

# HARVEY RECOVERY & FLOOD RESILIENCE

MARCUS & MILLICHAP / IPA HOUSTON  
MULTIFAMILY FORUM 2018

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# Flood Resilience in Houston



1

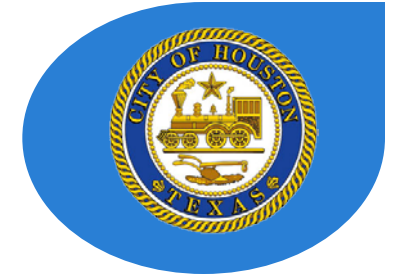
Increase channel conveyance & detention through large-scale, transformative projects

2

Address local urban drainage challenges

3

Advance flood management approaches through innovation



# Hurricane Harvey Summary

**\$125 B** in Harvey damages statewide according to National Hurricane Center



Bayou Flooding

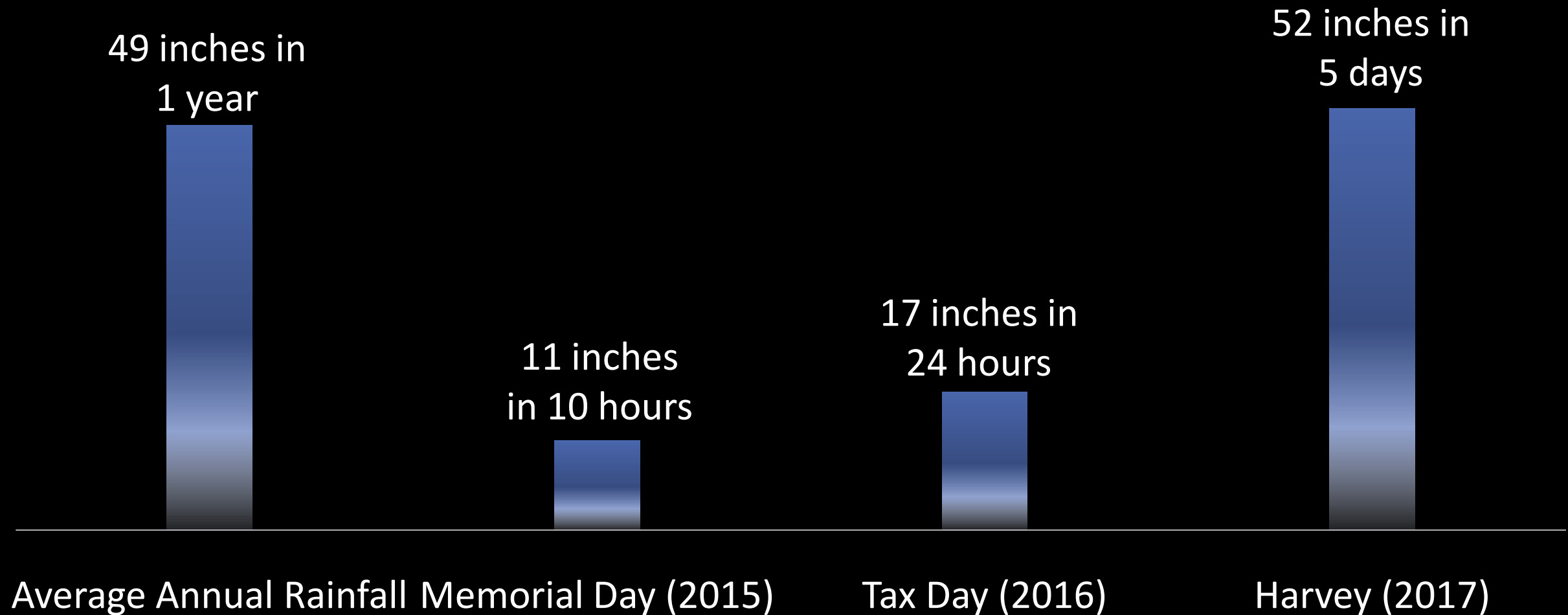


Reservoir Releases



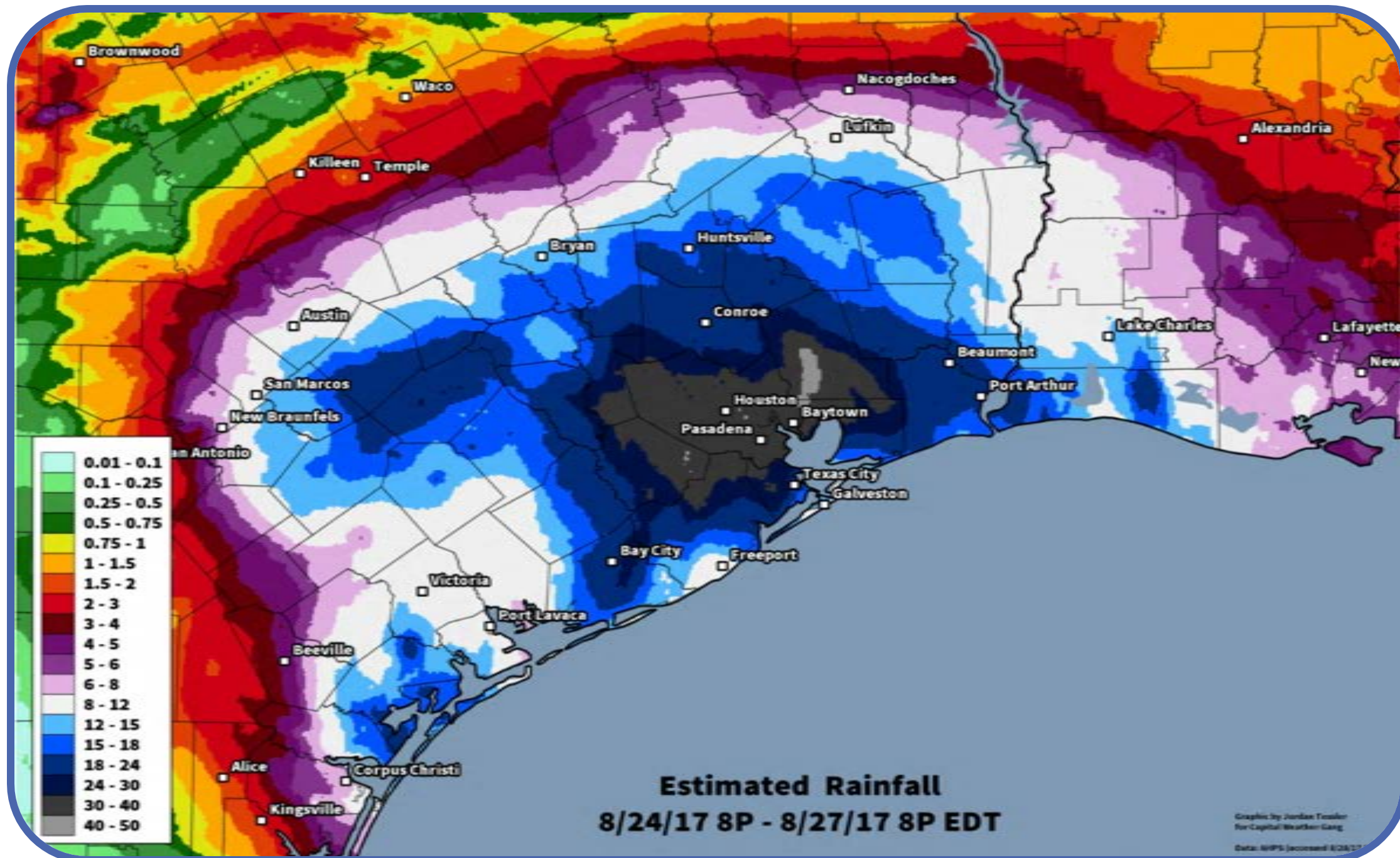
Highway Inundation – U.S. 59

# Comparing Rainfall Amounts



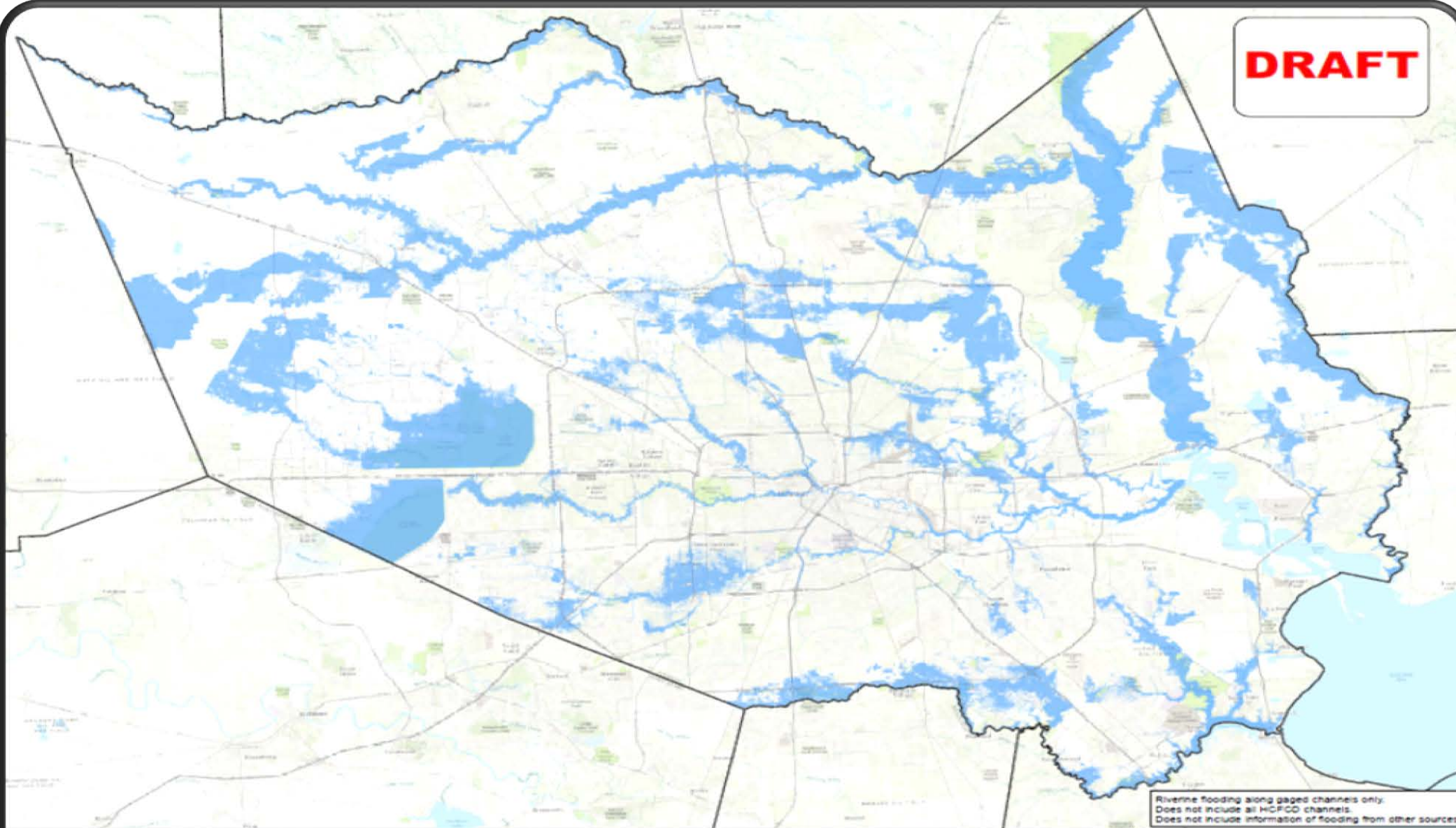


# Harvey Rainfall





**DRAFT**



## Harvey Estimated Maximum Riverine Inundation

Estimates include data through August 31 at 7:00 AM

Estimates include data through August 31 at 7:00 AM

# Harvey Impacts



52

INCHES  
OF RAIN



41,500

SQ. MILES  
IMPACTED  
ACROSS TEXAS



365,000  
DAMAGED HOMES

135,584



APPROVED APPLICATIONS



