



WT0202151018ALJO

Drainage Investigation and Flood Analysis

Wellington Avenue and Bridge Street

Project No. 15-037

Public Informational Meeting #1

Presented by:

ch2m:

July 2015

Introductions

- City of Newport

- » Julia Forgue, PE – Director of Utilities
- » Rob Schultz, PE – Deputy Director of Engineering
- » JR Frey, PE – Water Pollution Control

- CH2M

- » Peter von Zweck, PE – Project Manager
- » Becky Weig – Public Involvement
- » Suibing Liu, PE – Lead Engineer
- » Chelsea Durante - Engineer



Agenda

- Project Introduction
- Project Background
 - » Historic Issues
 - » Sea Level Rise Trends and Projections
- Wellington Avenue Study Area
 - » Study Area Boundaries
 - » Recent Flooding Events
 - » Results of Survey
 - » Stakeholder Discussion
- Bridge Street Study Area
 - » Study Area Boundaries
 - » Recent Flooding Events
 - » Results of Survey
 - » Stakeholder Discussion
- Next Steps
 - » Opportunities for public involvement
- Summary & Wrap-up

Project Introduction



Project Introduction

- Problem – Historical drainage and flooding issues in Bridge Street and Wellington Avenue neighborhoods during extreme high tides and high intensity precipitation events
- Objective – Identify sources of flooding, evaluate alternatives, develop recommendations including cost estimates
- Outcome – Short-term and long-term recommendations, including cost estimates



Following a systematic and collaborative approach will ensure the City's goals for the project are addressed

- Detailed understanding of the contributing factors to flooding
- Detailed delineation of limits of contributing existing storm drain infrastructure
- Modeling of each study area
- Development of potential mitigation alternatives
 - » Short-term (1-3 years)
 - » Long-term
 - » Conceptual designs
 - » Levels of control
 - » Implementation schedules
- Public involvement in the development and selection of mitigation alternatives

Project Background



Project Background

- Historical tidal or “sunshine” flooding
- Precipitation events coinciding with high tide create a compound problem
- Previous measures not 100% effective – example, tide gates at 2nd & 3rd Streets installed in November 2011
- Sea level rise and more intense and frequent storms are already being experienced....there is more projected to come



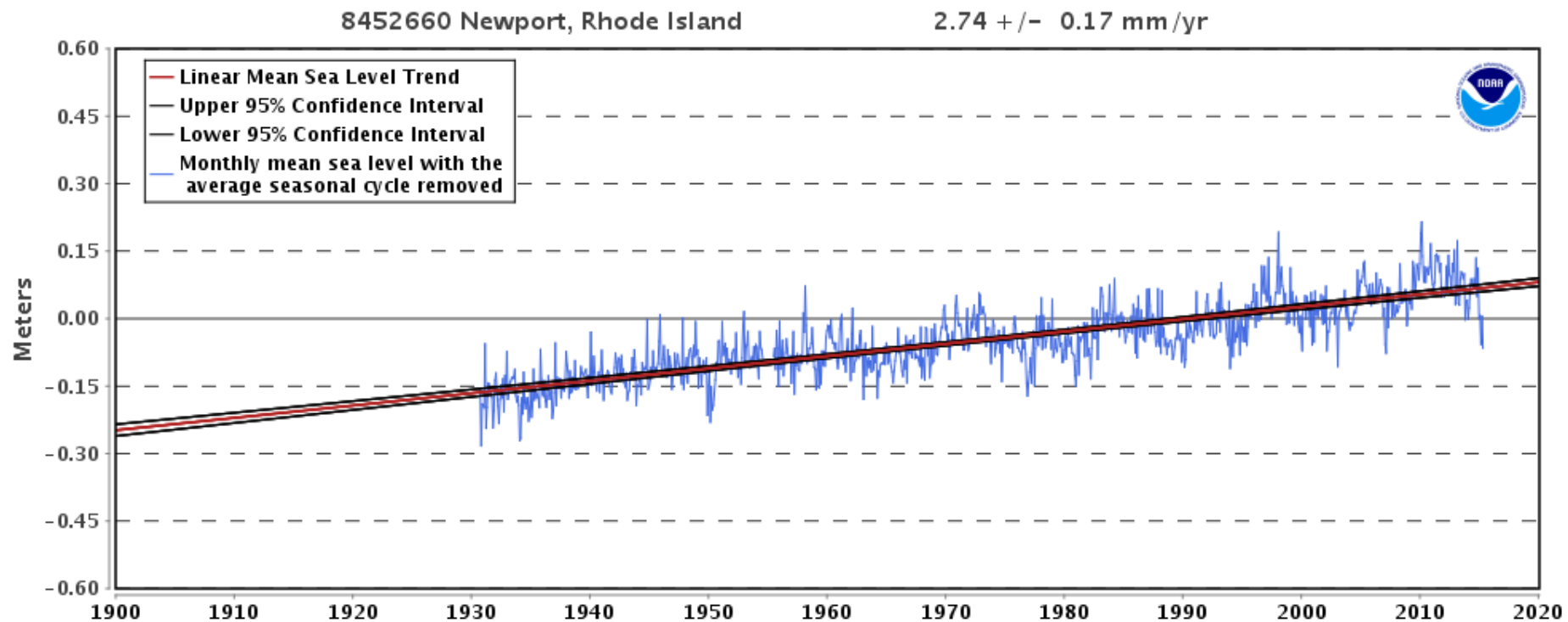
Tidal flooding at Wellington Avenue in 2011



Tidal flooding compounded by precipitation along 2nd Street in 2011

Water Levels Are Rising in Newport

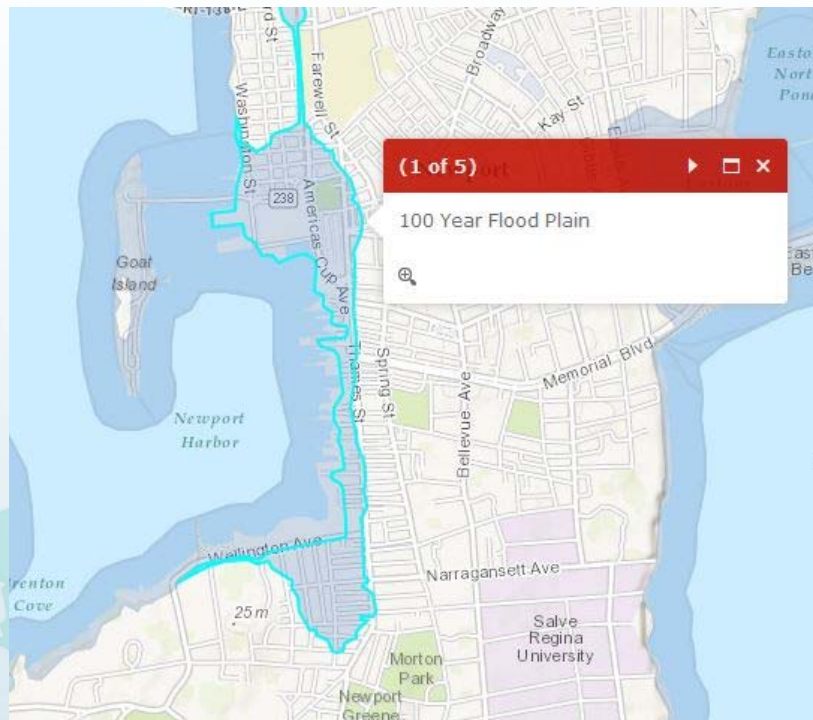
Historic sea level rise is 0.1 inch/year



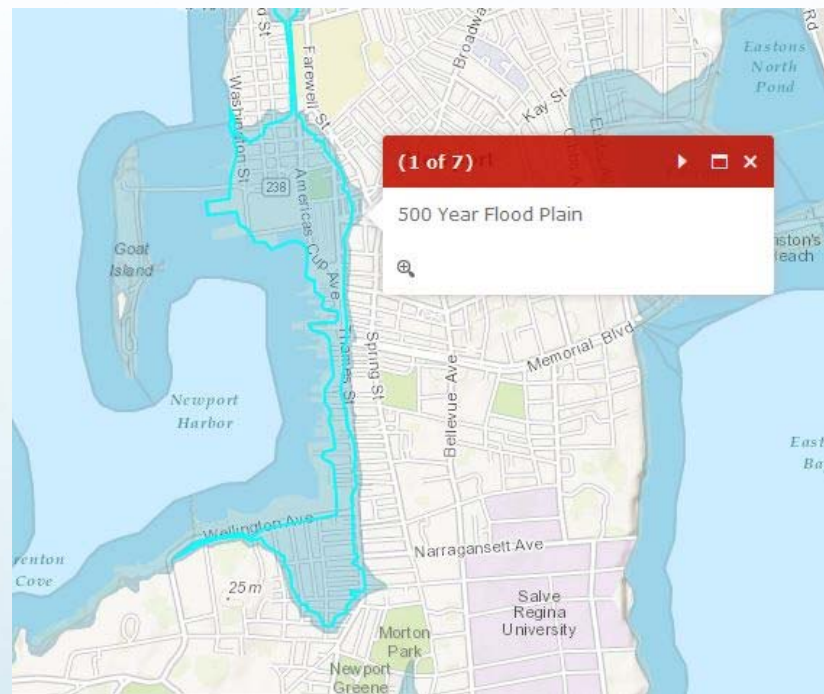
Flood Zones in Newport

100 and 500 year flood plains from the Federal Emergency Management Agency (FEMA),
September 2013

