



Coffey Street, Red Hook, Brooklyn

RESILIENT INDUSTRY: WHAT IS IT?

2

HURRICANE SANDY

PRESIDENTIAL DISASTER
DECLARATION DR-4085

HAZARD MITIGATION
4085 GRANT PROGRAM

NYC

Project Team:

Jen Gravel, Director of Industry Studies

Michael Marrella, Director, Waterfront and Open Space

Ryan Jacobson, Assistant Urban Designer

Allan Zaretsky, Retail Resiliency Lead

Christopher Lee, Intern

GOALS AND OBJECTIVES OF TODAY'S MEETING

- **Explain the purpose and context of the study**
- **Clarify the role and expectations of the Technical Advisory Committee**
- **Explain how Hurricane Sandy affected New York City industry**
- **Present early findings from risk assessment and regulatory analysis**
- **Solicit feedback from the TAC on whether we're "getting it right"**

Kingsland Avenue on Newtown Creek, Brooklyn

GOALS: PROTECTING NEW YORK CITY’S INDUSTRY, RESIDENTS AND ENVIRONMENT



Reduce flood hazard for businesses, the environment, and residents in the city’s flood zones

Identify appropriate emergency preparedness guidelines for industrial businesses in the flood zone

Promote cost-effective *physical* strategies to protect businesses and the environment

Promote cost-effective *operational* strategies to protect businesses and the environment

Identify financial and insurance strategies to help industrial businesses become flood resilient

TECHNICAL ADVISORY COMMITTEE - WHAT'S YOUR ROLE?

- **Provide technical expertise and first-hand accounts of issues faced by industrial businesses in the flood plain**
- **Review analysis of current regulations affecting industrial businesses and buildings in the flood plain**
- **Advise the Project Team on best practices that address physical and operational resilience strategies**
- **Represent the interests of a broad group of stakeholders in the fields of industry and resiliency**
- **Provide the Project Team with additional stakeholders who can inform the study and its recommendations**
- **Provide feedback on the study's initial findings and recommendations**

11th Street, Hunter's Point, Queens

RESILIENT INDUSTRY TIMELINE



Specific Outcomes Are Expected of *Resilient Industry*

NYC HAZARD MITIGATION PLAN

***Resilient Industry* will identify recommendations that will be incorporated into the New York City Hazard Mitigation Plan**

CATALOG OF BEST PRACTICES

***Resilient Industry* will create materials summarizing targeted best operational and design practices for industrial businesses**

POLICY RECOMMENDATIONS

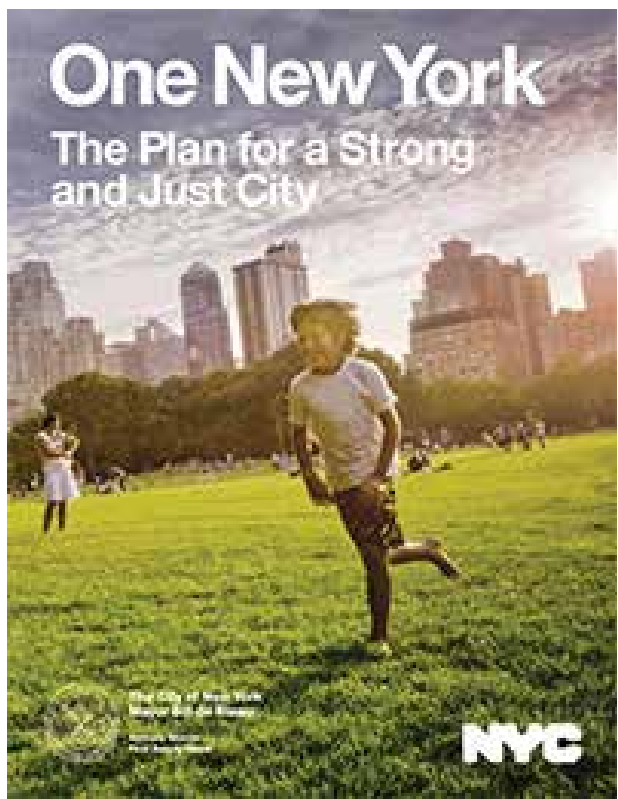
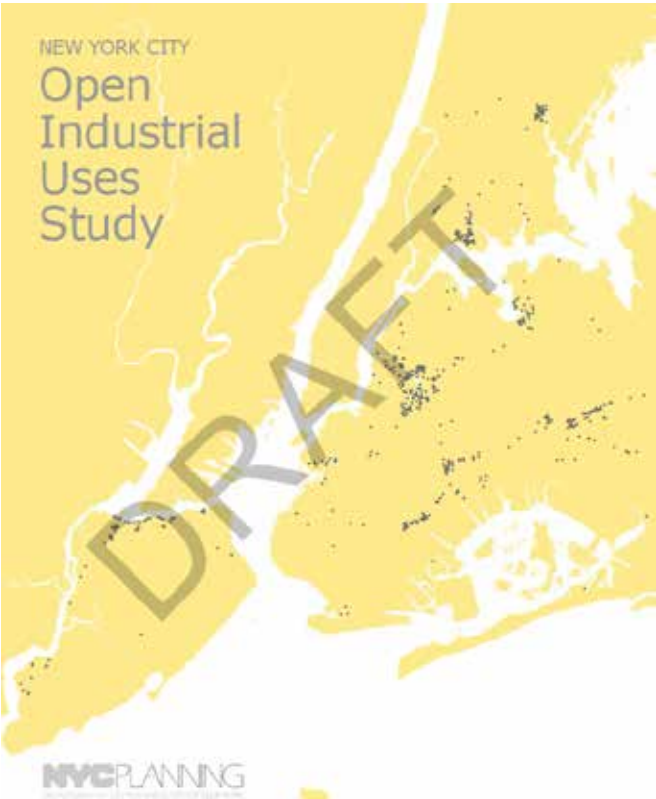
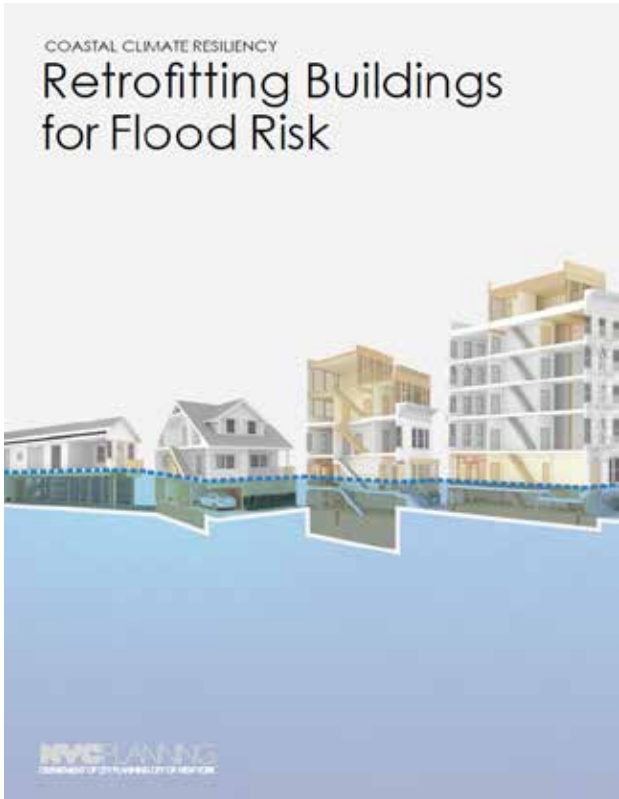
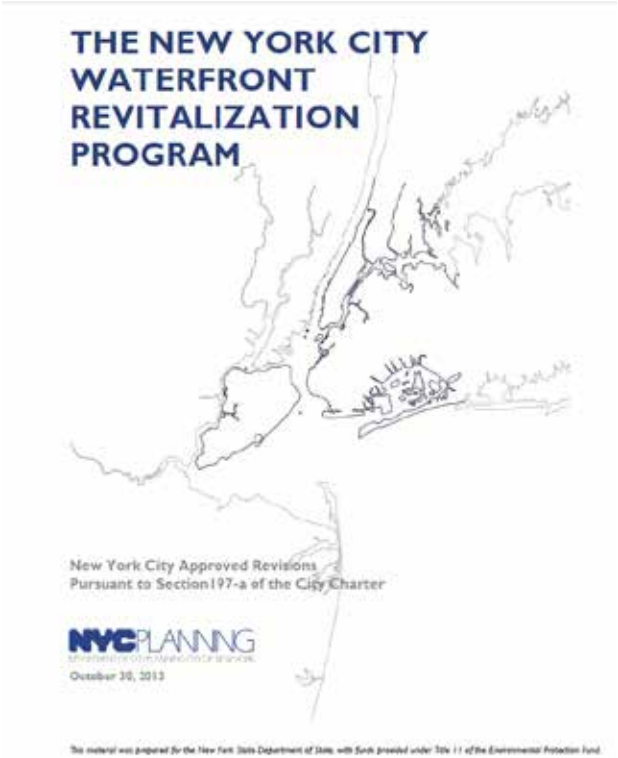
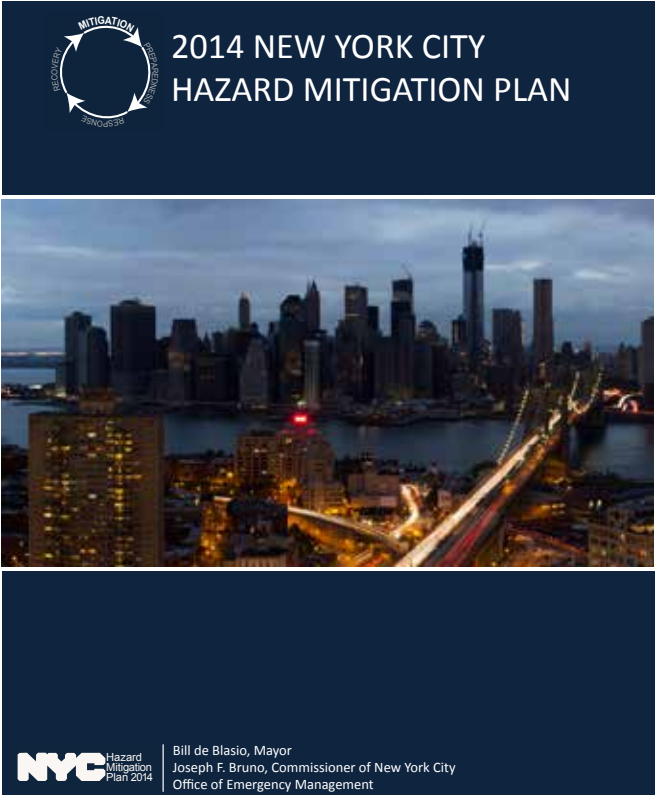
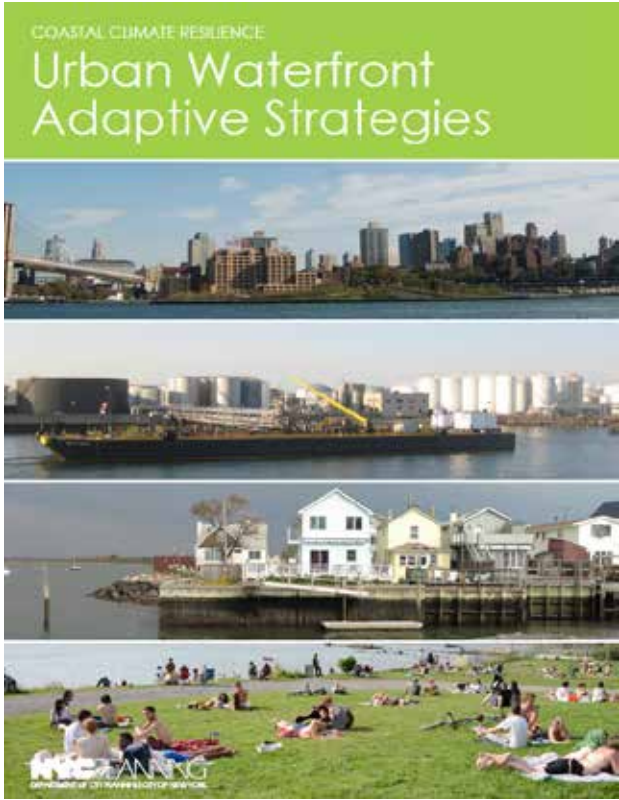
***Resilient Industry* will provide recommendations changes to city, state or federal policy, as needed**



RESILIENT INDUSTRY FITS WITHIN AN EXPANDING RESILIENCY PORTFOLIO

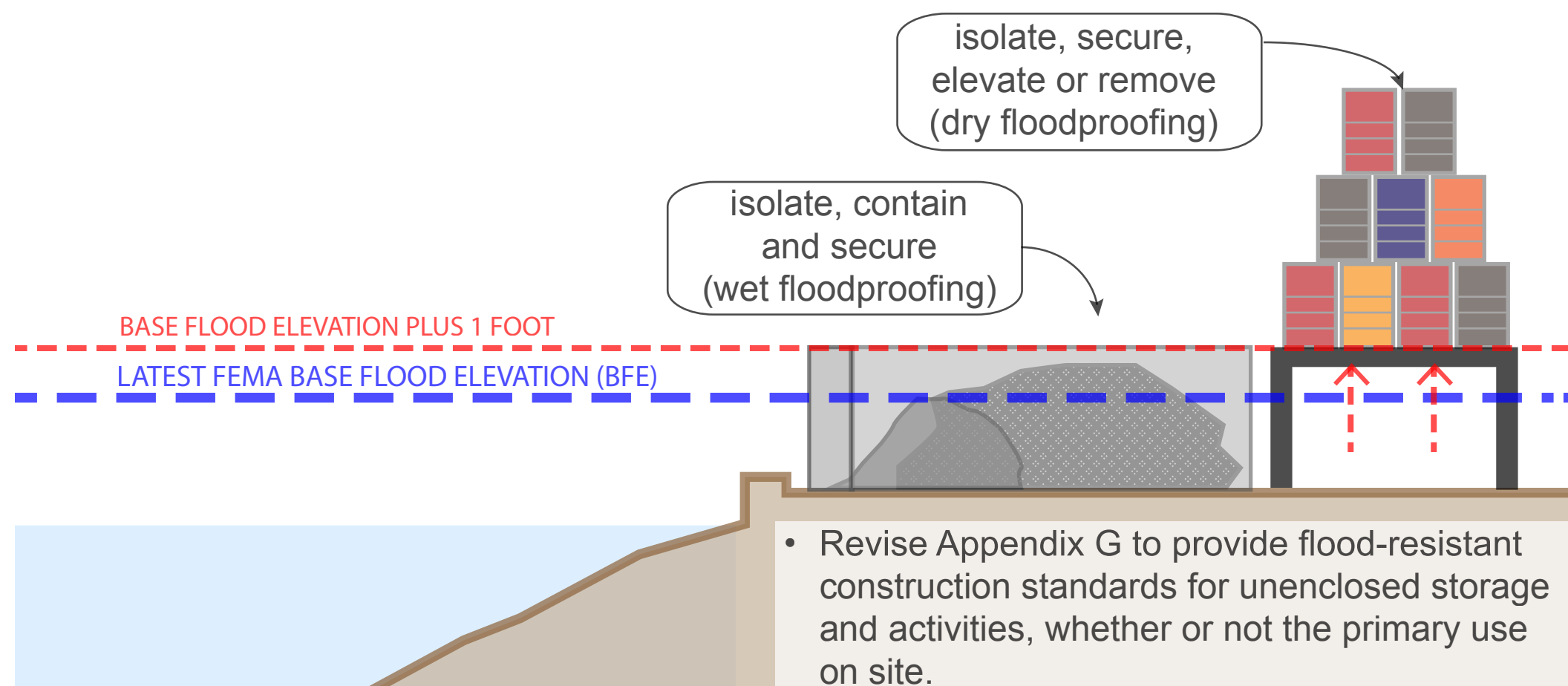
DCP Resilient Industry study (Ongoing)

DCP Resilient Retail study (Ongoing)



OPEN INDUSTRIAL USES ADDRESSED A NARROWER SCOPE OF USES AND ISSUES

- Focused specifically on *unenclosed* industrial uses; did not address buildings
- Recommendations included site design standards and flood protection
- Geographic applicability was not limited to the flood zone.
- Implementation of recommendations subject to ongoing MS4 permit coordination