37,000  
IN SHELTERS



8500+

CALLS  
AUGUST 2017

18%

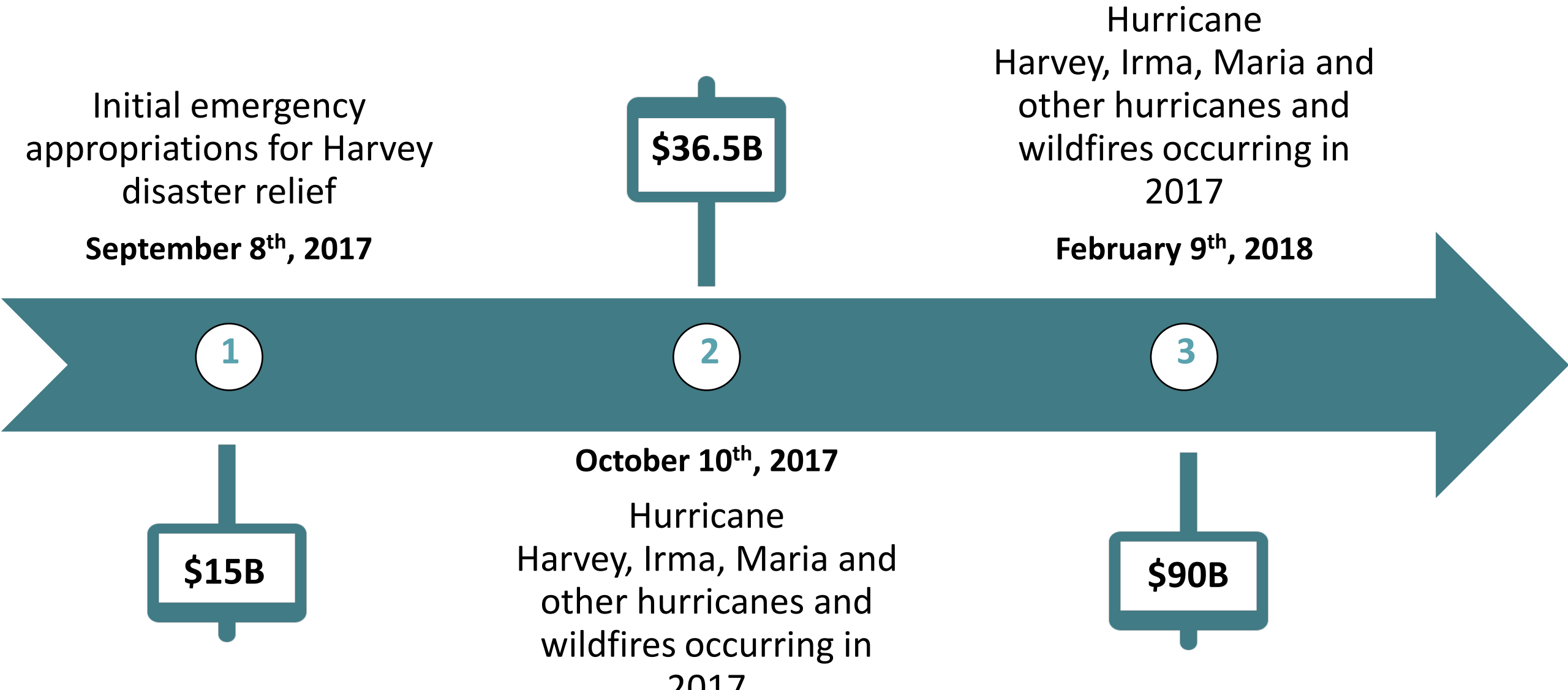


COUNTY RESIDENTS  
SUFFERING SERIOUS  
PSYCHOLOGICAL  
DISTRESS POST  
HARVEY<sup>1</sup>



256,845  
VOLUNTEER  
HOURS

# Federal Disaster Relief



Initial emergency appropriations for Harvey disaster relief

September 8<sup>th</sup>, 2017

1

\$15B

\$36.5B

2

October 10<sup>th</sup>, 2017

Hurricane Harvey, Irma, Maria and other hurricanes and wildfires occurring in 2017

3

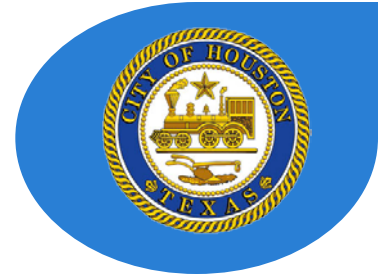
\$90B

Hurricane Harvey, Irma, Maria and other hurricanes and wildfires occurring in 2017

February 9<sup>th</sup>, 2018



# Recovery & Resilience Funding Sources



## Community Development Block Grant Disaster Recovery (CDBG-DR)

Provide assistance to cities, counties, and states to recover from declared disasters, especially in low income areas.

\* \$4.8B allocation for Texas  
\$1.15B allocation for Houston

# Recovery & Resilience Funding Sources



FEMA

## 404 – HMGP: Hazard Mitigation Grant Program

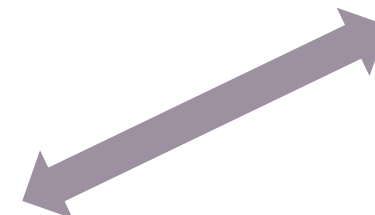
