



# **Arthur Kill Storm Surge Barrier Design Concept**

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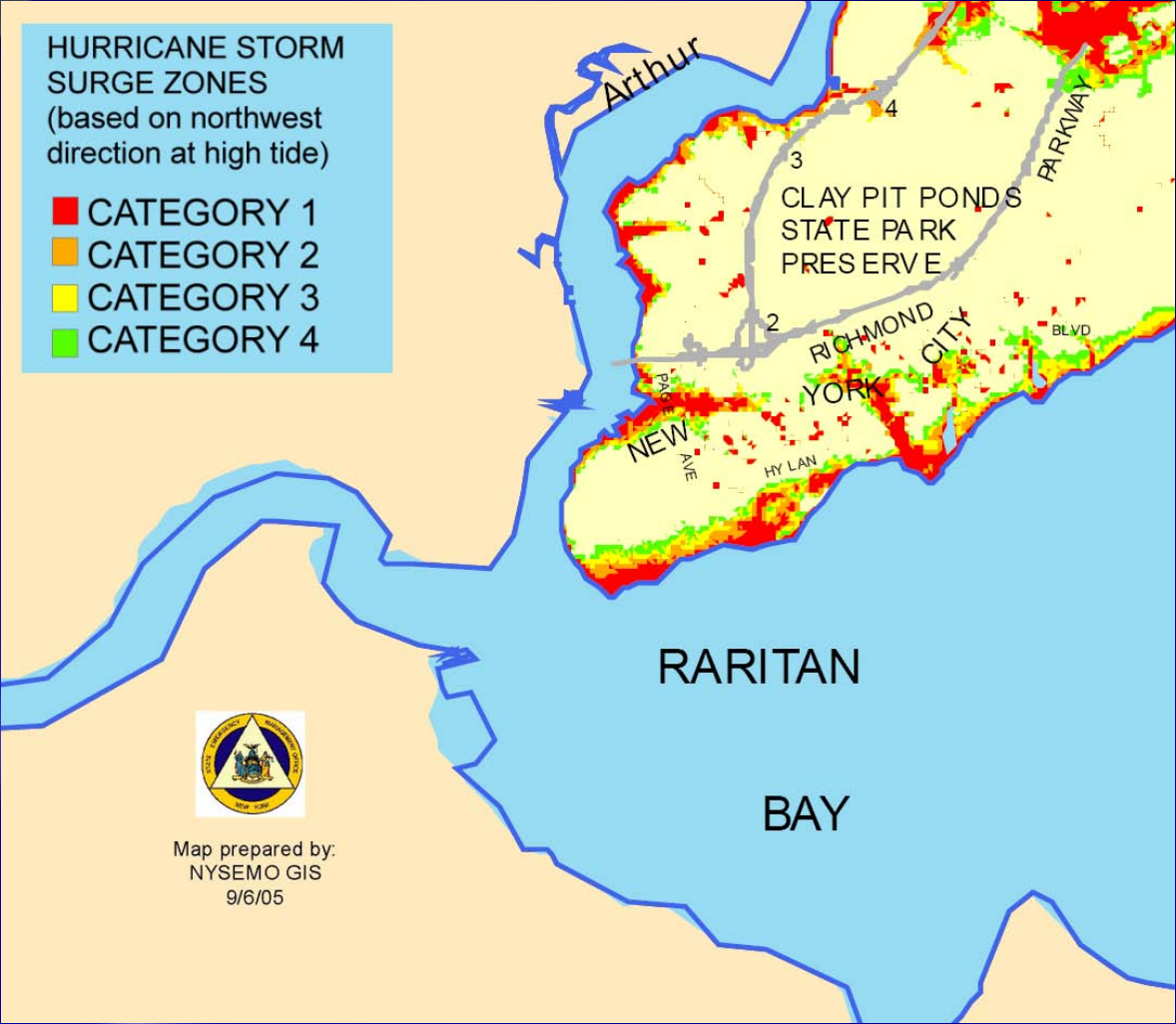
# Introductions

- ◆ **Lawrence J. Murphy, P.E.**
  - ◆ Principal with CDM
  - ◆ 25 years experience
  - ◆ Acting Surface Transportation Market Leader
  
- ◆ **Thomas R. Schoettle, P.E.**
  - ◆ Vice President with CDM
  - ◆ Over 23 years experience
  - ◆ NYC Metro Area Manager

## **Needs and Objective**

- ◆ **NYC Susceptible to flooding from hurricanes**
- ◆ **Climate Change Impacts – Rising Water levels**
- ◆ **Provide Protection via series of barriers**