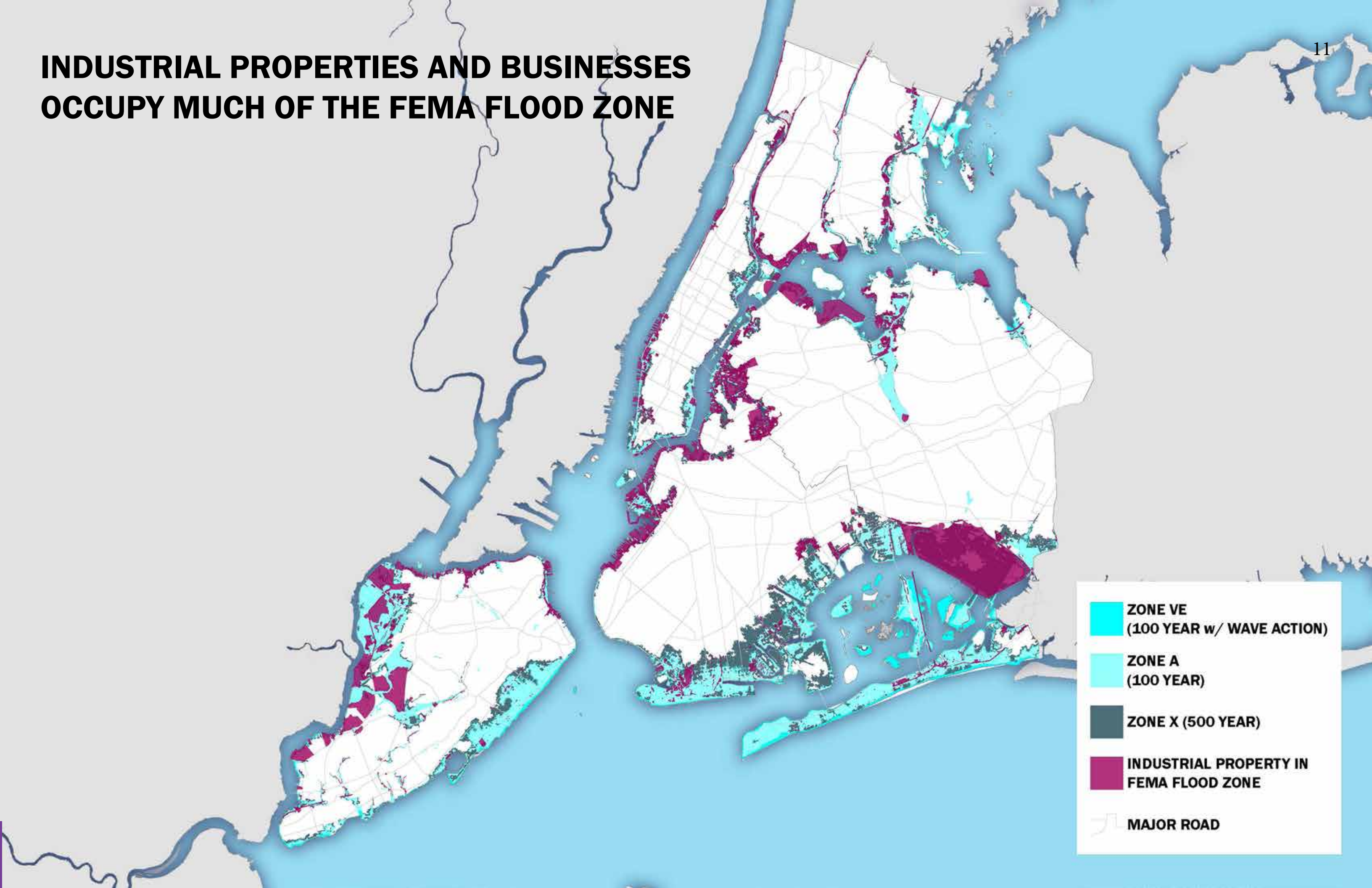


STUDY FOCUSES ON UNIQUE CHALLENGES OF SPECIFIC INDUSTRIAL ACTIVITIES

- **Manufacturing**
 - Food
 - Metal
 - Apparel
 - Printing
- **Construction**
 - Contractors
 - Engineering
- **Information**
 - Telecommunications
 - Film/Sound Recording
- **Retail Trade**
 - Gas Stations
 - Auto sales and repair
- **Wholesale Trade**
 - Durable
 - Nondurable
- **Transportation/Warehousing**
 - Couriers
 - Transportation Support
 - Transit and Ground Transportation
- **Other**
 - Repair/Maintenance
- **Admin, etc.**
 - Waste Mgmt.
- **Utilities**

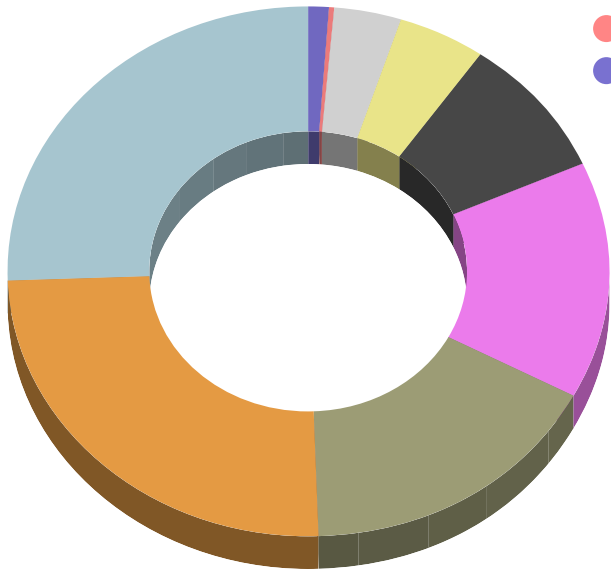


INDUSTRIAL PROPERTIES AND BUSINESSES OCCUPY MUCH OF THE FEMA FLOOD ZONE

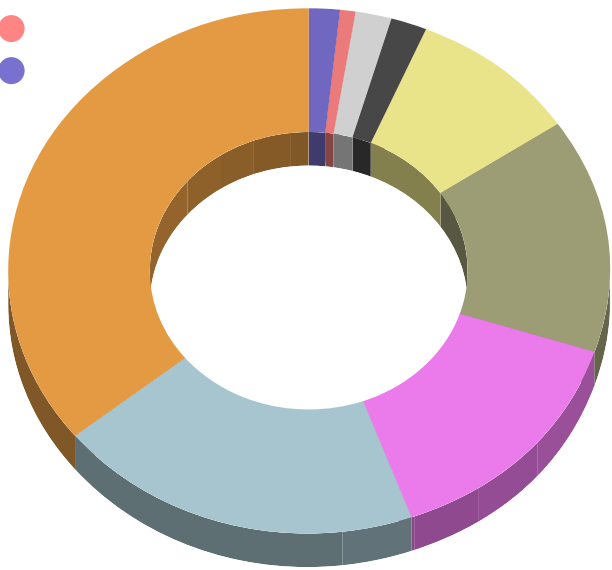


DIVERSE INDUSTRY WITH A CONCENTRATION OF TRANSPORTATION & WAREHOUSING

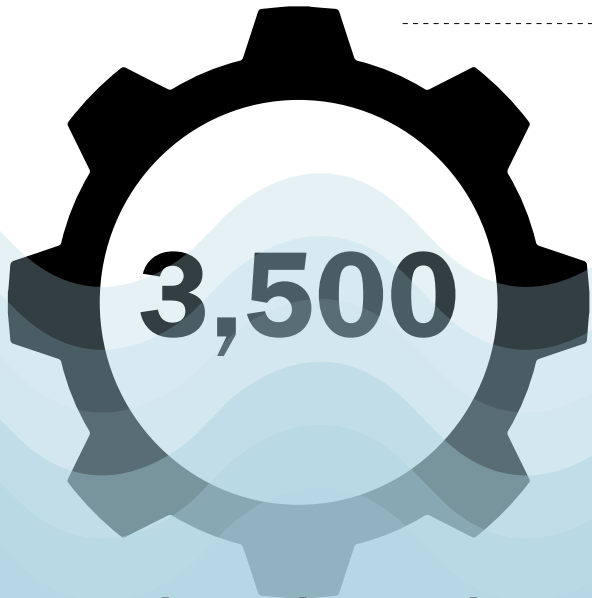
Industrial businesses in the FEMA Flood Zone



Industrial jobs in the FEMA Flood Zone



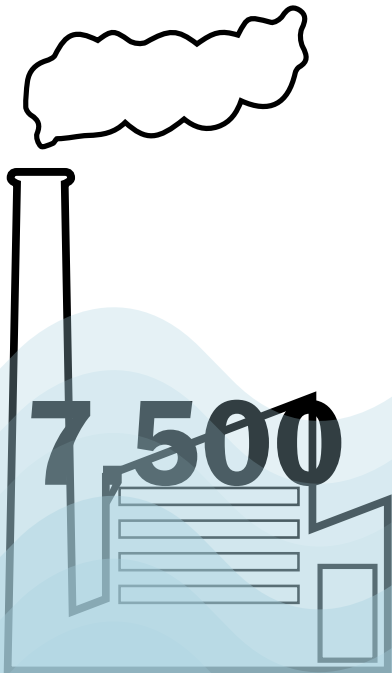
27.4%	Wholesale Trade	15.5%
20.3%	Transportation and Warehousing	50.9%
19.6%	Construction	13.8%
17.1%	Manufacturing	12.4%
7.2%	Other Services	1.4%
4.2%	Film/Audio Production	2.2%
2.4%	Gas Staion/Auto Repair	0.8%
0.6%	Utilities	1.6%
1.3%	Administrative, Support, Waste Management and Remediation Services	1.5%




Industrial businesses in the FEMA flood zone



Industrial jobs in the FEMA flood zone



Industrial buildings in the FEMA flood zone

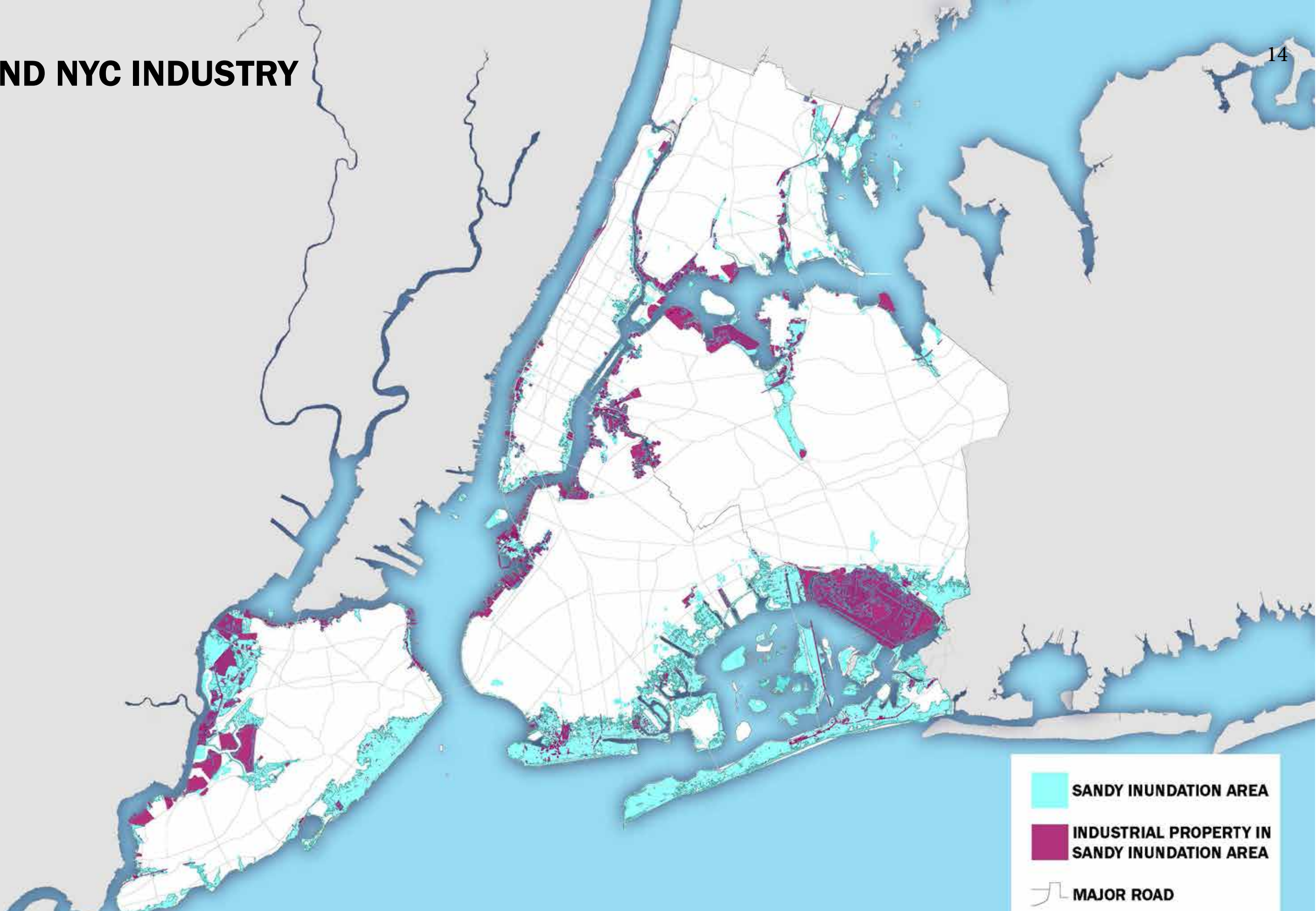
An aerial photograph of a large, swirling hurricane over the ocean, with a dark eye and dense, white clouds. The image is slightly faded to allow the text to be prominent.

HURRICANE SANDY

AND

NEW YORK CITY INDUSTRY

SANDY AND NYC INDUSTRY



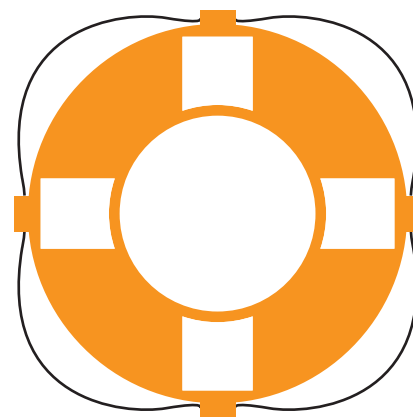
KEY VULNERABILITIES



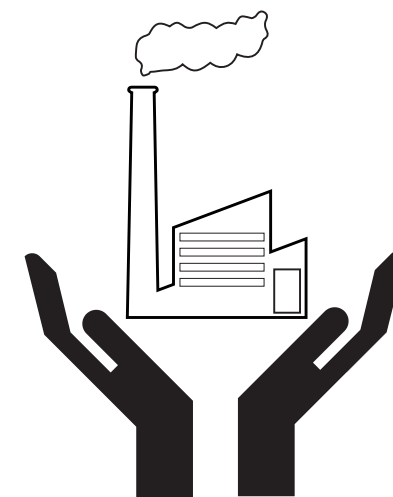
**ECONOMIC
SECURITY**



**PUBLIC
SAFETY
AND
ENVIRONMENTAL
PROTECTION**



**BUSINESS
CONTINUITY**



**PROPERTY
AND
CONTENTS
LOSS**



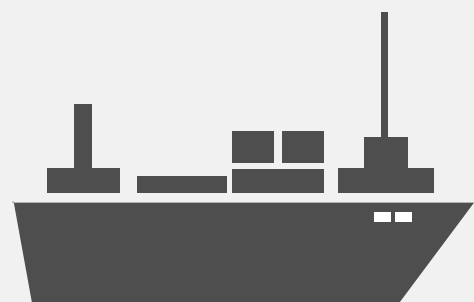
ECONOMIC SECURITY

16

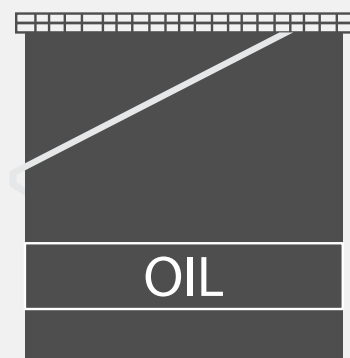
In the Sandy Inundation Area there were...



369 Food
Distribution
Businesses with **6,510**
Jobs

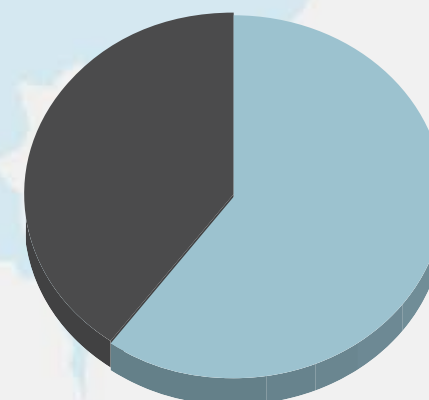


411
Transportation
Support
Businesses with **5,903**
Jobs



8 Fuel
distribution
Facilities out of **40**
citywide

60% of NYC's food
is distributed from
Hunt's Point





PUBLIC SAFETY AND ENVIRONMENTAL PROTECTION

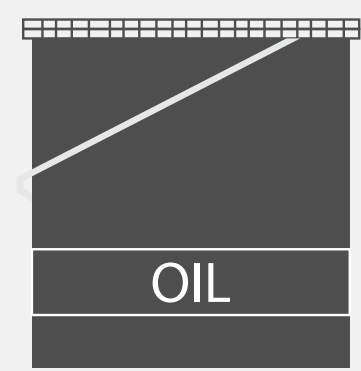
In the Sandy Inundation Area there were...



1,484 Facilities with reportable levels of toxic material in DEP's CFID

....>

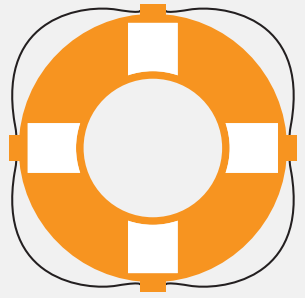
Out of which, ~250 spills were reported to DEP and DEC



8 Fuel distribution Facilities



1,186 Parking Facilities



BUSINESS CONTINUITY

In the Sandy Inundation Area there were...