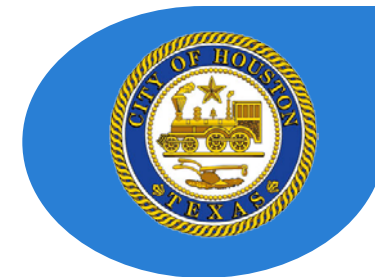
- Provide protection, reduction, and/or elimination of future risk to lives and property from natural hazards
- Disaster damaged and non-damaged facilities

## 406 – PA: Public Assistance Program

- Provide mitigation measures in conjunction with the repair of the disaster-damaged facilities.
- Damaged facilities only

## 428 – PAAP: Public Assistance Alternative Procedures

- Single “lump-sum” provided for hazard mitigation projects. It is intended to reduce costs and provide disaster recovery funds sooner, based on estimates for total project costs.
- Disaster damaged and non-damaged facilities



Leveraging  
Funding  
Sources



# Harvey Recovery Team

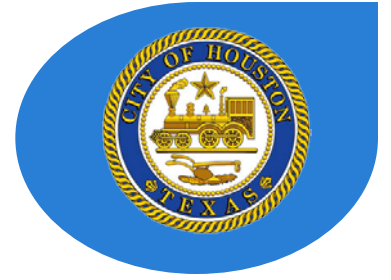


Housing

Infrastructure

Resilience

# Housing



## Master Program Manager

- Case Manager
- Construction Manager

- Direct Lease - Rental payments for up to 18 months post-Harvey
- Direct Assistance for Limited Home Repair - \$17K-\$60K
- Mobile Home Units

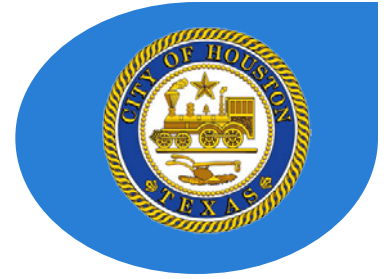
# Infrastructure

Where are we now?