# Hurricane Storm Surge Zones



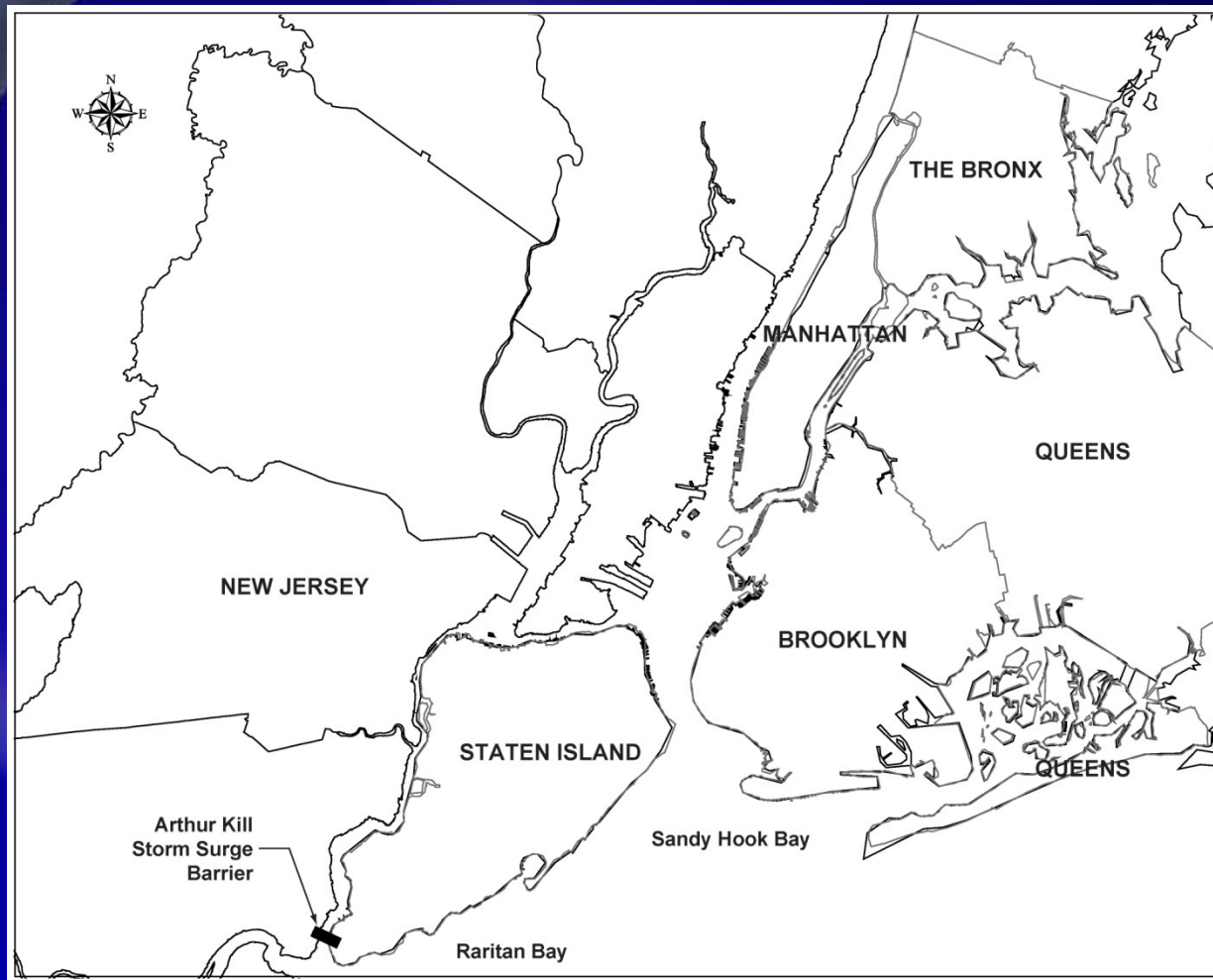
## **Design Criterion**

- ◆ **Develop a Concept Design for a Storm Barrier on Arthur Kill**
- ◆ **Protect from a Category 3 Hurricane and Associated Storm Surge**

