Multi-benefit Infrastructure for Flood Resilience

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Designing multi-benefit flood infrastructure

Considerations that can guide design and planning:

- Design criteria and prioritization framework
- Spatial requirements and constraints
- Multi-hazard design and function
- Adaptability and long-term implications
- Local applicability and appropriateness
- Alignment with stakeholder goals and objectives
Toolkit of strategies for flood mitigation

PROTECT
- Controlling floodplains
- Controlling delineable fows
- Controlling theaters

ATTENUATE
- Enhancing levee buildouts
- Controlling erosion
- Breakwater flood relief areas
- Controlling wetlands
- Controlling plagiarizes
- Controlling watercourses

ADAPT
- Implementing reservoirs
- Diverting runoff
- Uptake green intrusion
- Controlling limited and stabilizing below
- Facilitating water systems
- Controlling effusion

LIMIT
- Erosion control
- Controlling delineable fows

RETRACT
- Implementing marine
- Controlling delineable fows

Source: One Architecture & Urbanism
Toolkit of coastal barriers for flood risk reduction

Surge barrier  Deployable flood gates  Revetments  Raised walkway  Setback levees

Raised roads  Buried floodwalls  Leves / berms  Floodwalls  Bulkheads

Source: One Architecture & Urbanism
Criteria describe project characteristics, for example: project cost & funding; ease of implementation; design qualities.

Objectives describe desired project outcomes, for example: urban livability; economic and social considerations; flood risk control / damage reduction.

HATS objectives: reduced physical damages & avoided economic disruption.
Understanding spatial requirements & constraints

Exploring a suite of alignments and options for typical waterfront conditions

Rethinking Elevation
Rethinking Transportation Infrastructure
Rethinking Stormwater Management
Rethinking The Shoreline

Source: One Architecture & Urbanism
Understanding spatial requirements & constraints

Exploring a suite of alignments and options for typical waterfront conditions

Source: One Architecture & Urbanism
Addressing multiple hazards: surge, sea level rise, stormwater, heat...
Addressing multiple hazards

Drainage strategy goes hand in hand with flood protection

Source: Starr Whitehouse / One Architecture & Urbanism
Planning to ensure long-term adaptability & resilience

Source: One Architecture & Urbanism
Working with local context and conditions

Shoreline alignment + tie-ins = compartment

Source: USACE
Working with local context and conditions
Working with local context and conditions
Working with local context and conditions

- (no) stopping area
- sidewalk (discontinuous)
- light distribution
- loading dock
- on-street parking
- utility maintenance
- roadway maintenance
- trash collection

emergency access
curb cut
drainage
snow removal

ROW = 60'

19th Street, looking west
Aligning stakeholder goals & objectives

INTEGRATED FLOOD PROTECTION
SOLVING FOR COASTAL AND INLAND FLOODING

SOCIAL RESILIENCY
UNDERSTANDING SOCIAL COHESION AND COMMUNITY FACILITIES

OPEN SPACE PLANNING
DESIGN OPPORTUNITIES IN PARKS AND PUBLIC SPACES

VISION PLAN
OPEN SPACE PLANNING
FLOOD PROTECTION
SOCIAL RESILIENCY

Source: Starr Whitehouse / One Architecture & Urbanism
Designing flood protection integrated into urban environments

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Designing flood protection integrated into urban environments

Conceptual design of the Downtown Neighborhood Flood Barrier intended to reduce risk from future high tide flooding. This example shows a typical street condition, similar to Washington Street in Downtown. This is one way that a road elevation could serve as a barrier to flooding and be integrated within the character and experience of the Downtown streetscape.

Conceptual design of the Downtown Neighborhood Flood barrier during a flood event. The barrier is designed to protect against future flooding up to 7.5' NAVD88.

Source: One Architecture & Urbanism
Designing flood protection integrated into urban environments

Source: Mithun + One Architecture & Urbanism
Questions

- How wide do levees need to be compared to their height?
- What other flood risk reduction measures should we be considered to prevent water from coming up through the street drains and local plumbing?
- Would 15-20 ft. walls on the shoreline preclude or discourage creation of new waterfront parks?
- Will the walls divide communities from parks/waterfronts?
- For projects that have been implemented in other cities, what lessons have been learned? Have they been effective thus far? Any design flaws? What type of upkeep has been needed?
- What are examples of projects that address multiple risks and have multiple benefits? What are other cities doing?
- What are the benefits of this approach?