

Urban Flooding in the United States Decision Making and Policies in Houston

July 2017



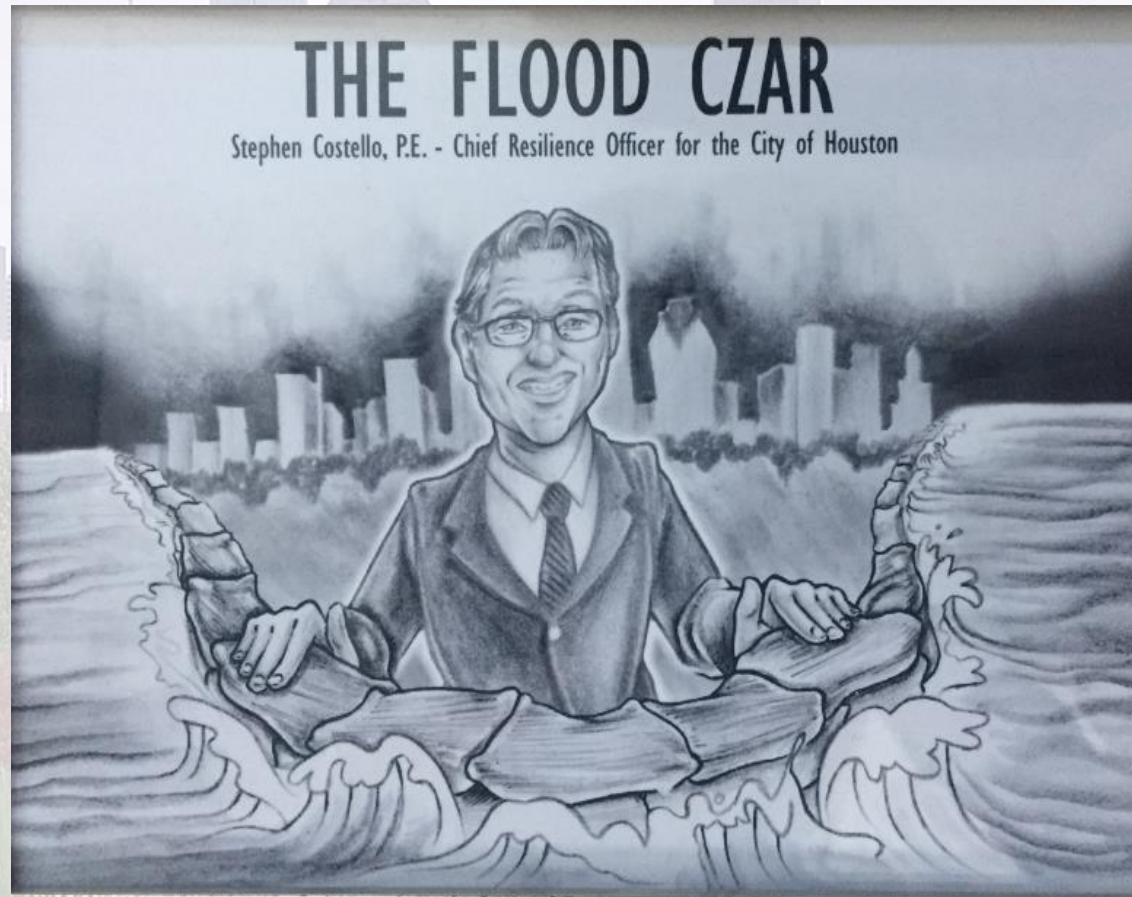
Stephen C. Costello
Chief Resilience Officer

Resilience

- Resilience is the capacity of individuals, communities and systems to survive, adapt, and grow in the face of stress and shocks, and even transform when conditions require it. Building resilience is about making people, communities and systems better prepared to withstand catastrophic events – both natural and manmade – and able to bounce back more quickly and emerge stronger from these shocks and stresses.



What's in a name?



Making Sure We Don't Forget

Local Efforts to Build Public Trust

WORK TOGETHER TO SOLVE FLOODING ISSUES

- Seek regional flooding solutions
- Be prepared and mitigate for disasters
- Invest in infrastructure
- Provide relief as quickly as possible
- Apply rules consistently and ensure responsible development
- Encourage green solutions & citizen participation



“Just keep water out of our homes!”