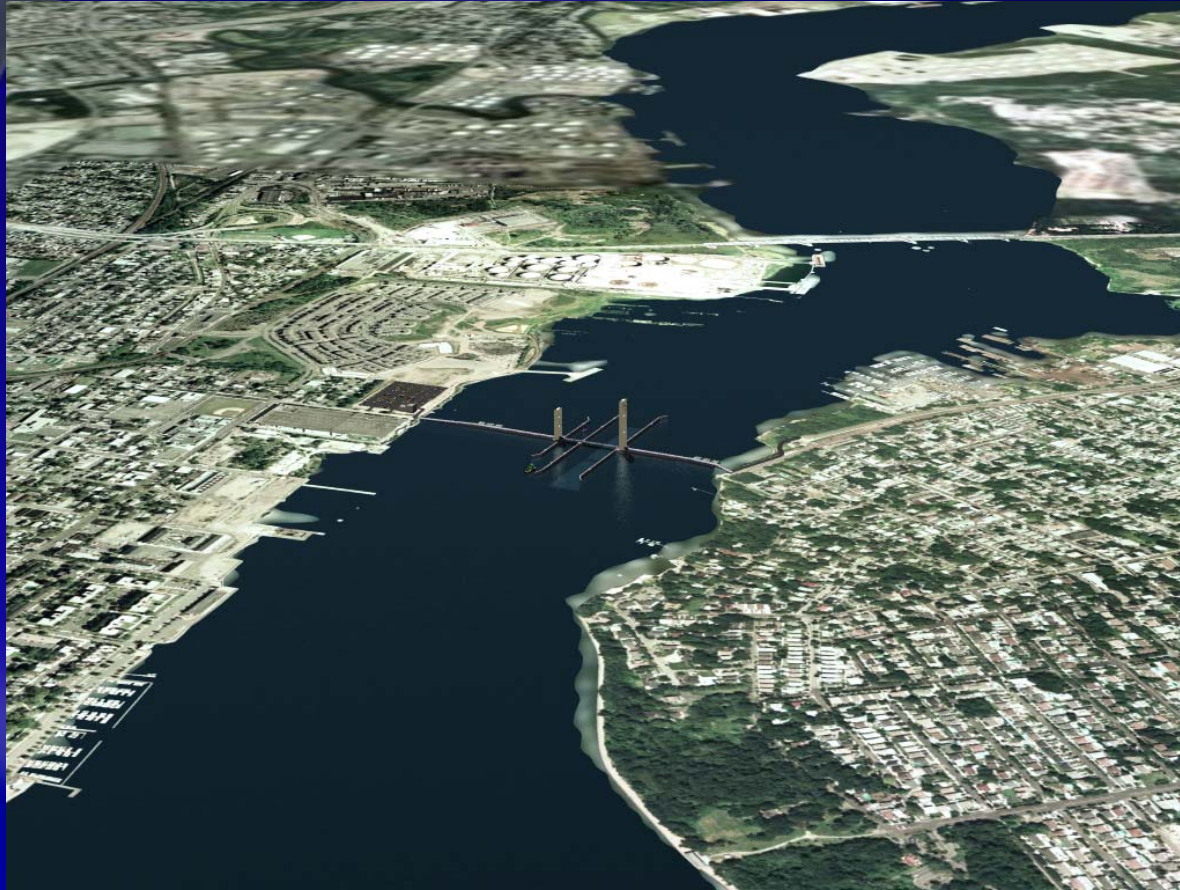
## **Arthur Kill**

- ◆ **Arthur Kill – Separates Staten Island and New Jersey**
- ◆ **The Arthur Kill is a commercial and recreational waterway that runs between Upper New York Bay (via Kill Van Kull) and Raritan Bay**
- ◆ **Tidally Influenced**

# Arthur Kill Storm Barrier



# Arthur Kill Storm Barrier



*Overview*



# Arthur Kill Barrier Design Goals

- ◆ Resist Category 3 hurricane
- ◆ Minimize Impacts to Community
- ◆ Provide Sustainable Elements into Design