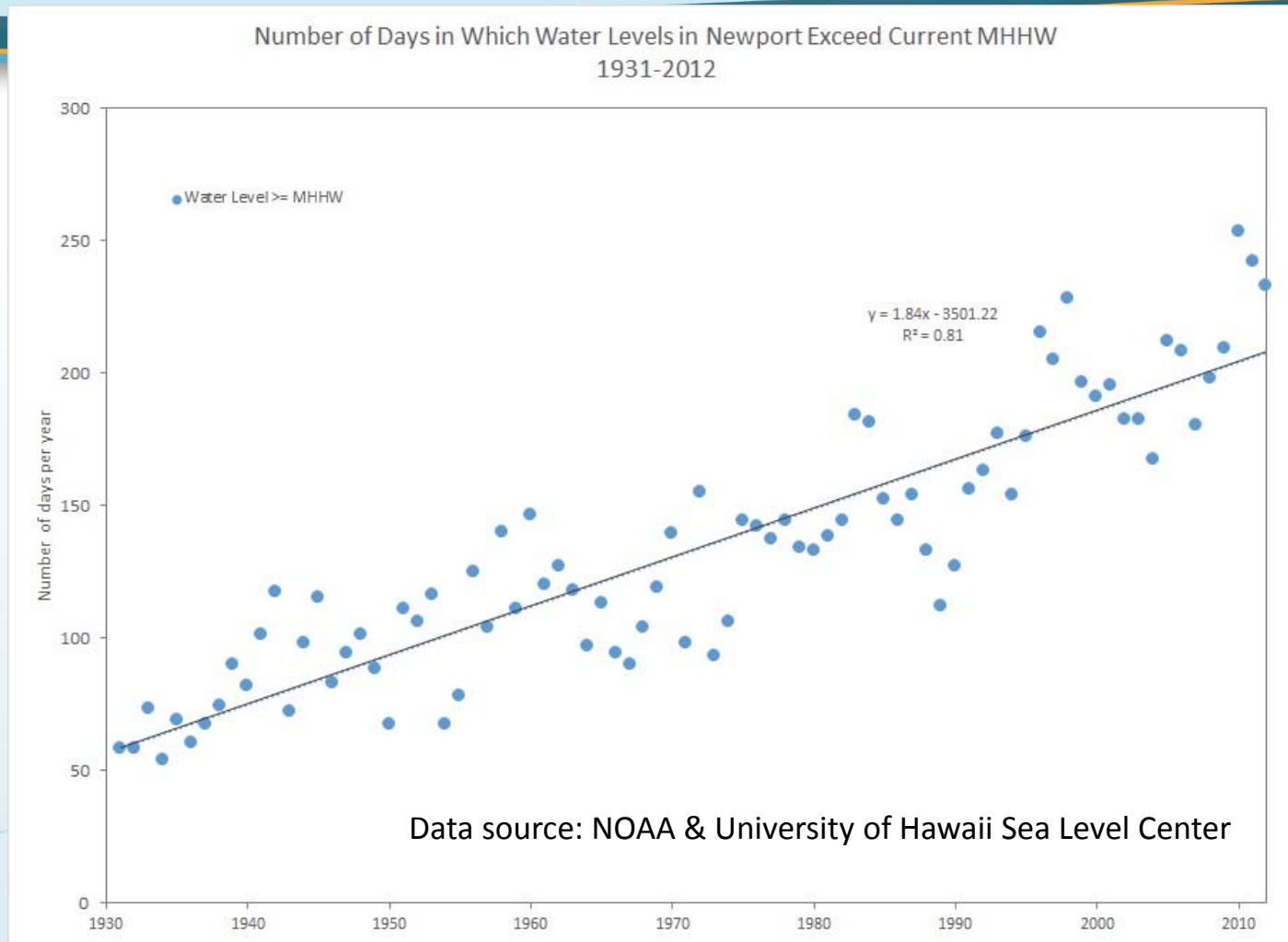
100-year Flood Zone



500-year Flood Zone



Historic Tidal Patterns for Newport – the Water Levels are Getting Higher



MHHW - Mean Higher High Water - High and low tides occur twice a day each. MHHW is the average of the higher high water height of each tidal day at that station. This is different from Mean High Water (MHW), which is the average of the water heights of all high tides.

Bill McMillin – Sea Level Rise Principal Technologist

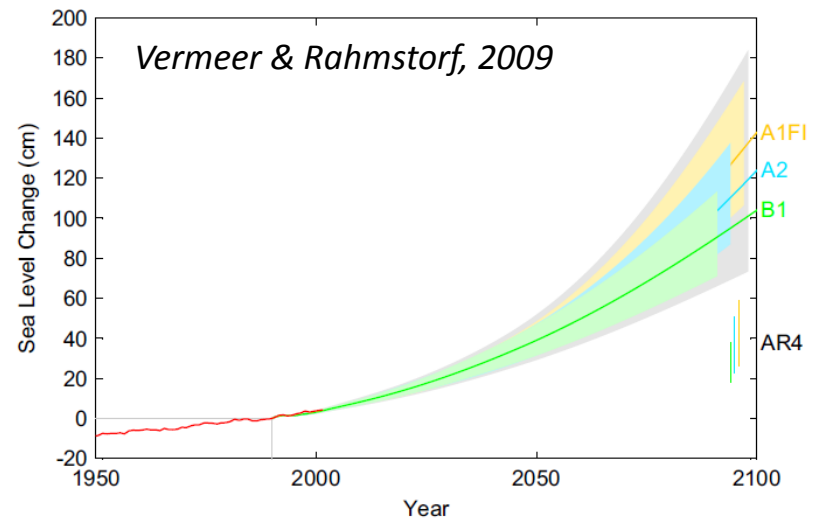
■ Climate Risk and Resilience Related Experience

- » CH2M's East Regional Technology Leader for Integrated Water Resource Management and a core member of CH2M's Climate Risk and Resilience Service Team
- » Appointed to the New Jersey Department of Environmental Protection (DEP) Science Advisory Board (SAB) on the Climate and Atmospheric Sciences Standing Committee in 2010
- » American Society of Civil Engineers, EWRI Climate Change Task Committee member
- » Member of ASCE-Structural Engineering Institute post-disaster investigation to determine structural flooding impacts in New York City after Hurricane Sandy and recommended updates to ASCE 24-05, Flood Resistant Design and Construction
- » Delivered multiple projects to EPA on climate resiliency and flood recovery
- » Task leader for NYC project to develop an adaptation and optimization strategy for addressing increased demand and minimizing risks of global climate change to New York City drainage and wastewater management systems

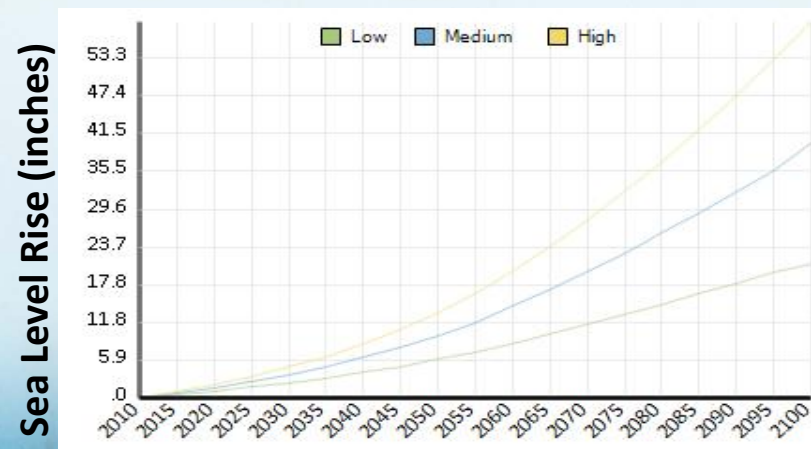
Projected Sea Level Rise for Newport

- 2014 US National Climate Assessment
 - » Global: 1 to 4 feet by 2100
 - » Local projections affected by subsidence and other regional factors
- RI Sea Grant for Newport:
 - » 3 to 5 feet by 2100
- US EPA CREAT 2.0
 - » Climate Resilience Evaluation & Awareness Tool for water and wastewater utilities
 - » 2 to 6 feet by 2100 at Newport

