ACHIEVING FLOOD RESILIENCY

NEW CHALLENGES FOR PRESERVATION IN COASTAL COMMUNITIES

AGENDA

- Welcome & Introductions
- Overview of regional issues
- Introduction of site locations
- Lunch and discussion
- Tour
- Wrap up & Departure

WHO IS BUILDING RESILIENT SOLUTIONS (BRS)?

HOW DID WE GET HERE?

2009

CPG starts seeing residential owners implementing FEMA mandated flood mitigation retrofits

Begins responding to inquiries about how to mitigate unintended consequences of retrofits

2010-2012

Norfolk ARB attempts to develop recommendations for elevation/retrofits; CPG staff involved in role on ARB

2014

CPG notices changes in flood mitigation needs, practices that are policy driven

- The Roebuck, Front Street, Norfolk
- 161 Granby Street, Norfolk
- Dunmore Apartments

HOW DID WE GET HERE?

2015

- City of Norfolk early adopter of new flood retrofit standards in Building Code
- CPG participates in Hampton University/ODU student project studying flooding in Chesterfield Heights HD
  - Horowitz thesis, MAHP 2013
  - Project leads to $120M HUD grant to address Ohio Creek Watershed
- CPG approached by property owner regarding pervasive brick deterioration; seeking assistance to remediate

2017

- CPG and Wetlands Watch successfully nominate to 11 Most Endangered List with Preservation Virginia

HOW DID WE GET HERE?

2018

CPG and Museum Resources partner for Rise Resilience Innovations Coastal Community Challenge seeking funding to develop an empirical data set

2019

Outreach and engagement begin

Rise grant awarded, data collection approach and methodology refined

2020

Lab planning

VIRGINIA TECH

MUSEUM RESOURCES CONSTRUCTION & MILLWORK

VIA DESIGN

MEADORS SINCE 1984

NATIONAL PARK SERVICE

UNION BANK & TRUST

DHR Virginia Department Of Historic Resources

PRESERVATION VIRGINIA APVA 1889

WPA WORK PROGRAM ARCHITECTS

OLD DOMINION UNIVERSITY

VCC Virginia Community Capital Let's do more, together.