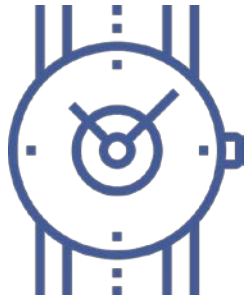




# Regional Flood Mitigation Action Plan



regional flood  
mitigation  
blueprint



prioritized &  
timely

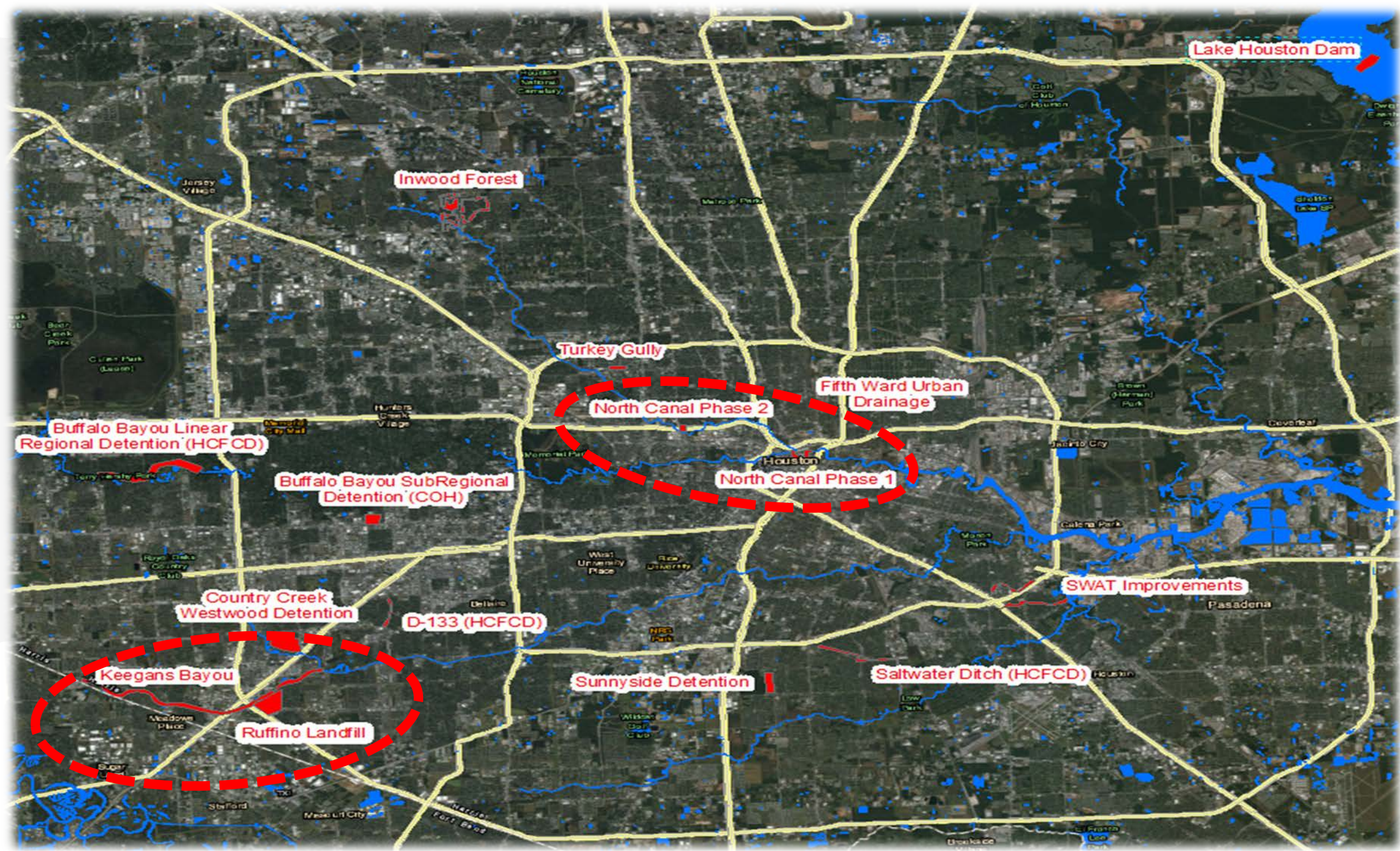


links  
large-scale  
projects to  
neighborhood  
drainage projects



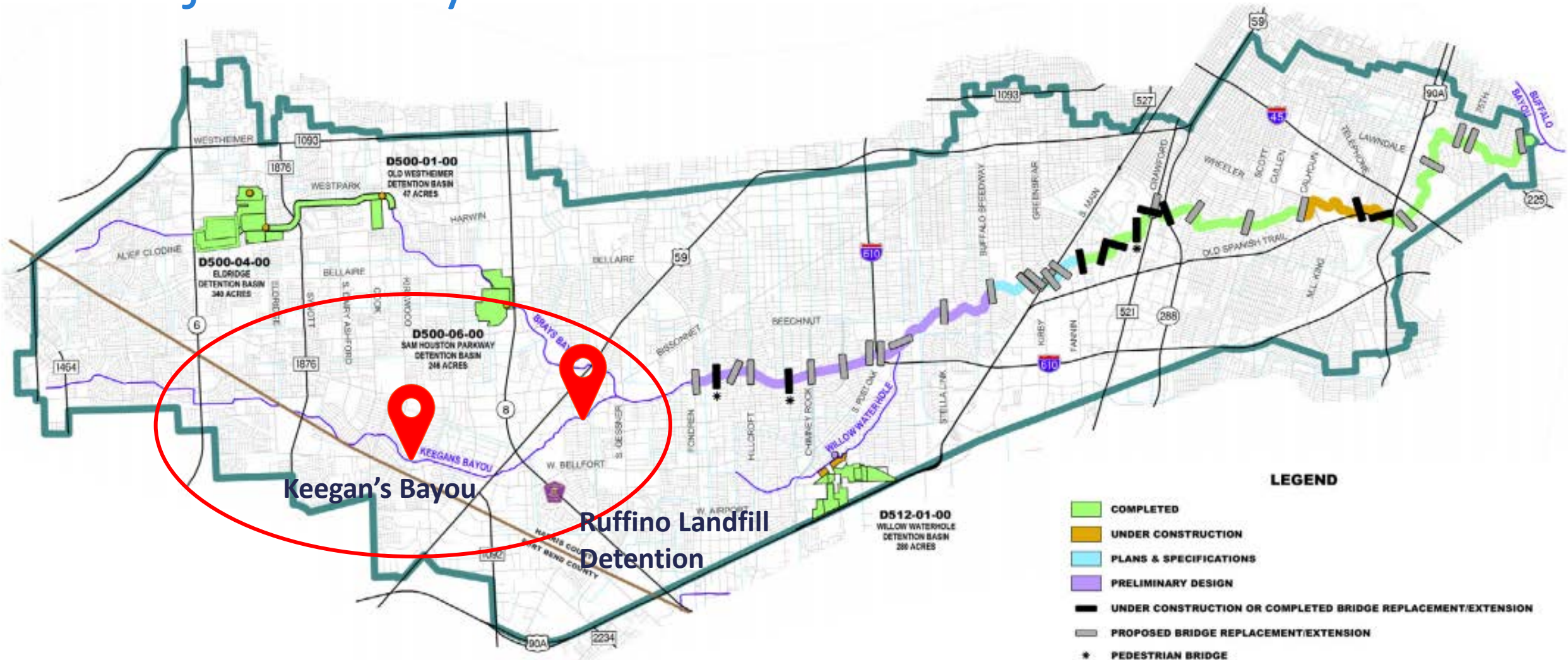
backed up by  
long-term  
funding  
strategy