Global Sea Level Rise

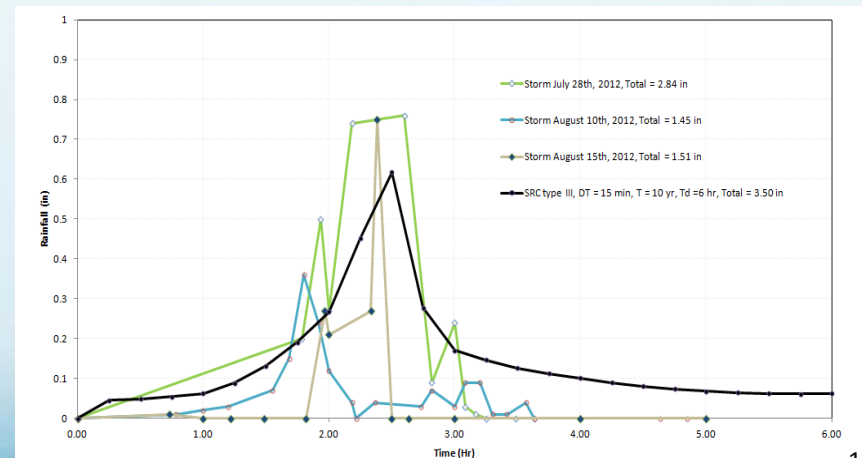
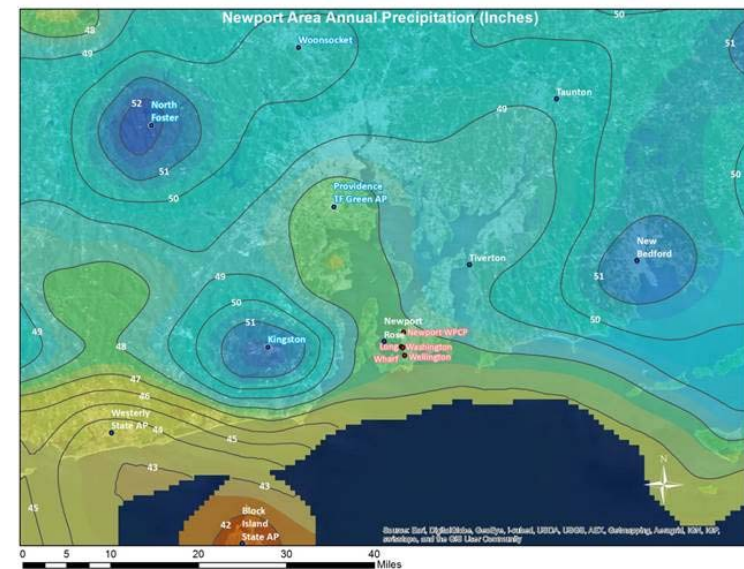


US EPA CREAT 2.0



Planning in Newport Needs to Include Consideration of Trends in Precipitation

- Historic rainfall data will be used to evaluate design storms and risks associated with more intense storms occurring in the future with climate change
- Analyze historical storm events that caused flooding in the study areas
- Cross-check the data with tidal conditions during those events



Case Study for Boston, MA

Scenario	Total Storm Volume (inches)			Peak Hourly Intensity (inches per hour)		
	2035	2060	2100	2035	2060	2100
Medium (B2)	5.55	5.76	6.08	1.76	1.83	1.93
Precautionary (A1FI)	5.60	6.03	6.65	1.78	1.91	2.11

BWSC's current design standard is 4.8 inches

Climate change is increasing the size and intensity of this statistical storm and it could be 6.65 inches by 2100.

Wellington Avenue Study Area



Wellington Avenue Study Area

■ Root Causes of Flooding

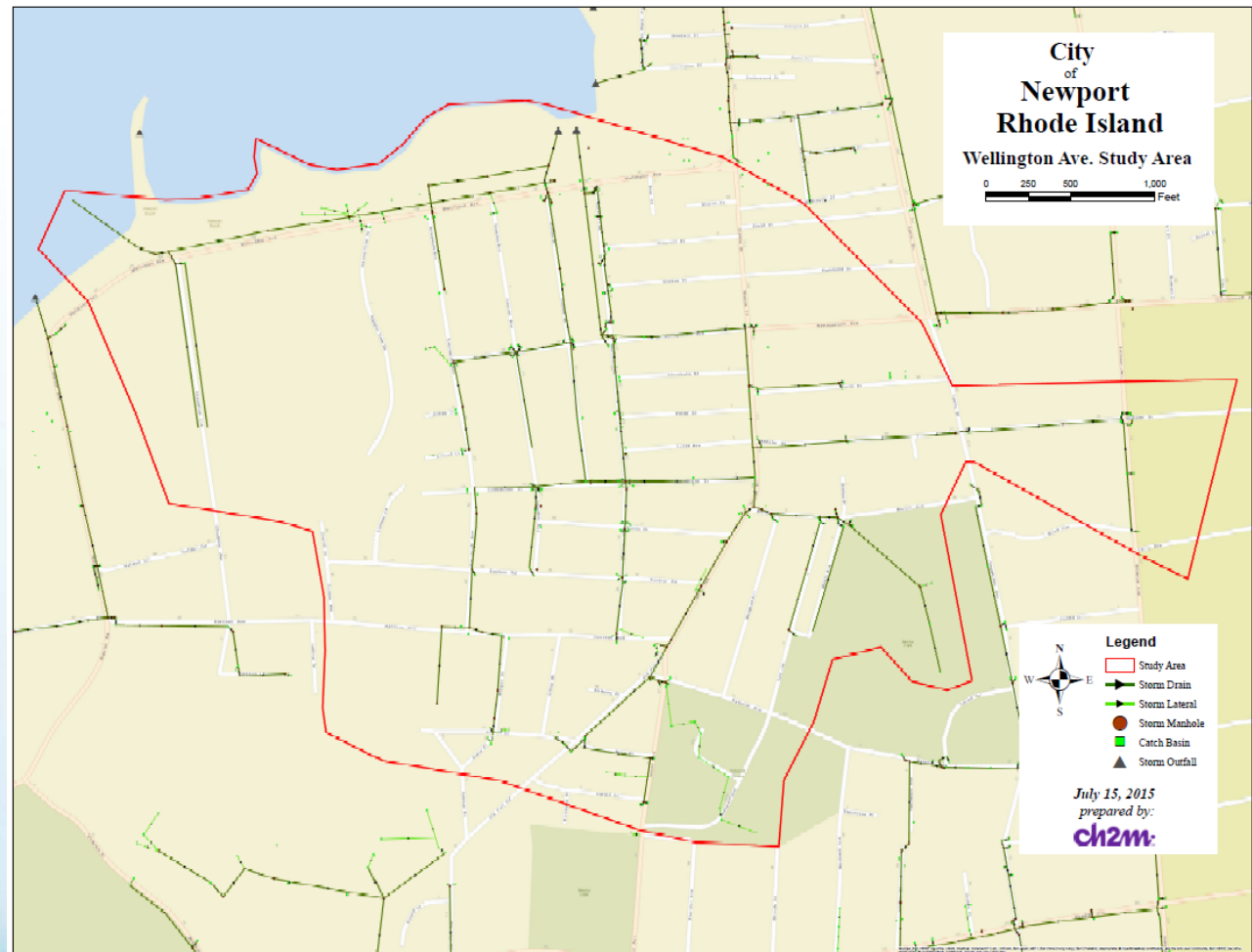
- » Extreme high tides
- » Storm surge
- » Sea level rise
- » Precipitation events
- » Combinations of above