McPHERSON DESIGN GROUP p.c. STRUCTURAL ENGINEERS

US Army Corps of Engineers ® Norfolk District

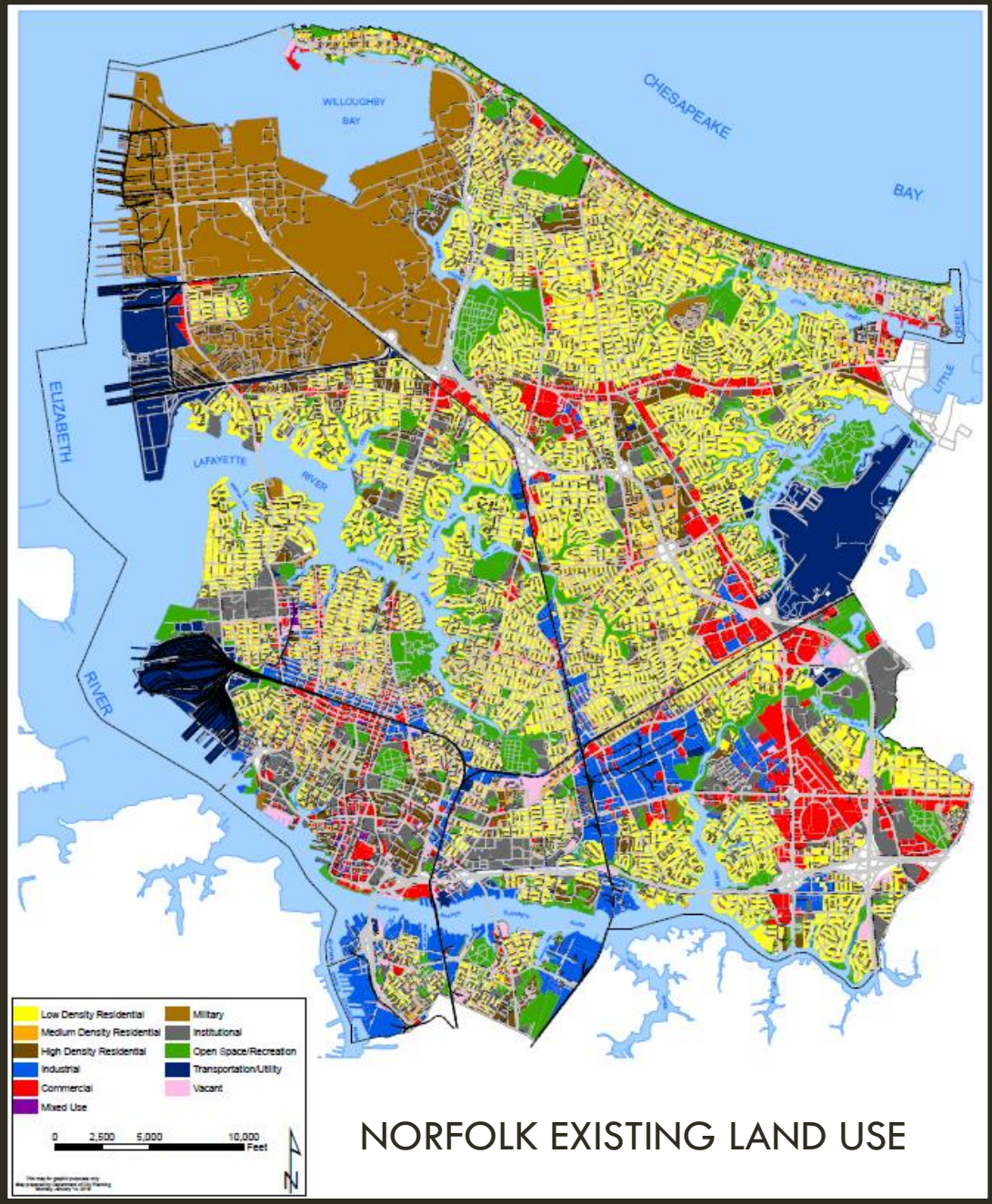
COMMONWEALTH PRESERVATION GROUP

HAMPTON UNIVERSITY ARCHITECTURE

Norfolk Historical Society

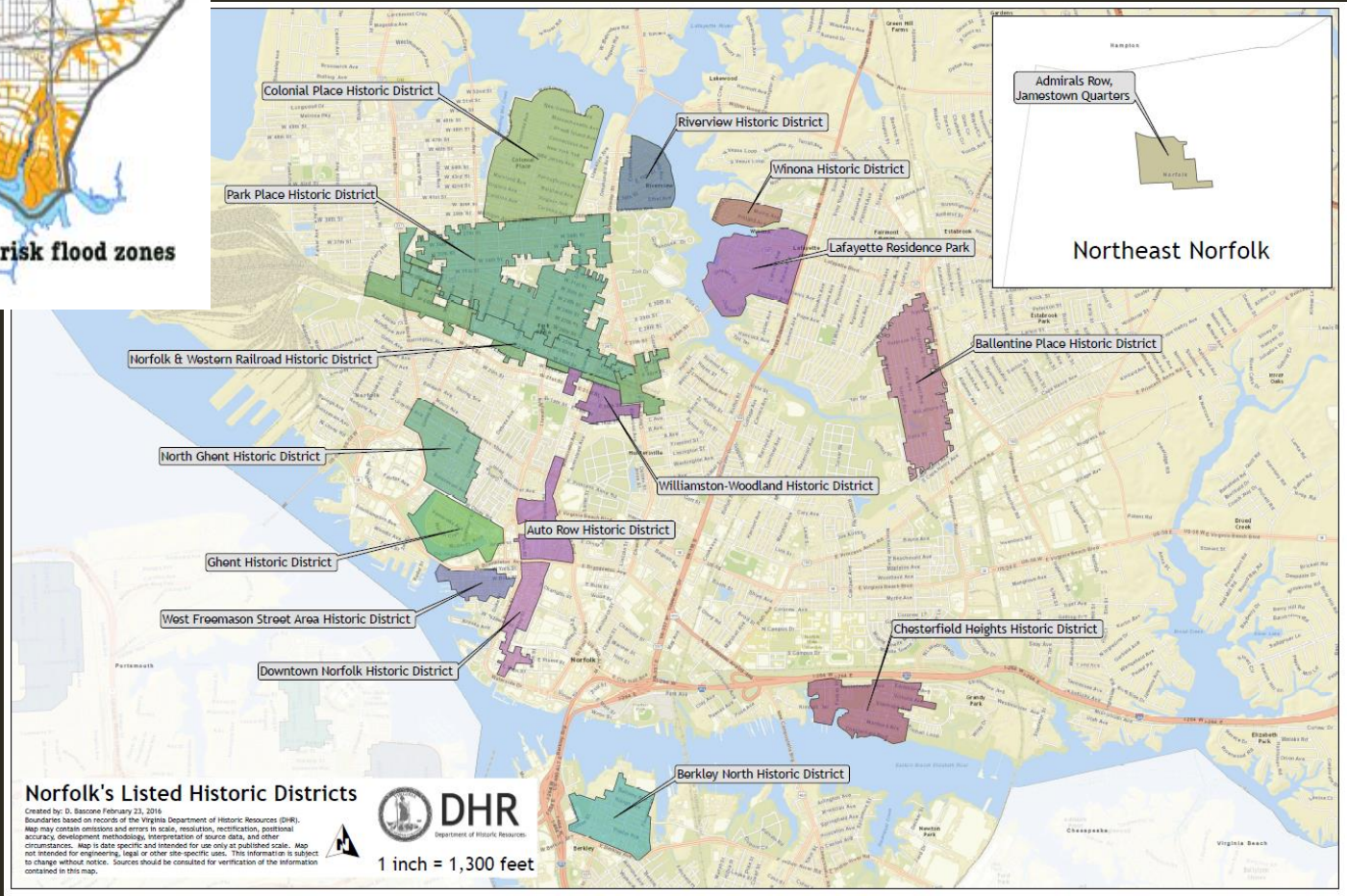
PROBLEM STATEMENT

- Example: Norfolk is 94% built out
- Built environment must adapt-in-place to increasing flood risk or retreat
- Coastal resiliency solutions (policy and regulatory) currently focused on new construction



NORFOLK EXISTING LAND USE

So then what will Norfolk look like in 80 years?