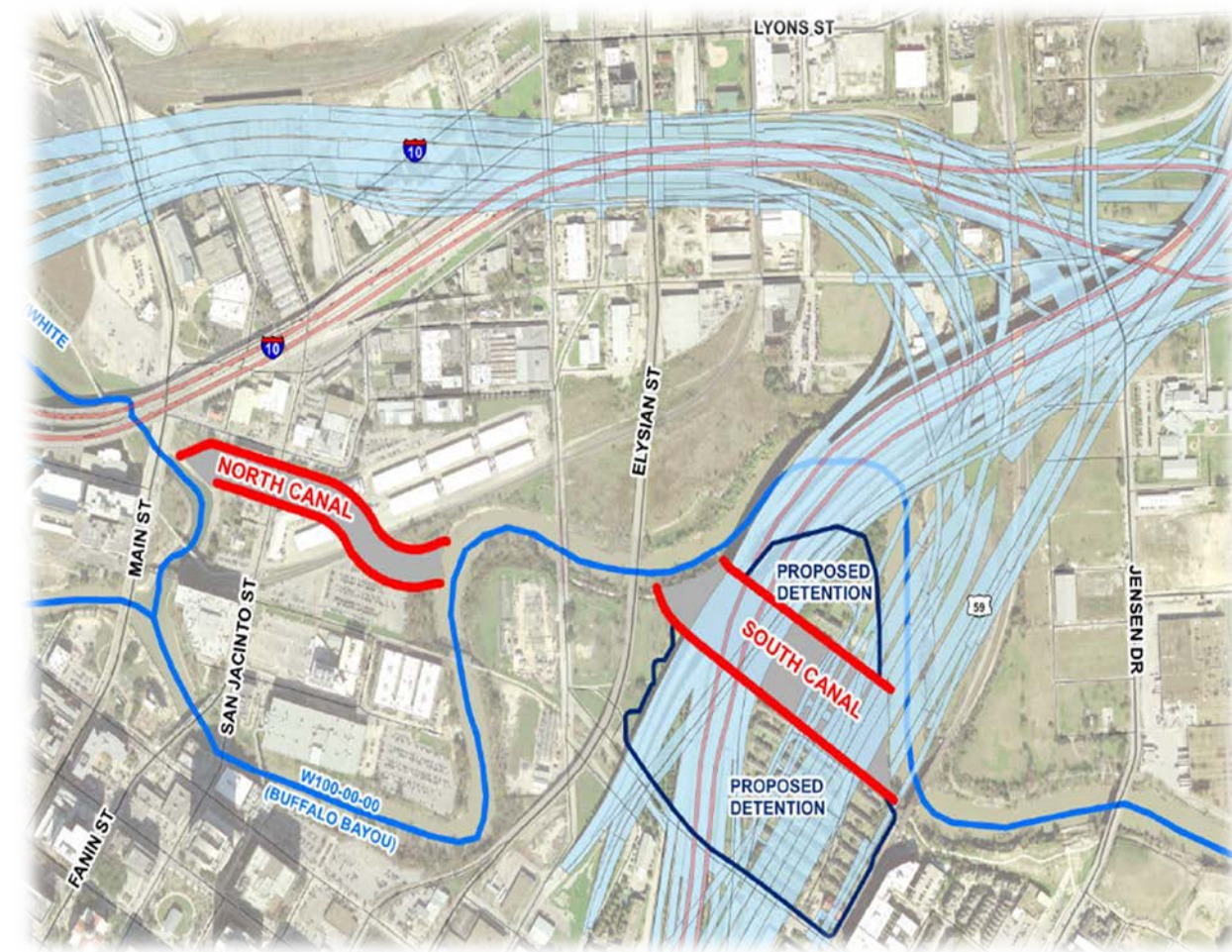




# Project Brays

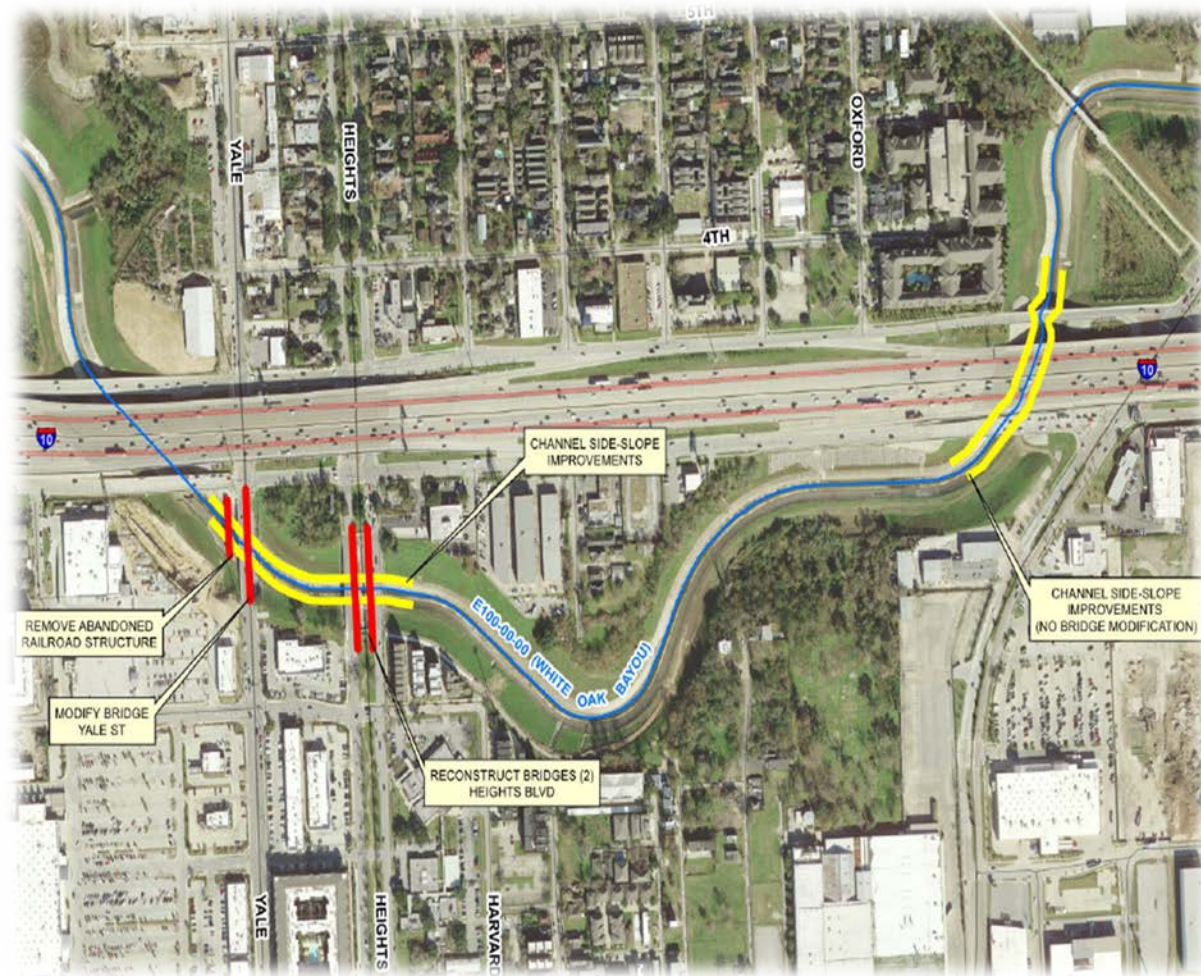






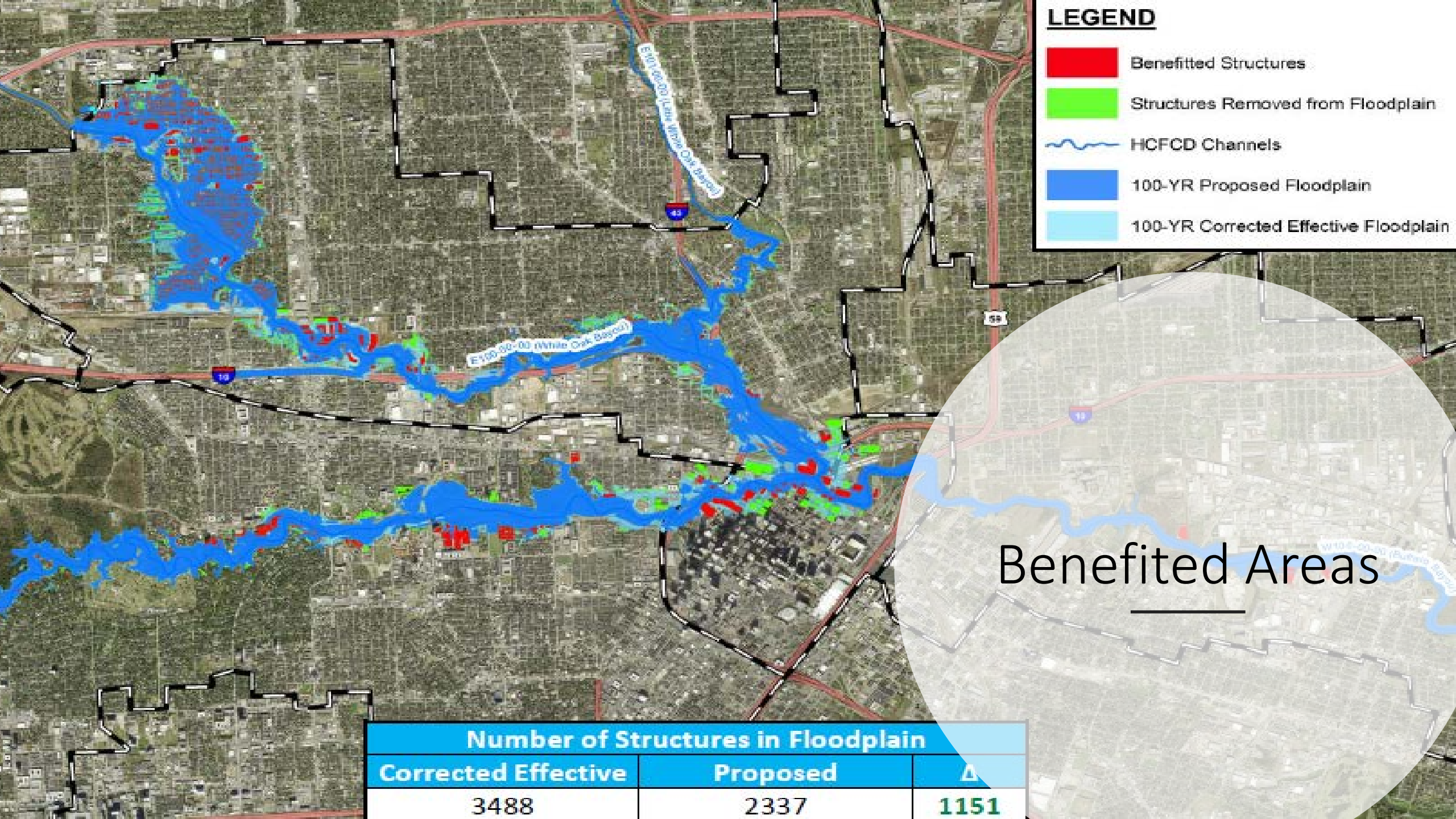
Phase 1: Downtown

Phase 2: Heights & Yale



North Canal