Work Together to Solve Flooding Issues



- **\$43 million loan from Texas Water Development Board**
- **City to advance funding to Harris County for flood protection measures on Brays**
- **Harris County to reimburse city with federal funds**
- **City hopes to advance total of \$130 million for flood damage reduction projects on Brays, Hunting and White Oak Bayous**
- **Unprecedented coordination between city, county, state and federal agencies**



Common Taxpayer, Common Problem, Common Solution

Brays Bayou Bridge Work

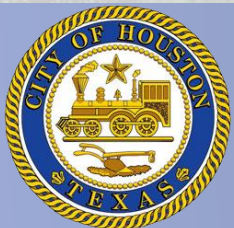
BRAYS BAYOU Eight Bridges in COH TWDB Application

Service Area - Entire Watershed



Disaster Relief

- U.S. Housing and Urban Development, Texas General Land Office
- CDBG Disaster Recovery 2015 (\$60 million) and 2016 (\$12 million) for infrastructure
- Emphasis on infrastructure projects to benefit more people
- Collaboration - Housing and Public Works
- SWAT and CIP projects
- Buyouts



Build Public Trust

Work together to solve flooding issues

SEEK REGIONAL FLOODING SOLUTIONS

Be prepared and mitigate for disasters

Invest in infrastructure

Provide relief as quickly as possible

Apply rules consistently and
ensure responsible development

Encourage green solutions
& citizen participation

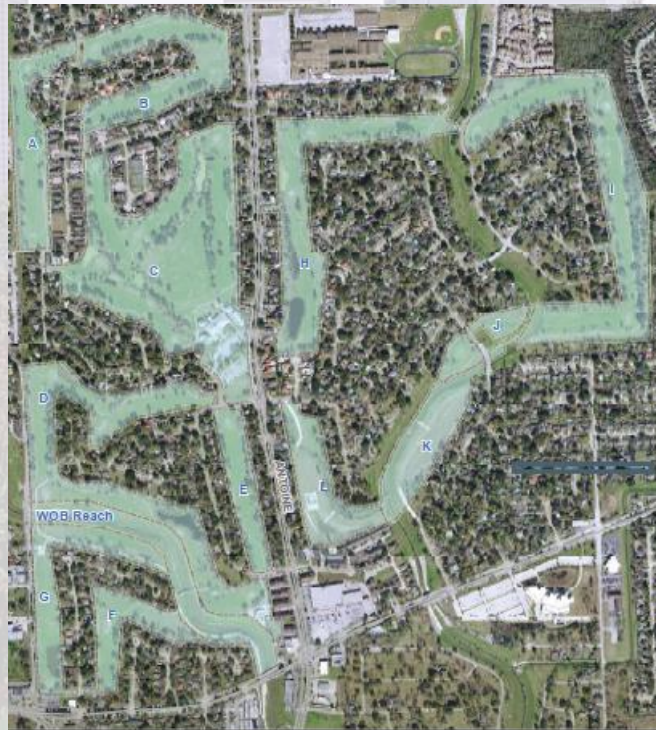


“Just keep water out of our homes!”

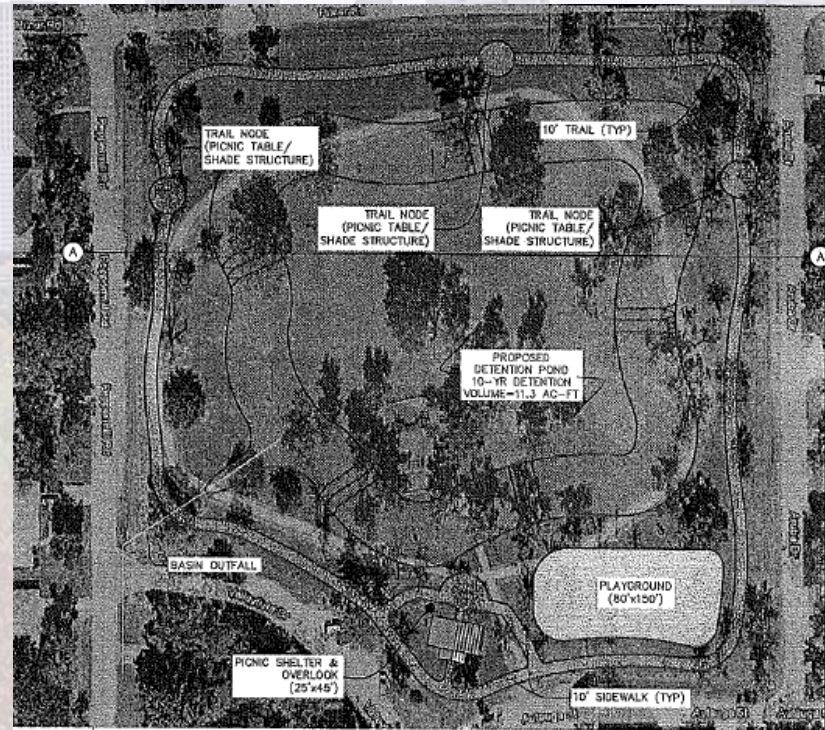
Seek Regional Flooding Solutions

PWE consultant looking for regional detention sites

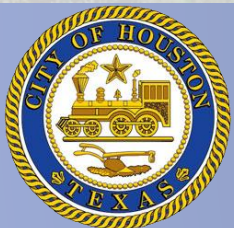
Exploring use of golf courses, landfills, and parks for detention