■ Infrastructure

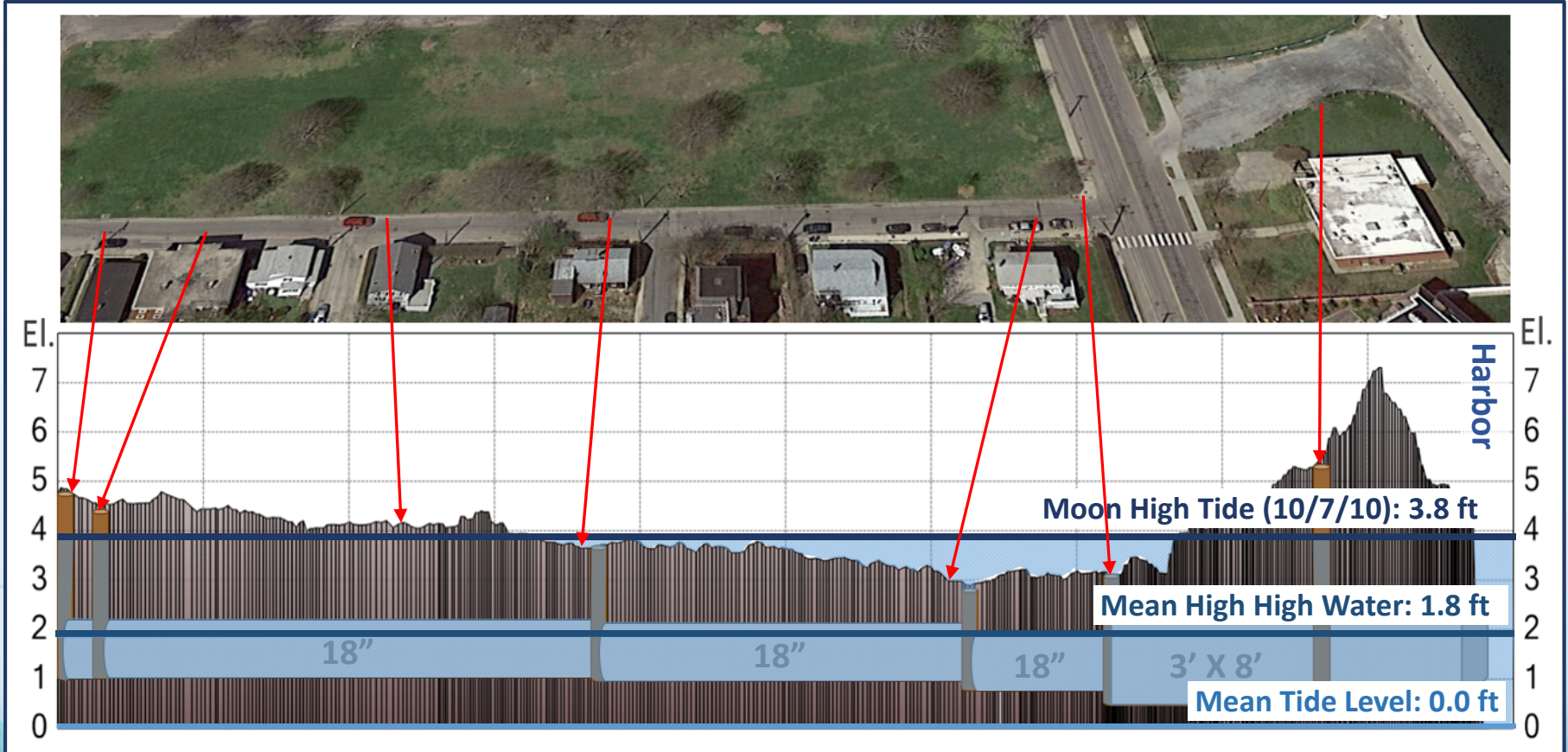
- » Existing storm drain outfalls to harbor
- » No tide gates

■ Impacts

- » Frequent traffic rerouting
- » Access restrictions to public facilities
- » Basement flooding



Marchant St. Flood Profile

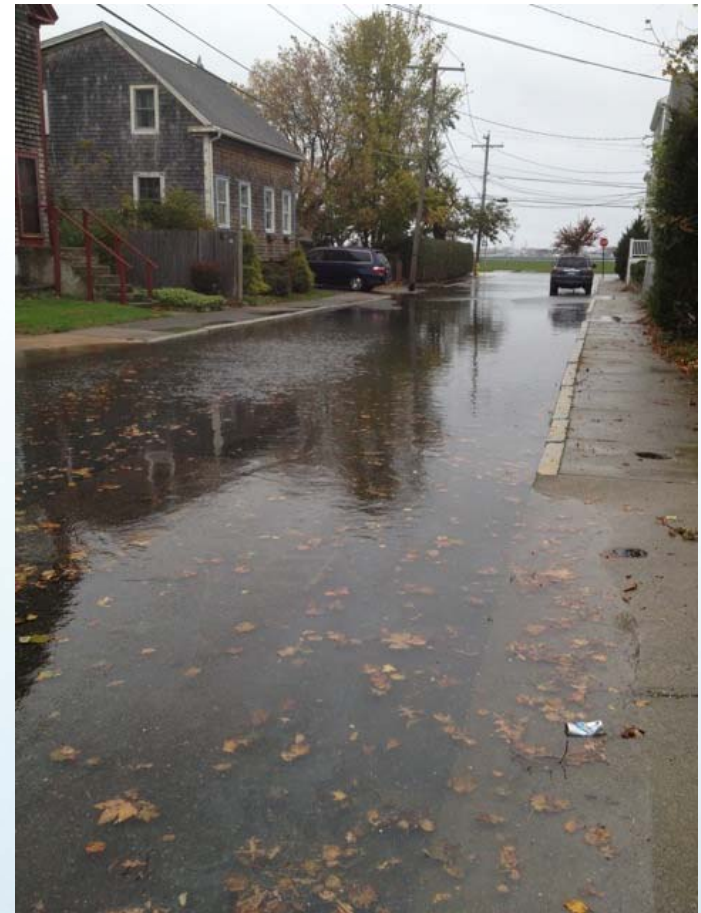


All elevations in NAVD 88

Wellington Avenue Tidal Flooding



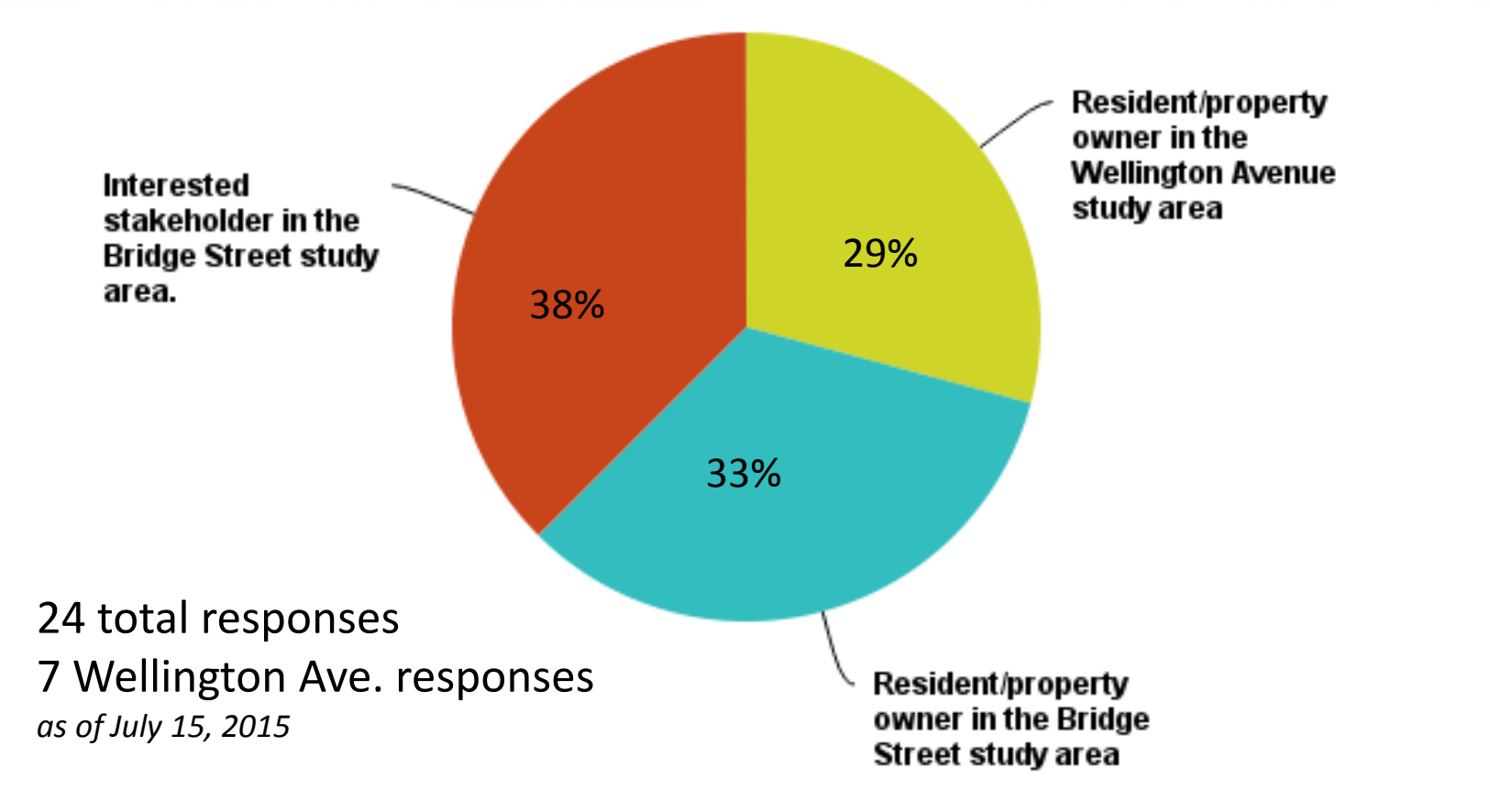
Intersection of Wellington Avenue and Marchant Street during a High Tide on 10/07/2011



