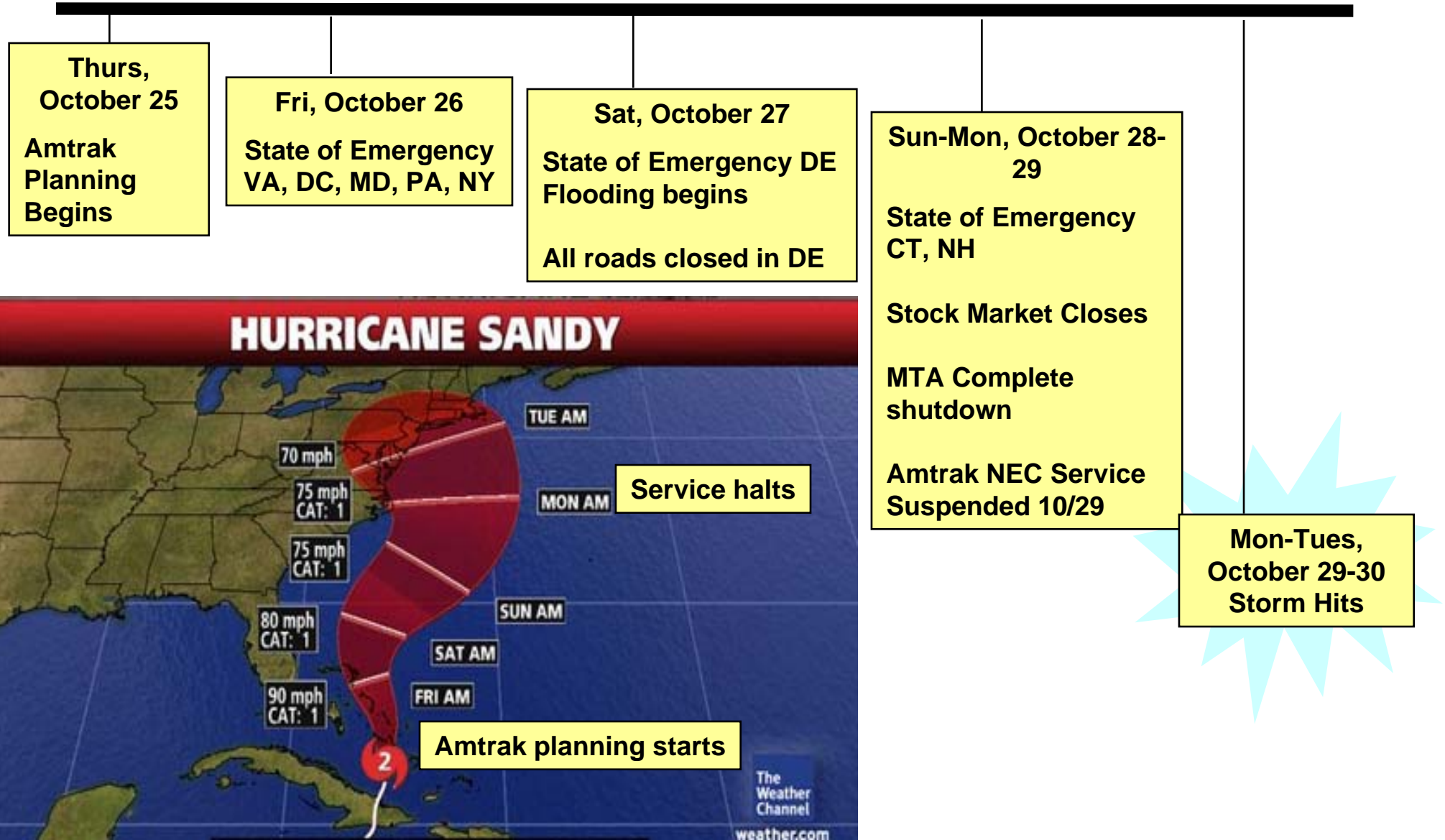


A satellite image of Hurricane Sandy, showing its characteristic eye and spiral cloud bands. The hurricane is positioned over the Eastern United States, with state boundaries visible as thin white lines. The landmass is shown in shades of gray, and the surrounding ocean is dark blue. A dark blue rectangular box is overlaid on the center of the image, containing the text "Hurricane Sandy" in white, italicized font.