600,000
customers who lost
power



**Many instances of
businesses losing
records and computers**





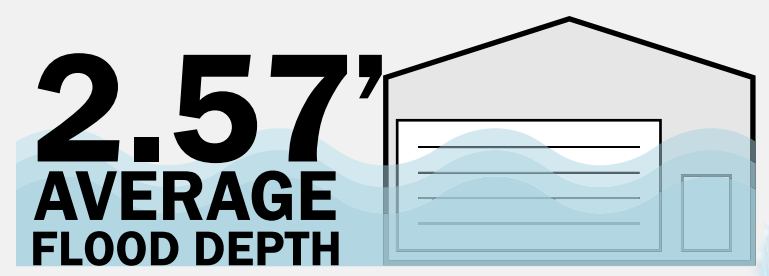
PROPERTY AND CONTENTS LOSS

In the Sandy Inundation Area there were...

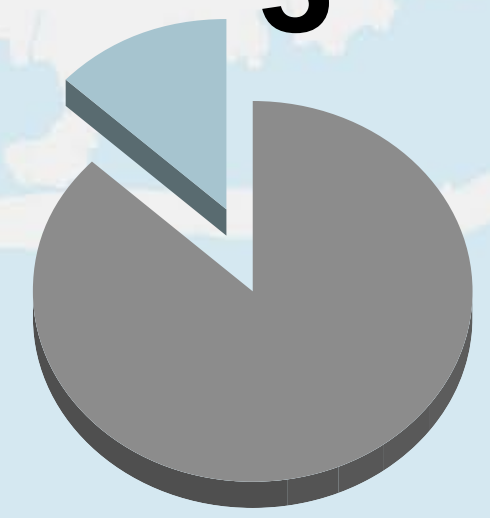


5,543 Industrial Buildings

Out of which, **92%** were built before **1983** (when floodplain regulations were adopted in NYC)
Average year of construction = **1940**



13% of flooded industrial buildings had flood depths greater than **5'**





THE SANDY RESPONSE

HURRICANE SANDY RESPONSE

IN-STORM

POST-STORM

RECOVERY

PRIVATE

Staff on-site

Staff on-site

Emergency Management Plan

Private Flood Insurance
Capital Investments

PUBLIC

DOB Building Placard Initiative

SBA Disaster Recovery Assistance Program
SBS Business Loan and Grant Program
NFIP Flood Insurance

DOB Building Placard Initiative

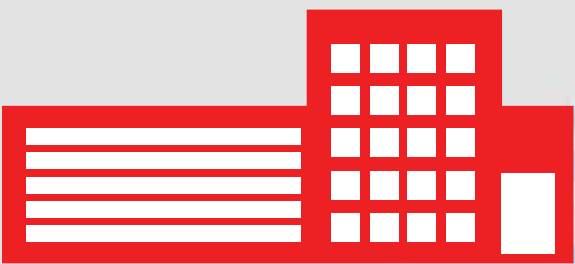
1,130 Industrial Buildings were tagged after Sandy



1,056 Green Tags
Affected, Little Evident Damage



66 Yellow Tags
Non-Structural Damage



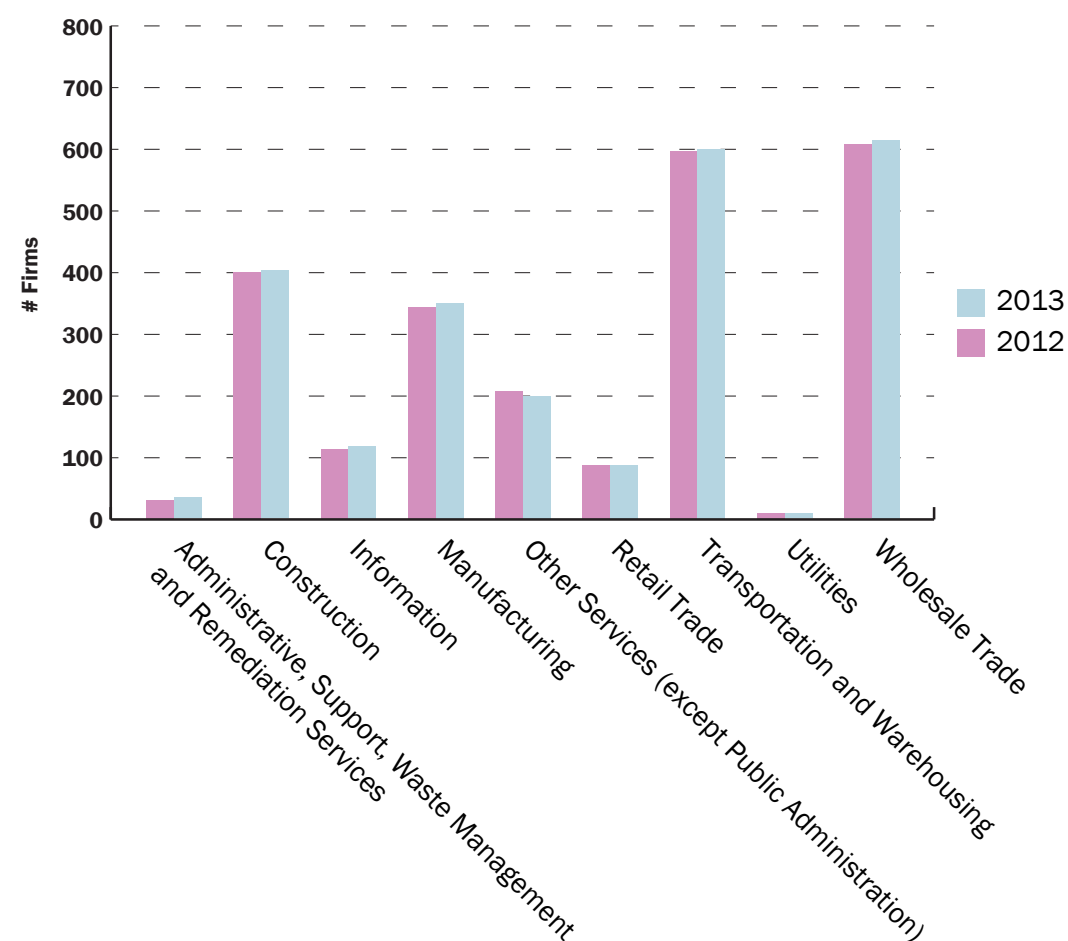
8 Red Tags
Seriously Damaged

• 1 Dot = 1 Building Tag

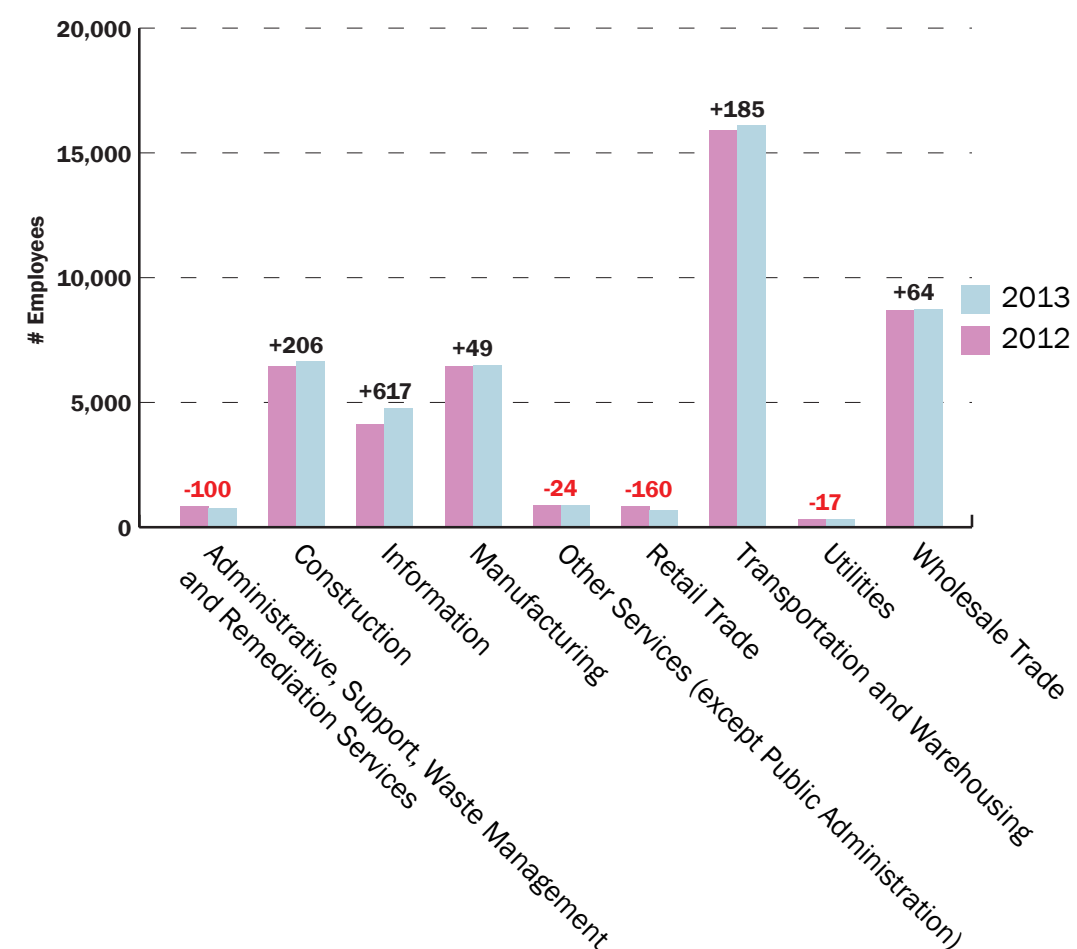
SLIGHT GROWTH IN SANDY-AFFECTED INDUSTRIAL AREAS

- Employment in the Sandy inundation area has remained steady
- The largest gains have been in Construction, with an increase of 440 jobs
- The largest losses have been in retail gas stations/auto repair, with a decrease of 160

Industrial firm growth, 2012-2013

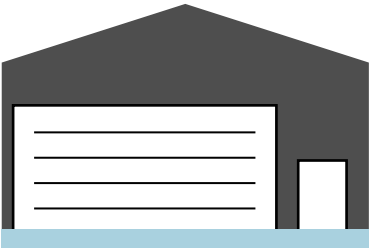
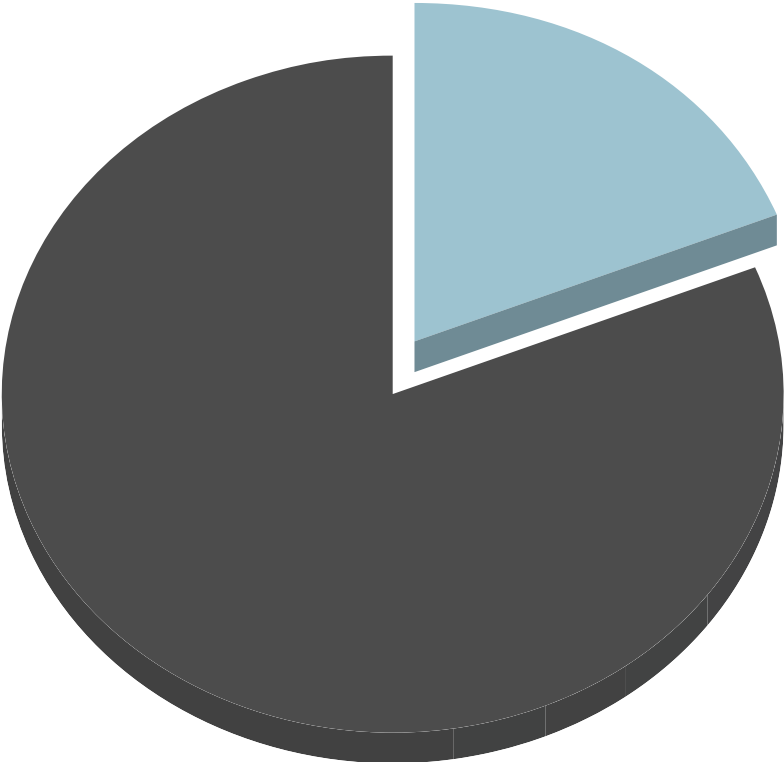


Industrial job growth, 2012-2013



INSURANCE TAKE-UP

Only 19 % of commercial and industrial businesses in the flood zone had flood insurance



Only 5-10 % of small businesses



Only 9 % of transportation and utility businesses

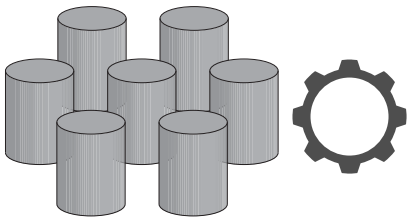
FLOOD INSURANCE LIMITS

NFIP

Low limits often leave coverage shortfalls



Only \$500K for buildings



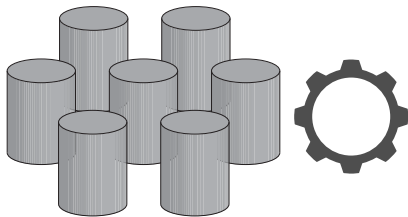
Only \$500K for contents

PRIVATE

Higher limits, but premiums often cost-prohibitive

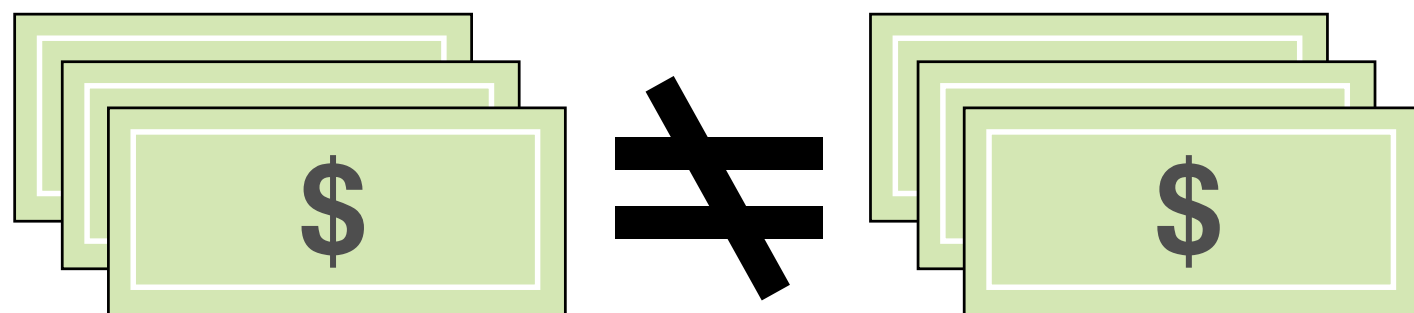


Up to \$4-\$5 M for buildings



Up to \$1M for contents

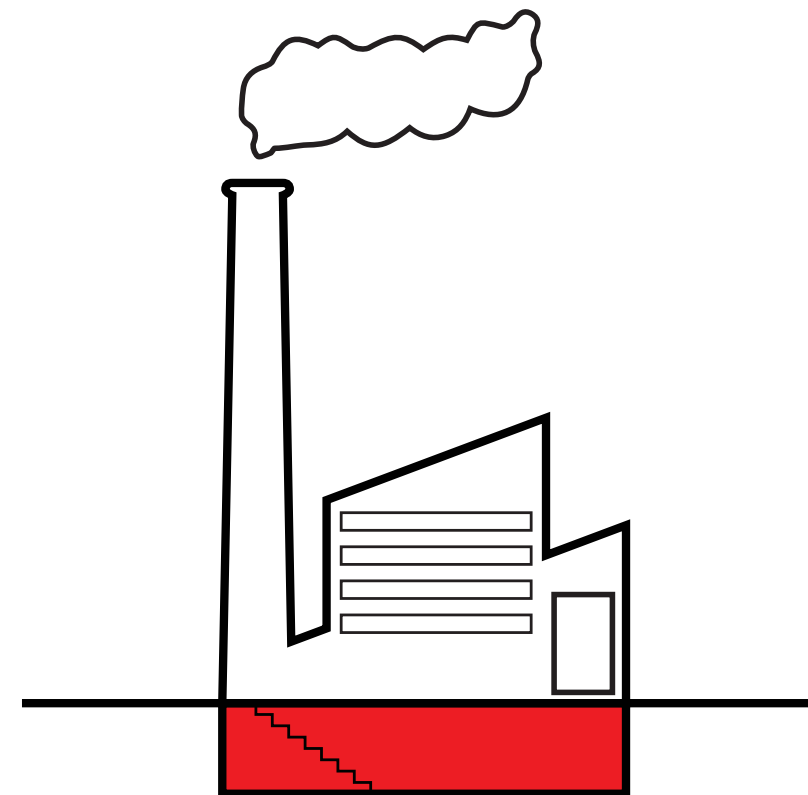
INSURANCE GAPS



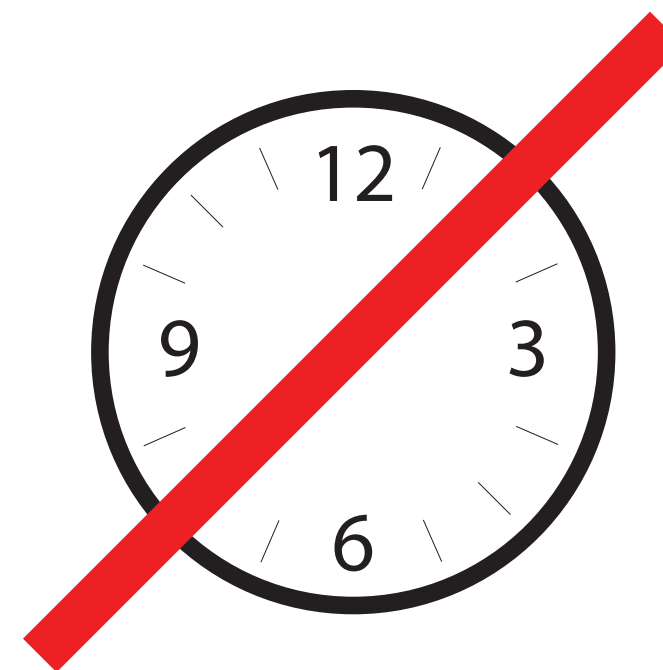
Actual cash value policies obscure true replacement costs