**LEGEND**

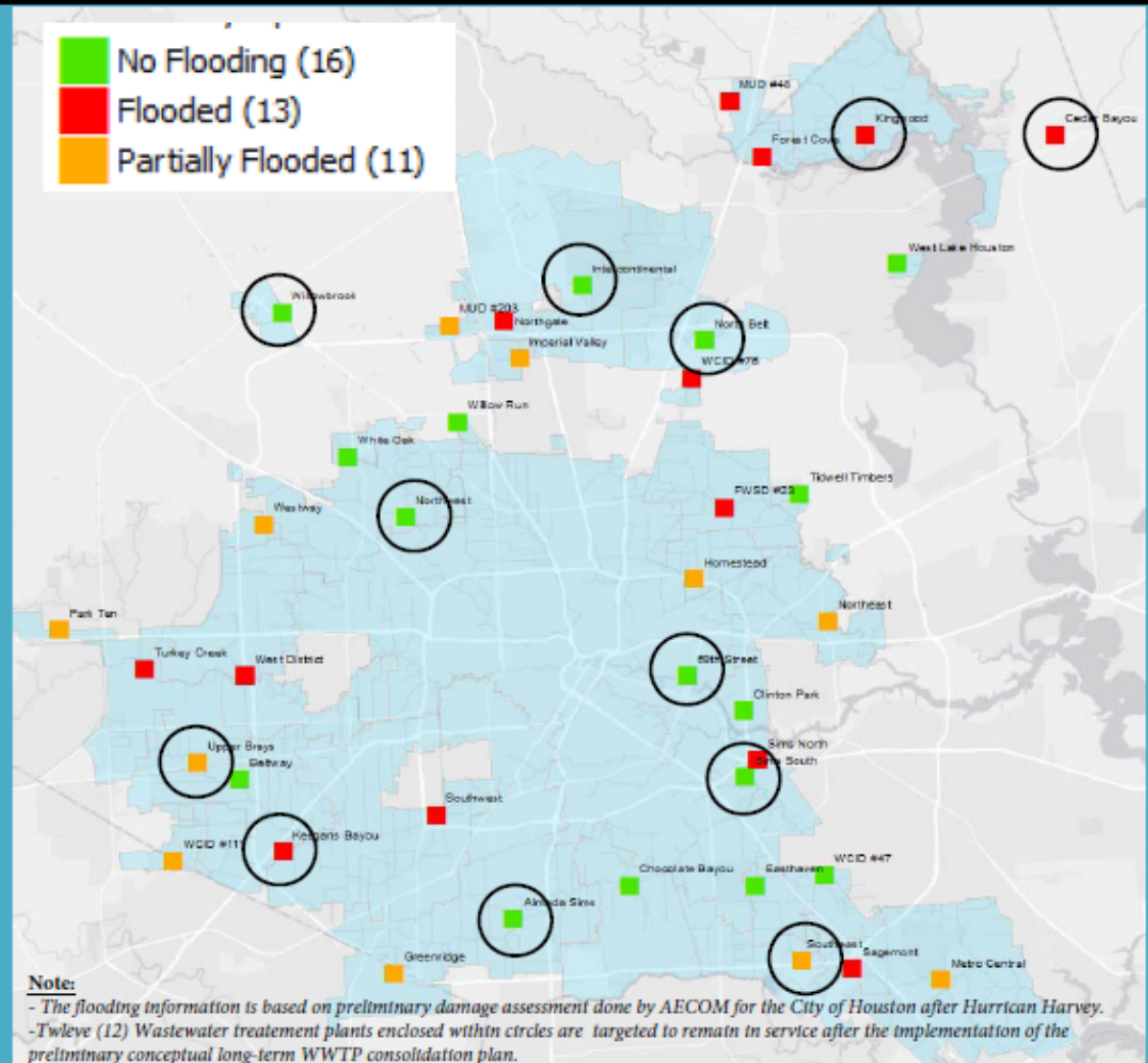
- Benefitted Structures
- Structures Removed from Floodplain
- HCFC Channels
- 100-YR Proposed Floodplain
- 100-YR Corrected Effective Floodplain

Benefited Areas