Houston Avenue facing Wellington Avenue during Superstorm Sandy

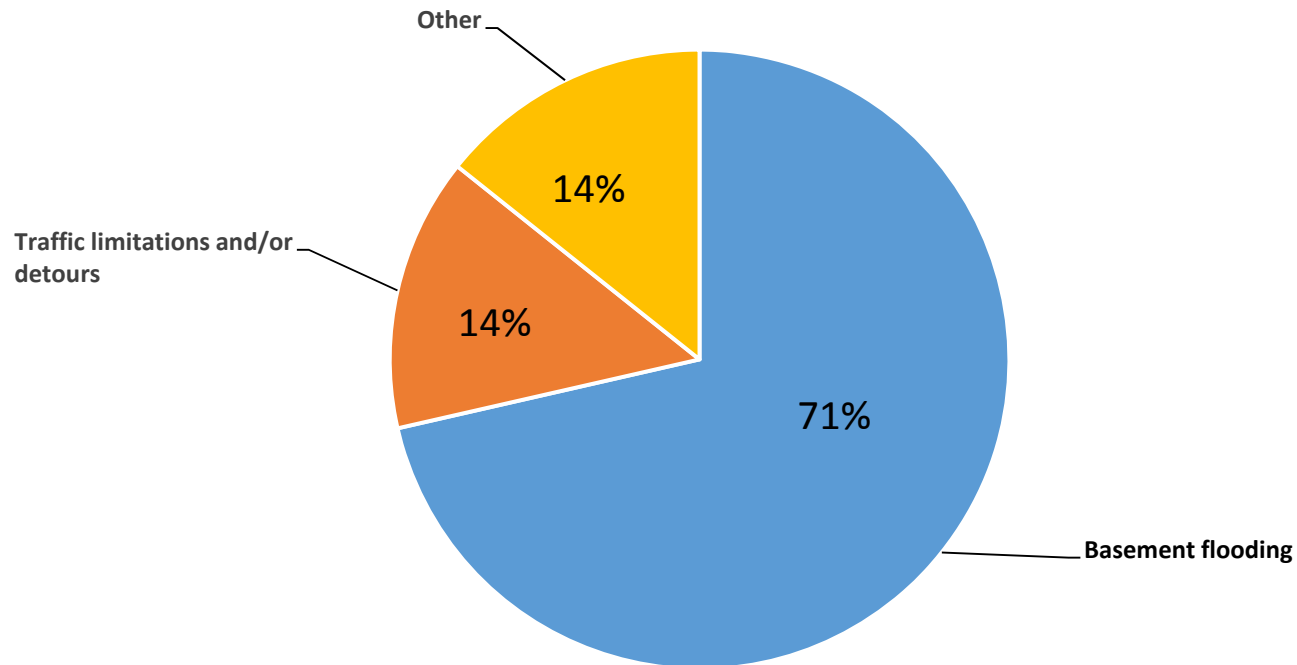
Survey Results for Wellington Avenue

Q1: Which of the following best describes you?



Which best describes your greatest concern with regards to drainage and flooding issues in your area?

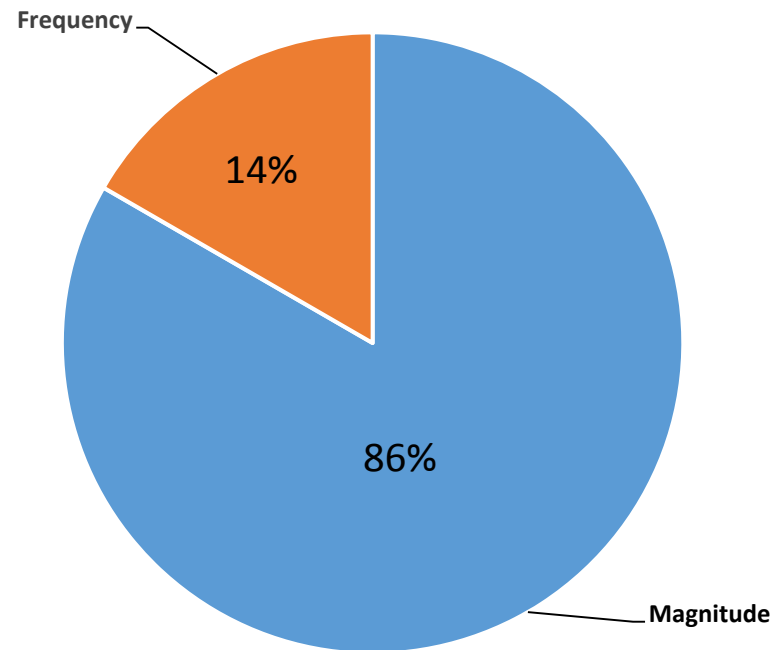
Wellington Avenue Study Area



7 total responses
as of July 15, 2015

Which best describes your greatest concern with regards to the flooding events?

Wellington Avenue Study Area



7 total responses
as of July 15, 2015

Wellington Avenue Stakeholder Discussion

- Any key concerns not captured by the survey?
- Any additional dates of significant flooding to be used in study?
- Additional comments?



Bridge Street Study Area



Bridge Street Study Area

■ Root Causes of Flooding

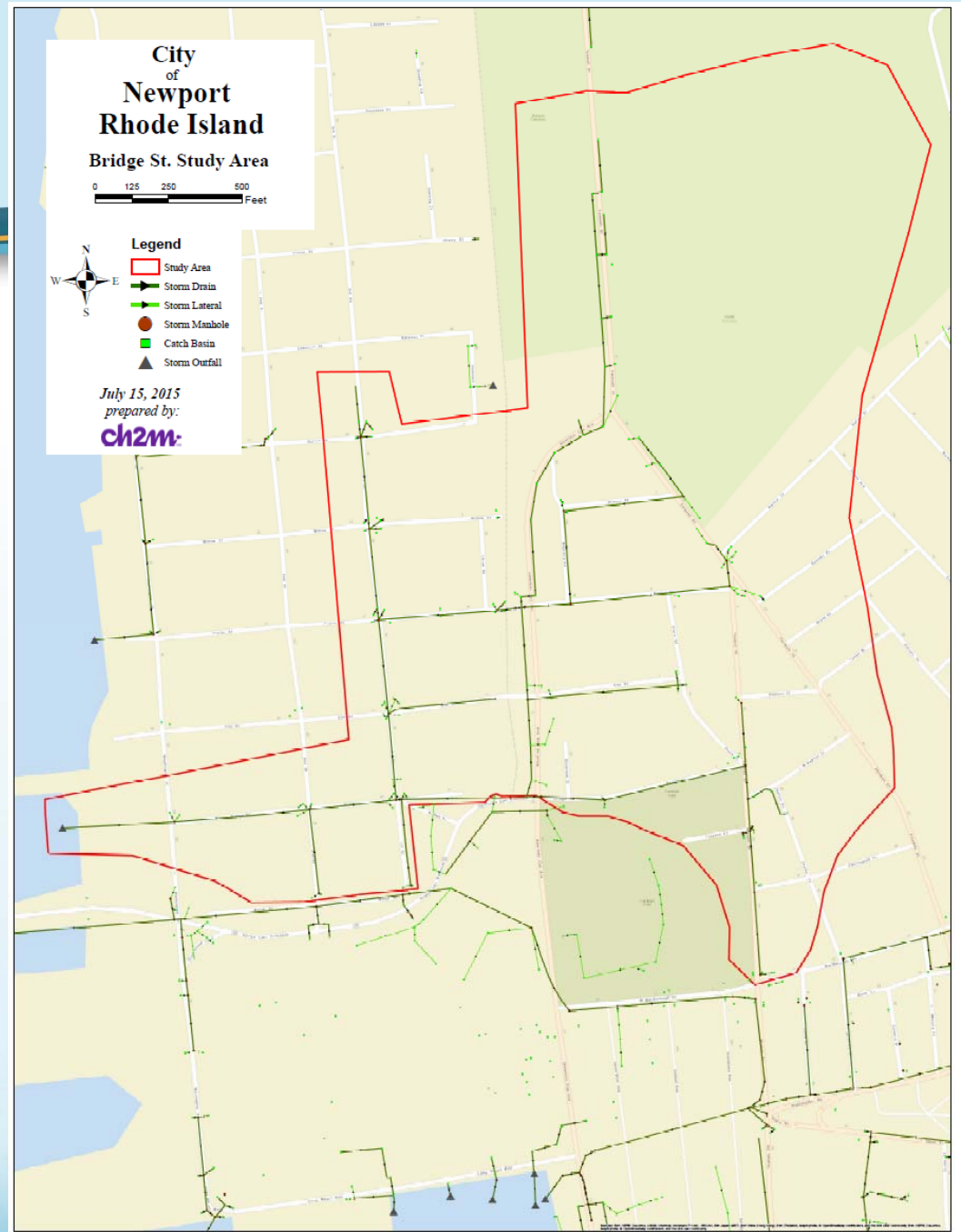
- » Precipitation events
- » Extreme high tides
- » Storm surge
- » Sea level rise
- » Combinations of above