Shortage of adjusters with knowledge of NYC market



Basements not covered

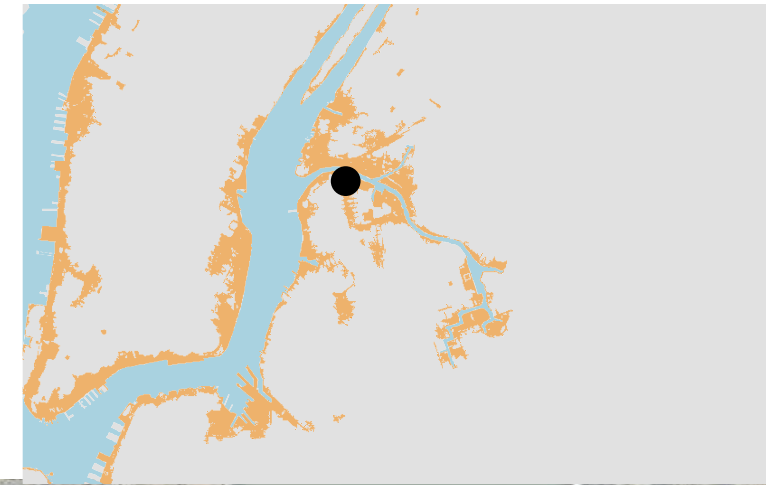


Business Interruption
not covered

CASE STUDY: UNITED METRO ENERGY IN GREENPOINT

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Prep and Recovery Profile



- Staff on site with evacuation plan
- NFIP Insurance
- EPA-required Spill Prevention, Control and Countermeasure Plan
- Newly constructed bulkhead
- Spill contractor scheduled pre-storm

CASE STUDY: JETRO IN OAK POINT

Prep and Recovery Profile

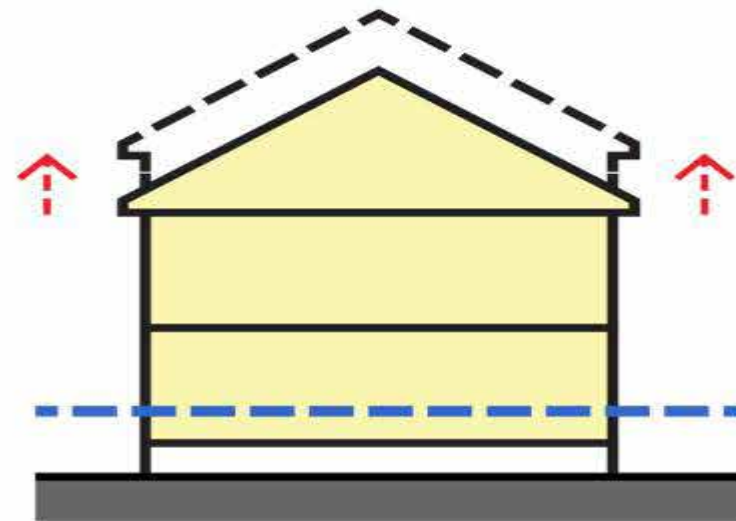
- **Site safely elevated**
- **Site serviced by independent, high quality power source**
- **Food inventory disbursed out of precaution**
- **Site used as emergency refrigeration hub for local and citywide restaurants and stores**



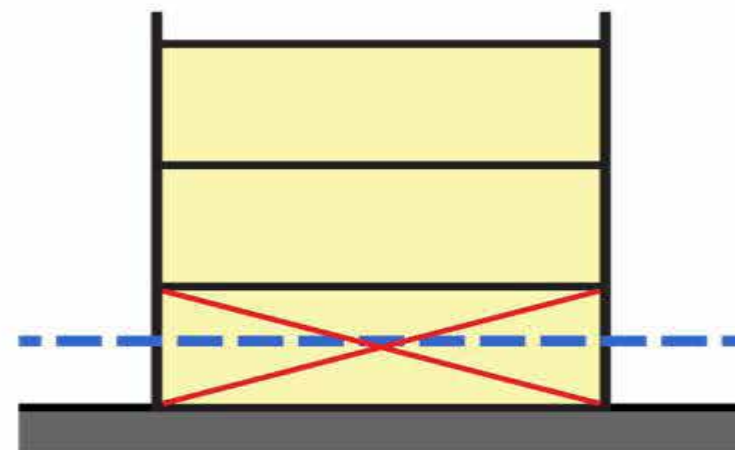
THE REGULATORY FRAMEWORK

Van Brunt Street, Red Hook, Brooklyn

NEW RESILIENCY REGULATIONS ADDRESS DEVELOPMENT IN THE FLOOD ZONE



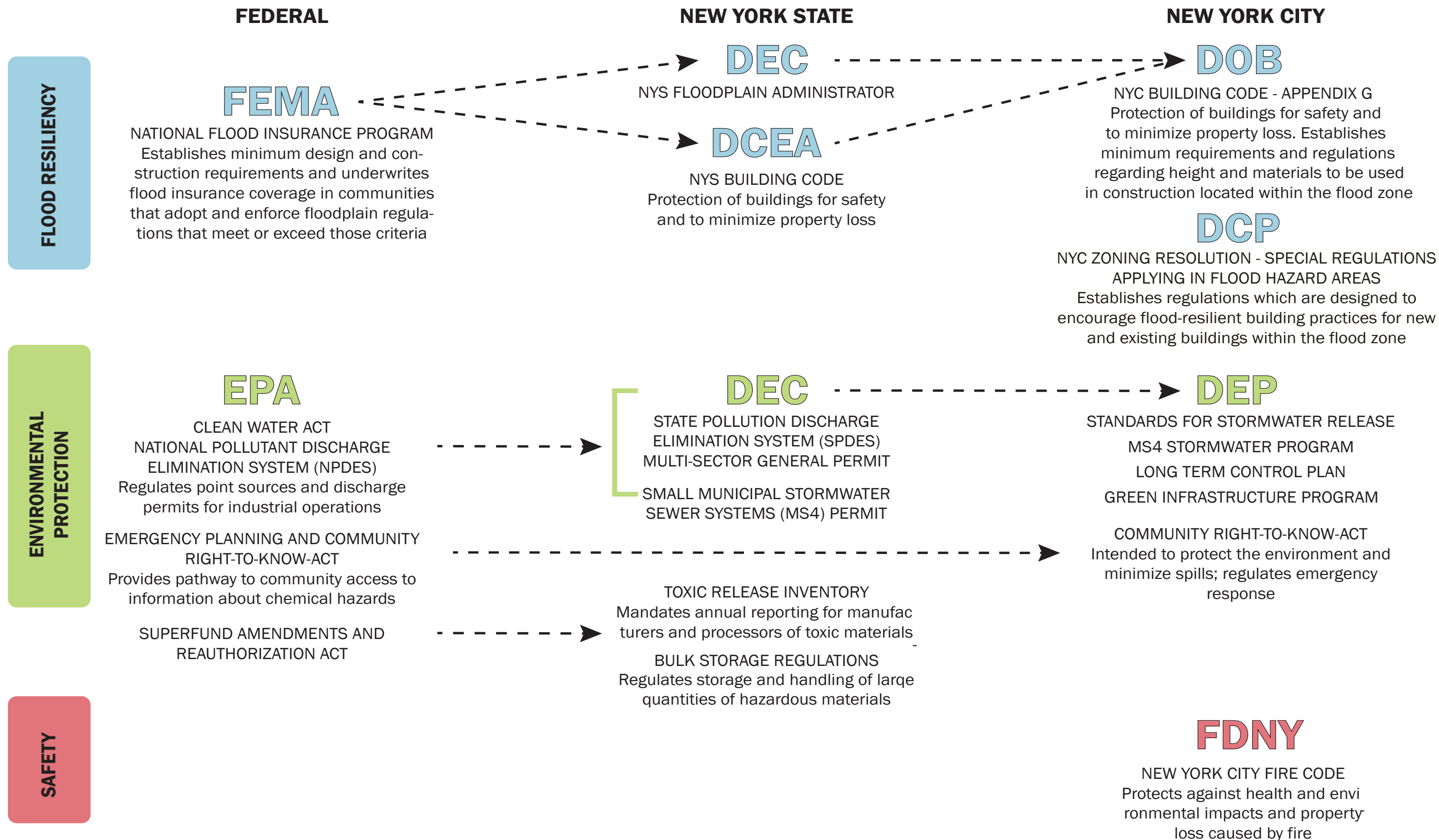
HEIGHT *must recognize elevation requirements in flood zones*



GROUND FLOOR USE
buildings may be allowed only limited use of ground floors

- **Adoption of PFIRMs into Building Code, including freeboard (2013)**
- **Update of Appendix G Building Code (2013)**
- **Update to Zoning to facilitate mitigation (2013)**
- **16 new building local laws to increase resiliency, including:**
 - **Flood-resistant construction standards for hospitals and nursing homes**
 - **Backflow preventers required on sewage outflows for buildings in the floodplain**

MANY INDUSTRIAL FIRMS ARE COVERED BY MULTIPLE LAYERS OF REGULATION

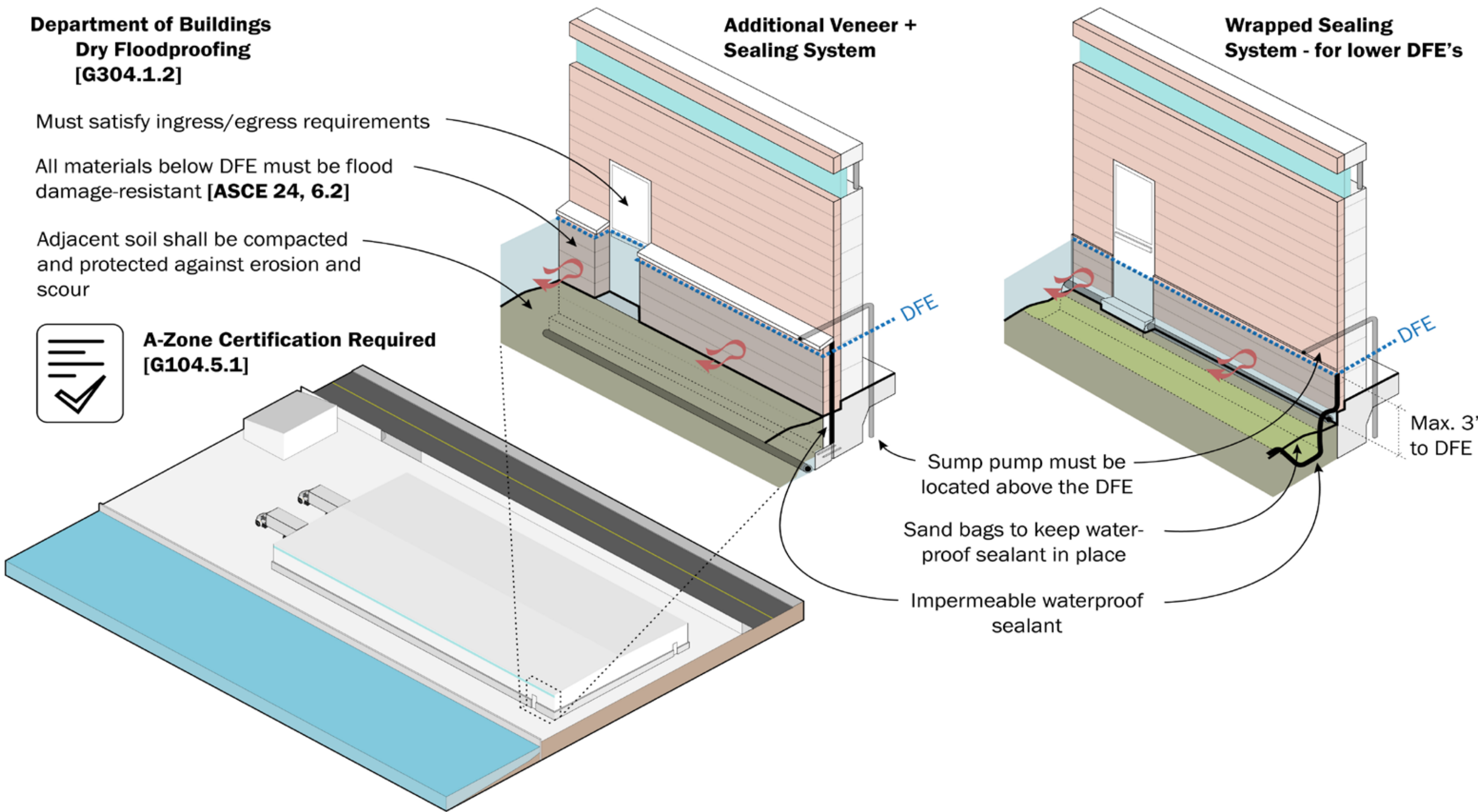


PERTINENT REGULATIONS:

- Zoning (M3)
- NYC Building Code Appendix G
- DEC Chemical Bulk Storage Program
- DEP Right-to-Know
- NYC Fire Code

REGULATIONS CASE STUDY

- Printing Facility
- Lot Area: 49,500 sq. ft. (~ 0.5 FAR)



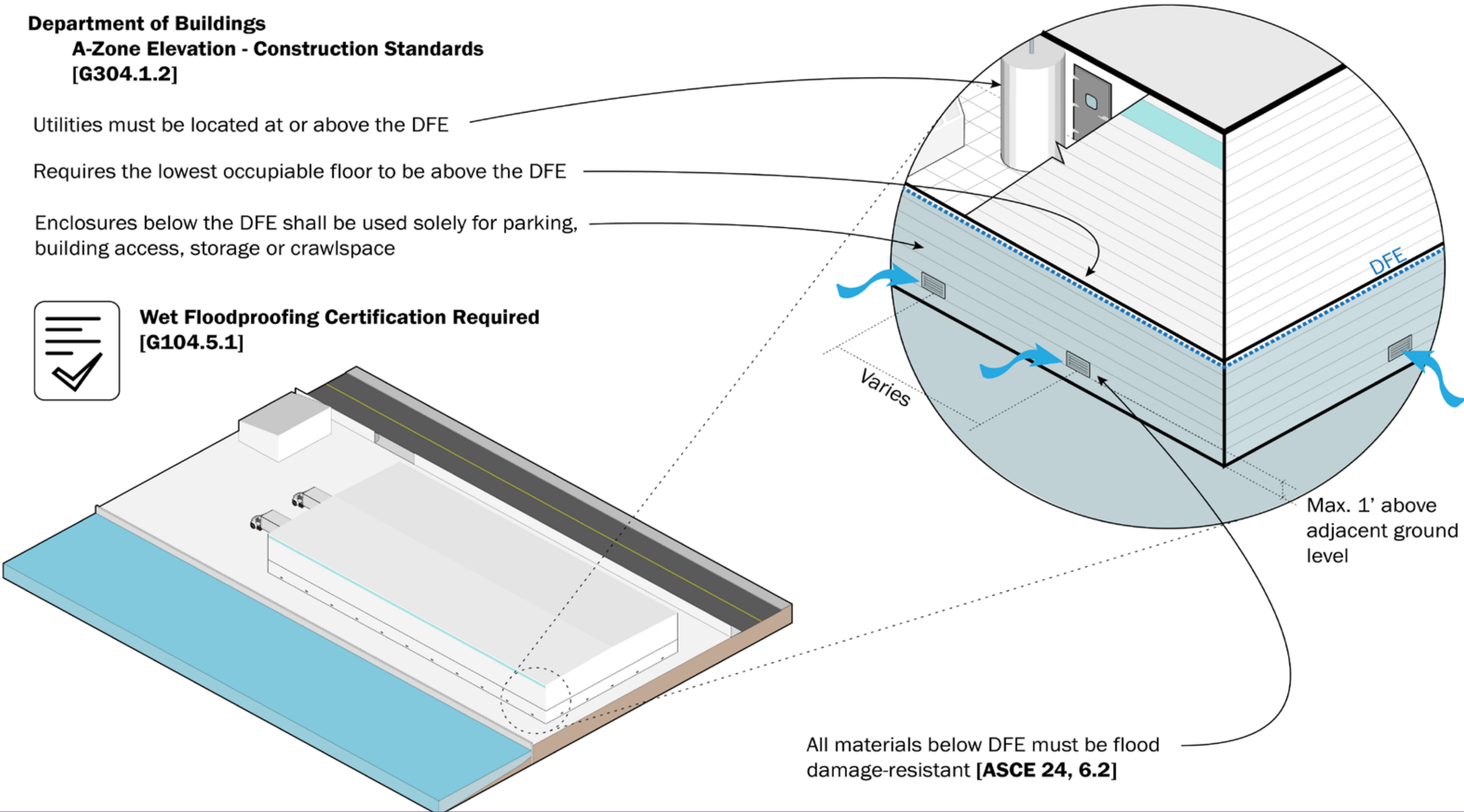
NFIP/BUILDING CODE REQUIRE ELEVATION ABOVE DFE FOR WET FLOODPROOFING

Department of Buildings
A-Zone Elevation - Construction Standards
[G304.1.2]