Inwood



James Lee Park



Build Public Trust

Work together to solve flooding issues

Seek regional flooding solutions

BE PREPARED AND MITIGATE FOR DISASTERS

Invest in infrastructure

Provide relief as quickly as possible

Apply rules consistently and
ensure responsible development

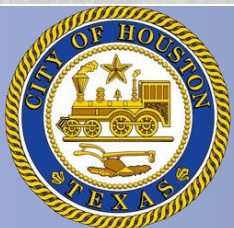
Encourage green solutions
& citizen participation



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Be Prepared and Mitigate for Disasters

City of Houston **HAZARD MITIGATION ACTION PLAN**



Build Public Trust

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Be prepared and mitigate for disasters

INVEST IN INFRASTRUCTURE

Provide relief as quickly as possible

Apply rules consistently and
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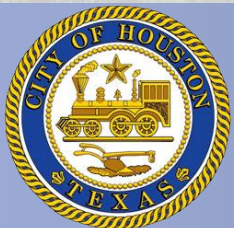
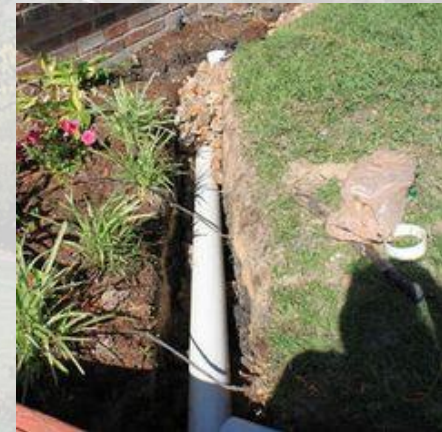


“Just keep water out of our homes!”

Invest in Infrastructure



- ReBuild Houston Program
- 5-year Capital Improvement Plan projects
- Ongoing maintenance
- Storm Water Action Teams (SWAT) for rehabilitation and upgrade to standards



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Invest in infrastructure

PROVIDE RELIEF AS QUICKLY AS POSSIBLE

Apply rules consistently and
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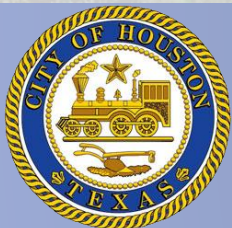
Provide Relief as Quickly as Possible - SWAT

Improvements

- Ditch Widening
- Driveway Culvert Replacement
- Inlet Replacement
- Side Lot Swales
- Sewer Line Replacements

Issues

- Department Resources and Funding
- Policy Changes
 - De minimus Storage
 - Roadside Ditch Driveways
 - Roadside Ditch Obstructions



**Pothole Program for Drainage
Between Normal Maintenance and CIP**

Roadside Ditch Repair

In Design



10058 Briarwild Ln.

(N - Warwana Rd.; S - Briarwild Ln.;
E - Gessner Rd.; W - Witte Rd.)

Drainage Issues:

Culverts undersized, collapsed or
not set to proper flow line
Silted ditch flow lines and culverts