■ Infrastructure

- » Storm drain outfall to harbor
- » Tide gates

■ Impacts

- » Residential zone flooding
- » Street flooding and access issues
- » Basement flooding



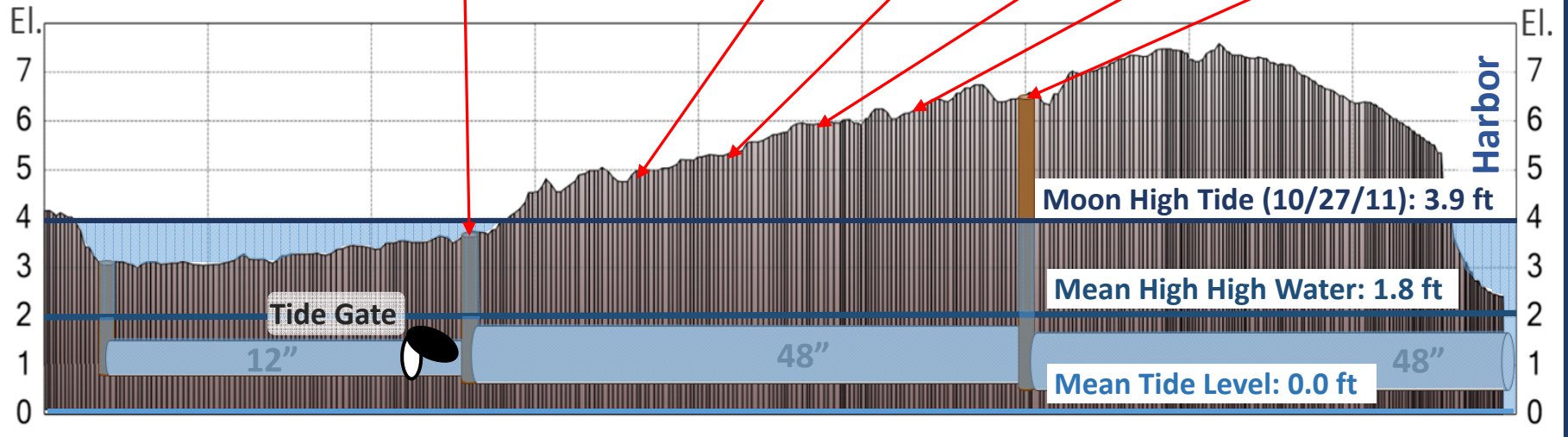
2nd Street Flood Profile



2nd Street

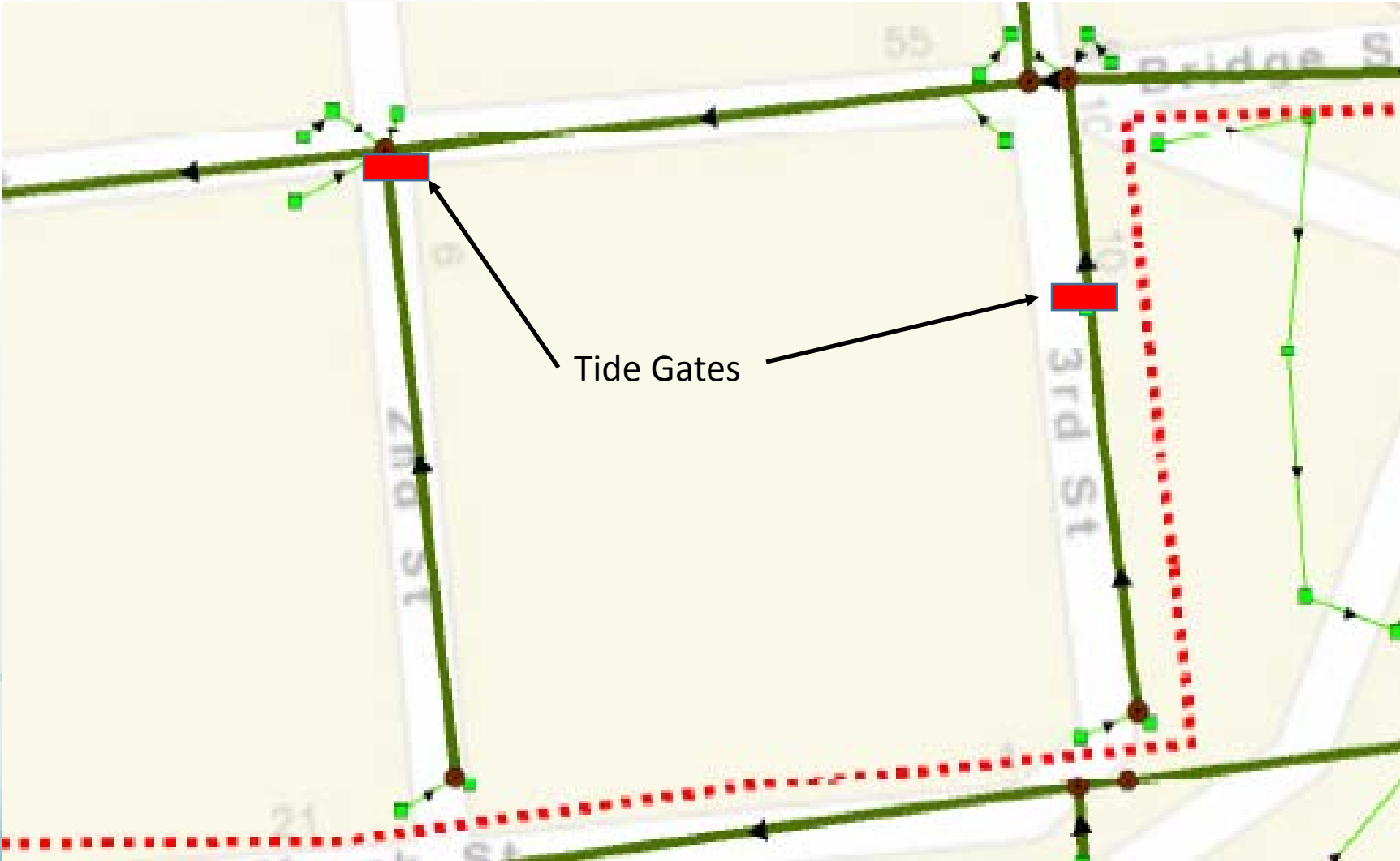


Bridge Street



All elevations in NAVD 88

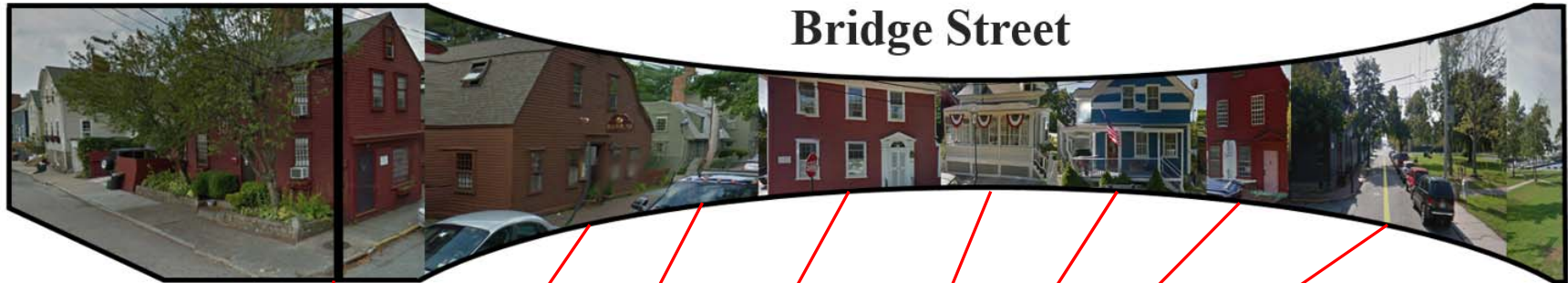
Close-up of 2nd St. Drainage System



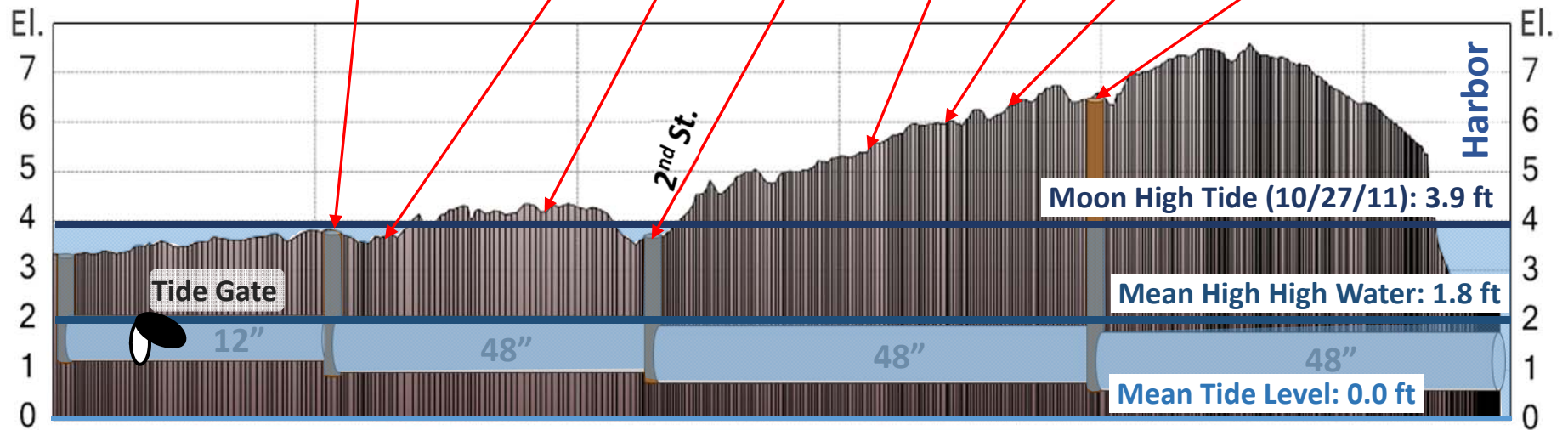