FEDERAL ROLE IN RISK REDUCTION

- FEMA acts as insurer of at-risk properties
- NFIP is established, reauthorized by Congress
- Establish 'standard acceptable practices' for risk reduction through eligibility for rate reduction
- Seeking better options; looking to others to demonstrate
- No perceived responsibility to identify best practices

FEMA

STATE ROLE IN RISK REDUCTION

As of September 4, 2019, any new construction or houses that need substantial improvements must be built to the same standards as ones in the highest-risk coastal areas. Norfolk has enforced this element of the 2015 building code since its adoption, while most other communities took advantage of a transition period allowed in the update.

LOCAL ROLE IN RISK REDUCTION

- Floodplain Manager must demonstrate FEMA's risk is reduced when approving building plans for structures in flood zones
- Limited to using FEMA-approved solutions and/or making subjective decisions without empirical data on efficacy of solutions
- Some FEMA guidance is not appropriate for older structures and can cause harm
- Localities are subject to FEMA audit of floodplain management program and NFIP participation restrictions

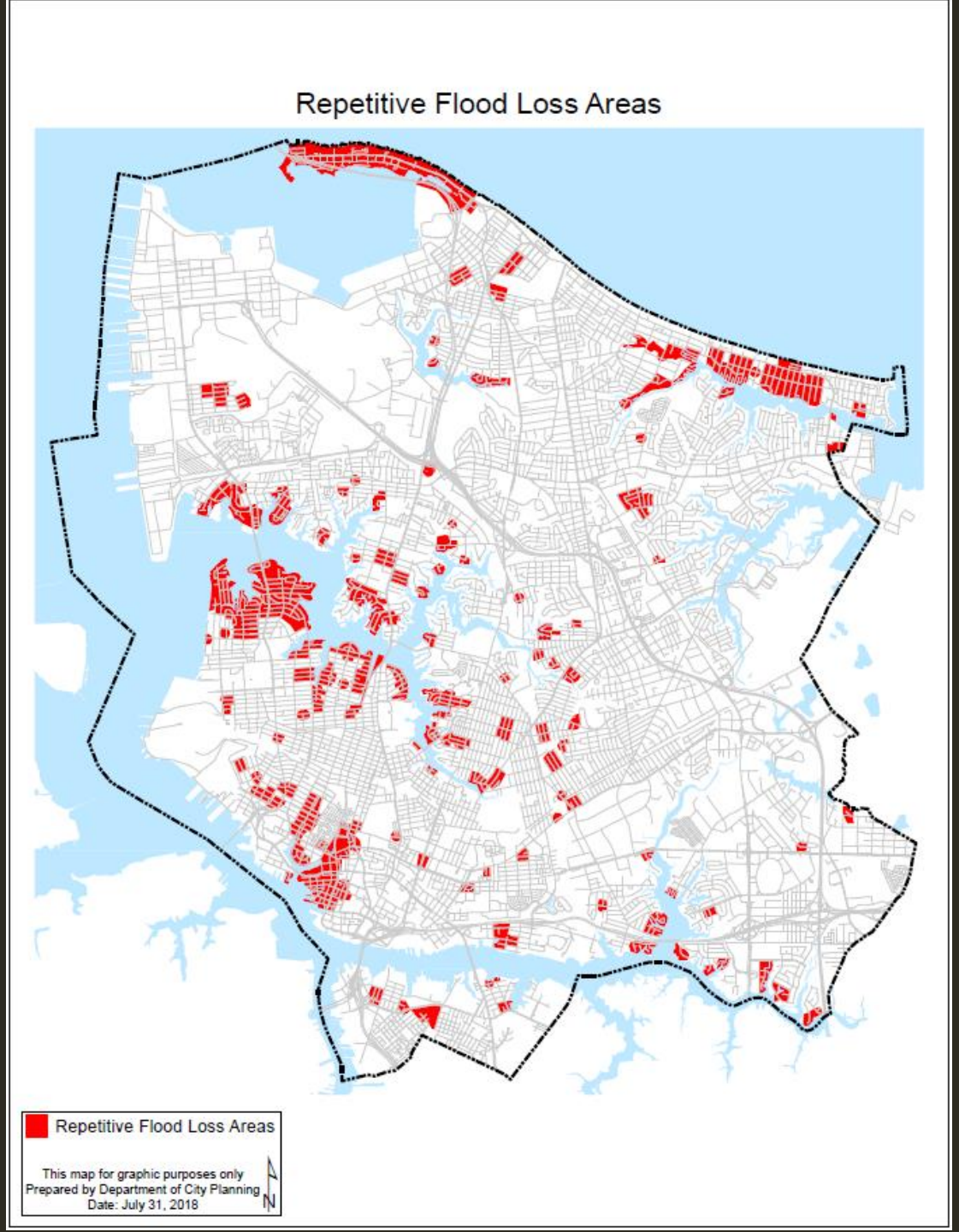
NO REGULATORY ENTITY IS USING DATA-DRIVEN SOLUTIONS FOR RETROFITTING THE BUILT ENVIRONMENT OR STEPPING UP TO PROVIDE THE DATA THAT IS NEEDED

REPETITIVE LOSS
SEVERE REPETITIVE LOSS

A **Repetitive Loss** (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance **Program**(NFIP) within any rolling ten-year period, since 1978.

Severe repetitive loss-As defined by the Flood Insurance Reform Act of 2004, SRLs are 1–4 family residences that have had four or more claims of more than $5,000 or at least two claims that cumulatively exceed the building's value.