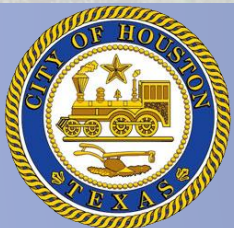


Storm Sewer Repair

COMPLETED

3600 Flora St.

Drainage Issues: Existing culvert/ grate failure blocking proper drainage



Outfall Repair



BEFORE



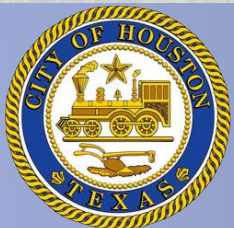
**11507 Bowlan Ln.
(Westbury Pkg. 2)**

**Drainage Issues:
24-inch outfall collapse**

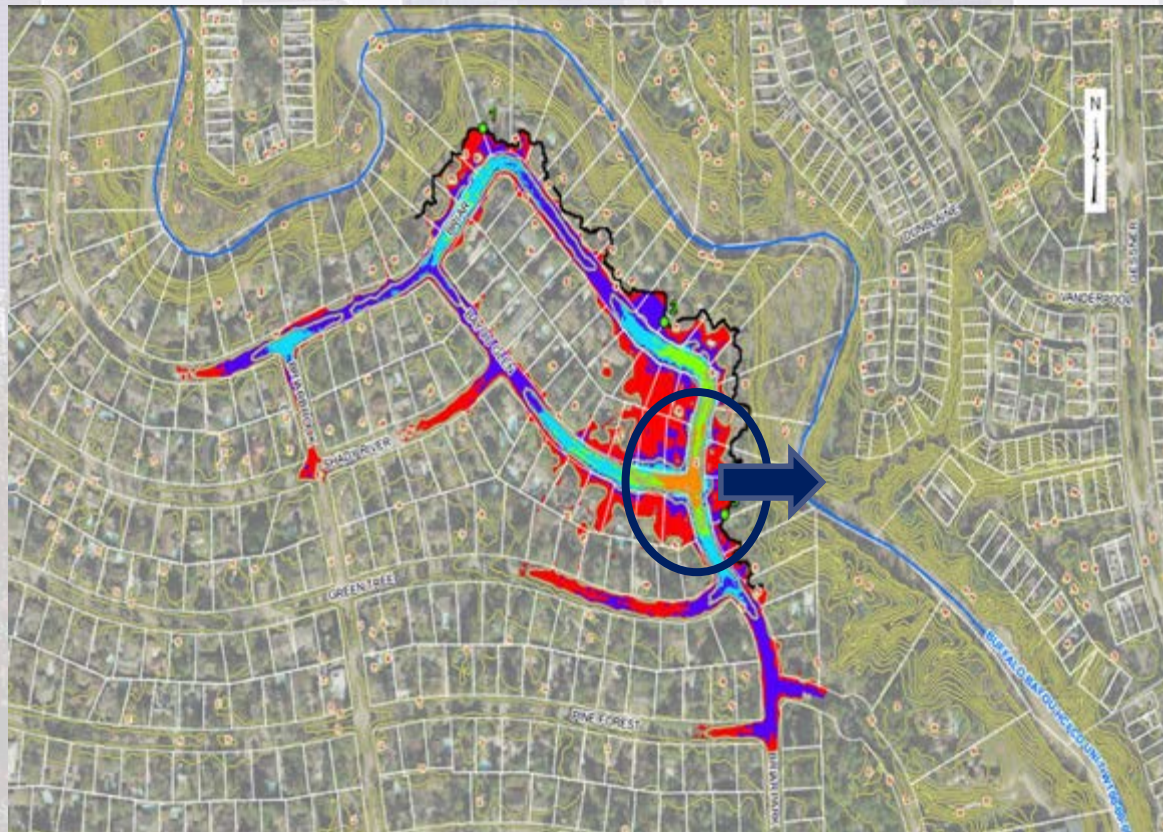
In Construction



AFTER

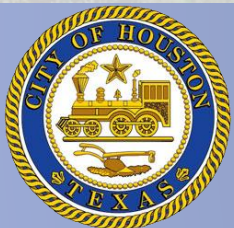


SWAT Side Lot Swale Pilot Projects



Legend

- Low Point
 - Drainage Area Divide
 - 2 ft Contours
- Ponding Elevation (ft)**
- | |
|-------------------------|
| 60.31 - 60.5 (13.5 hrs) |
| 60.5 - 61.5 (13 hrs) |
| 61.5 - 62.5 (11.5 hrs) |
| 62.5 - 63.5 (9.5 hrs) |
| 63.5 - 65 (7 hrs) |
| 65 - 66 |



Build Public Trust

Work together to solve flooding issues

Seek regional flooding solutions

Be prepared and mitigate for disasters

Invest in infrastructure

Provide relief as quickly as possible

**APPLY RULES CONSISTENTLY AND
ENSURE RESPONSIBLE DEVELOPMENT**

Encourage green solutions
& citizen participation



“Just keep water out of our homes!”

Apply Rules Consistently and Ensure Responsible Development



Re-examine city criteria as it relates to detention and fill requirements



Step up enforcement of rules in place to protect homeowners



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**ENCOURAGE GREEN SOLUTIONS
& CITIZEN PARTICIPATION**



“Just keep water out of our homes!”

Encourage Green Solutions and Citizen Participation



Grey to Green Concept

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