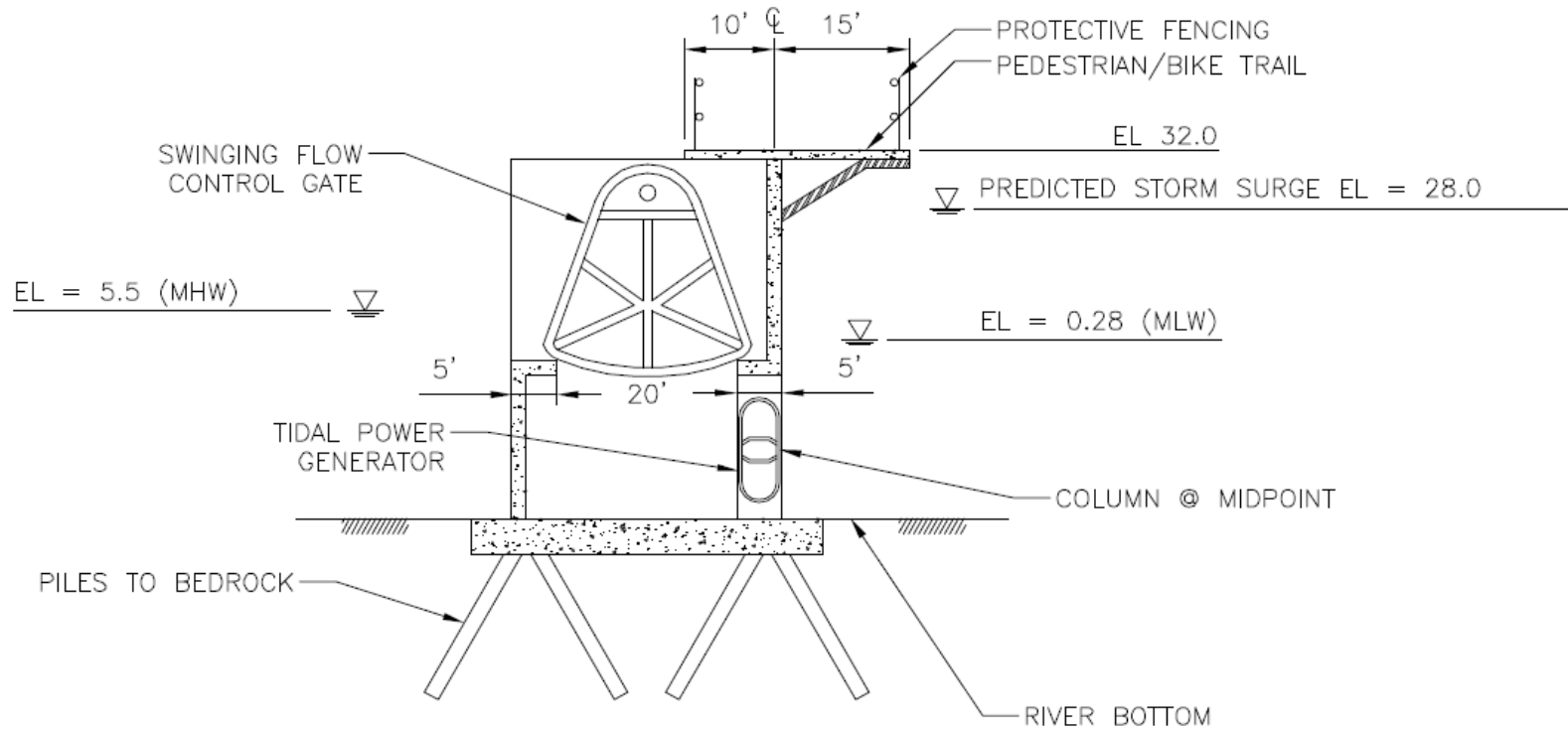
# Engineering Considerations

- ◆ Elevation of Surge Barrier
- ◆ Water Quality and Sediment
- ◆ Navigational Restrictions
- ◆ Operational Procedures
- ◆ Emergency Operations
- ◆ Structural and Geotechnical
- ◆ Wildlife Impacts
- ◆ Maintenance Issues

# Barrier Elevation

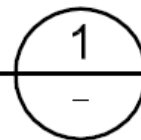
- ◆ ACOE Predicted Category 3 Surge – 14.4 feet
- ◆ Wave Estimate – 8 feet
- ◆ Tide Fluctuation – 5 feet
- ◆ Storm Surge Elevation approx. 28 (NGVD 29)