- Utilities must be located at or above the DFE
- Requires the lowest occupiable floor to be above the DFE
- Enclosures below the DFE shall be used solely for parking, building access, storage or crawlspace



Wet Floodproofing Certification Required
[G104.5.1]



PRACTICAL WET FLOODPROOFING OPTIONS OFTEN NOT PERMITTED UNDER NFIP

Requires a minimum total net area of all openings [ASCE 24, 2.6.2.2]

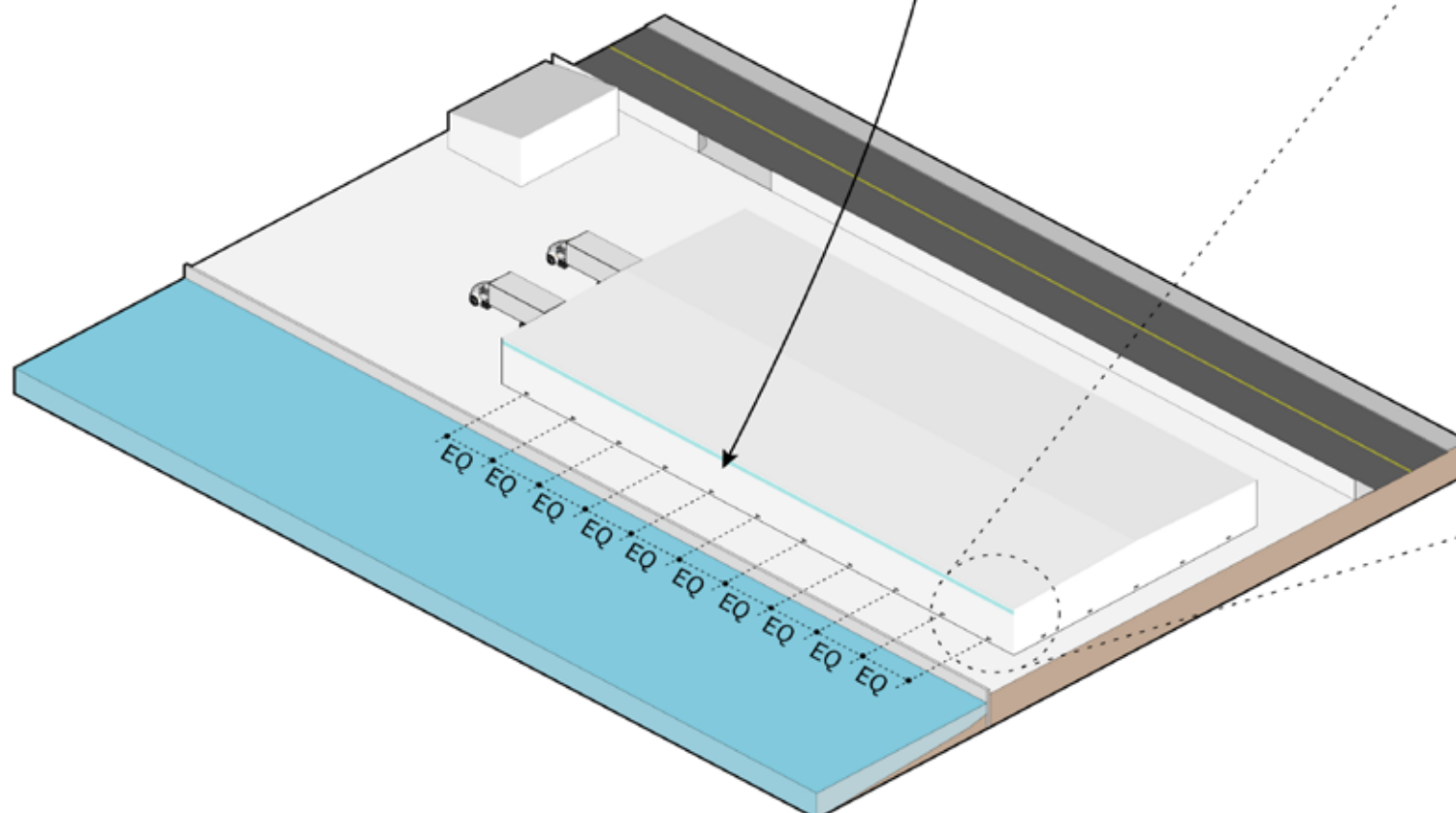
$$A_o = 0.033 (1/c)(R)(A_e)$$

A_o = total net area of openings required (sq. in)

c = opening coefficient of discharge (based on configuration of opening)

R = worst case rate of rise and fall (ft/h)

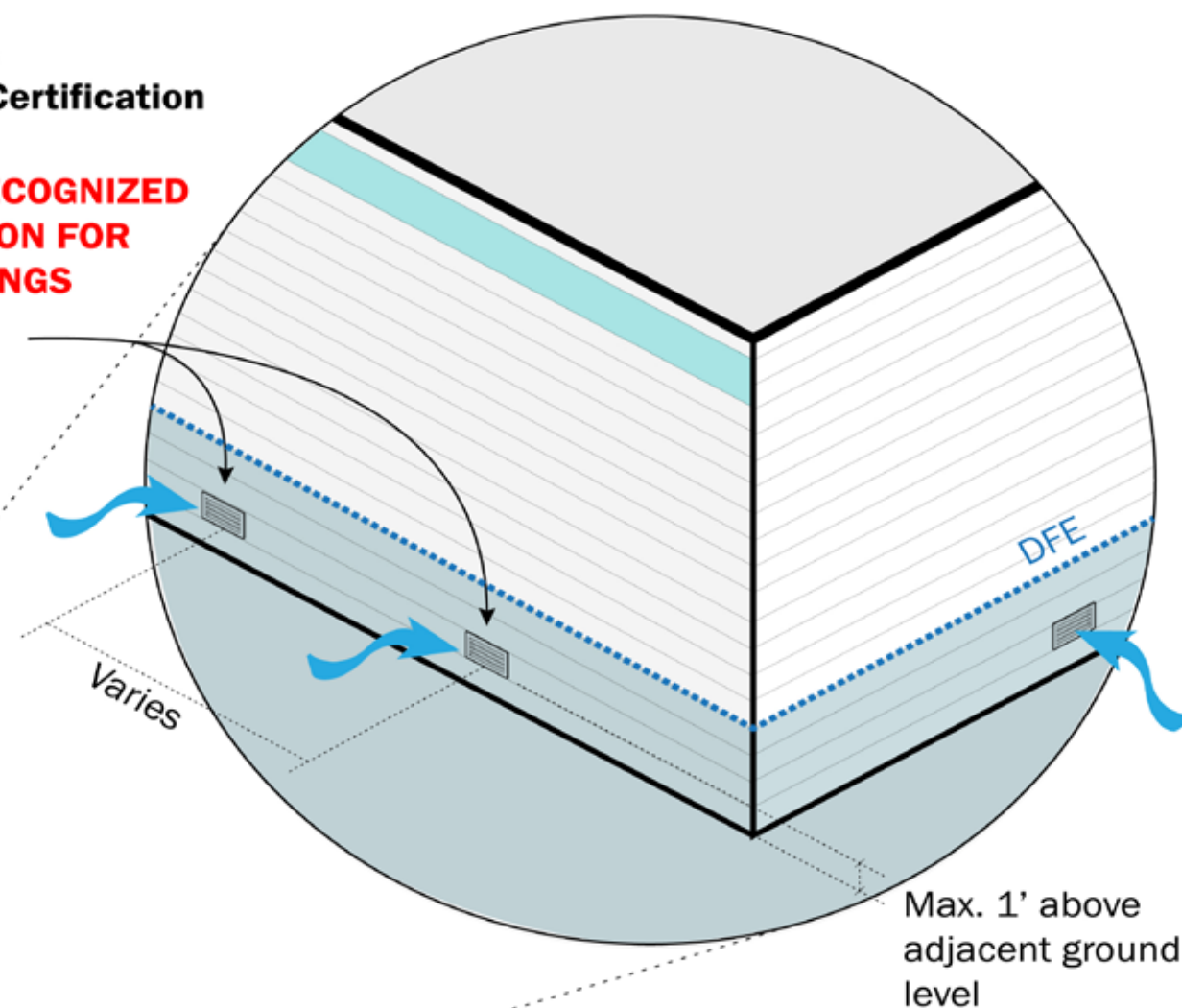
A_e = total enclosed area (sq. ft)



Department of Buildings
Wet Floodproofing Certification
[G104.5.1]

**NOT CURRENTLY RECOGNIZED
AS FLOOD MITIGATION FOR
INDUSTRIAL BUILDINGS**

Requires min. of two
openings per wall of
enclosed area



NFIP AND BUILDING CODE REQUIRE ELEVATION IN V-ZONE

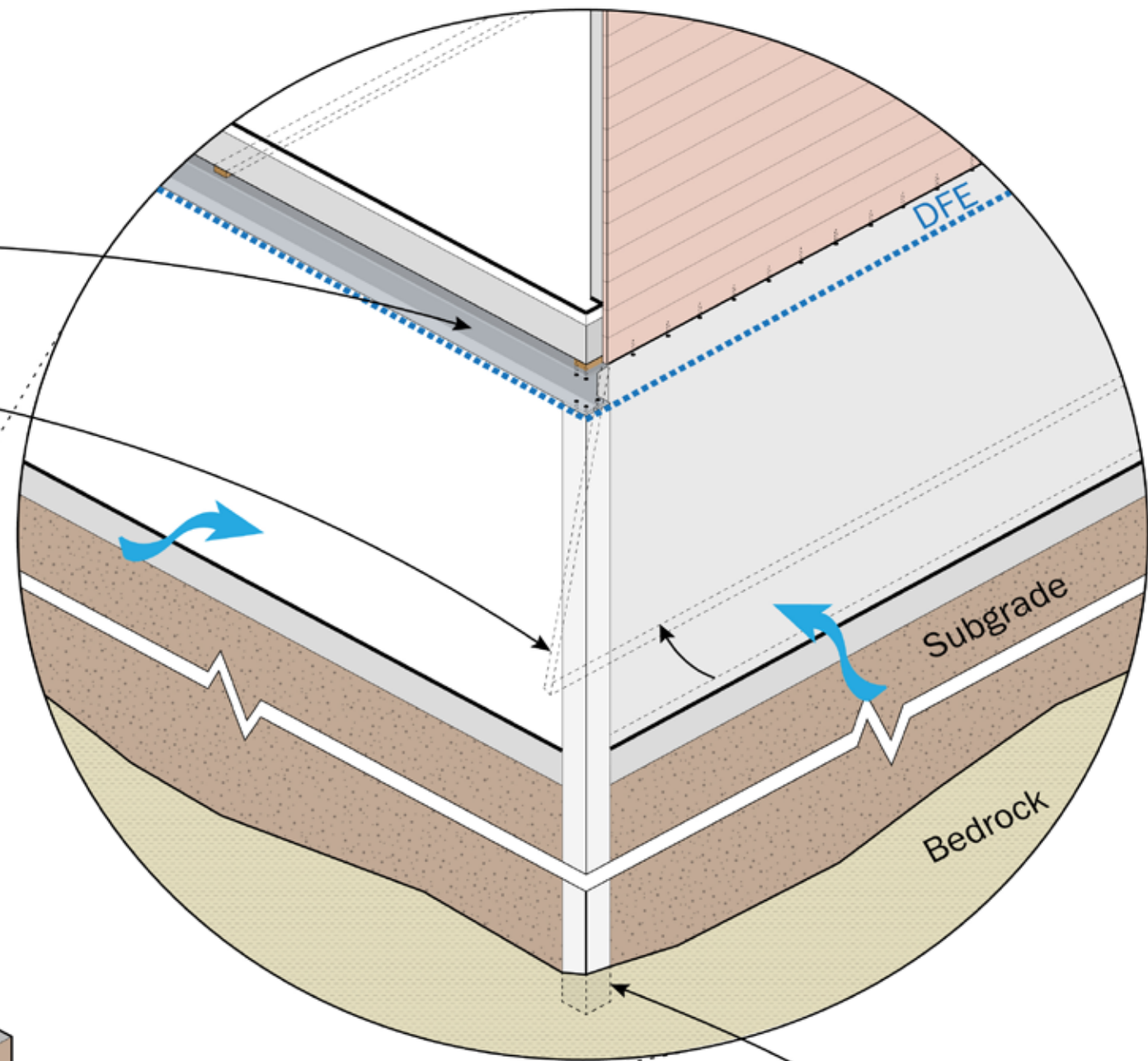
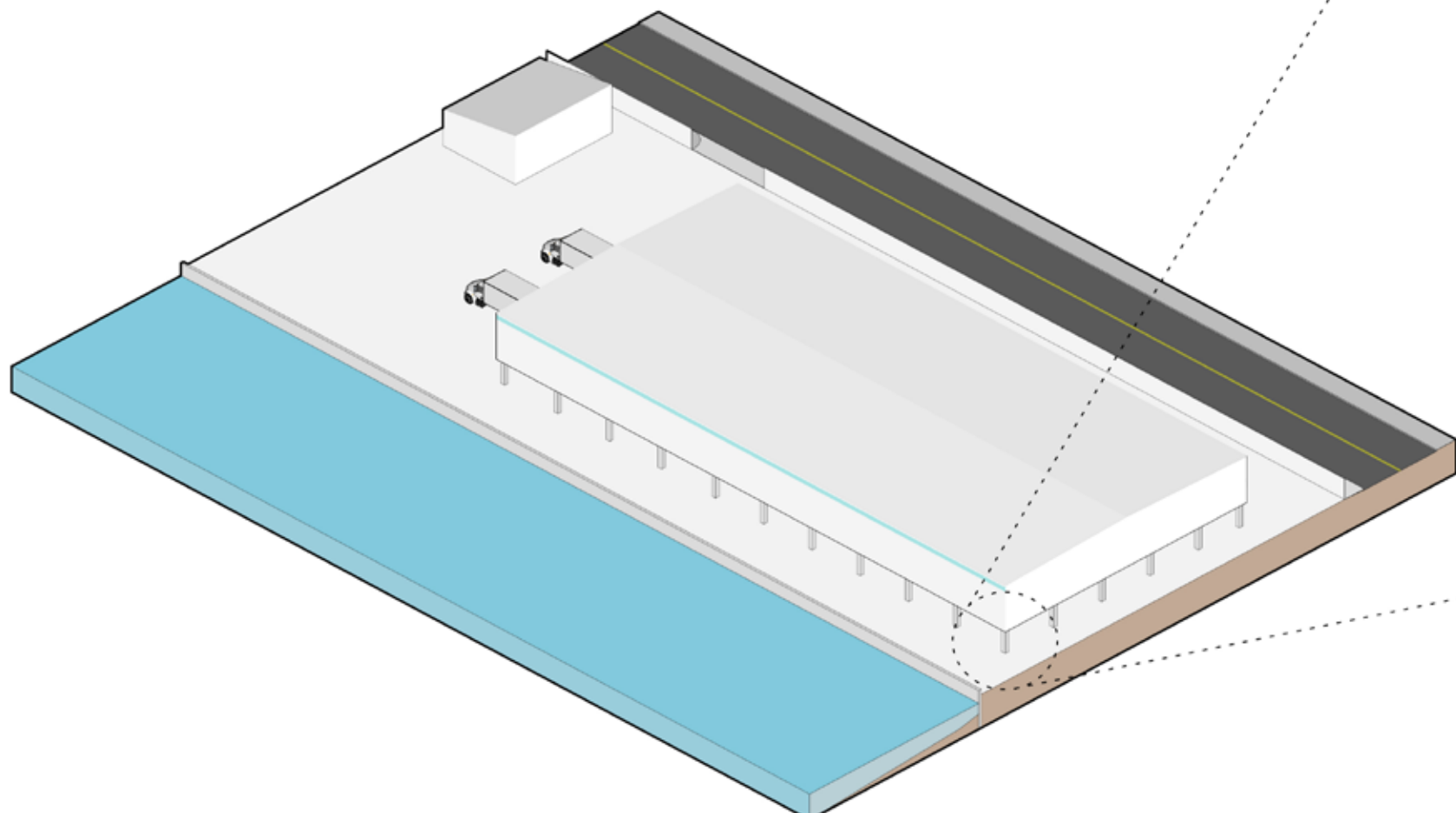
Department of Buildings
V-Zone Elevation - Construction Standards
[G304.2]

