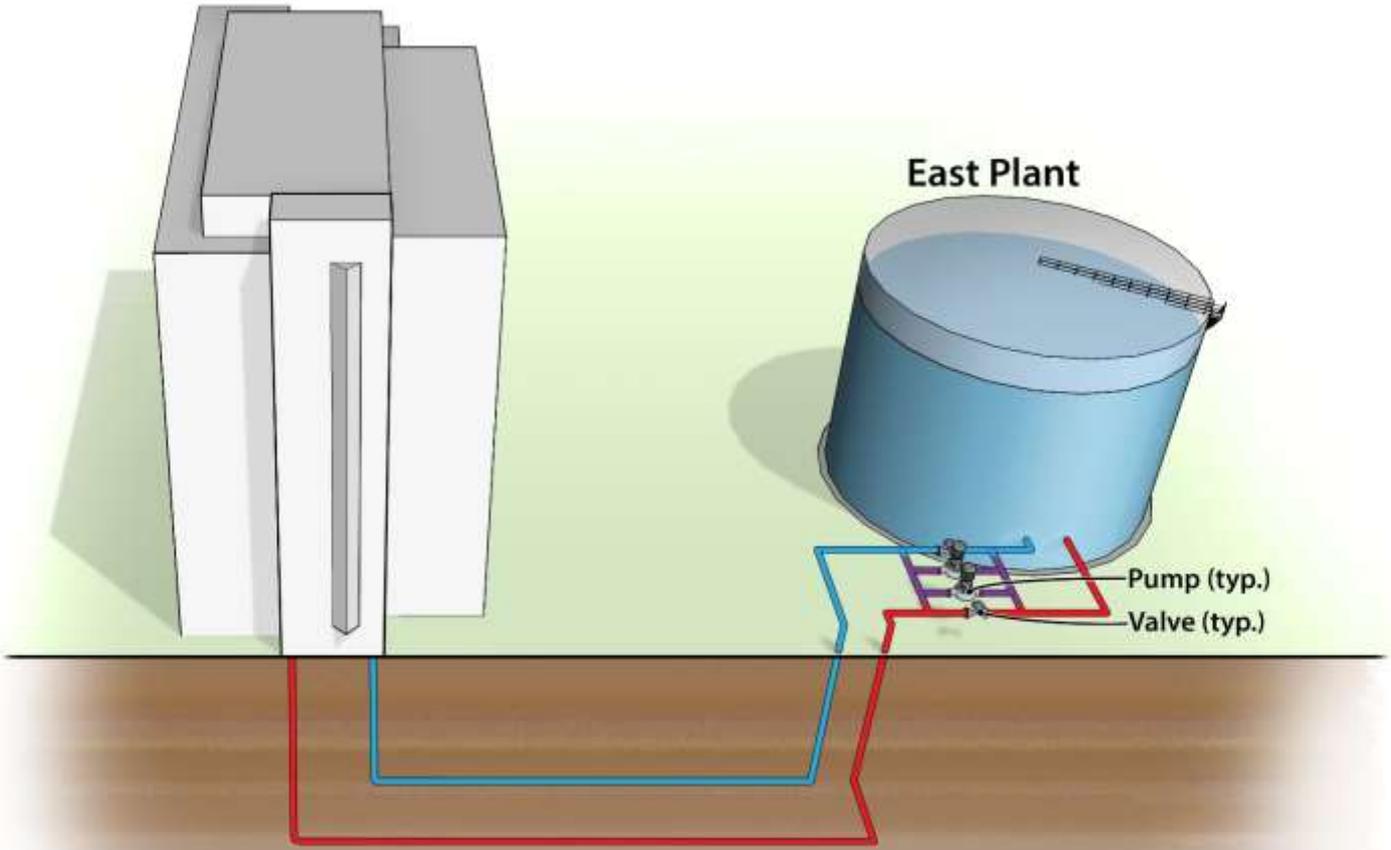
Hurricane Harvey vs. UTMB Galveston

- During Harvey and subsequently the local utility has lost feeders and had voltage dips, *no problem*
 - The East and West CHP systems have decoupled from the grid without interruption and operated in “Island Mode”
- Harvey rainfall caused minor flooding, *no problem*
 - For the new overhead steam and underground heating hot water distribution systems “It was just another day at the office”.
 - As a precaution, the gates in the new floodwall surrounding the older West Plant were secured.
- The two thermal storage tanks have supplied back-up cooling and cooling tower make-up water.