# Barrier Cross Section



SECTION

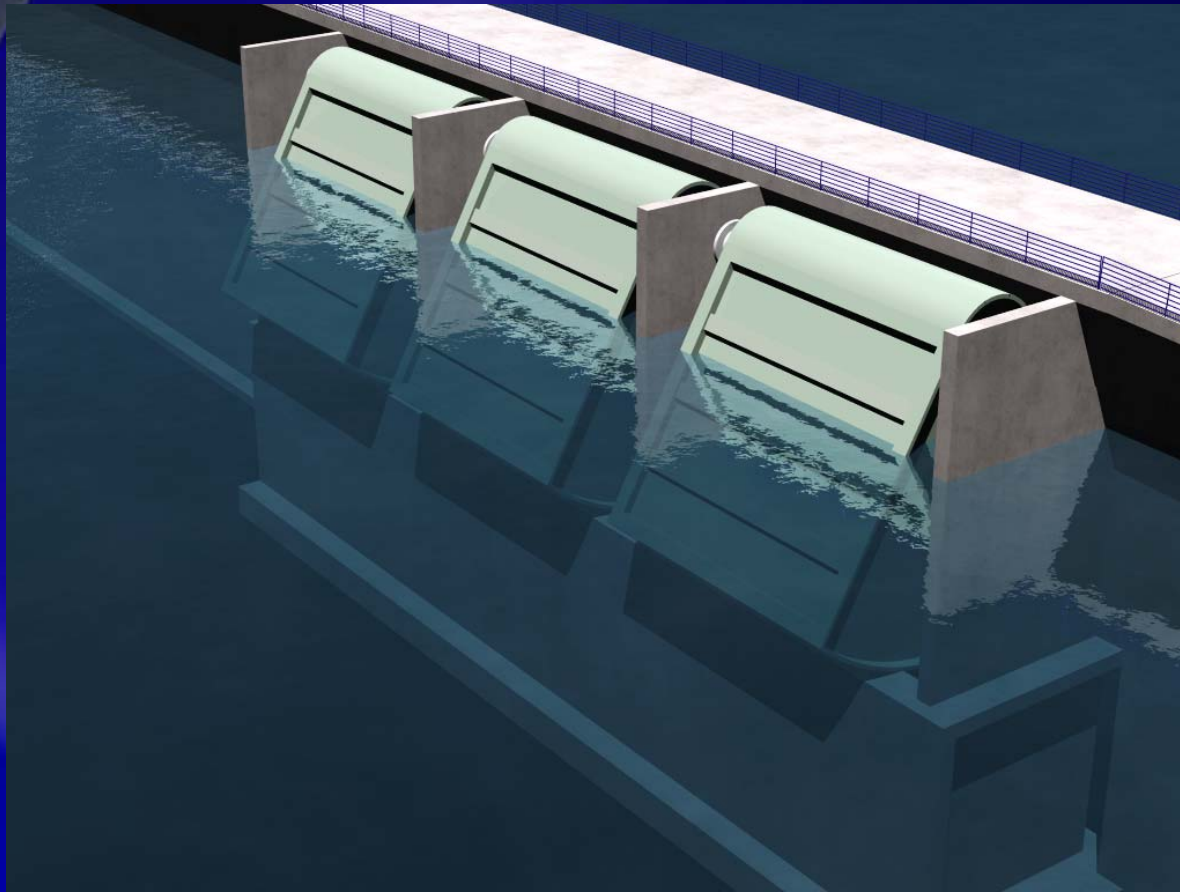
NTS



# Waterway Opening Design Considerations

- ◆ Hydraulics
- ◆ Water Quality and Sediment
- ◆ Navigational Needs
- ◆ Maintenance