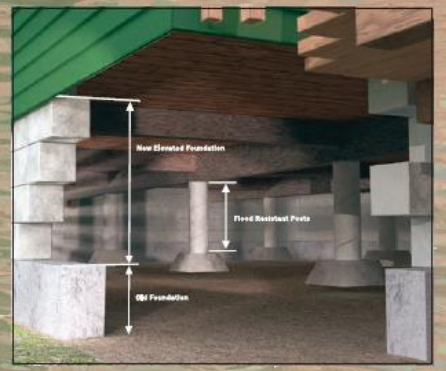
*There are currently 1000+properties in Norfolk which are classified in one of these two ways.

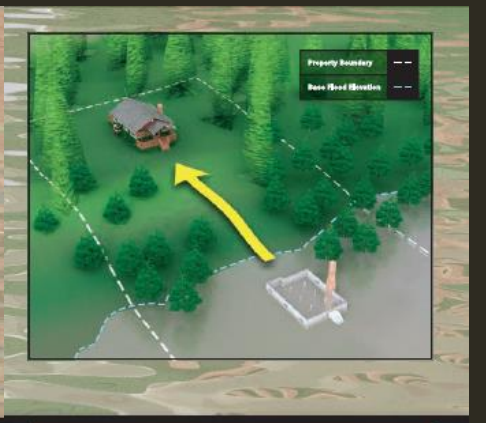


CURRENT OPTIONS FOR RL & SRL PROPERTY OWNERS

Raise or Raze?

FEMA RATE REDUCTION OPTIONS





Utilities

If you locate any machinery or equipment that services your building (i.e., electrical, heating, ventilation, plumbing, and air conditioning equipment) below the base flood elevation, an additional surcharge will be added to your insurance premium causing your annual insurance rates to increase. If your house was elevated to a safer level, maximize your savings and reduce your losses by relocating your machinery and equipment above the base flood elevation. Consider using your attic, an extra closet, or an elevated platform (as shown) to store utilities.

For more information on relocating utilities see FEMA publication 259: Engineering Principles and Practices of Retrofitting Floodprone Residential Structures

Flood Openings

One common reason why insurance policies are rated so severely is due to a lack of proper flood openings. IBC/IRC minimum building code requirements for "foundation vents" in areas outside the floodplain may not meet the same specifications as "flood openings" or "flood vents" within a floodplain. For buildings in the floodplain, there must be at least two openings with 1 sq. inch of opening per sq ft of enclosed area, and the bottom of those openings can be no higher than 1 ft above the exterior finished grade. There are no discounts for "partial credit." If you have 1000 sq feet of enclosed crawlspace and 900 sq inches of openings, you will be charged as though there are no openings (i.e., basement loading fees could apply). Don't forget that garage doors, windows, and doors do not count as flood openings unless they have openings installed within them.

For more information on flood openings, see FEMA Technical Bulletin 1-93

Basements

Unless explicitly authorized, basements in new buildings constructed in the floodplain are prohibited. FEMA considers "crawlspaces" that are sub-grade on all sides to be basements as well. If your community has adopted building standards that allows such construction, homeowners in the floodplain with an excavated subgrade crawlspace will bear an additional financial burden through a 15-20% increase on their flood insurance premiums. When building, you can save that cost by backfilling any excavated areas within the foundation. It can also be done at a later date by using pea-gravel or other suitable material to raise the interior crawlspace floor elevation to the same height or higher than the exterior finished grade.

For more information on basements, see FEMA Technical Bulletin 11-01

Elevation

Elevating above the base flood elevation is the fastest way to reduce the cost of your annual flood insurance premium. You can save hundreds of dollars for every foot the elevated floor is located above your community's established base flood elevation. Elevating just one foot above the base flood elevation often results in a 30% reduction in annual premiums. A homeowner with an elevated home, like the one shown on this poster with its first floor elevated 3 feet above the base flood elevation, can expect to save 60% or more on annual flood insurance premiums.

For more information on elevation, see FEMA Technical Bulletin 2-93

Relocation

One of the most effective options is relocating your home on an area of your property that has its natural grade above the base flood elevation. This method may be costly, but can reduce or eliminate the need to pay flood insurance entirely. If you are preparing to build a new home or structure, evaluate your property to determine if there is a suitable building area outside of the floodplain. Be warned; homes constructed outside the floodplain (or on natural ground above the base flood elevation) are not 100% safe from flooding. On average, between 20-25% of all flood insurance claim payouts go to buildings that are located outside of the special flood hazard area. If your home is located outside the floodplain and you still want to be covered, affordable "Preferred Risk" policies are available.