Horizontal structural beams are required to be located above the DFE and perpendicular to wave action [ASCE 24, 4.4]

Requires breakaway walls, which are not anchored to base



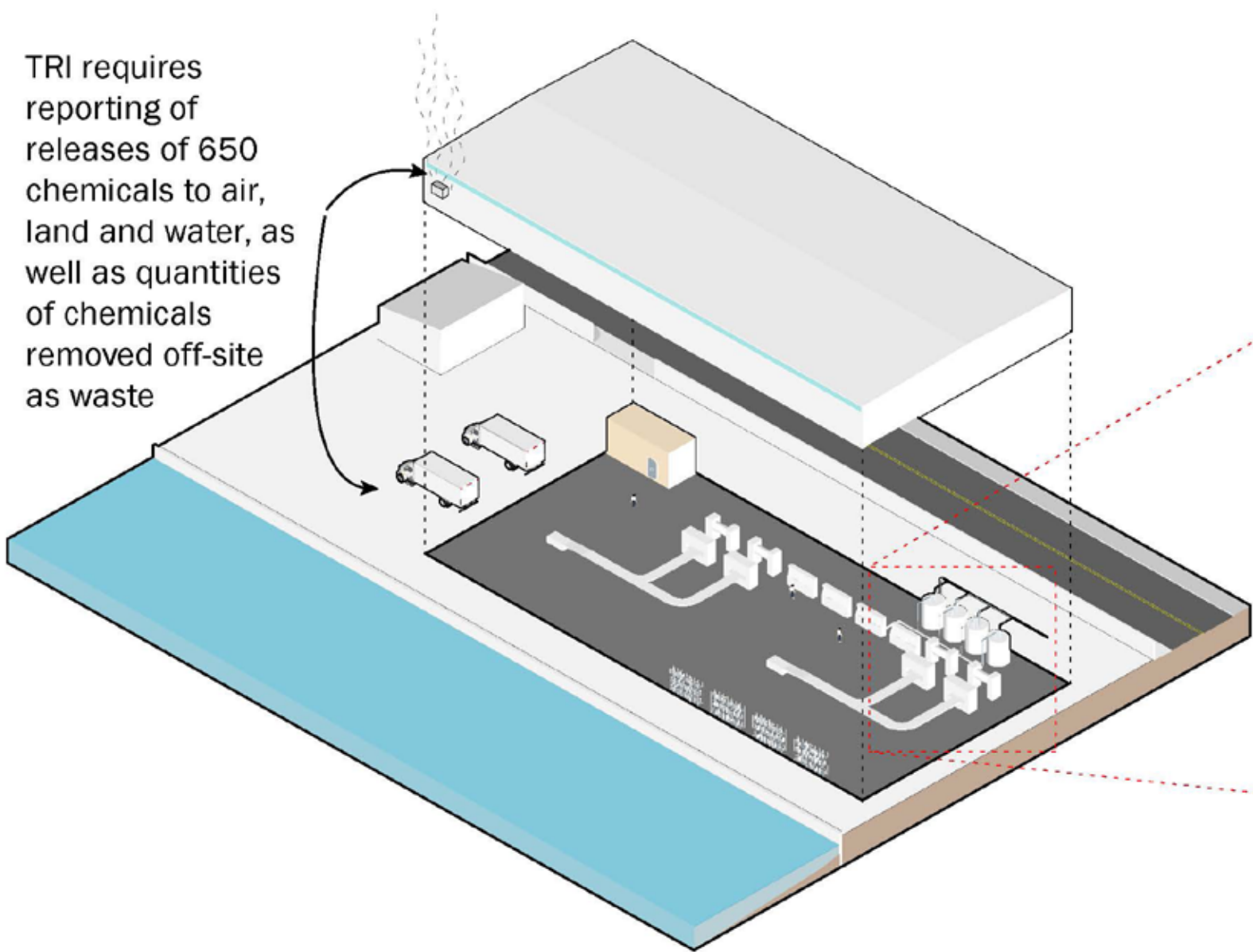
V-Zone Certification Required
[G104.5.2]



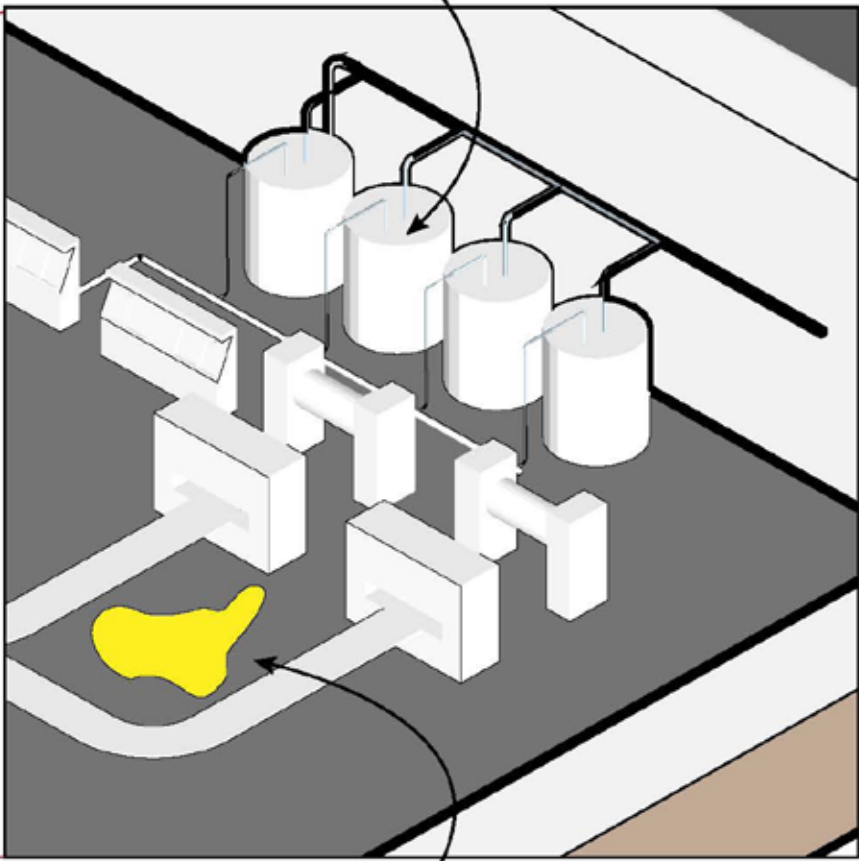
Elevated building must be attached to pile or column foundation designed to prevent flotation, collapse or lateral movement

STATE CHEMICAL BULK STORAGE REGS PROVIDE ADDITIONAL PROTECTIONS

Dept. of Environmental Conservation
Chemical Bulk Storage
(6NYCRR Parts 595-599)
Toxic Release Inventory
(Title III of Federal SARA)



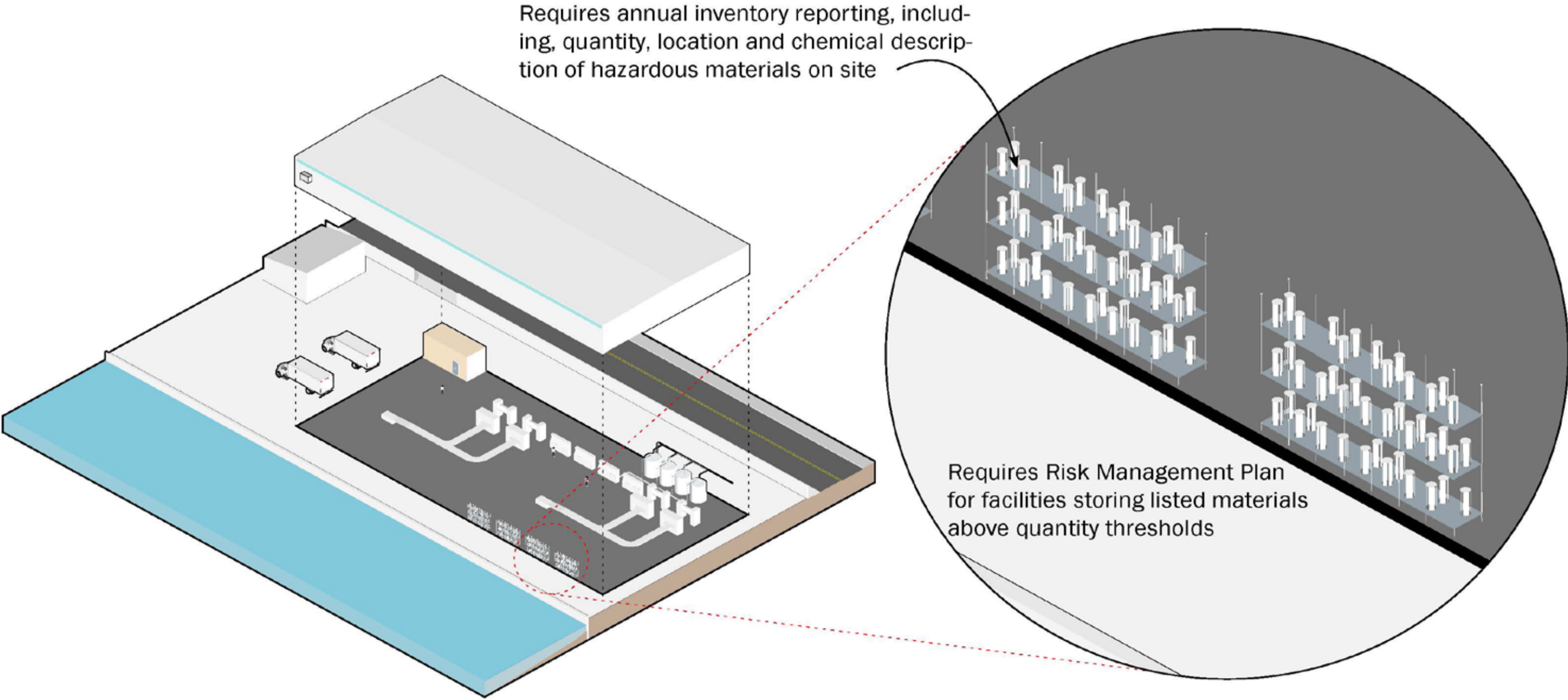
Requires reporting of chemicals in large, above-ground tanks or any size underground tank



Requires reporting of known and suspected spills of chemicals contained in 6 NYCRR Part 597

RISK MANAGEMENT PLAN REQUIRED FOR SITES COVERED BY RIGHT-TO-KNOW

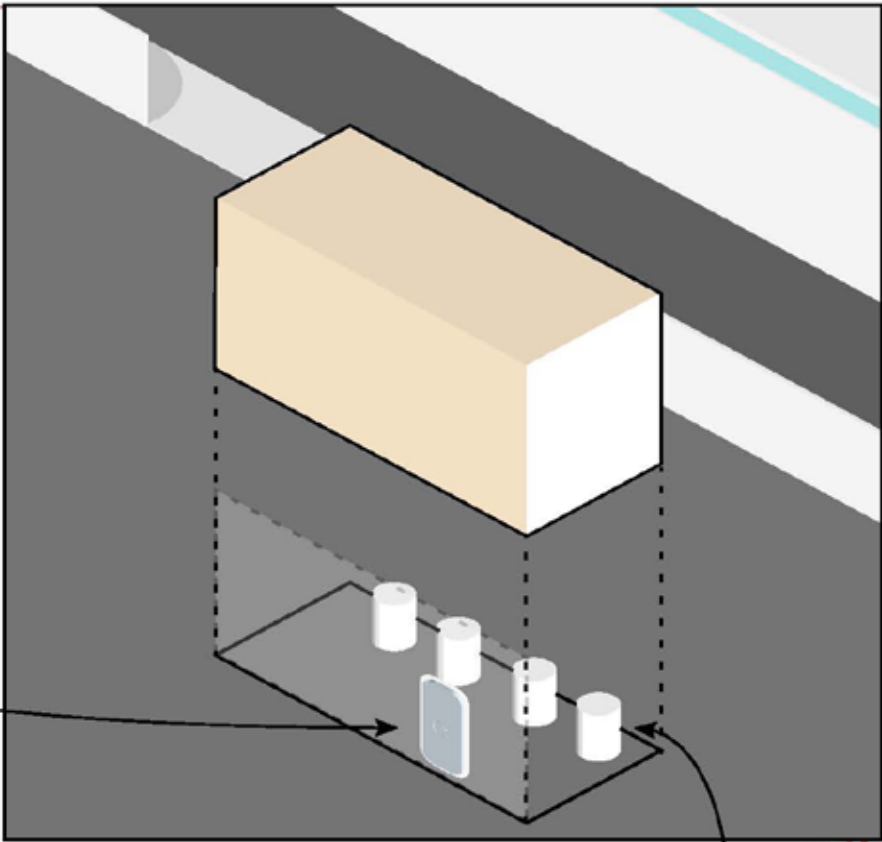
Dept. of Environmental Protection
Division of Emergency Response and Technical Assessment
(Community Right-to-Know Local Law 26 of 1988)
Industrial Pretreatment Program
(Title III of Federal SARA)



STORAGE OF WATER-REACTIVE MATERIALS REGULATED BY THE CITY FIRE CODE

FDNY Fire Code Chapter 4404
Water-reactive Solids and Liquids

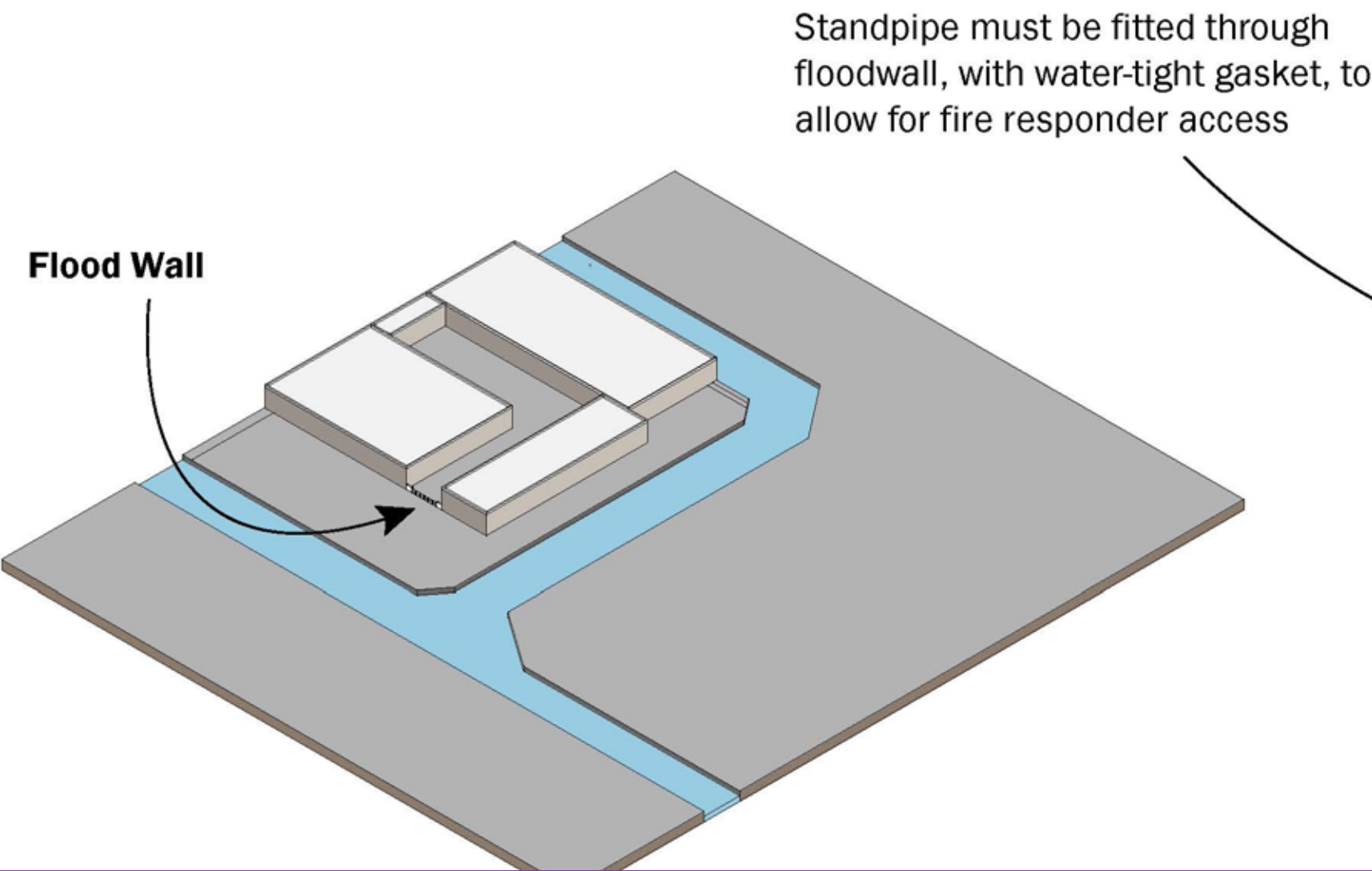
Requires waterproof storage structure
for water-reactive solids and liquids