# Arthur Kill Storm Barrier

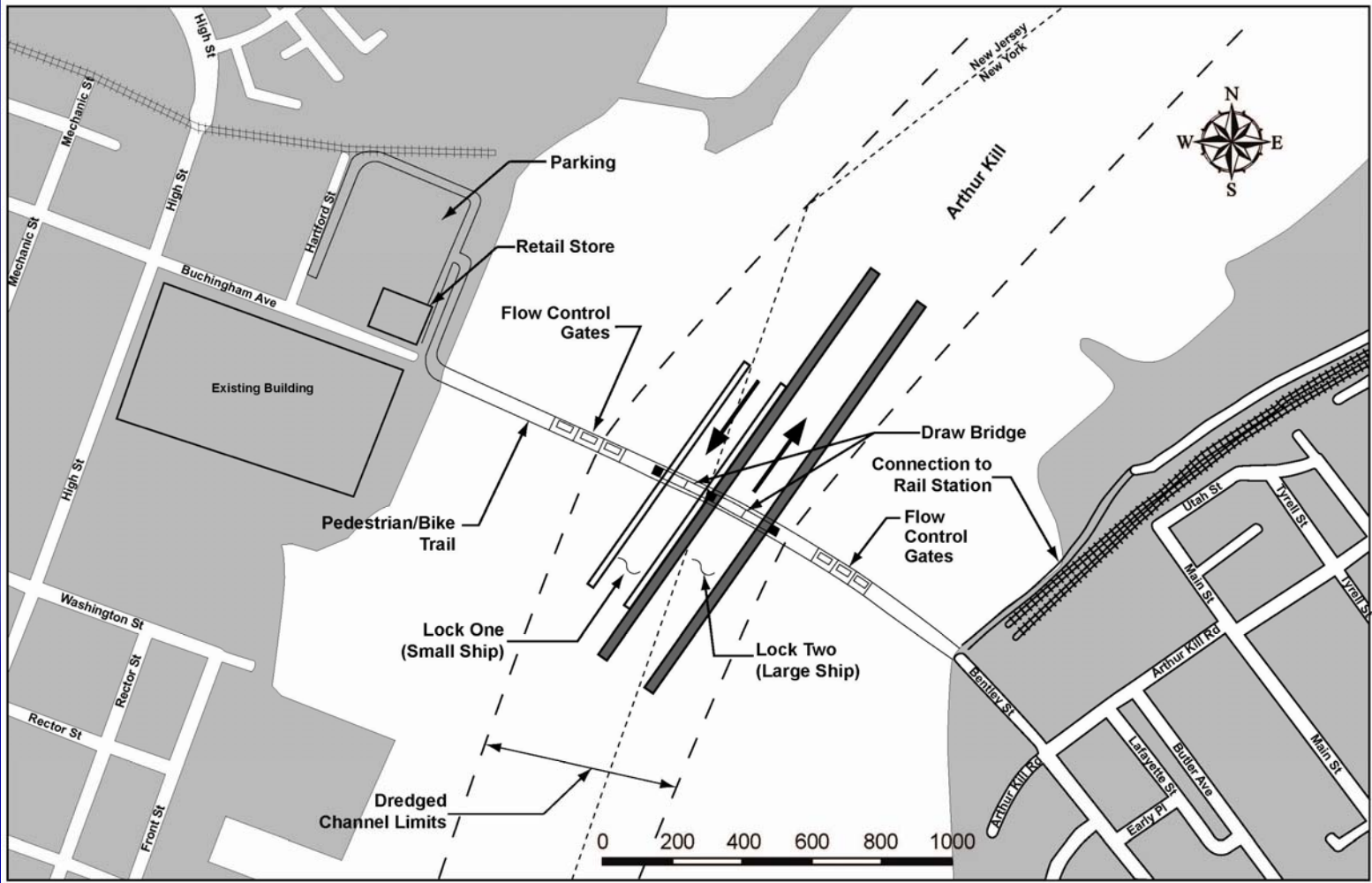


*Tidal Gates*

# Navigational Considerations

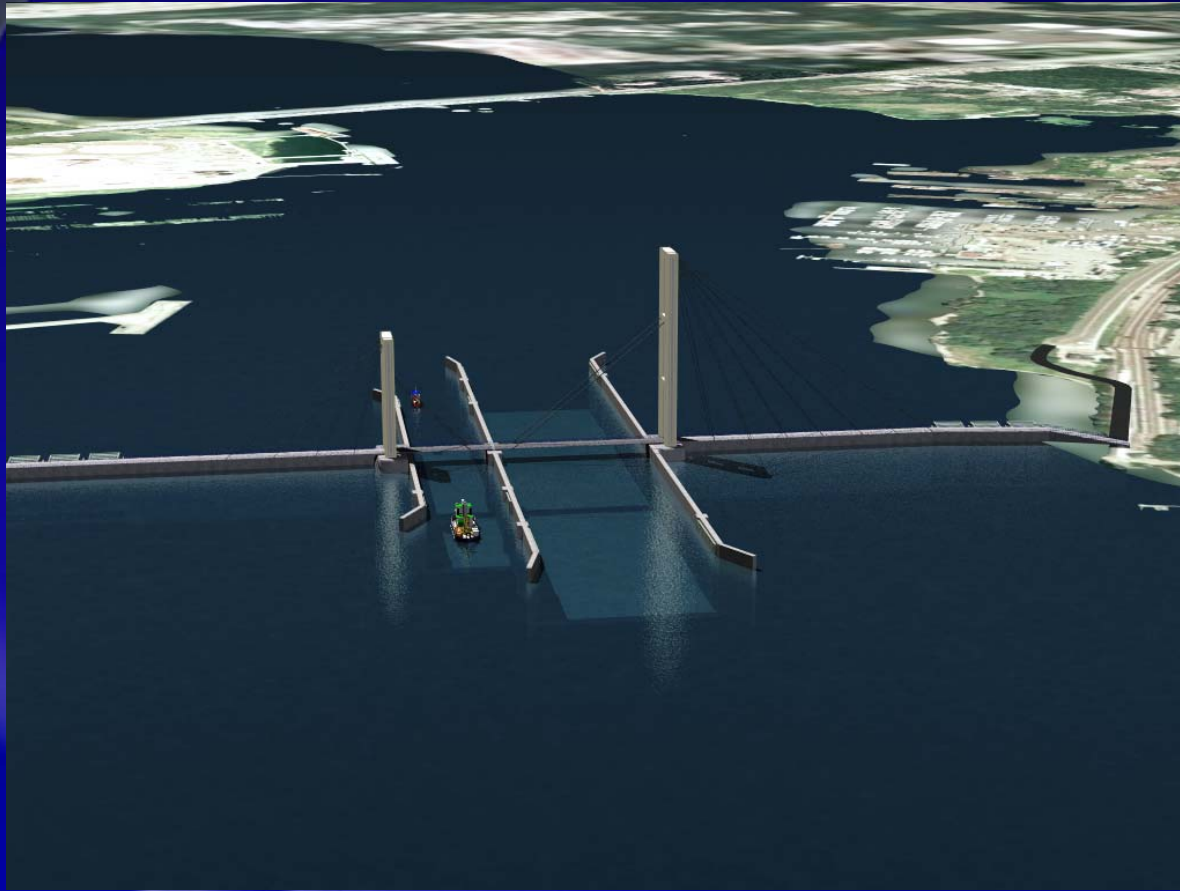
- ◆ **Significant Marine Usage**
- ◆ **Barrier With Lock**
  - ◆ **Improved Operations at Higher Water Level**
  - ◆ **Provides Access During Storm Event**
  - ◆ **Suited for Channel Geometry**
- ◆ **Barrier Without Lock**
  - ◆ **Lower Capital Burden**
  - ◆ **Less Maintenance Needs**