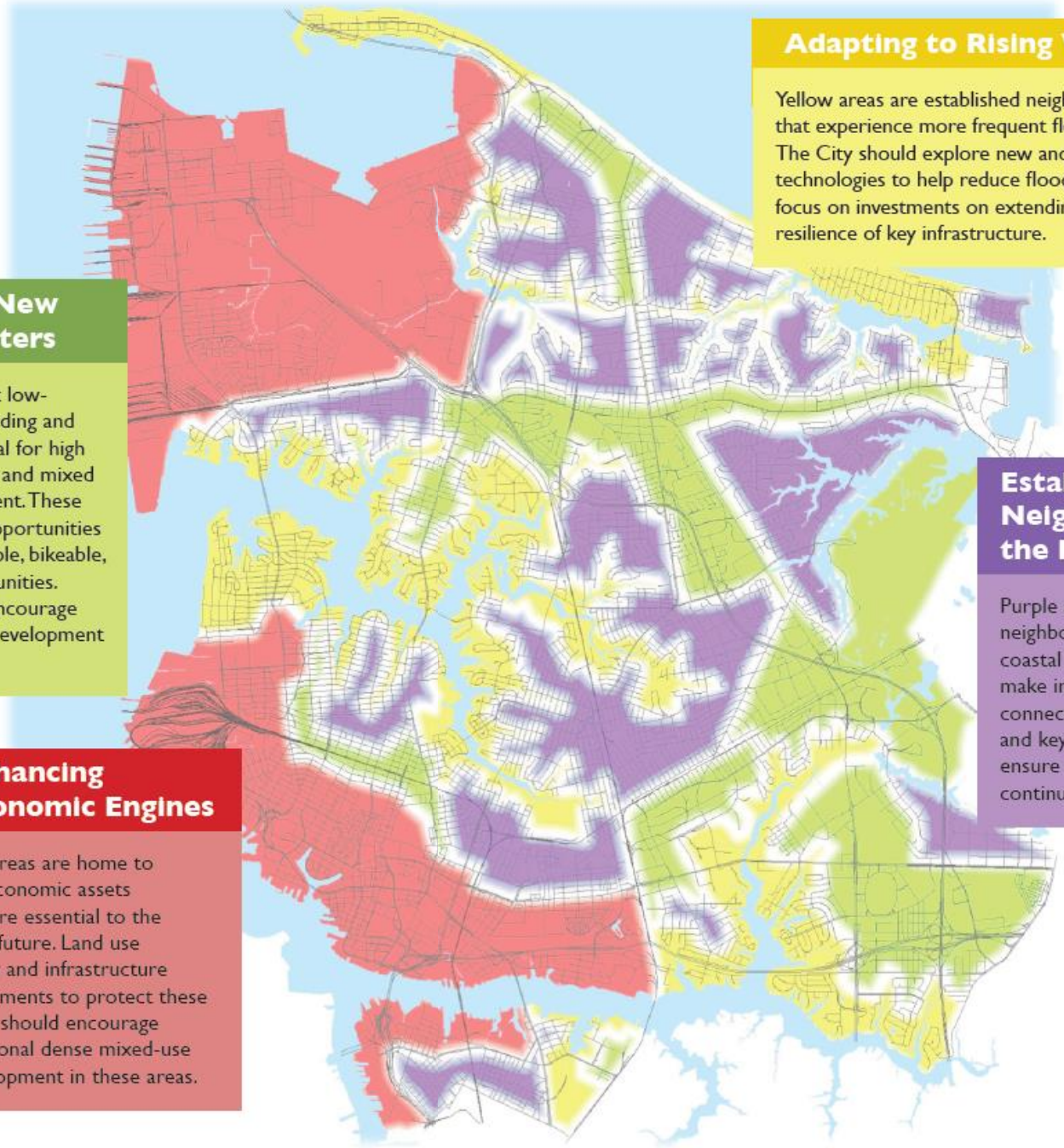
For more information on relocation, see FEMA Techni-

THE LOCAL LANDSCAPE

- Vision 2100 Plan
- Movement away from allocating FEMA grants to home elevation
- Tracking economic, planning and quality of life impacts
- Uncertainty about best practices
  - Lack of guidance for retrofits
  - FEMA oversight via audits (after the fact)
  - Often point of first engagement for distressed property owners

Designing the Coastal Community of the Future

By working with residents, the City of Norfolk is building a long-term strategy to address the flooding challenges due to sea level rise. How we use land today helps ensure the opportunity that Norfolk will be a dynamic, water-based community into the next century.



Adapting to Rising Waters

Yellow areas are established neighborhoods that experience more frequent flooding. The City should explore new and innovative technologies to help reduce flood risk and focus on investments on extending the resilience of key infrastructure.

Designing New Urban Centers

Green areas are at low-risk of coastal flooding and have great potential for high density, mixed-use and mixed income development. These areas are prime opportunities for creating walkable, bikeable, transit-rich communities. The City should encourage transformational development in these areas.

Establishing Neighborhoods of the Future

Purple areas are established neighborhoods at less-risk of coastal flooding. The City should make investments that improve connections between these areas and key economic assets to ensure that these neighborhoods continue to thrive.

Enhancing Economic Engines

Red areas are home to key economic assets that are essential to the city's future. Land use policy and infrastructure investments to protect these areas should encourage additional dense mixed-use development in these areas.

VISION AREAS

Vision 2100 divides the City into four vision areas and provides a set of goals and actions for each (beginning on page 24). The best way to understand the distinction between the four vision areas is to imagine their placement on two competing axes: a vertical axis representing the number of key citywide assets in the present or future and a horizontal axis representing the risk presented by sea level rise or other recurrent flooding risks. The strategy set forth for each vision area is intended to respond to the unique challenges brought about by the unique set of circumstances in each.

HOW BIG IS THIS PROBLEM?

In Norfolk alone….

3,260 NFIP claims since 1986

2,002 of those have occurred since 2009

HOW BIG IS THIS PROBLEM?

Realtors are refusing listings in hard to sell areas.

Some impose mandatory price reductions for properties with high insurance rates.