Number of Structures in Floodplain		
Corrected Effective	Proposed	Δ
3488	2337	1151

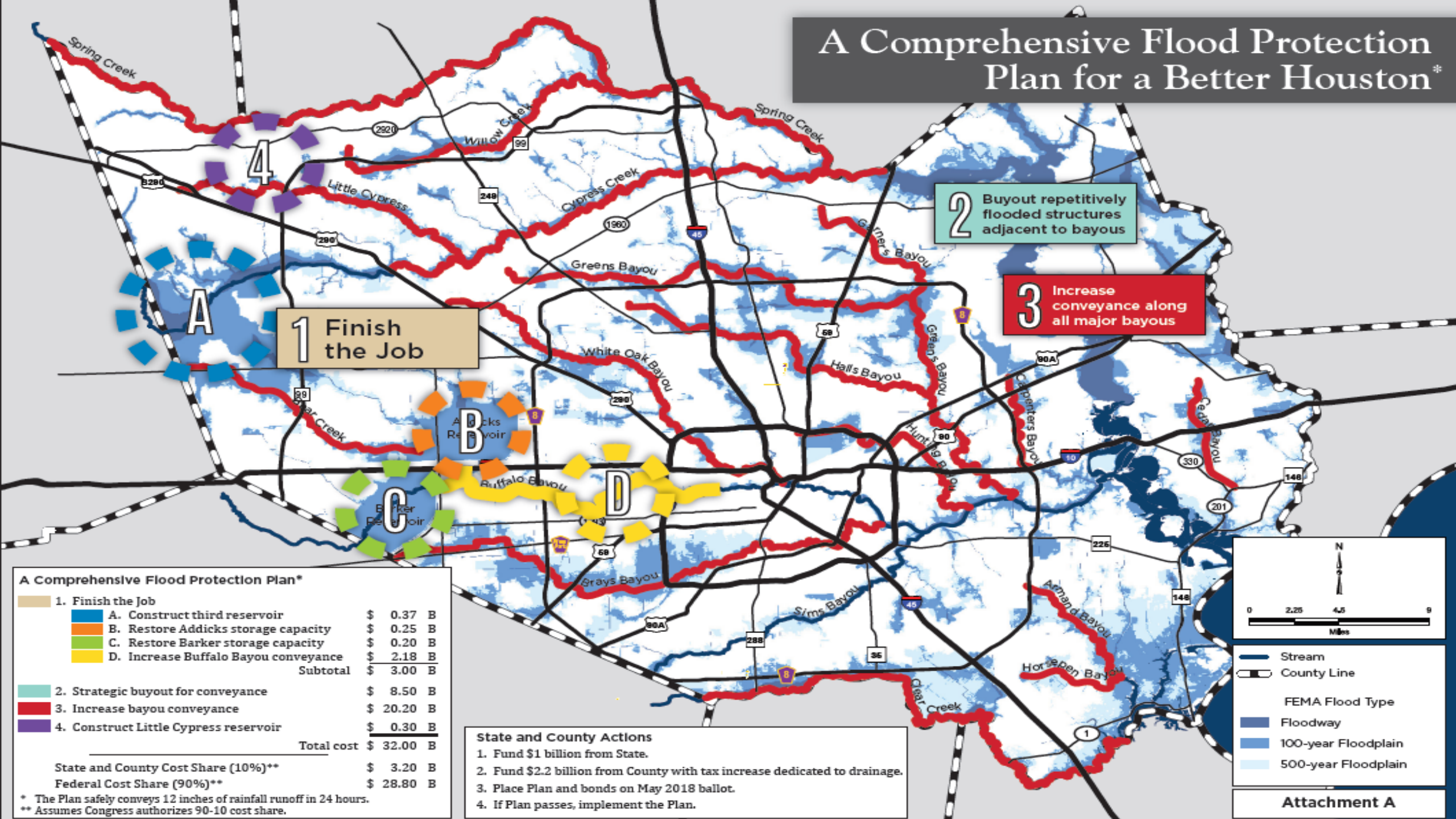
## Impact of Harvey on WWTPs & Preliminary Conceptual Long-term 12 Targeted WWTPs