3rd Street Flood Profile



3rd Street ↗



Bridge Street



All elevations in NAVD 88

Recent Bridge Street Area Flooding



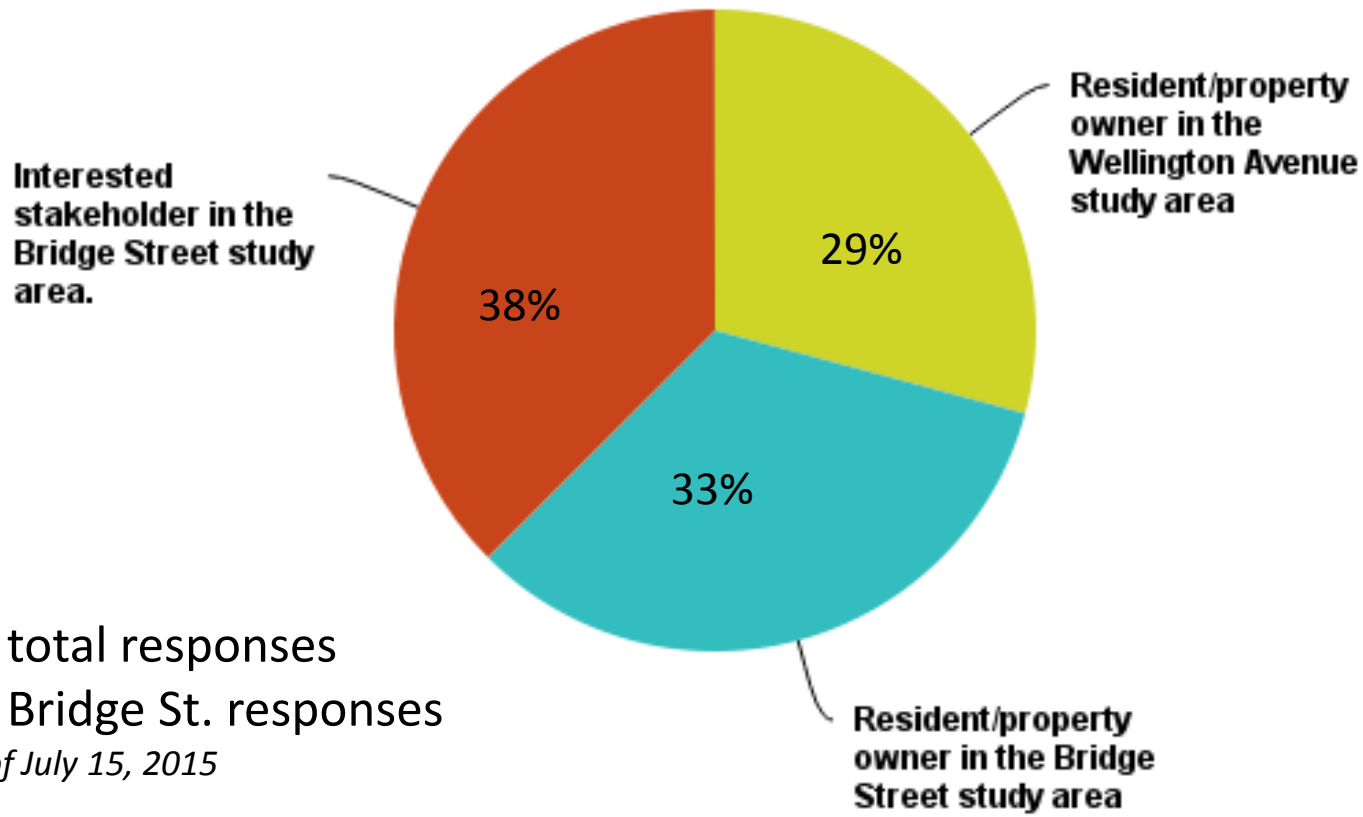
Intersection of Third Street and Marsh Street during Superstorm Sandy



July 1, 2015 – Bridge Street between America's Cup and Thames Street ~ 1 ¼" rainfall in 1 Hour coinciding with High Tide

Survey Results for Bridge Street

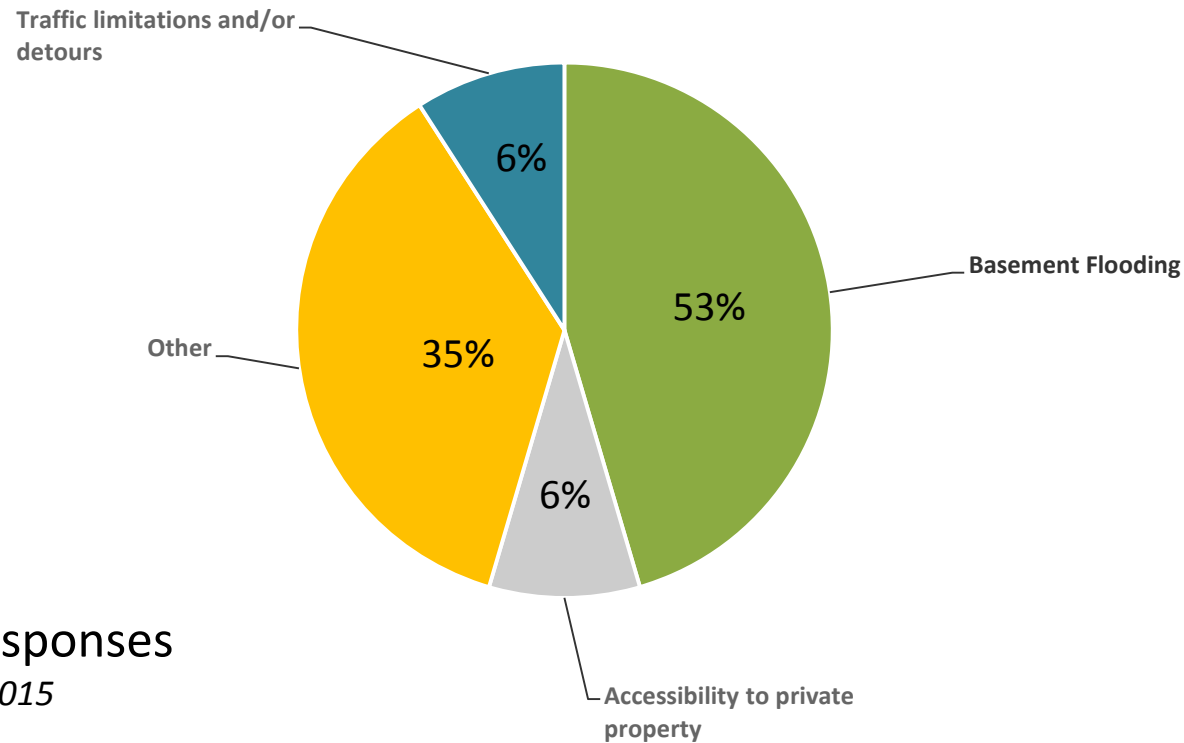
Q1: Which of the following best describes you?