No mandatory disclosure means protected properties are losing value because appraisers can not account for flood risk.

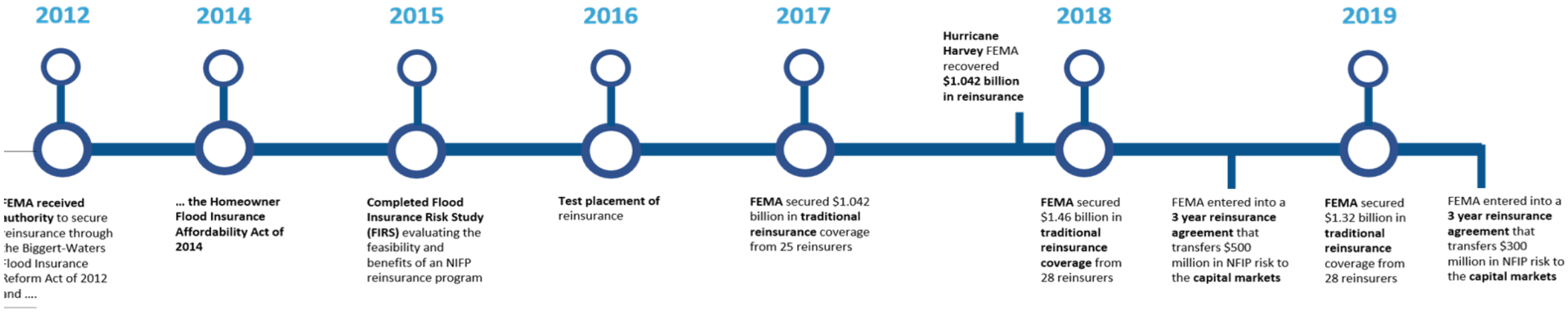
POLICY EVOLUTION

FEMA Risk 2.0 - Site specific risk assessment for flood insurance rates

- Will become effective Oct 2021
- No apparent guidance/process to evaluate

NPS Releases Guidelines on Flood Adaptation for Rehabilitating Historic Buildings

- November 2019
- Incorporates recommendations to evaluate retrofits
- Informed by recent CERL testing of FEMA endorsed retrofits



THE OPPORTUNITY

First opening in policy to reset conversation

- What is the site specific history?
- What is the site specific risk?
- What is the site specific damage?
- What is the goal/capacity of the property owner?
  - Full scale solution
  - Incremental improvement
  - Managed retreat

What is the site specific solution?

THE GAP

Largest group of affected properties are:

- Pre-1970
- Suffer from recurrent, inconvenient water intrusion
- Don't warrant elevation
- Don't benefit from rate reduction measures

Lack of dedicated testing facility to evaluate effectiveness of retrofits (FEMA required or alternative)

A SOLUTION?

LOOK AT THE BUILDING AND SITE

TABLE OF CONTENTS

I. PROPERTY INFORMATION

Figure 1: Parcel Map Parcel 1 Map. Source: Norfolk AIR v2.1, 2019.

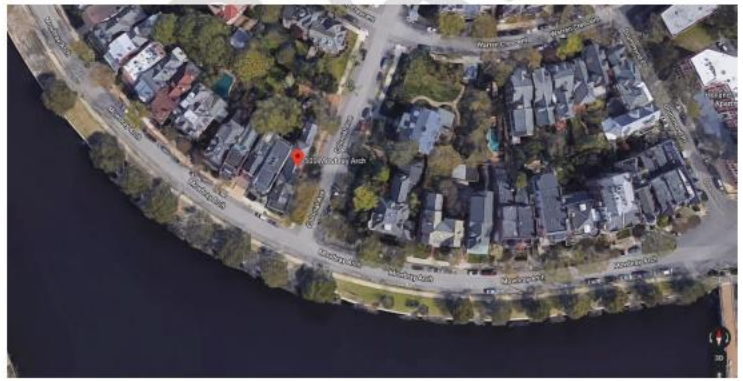


Figure 2: Aerial Photo. Source: Google Maps, 2019.

C. Photos (if available)

V. Sea Level Rise Projection Scenario Mapping (ADAPT VA)

VI. Flood Elevation Certificate (if available)

VII. FEMA NFIP Paid Loss History Report (official by property owner request)

II. EXISITING CONDITIONS

A. Property Owner Concerns and Field Observations

The property owner states that the basement (both finished and unfinished portions?) has a history of flooding. There is salt water intrusion in the foundation/basement on the east elevation and fresh water intrusion in the foundation/basement on the west elevation. The ion of the mortar on the east elevation has become progressively worse over time.

vations: The façade foundation/basement wall has foundation vents. t elevation, the exterior bricks and mortar at the foundation/basement beneath the nporch have cracked, some bricks exhibit a white discoloration, and the mortar is g in some areas; the bricks at the foundation/basement north of the enclosed spalling and the mortar is disintegrating in various locations. The west side yard t side yard of the adjacent property along the majority of the west elevation, from perty line to a side yard gate, is entirely covered with a concrete pad, which foundation to foundation and is slightly graded to a center channel. The roof along the west elevation are directed vertically into the ground through the at the foundation. A PVC condensation drain pipe from the roof? was observed to onto the concrete pad at the foundation and was observed to be pooling and ure at the foundation. A PVC condensation drain pipe observed at the neighbor's ement was also draining onto the concrete pad with condensate moving through nel primarily south to north and pooling between the two houses. The verge the neighbor's house and extending onto a portion of the verge in front of the is comprised of stone pavers and exhibits limited perviousness. On the east terior bricks at the foundation/basement at the entrance area exhibit a white e roof drain gutters along the east foundation are connected to plastic ubing that is buried in the mulch beds with discharge directed to the sidewalk; discharge pipe is clogged with mulch. In July 2019, some of the brick pavers finished basement area appeared to be darker in color, indicating potential areas. The exterior masonry walls in the basement walls appear to have had a he past which has deteriorated over time. Along the walls throughout the nificant amount of brick dust. During a recent basement cleanout, the ected the brick dust in an effort to determine the overall volume.