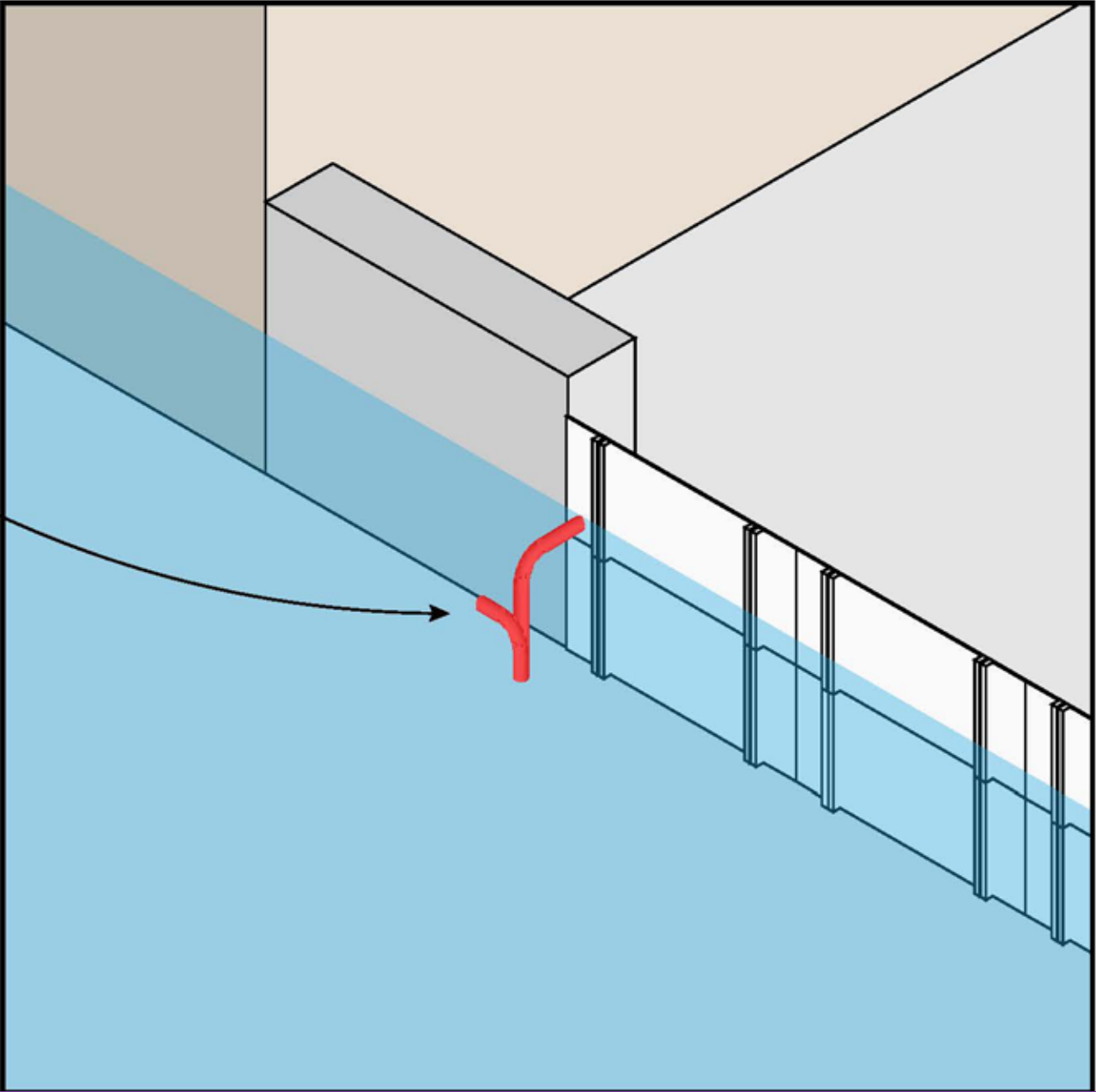
Requires liquid-tight containers for
water-reactive solids and liquids

Case Study:
**Printing Facility with hazardous and
water-reactive materials**

Case Study:
Distributor with multiple
building complex

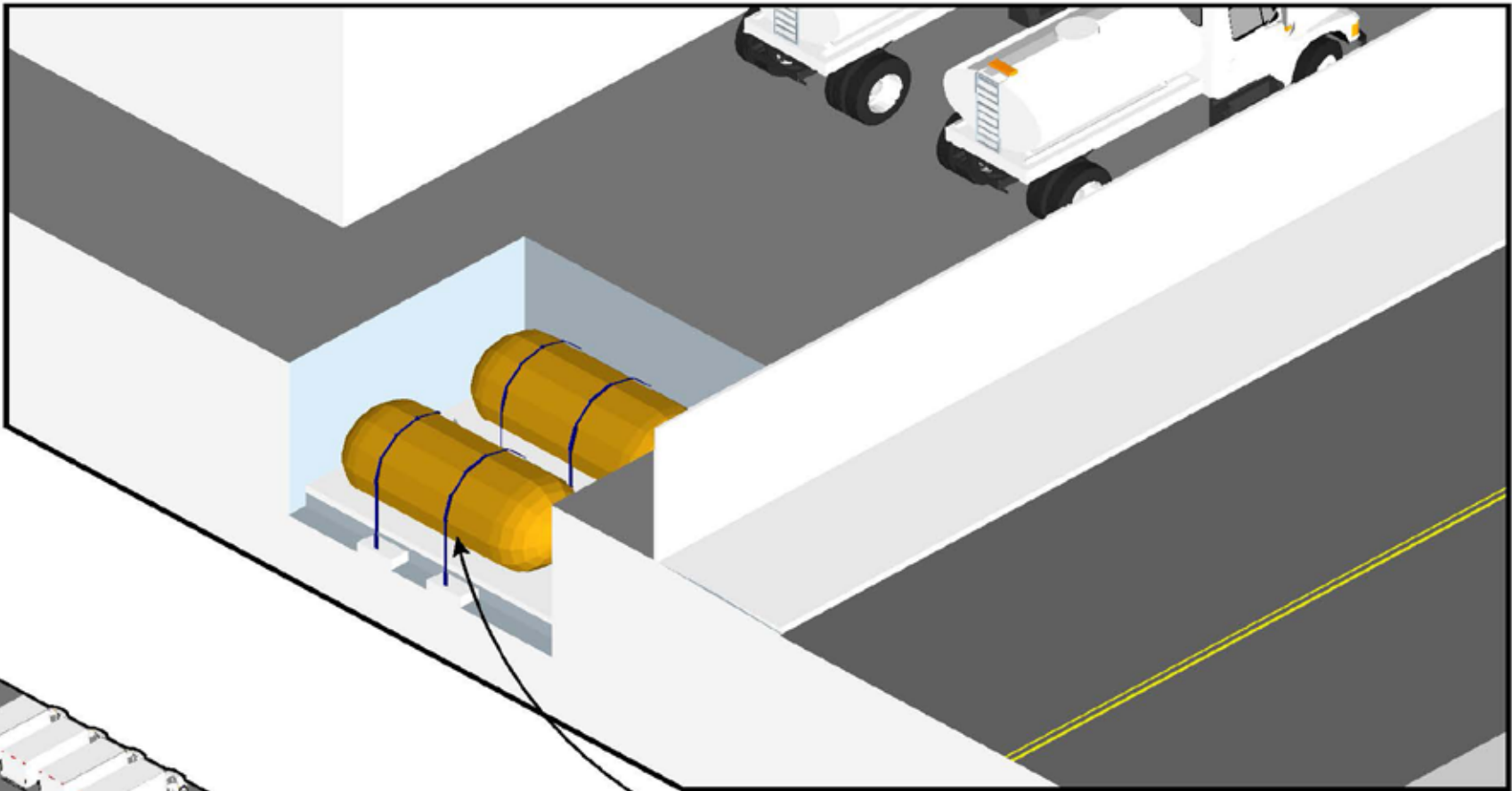


FDNY Fire Code Section FC 1027:
Maintenance of the Means of Egress



BUILDING CODE REQUIRES FUEL TANKS TO BE ANCHORED

Building Code G307.1
Underground Tanks

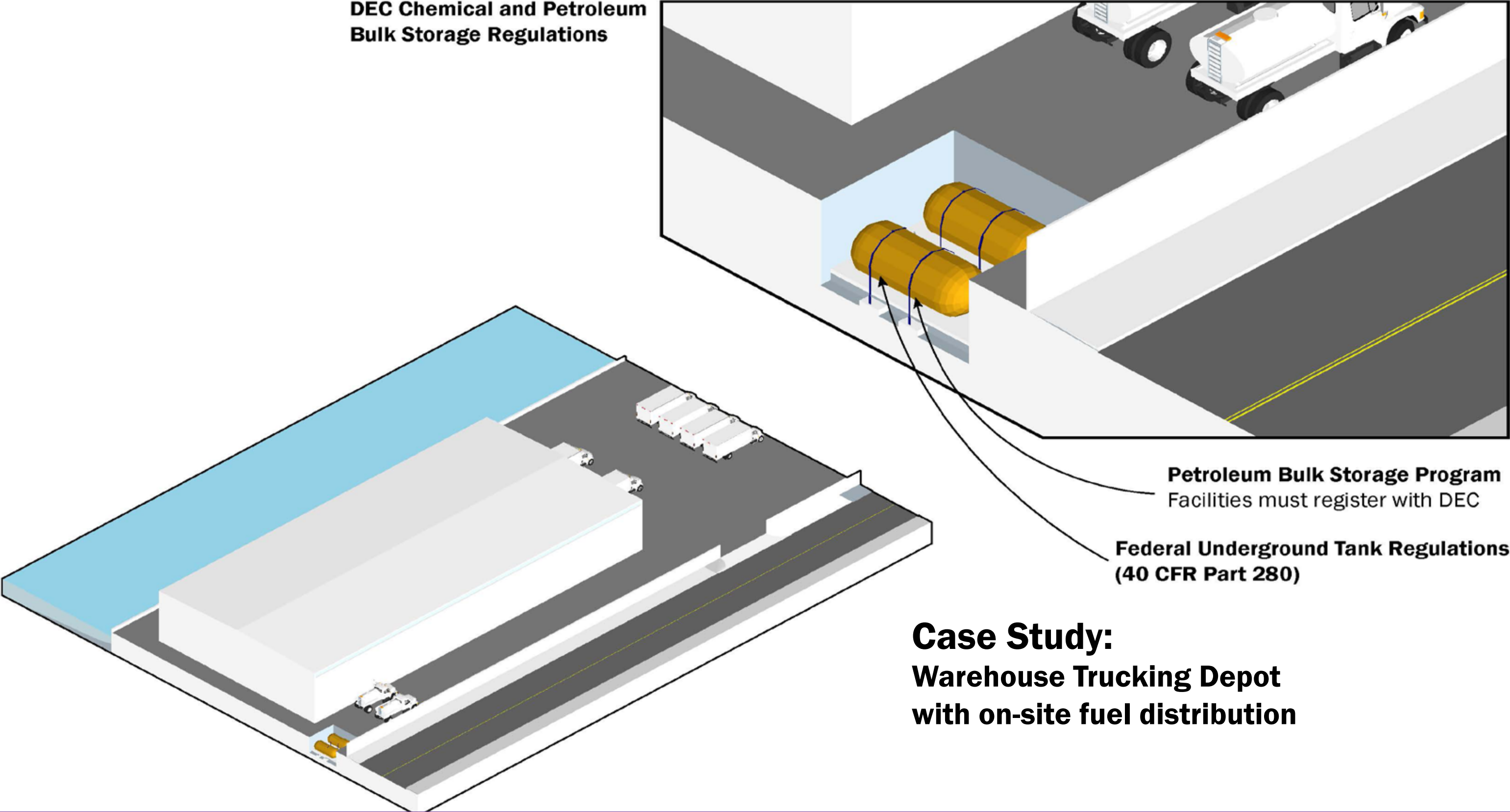


Storage of motor fuel-dispensing tanks
Tanks must be supported and anchored to prevent uplift, flooding, or spillage

Case Study:
Warehouse Trucking Depot
with on-site fuel distribution

BULK STORAGE OF PETROLUEM MUST REGISTER WITH DEC

DEC Chemical and Petroleum Bulk Storage Regulations



Petroleum Bulk Storage Program
Facilities must register with DEC

Federal Underground Tank Regulations
(40 CFR Part 280)

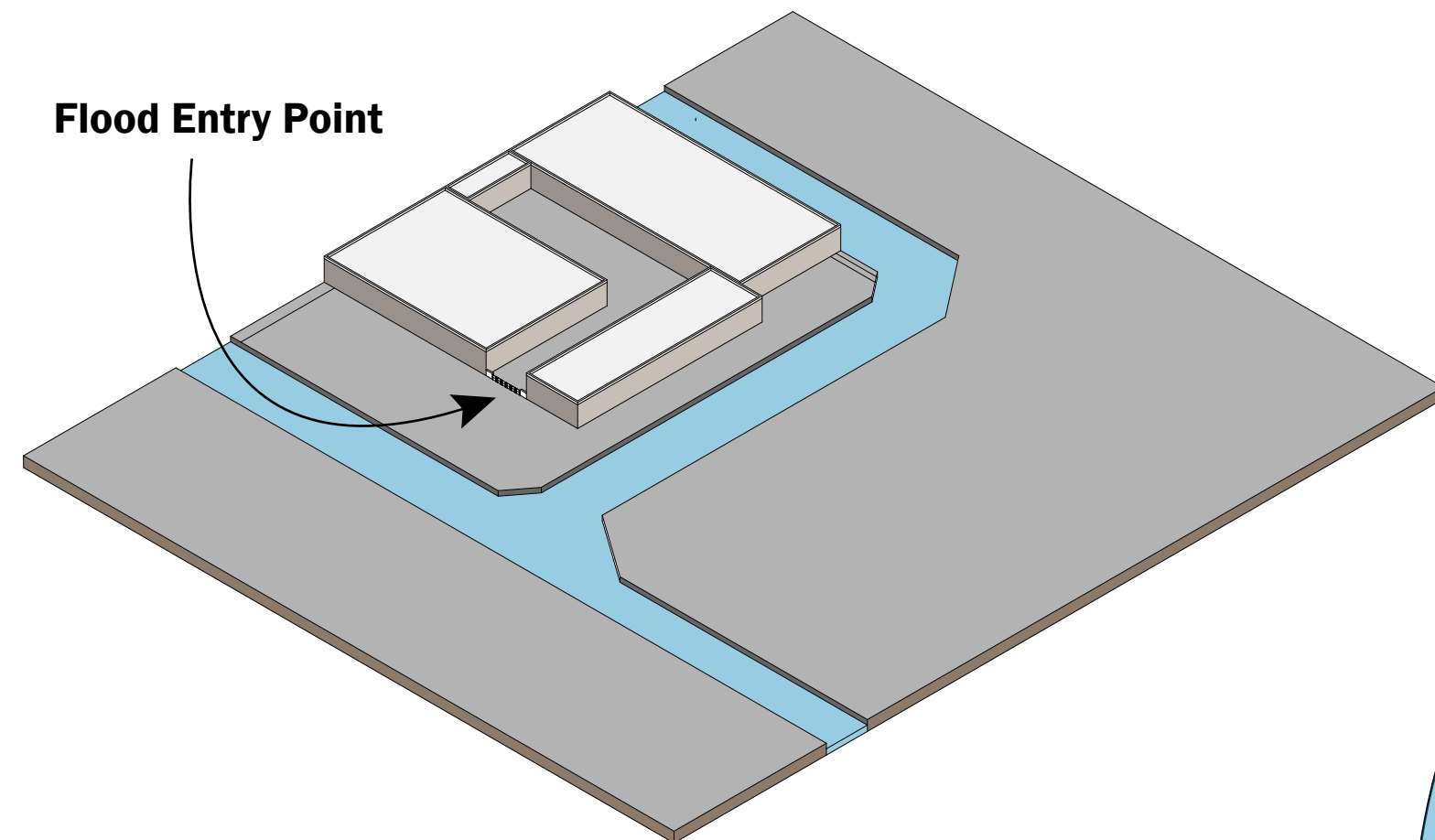
Case Study:
Warehouse Trucking Depot
with on-site fuel distribution

APPENDIX G NON-COMPLIANT CASE STUDY: WHOLESALE DISTRIBUTOR

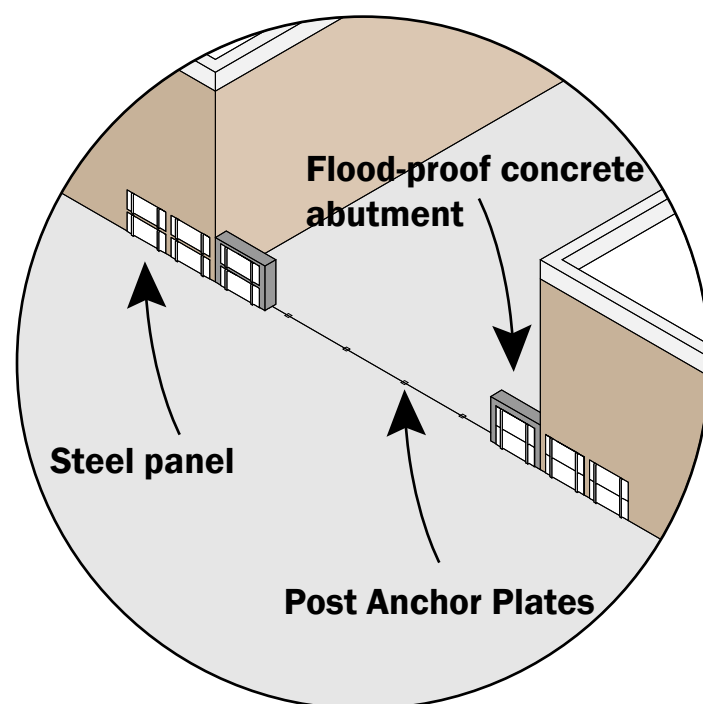
Post-Sandy Resiliency Improvements

- Newly constructed bulkhead
- 4 strategically sited, removable flood walls
- 1 water-tight “submarine door”
- Flood resilient liner under brick veneer (to DFE)
- Refurbished office space