# Arthur Kill Storm Barrier





# Arthur Kill Storm Barrier



*Dual Locks*

# Arthur Kill Storm Barrier

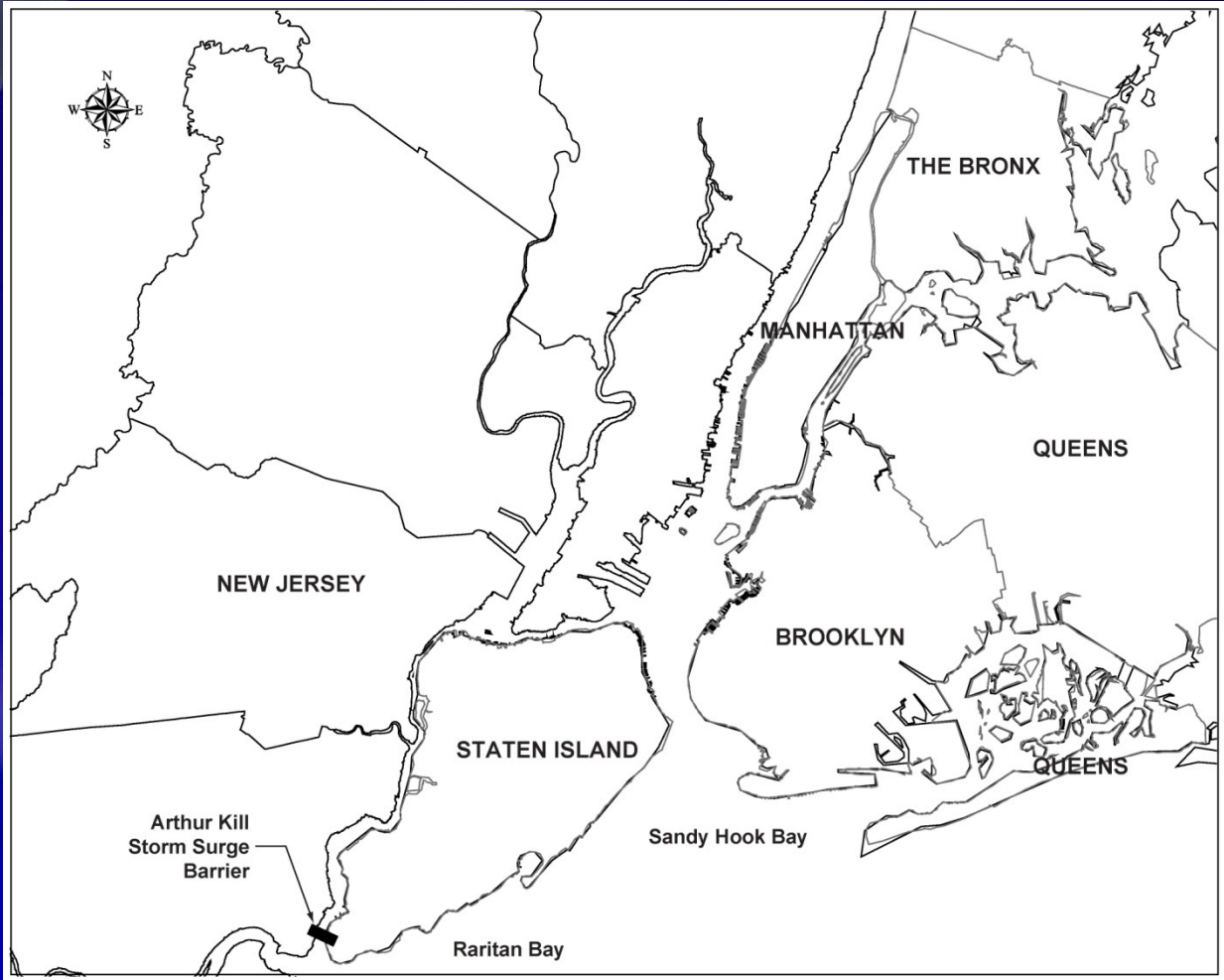


*Overview*

# Social Considerations

- ◆ **Environmental Permitting**
  - ACOE
  - Coast Guard
  - NYSDEP
  - US Fish and Wildlife
  - Etc., Etc., Etc.
- ◆ **Ownership**
- ◆ **Impact of Barrier Location**