en on 2/20/2019 and 6/27/2019. See Appendix A.

wner

rofits Completed

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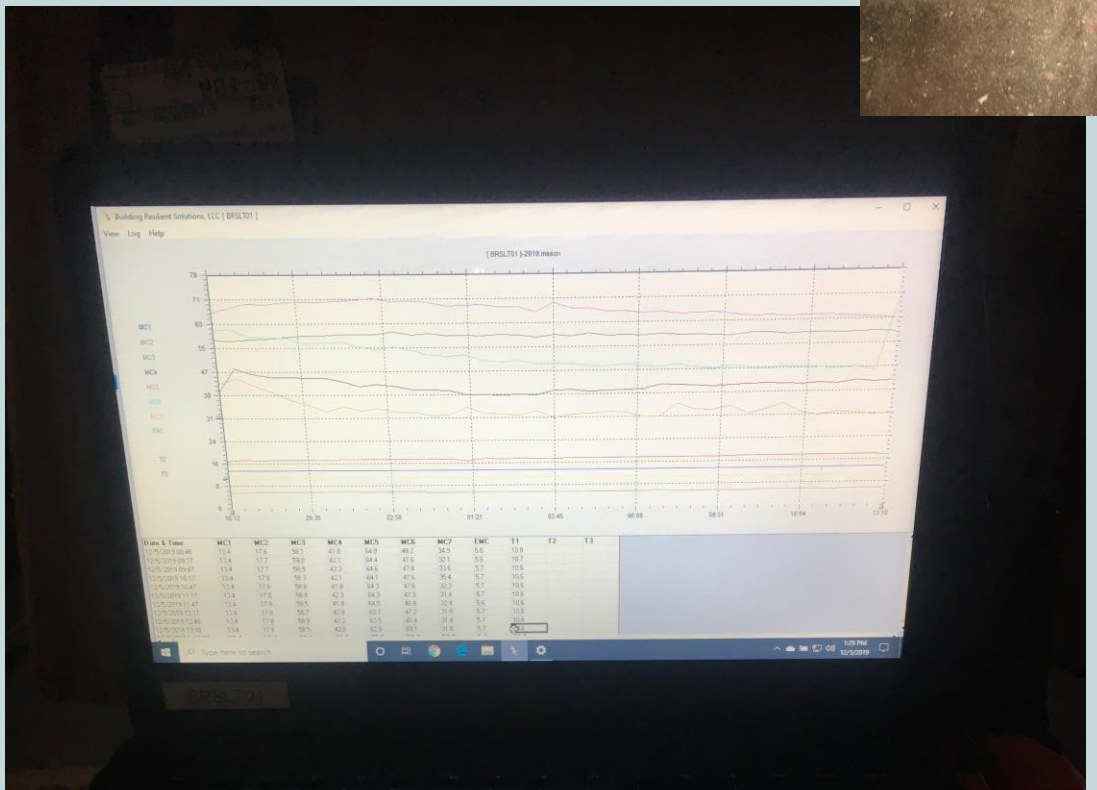
Collection and Analysis Report

Monitoring Period and Cost

A SOLUTION?

GATHER DATA



A SOLUTION?

GATHER DATA

Date	Time	MC1	MC2	MC3	MC4	MC5	MC6	MC7	EMC	T1
12/4/2019	18:12	13.4	16.6	57.5	40.3	66.4	60.9	43.1	5.5	11.3
12/4/2019	18:42	13.3	17.1	57.4	48.3	68.1	61.1	45.0	5.6	10.9
12/4/2019	19:12	13.4	17.0	57.7	46.4	69.3	58.6	42.6	5.7	10.9
12/5/2019	12:17	13.4	17.8	58.7	42.8	63.7	47.2	31.9	5.7	10.6
12/5/2019	12:48	13.4	17.8	58.9	42.2	63.5	46.4	31.4	5.7	10.6
12/5/2019	13:18	13.4	17.6	58.5	42.6	62.8	69.1	31.8	5.7	10.6
12/5/2019	13:48	13.4	17.5	59.1	42.6	67.6	66.2	45.9	5.7	10.6
12/5/2019	14:18	13.4	17.4	59.3	43.0	66.4	65.6	42.4	5.6	10.8

MC = Moisture Content Percentage

MC1 – top of wall on west side, approx 30’ from south end of house

MC2 – middle of the wall on west side

MC3 – 18 inches above floor on west side

MC4, 5– on Colonial Ave wall, top and bottom (no middle)