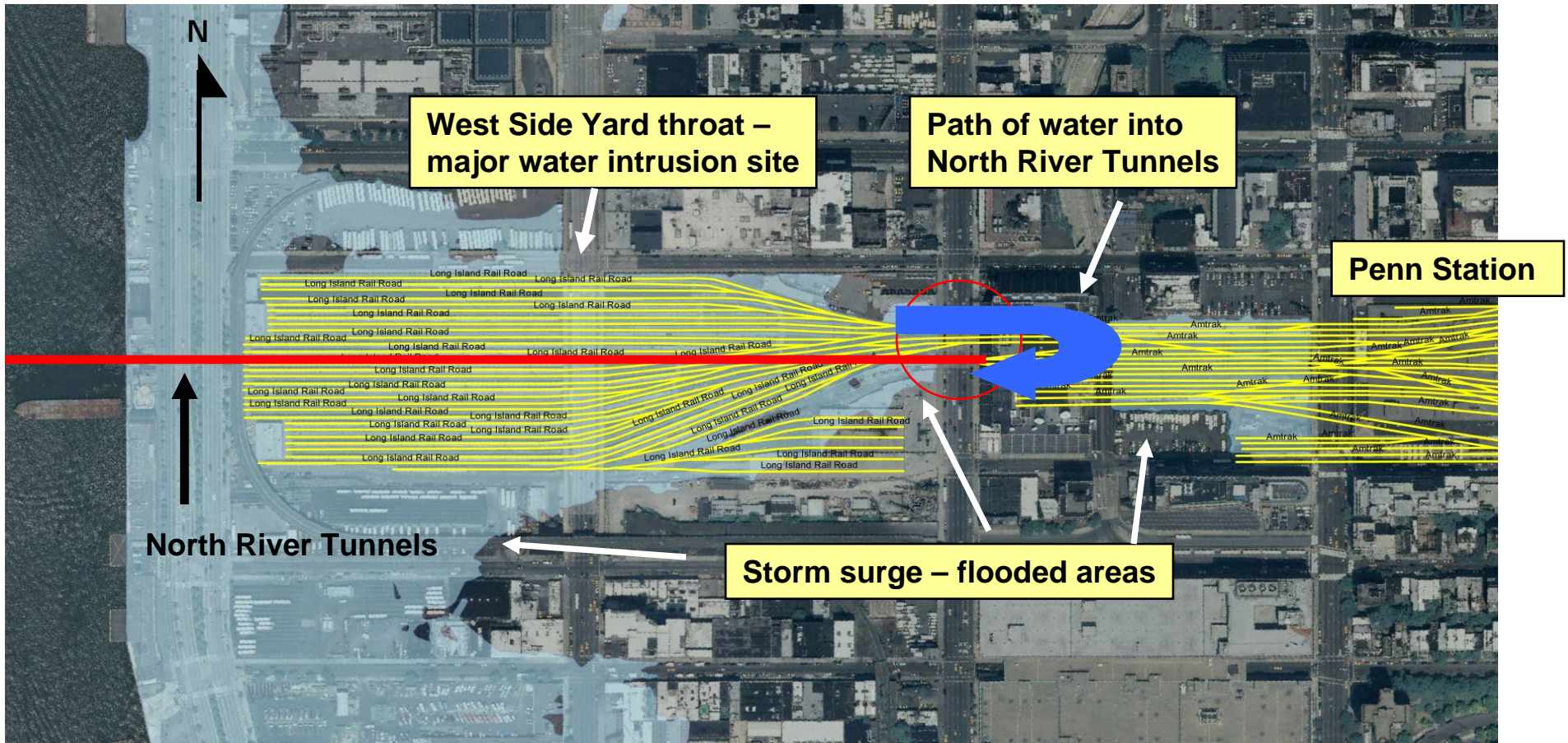
# *Hurricane Sandy*

# Hurricane Sandy Timeline





# Storm surge – inundation – LIRR West Side Yard

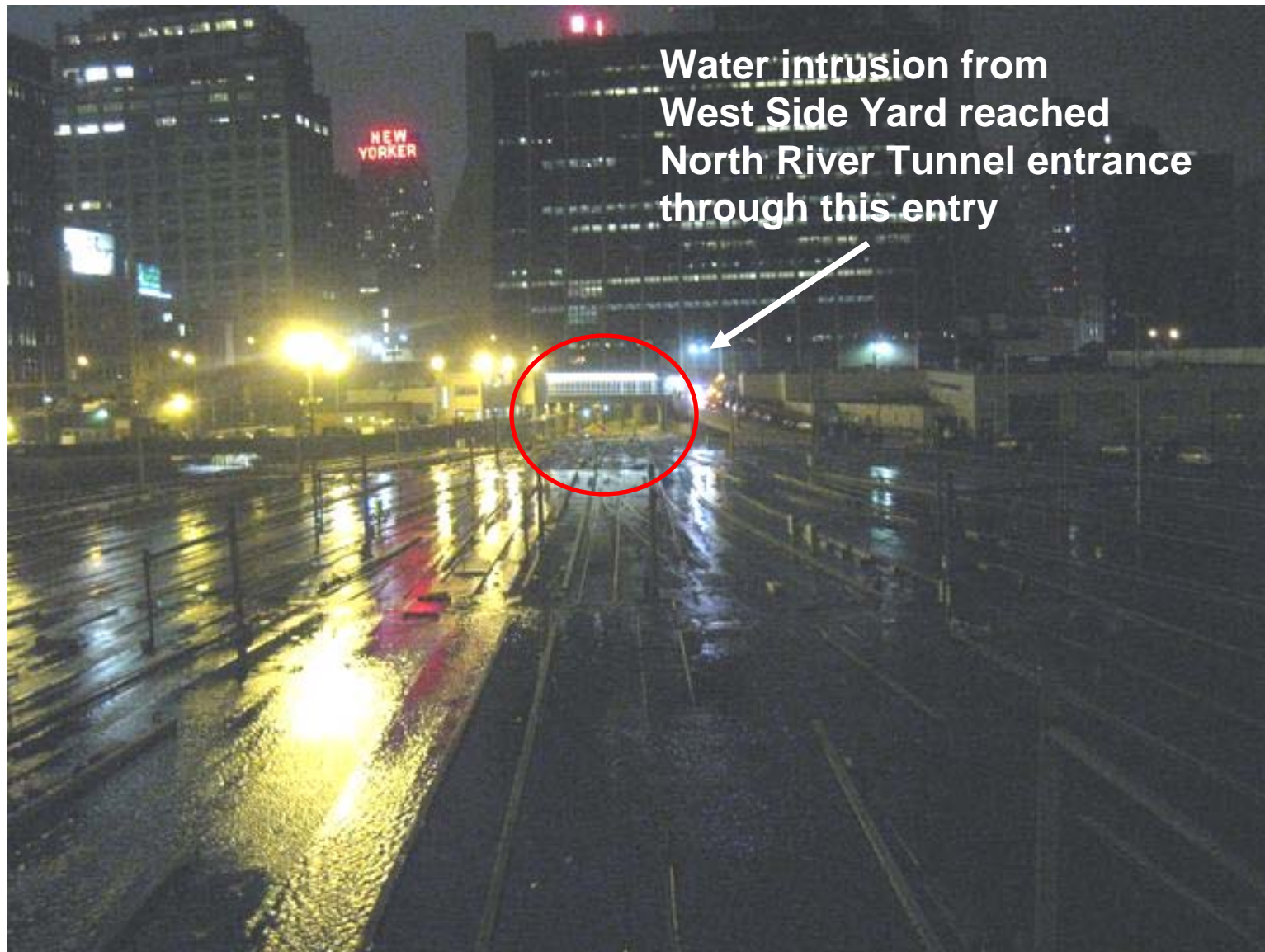


- Both North River tunnels flooded
- 2 of the 4 East River tubes flooded (Long Island Railroad tubes did not)
  - Connection at Harold Interlocking in Queens allowed Amtrak trains to enter and leave Penn Station via LIRR tubes



# Amtrak Flooding West Side Yard Throat

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# Water Source That Flooded North River Tunnels

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Water came down the West Yard Tracks above to the throat and around into the tunnels.



# East River Tunnels Under Water



**Standpipe system installed as part of Fire and Life Safety Program – materially aided pumping and recovery effort**

**Estimated 3.25 Million Gallons of Water**

# Kearny Electrical Substation 41 Flooding



Limited traffic between Newark and NYC due to constrained power availability



# 80 Trees Damaged on the NEC

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# Recovery and Response Force Summary

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## Response Force

- 507 Communications & Signal employees NEC
- 910 Track employees NEC
- 455 Bridges and Buildings employees NEC
- 405 Electric Traction employees NEC
- Contract Services
  - Hulcher Railroad Services
  - Mobile Dredging
  - Clean Harbors
  - Moran Environmental
  - Asplundh Tree Removal Services
  - ARS Tree Removal Services
  - DBI Water Truck for rail cleaning
  - Bombardier Aqua Train (NJT Riverline South Loan)