S. No	Facility ID	Wastewater Treatment Plant (WWTP) Facility	Harvey Impact
1	400	69th Street	
2	6	Almeda Sims	
3	242	Belway	
4	244	Cedar Bayou	Flooded
5	39	Chocolate Bayou	
6	40	Clinton Park	
7	59	Easthaven	
8	565	Forest Cove	Flooded
9	83	FWSD #23	Flooded
10	240	Greenridge	Partially Flooded
11	107	Homestead	Partially Flooded
12	268	Imperial Valley	Partially Flooded
13	238	Intercontinental Airport	
14	250	Keegans Bayou	Flooded
15	518	Kingwood Central	Flooded
16	397	Metro Central	Partially Flooded
17	243	MUD #203	Partially Flooded
18	451	MUD #48 (Kingwood West)	Flooded
19	252	Northbelt	
20	146	Northeast	Partially Flooded
21	270	Northgate	Flooded
22	145	Northwest	
23	245	Park Ten	Partially Flooded
24	171	Sagemont	Flooded
25	182	Sims Bayou-North	Flooded
26	283	Sims Bayou-South	
27	189	Southeast	Partially Flooded
28	190	Southwest	Flooded
29	498	Tidwell Timbers	
30	201	Turkey Creek	Flooded
31	286	Upper Braes	Partially Flooded
32	279	WCID #111	Partially Flooded
33	225	WCID #47	
34	485	WCID #76	Flooded
35	237	West District	Flooded
36	398	Westway MUD	Partially Flooded
37	274	White Oak	
38	469	Willowbrook	
39	585	Willow Run (flow diverted to 69th st, so plant will be decommissioned)	
40	627	West Lake Houston	





# A Comprehensive Flood Protection Plan for a Better Houston\*

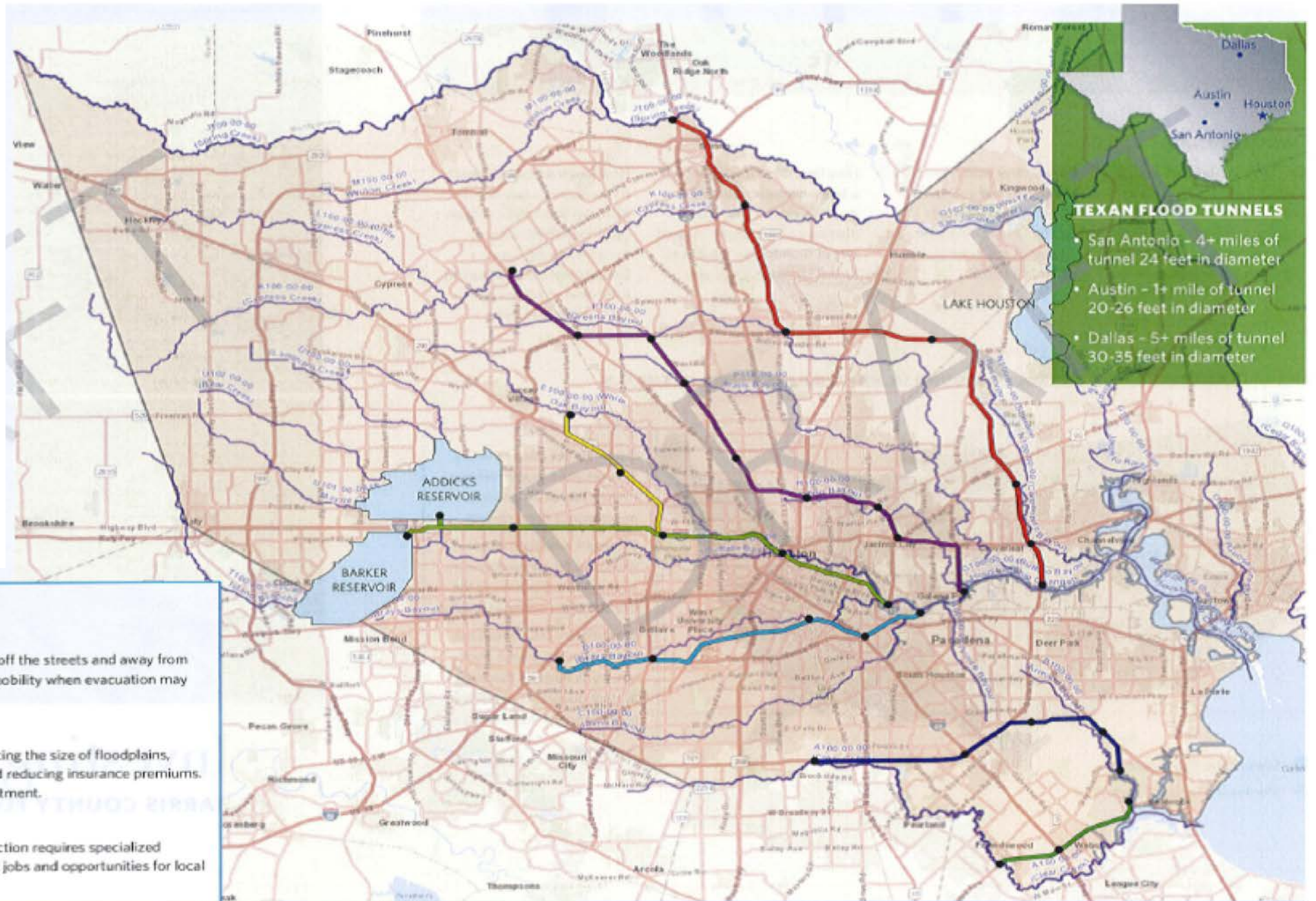


A Comprehensive Flood Protection Plan*			
1. Finish the Job			
A. Construct third reservoir	\$	0.37	B
B. Restore Addicks storage capacity	\$	0.25	B
C. Restore Barker storage capacity	\$	0.20	B
D. Increase Buffalo Bayou conveyance	\$	2.18	B
	Subtotal	\$	3.00 B
2. Strategic buyout for conveyance	\$	8.50	B
3. Increase bayou conveyance	\$	20.20	B
4. Construct Little Cypress reservoir	\$	0.30	B
	Total cost	\$	32.00 B
State and County Cost Share (10%)**		\$	3.20 B
Federal Cost Share (90%)**		\$	28.80 B

- State and County Actions**
1. Fund \$1 billion from State.
  2. Fund \$2.2 billion from County with tax increase dedicated to drainage.
  3. Place Plan and bonds on May 2018 ballot.
  4. If Plan passes, implement the Plan.



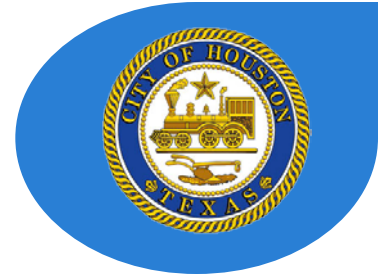
# Alternative Solutions



# Contact



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832-393-0811



Questions?