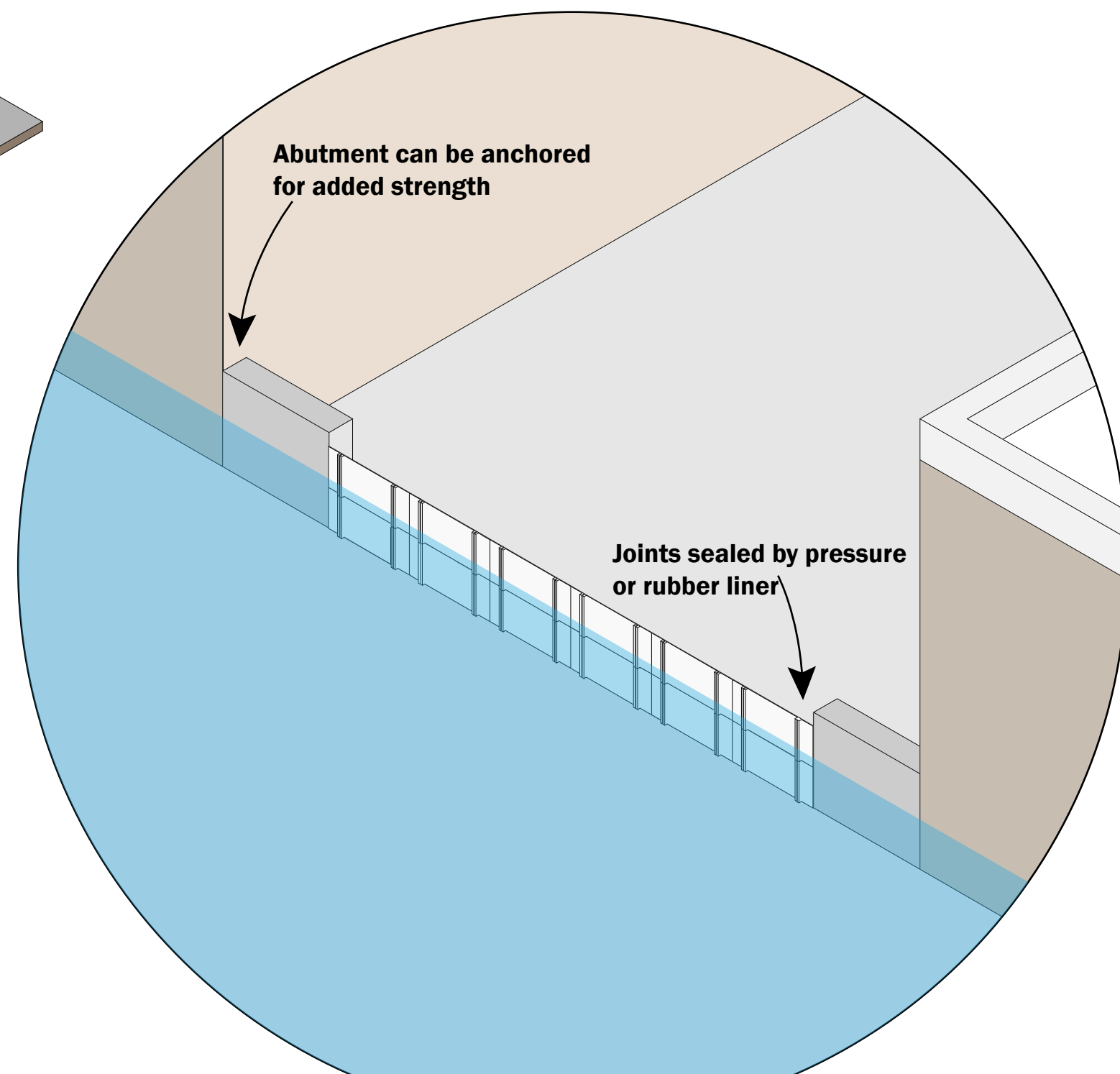
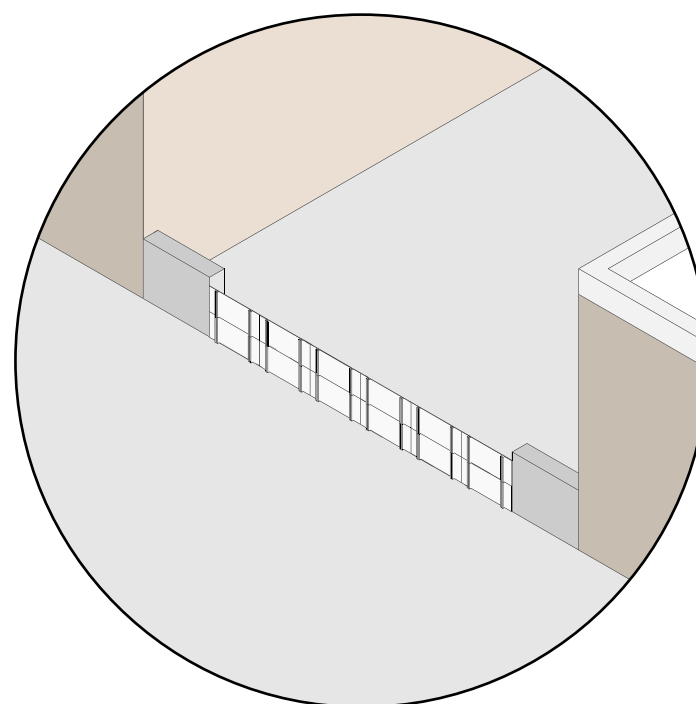
APPENDIX G NON-COMPLIANT CASE STUDY: WHOLESALE DISTRIBUTOR



Normal Conditions



Pre-Flood Preparation



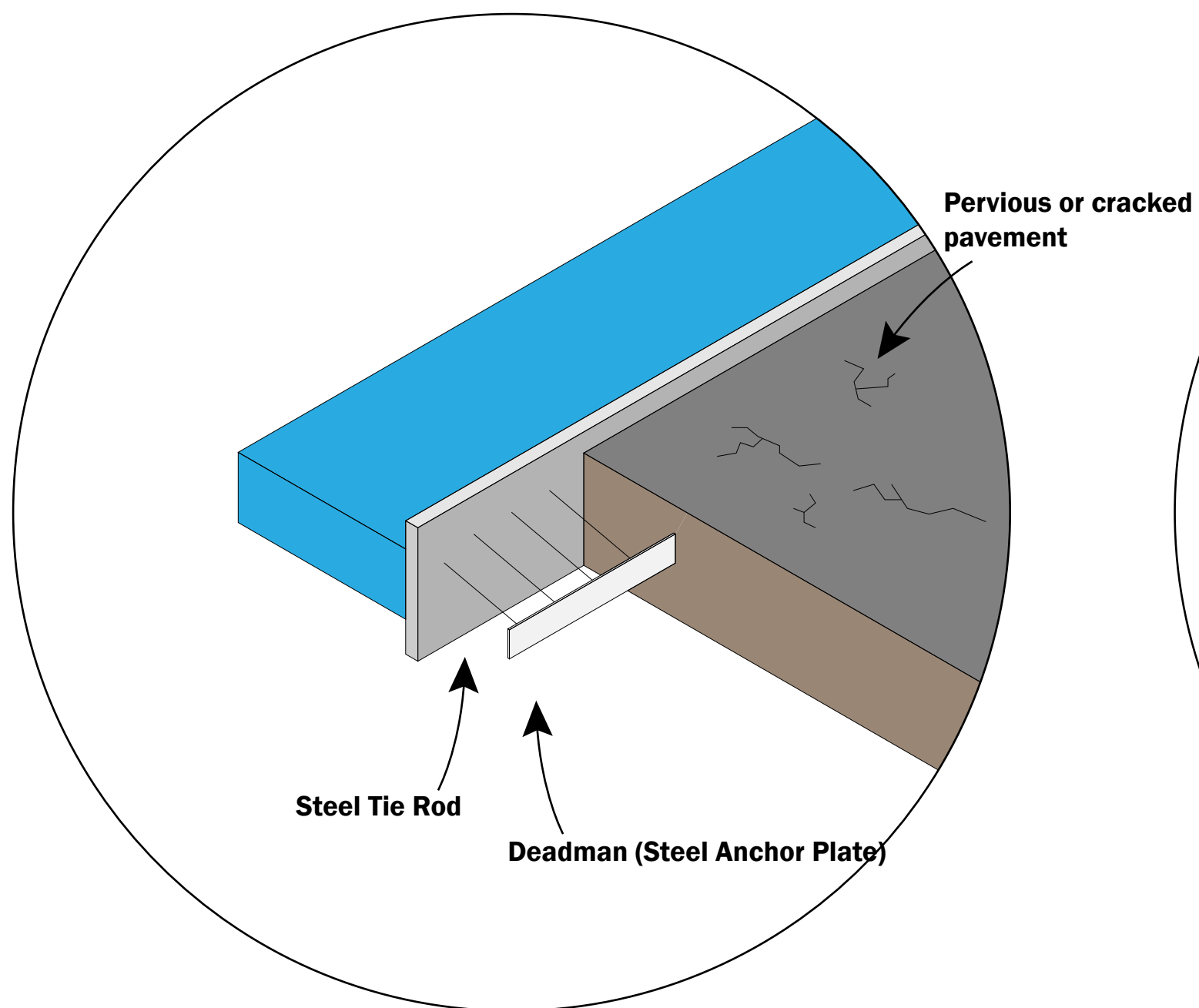
APPENDIX G COMPLIANT CASE STUDY: SANDY HOOK PILOTS

Post-Sandy Resiliency Improvements

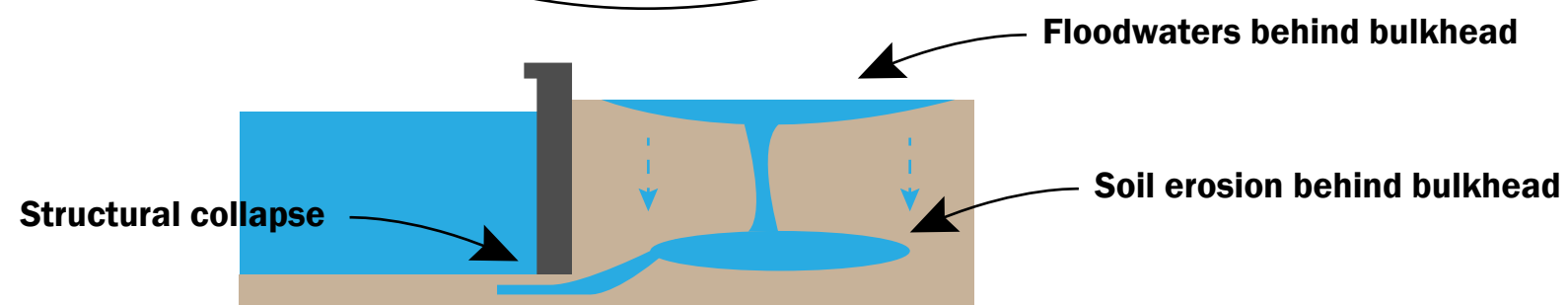
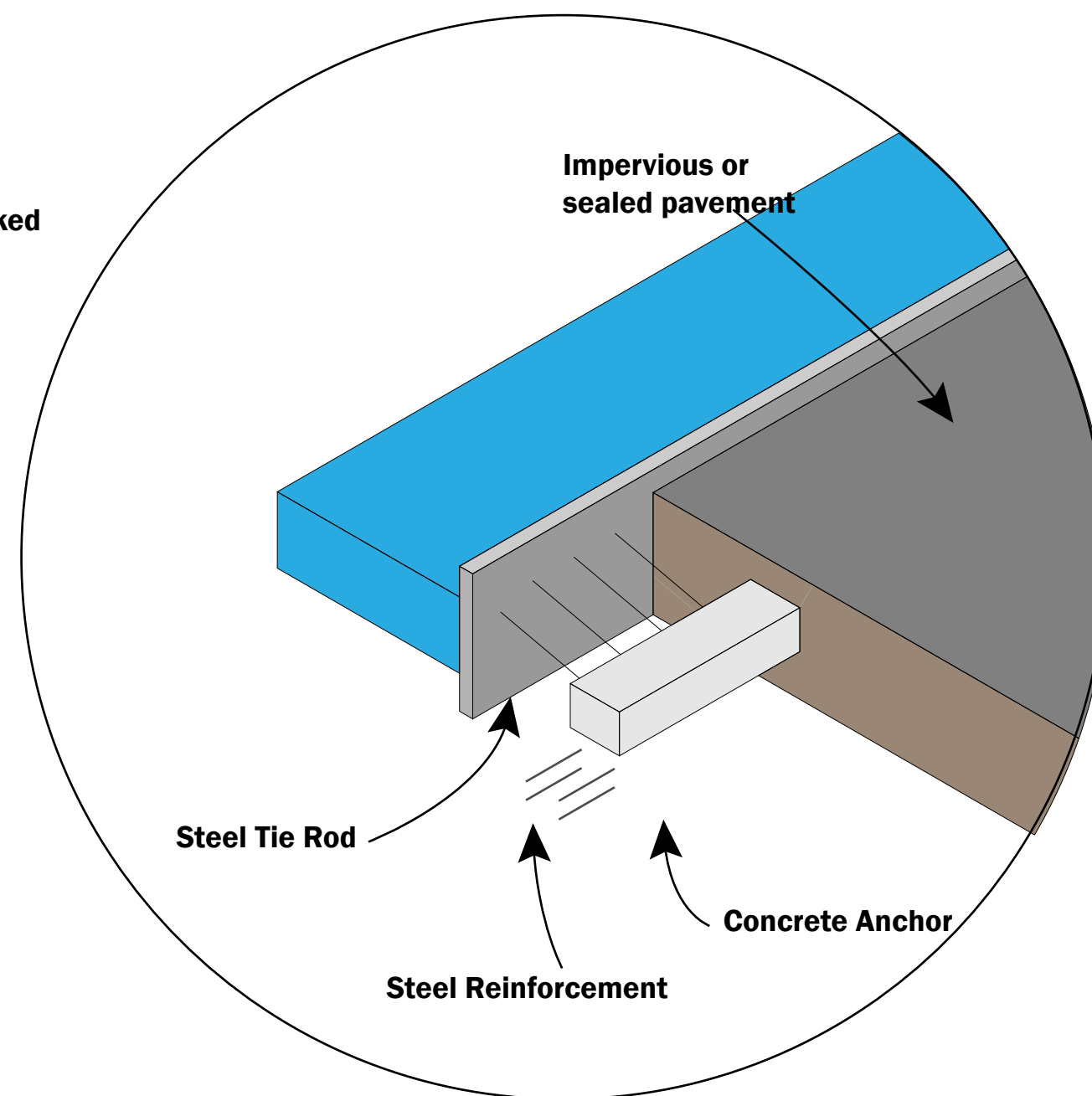
- New code-compliant headquarters and shop building
- New building elevated and on piles
- New ultra-secure bulkhead
- Zinc Titanium shell below BFE
- New pier decking

APPENDIX G COMPLIANT CASE STUDY: SANDY HOOK

Standard Bulkhead



Reinforced Bulkhead



SUMMARY

PRELIMINARY RESEARCH PROVIDES SEVERAL INFORMATIVE FINDINGS

- **Despite Losses, businesses in the industrial flood zone proved resourceful**
- **Although businesses that sustained heavy losses are preparing for the next storm, many companies do not perceive a threat and are not making resiliency improvements**
- **Flood Insurance for industrial businesses is insufficient**
- **Regulatory framework addresses many vulnerabilities, but gaps and inconsistencies exist**
- **Fully compliant retrofits and FEMA dry floodproofing requirements have proven infeasible or impractical for many industrial businesses**
- **Need for better individual businesses preparedness + targeted City-coordinated area-specific emergency response and preparedness plans**

DISCUSSION QUESTIONS

- **What are the impediments to achieving resiliency in industrial areas?**
- **What can city, state, and federal agencies do to promote industrial resiliency?**
- **What can businesses do to best promote resiliency in their operations?**
- **In your work, have you encountered gaps or inconsistencies in the regulations that affect industrial operations and development in the flood zone?**
- **What are the most pressing environmental or public safety concerns for your constituency?**

NEXT STEPS

- **Solicitation of Technical Advisory Committee Feedback**
- **Selection of prototypical sites**
- **Assessment of best operation and design practices**
- **In-depth interviews with stakeholders and technical experts**
- **Surveys of industrial businesses and property owners**