  - Machinery Services
  - Rapid Pump
- Six Pumps Continually Pumping (East River Tunnel/North River Tunnel)
- 24,000 feet of Portable Pipe / Stand Pipe for pumping

## Recovery Work

- 80 Trees Removed
- 15 Locations of Catenary Repairs
- 4 Tunnels Pumped Dry – 13.6 Million Gallons of Water
- 3 Tunnels Required Signal Repairs
- 2,353 Miles of Track Patrolled
- Substation 41 (Kearny) Repairs
- Lost 60 Cycle electric sources – Generators Provided
- 2 Washouts
- 1 Debris Slide – 4 feet above rail
- Interlocking Restoration
  - Fair and Ham (New York Division) - Trenton
  - Orms (New England Division) - Providence
  - Paul (Mid Atlantic Division) - Baltimore

# Previous investment mitigated damage and aided recovery



- Recovery Act funding and annual capital appropriations supported extensive investment in the 2005-2011 timeframe
  - Major improvements to tunnel fire and life safety equipment
  - New ventilation systems
  - Tunnel access improvements
- Over 230 miles of tree removal and clearing since 2008
- Culvert and ditching clearance prevented water accumulation and washouts along roadbed

**These investments minimized damage and speeded system recovery**



# Conclusion

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- **Turn Around Service Washington to Newark – October 31**
- **Tunnel Restoration:**
  - South Tube Restored - November 1
  - East River Tunnel Line 2 Restored – November 10
  - East River Tunnel Line 1 Restored – November 11
  - North Tube Restored – November 12
- **Substation Restoration:**
  - Kearny Substation 41 Restored – November 16