# Location of Barrier



# **Sustainability Opportunities**

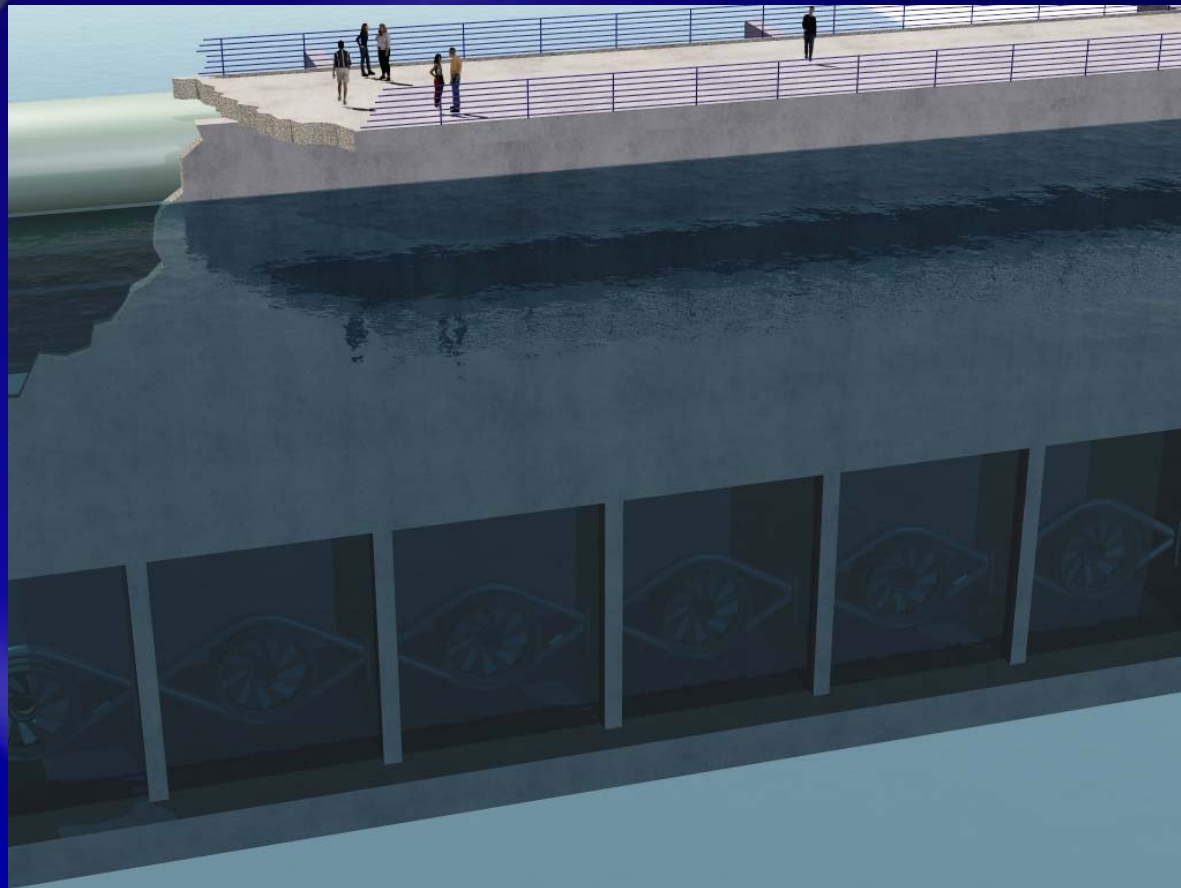
- ◆ **Multi-Modal Linkage**
- ◆ **Tidal Power Generation**
- ◆ **Transit Oriented Development**
- ◆ **Recreational Enhancement**

# Arthur Kill Storm Barrier



*Multi-Modal Linkage*

# Arthur Kill Storm Barrier



*Tidal Power Generation*

# Arthur Kill Storm Barrier



*Transit Oriented Development*



# **Arthur Kill Storm Barrier**

**Animation**

# Closing

- ◆ **Challenges and Opportunities**
- ◆ **Long Term Planning for Success**

**Questions?**