Single Thermal Storage Tank Operation

- Buildings are taller than the tanks.
- Pressure sustaining valves control system pressure to maintain 5 psi at the building high points.
- Water is pumped out of the tanks into the system.
- Flow in = flow out so tank level is not directly controlled.

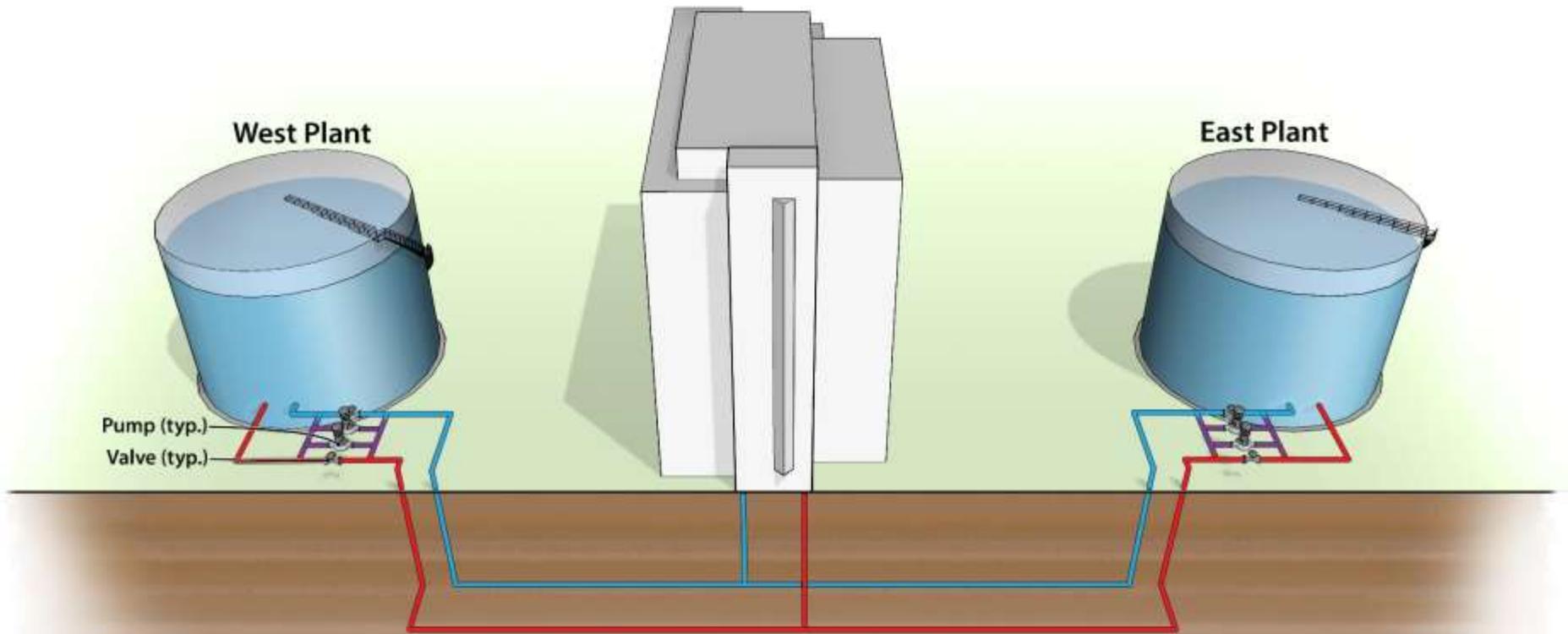
Single Thermal Storage Tank Operation



Dual Thermal Storage Tank Operation

- Buildings are taller than the tanks.
- Pressure sustaining valves control system pressure to maintain 5 psi at the building high points.
- Water is pumped out of the tanks into the system.
- Water can flow from one tank to the other so tank level must be controlled.

Dual Thermal Storage Tank Operation



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QUESTIONS