24 total responses
17 Bridge St. responses
as of July 15, 2015

Which best describes your greatest concern with regards to drainage and flooding issues in your area?

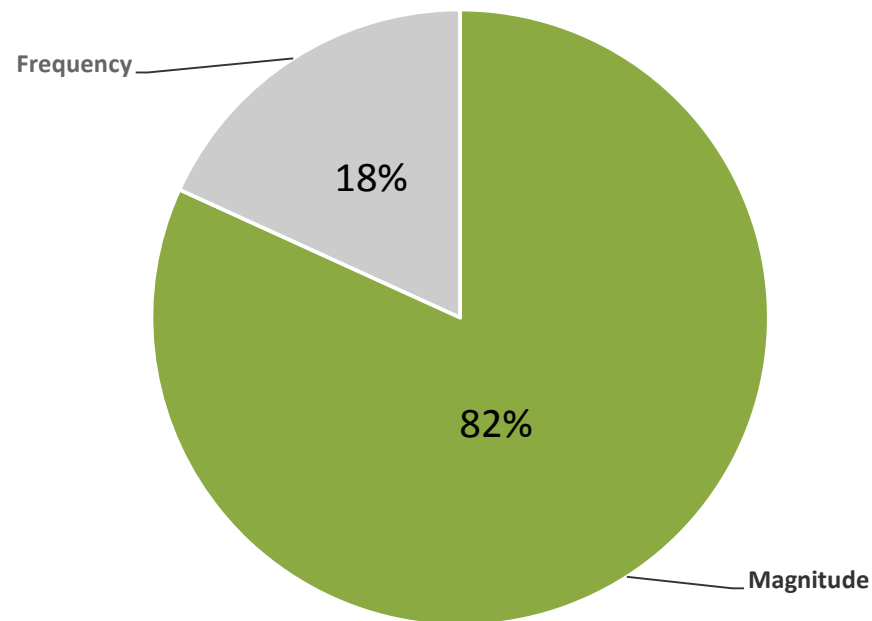
Bridge Street Study Area



17 total responses
as of July 15, 2015

Which best describes your greatest concern with regards to the flooding events?

Bridge Street Study Area



17 total responses
as of July 15, 2015

Bridge Street Stakeholder Discussion

- Any key concerns not captured by the survey?
- Any additional dates of significant flooding to be used in study?
- Additional comments?



Next Steps



Next Steps for Both Study Areas

- Complete data collection
- Develop, calibrate and verify model
- Develop potential mitigation options
- Evaluate potential mitigation options using model
- Develop conceptual cost estimates
- Additional opportunities for stakeholder input and information
- Hold second public informational meeting in Fall 2015 to review modeling results and draft recommendations

Good data from the field makes for good models

- **Comprehensive Study** by developing hydrologic/hydraulic model of entire drainage basin
- **Efficient Model Development** by utilizing automation tool and LiDAR DEM
- **Accurate Simulation** by coupling pipe flow with 2D surface model



Case Study for New Haven, CT

Manhole Overflow / Street Ponding During June 13, 2014 Storm



Union ave Flooded parking lot on Union Avenue



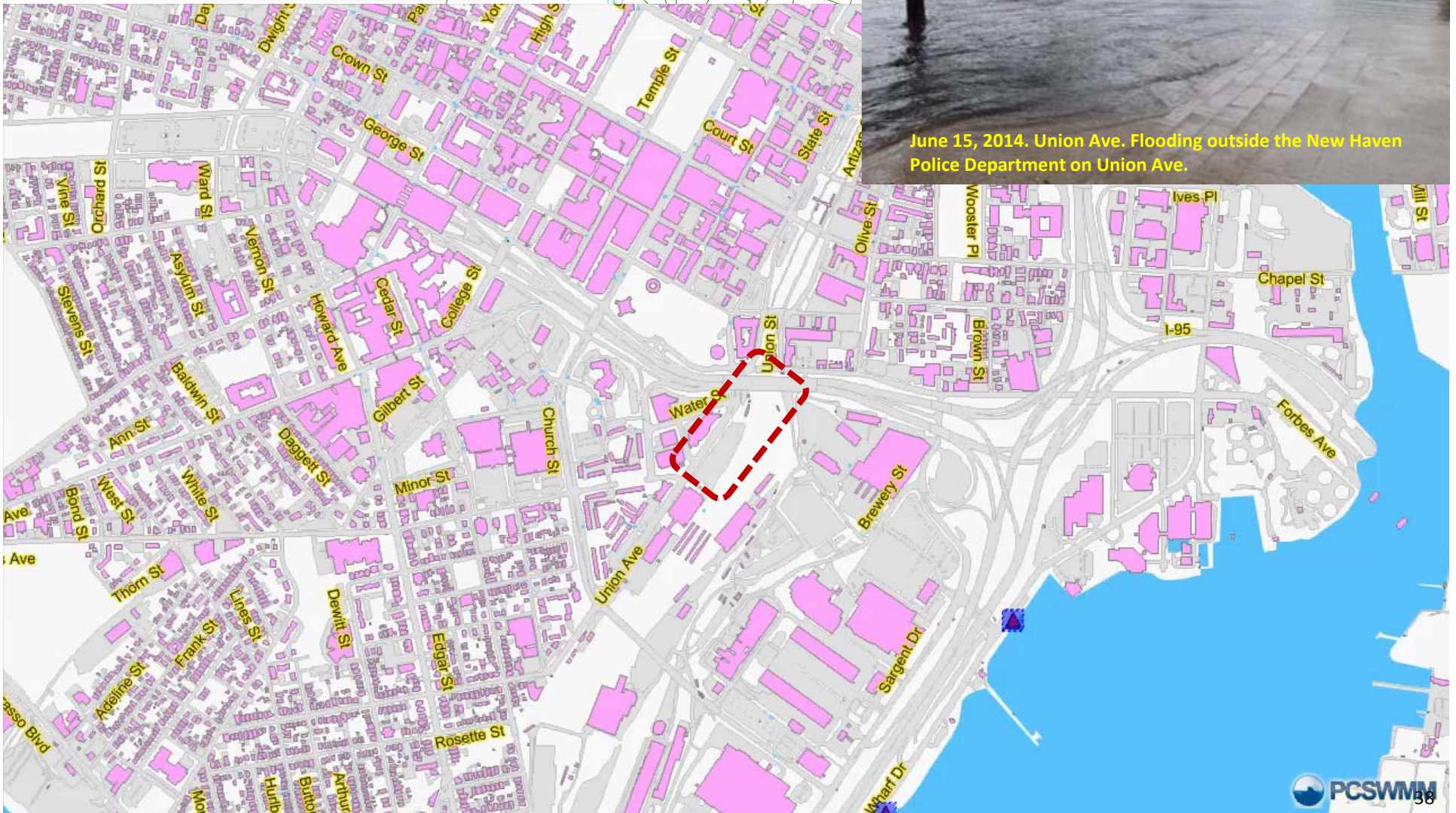
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Case Study for New Haven, CT



June 15, 2014. Union Ave. Flooding outside the New Haven Police Department on Union Ave.

Additional Opportunities for Stakeholder Involvement

- If you haven't already, please complete survey at: <https://www.surveymonkey.com/s/NewportStudy>
- Additional photos and information to Becky Weig at becky.weig@ch2m.com
- Updates posted to Engage Newport with link to Department of Utilities page on the City's website
 - » This presentation
 - » Updated survey results
 - » More information as it becomes available
- Second public informational meeting in Fall 2015
- Thank you for the information provided so far!

Wrap-Up & Summary