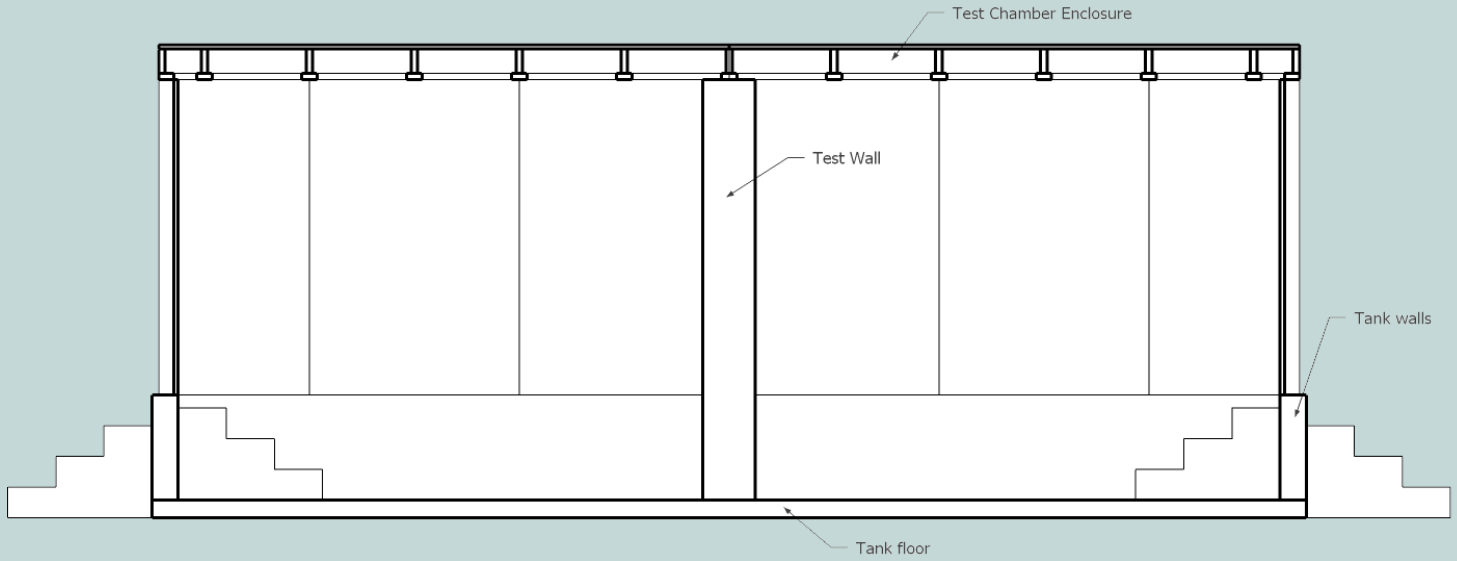
MC6, 7 – Hague side of demising wall, top and bottom, approx 16’ from south end of house

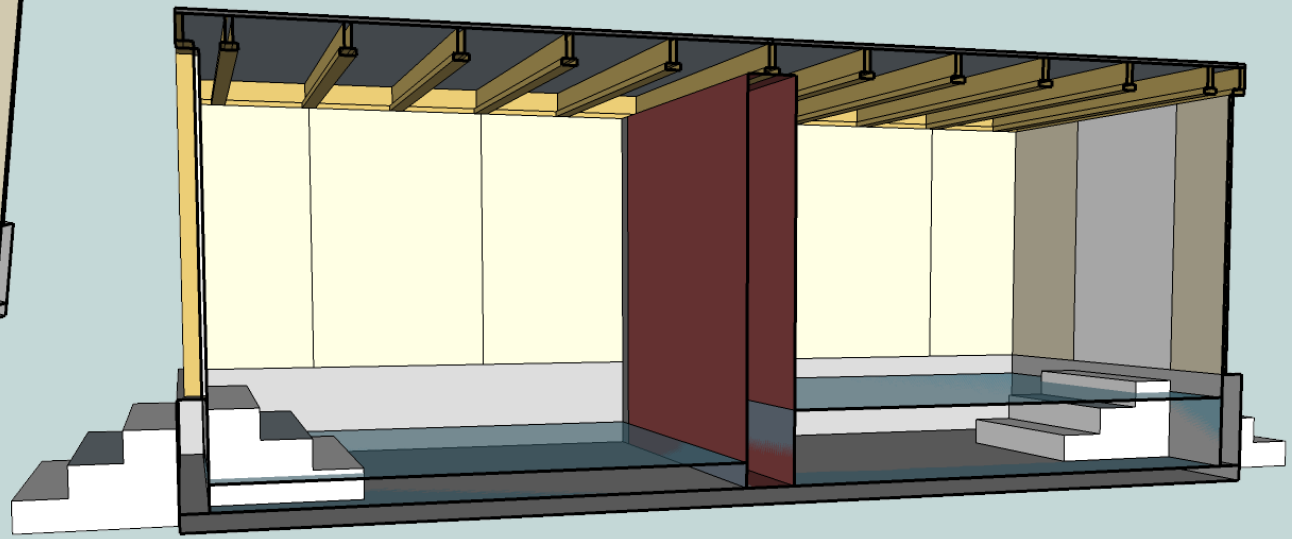
EMC = Relative Moisture Content (relationship of humidity, temperature and moisture content in probes)

T1 = Temperature Celsius (of masonry wall on the side that faces the adjacent house)

A SOLUTION?

CUSTOMIZE RETROFIT DESIGN & TEST IT





THE GOAL

Thoughtful, Informed
Retrofit Design