



# GIS Management of NYC's Waterfront Infrastructure

Presented By:

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# Presentation Outline

- Introduction
- Project History
- Waterfront Structure Data
- Management Application
- Closing

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# NYC Waterfront

- One of the world's premiere waterfronts
- Approximately 575 miles of both natural and engineered water/land boundary
- Many of the engineered structures built 25 to 100 years ago.
- Key city-owned structures are responsibility of the New York City Economic Development Corporation.

# NYC Waterfront Timeline to 1870

- 1524 - Giovanni da Verrazano discovers New York Harbor.
- 1648 - Peter Stuyvesant constructs first structure for mooring vessels.
- 1825 - Erie Canal opens and NYC grows rapidly in size and importance.
- 1870 - Department of Docks established to handle waterfront development.

# Department of Docks Timeline

- 1870 – 1942: Department of Docks
- 1942 – 1969: Department of Marine & Aviation
- 1969 – 1986: Department of Ports & Terminals
- 1986 – 1989: Department of Ports, International Trade & Commerce
- 1989 – 1991: Department of Ports & Trade

# Closing of Department of Ports and Trade

- In 1991, the Department of Ports and Trade closed.
- Jurisdiction for city-owned waterfront transferred by city charter to DSBS and other agencies.
- DSBS contracts with EDC under the Maritime Contract to manage and maintain portfolio of waterfront properties.

# Rate of Deterioration

- Structures in the marine environment are subject to conditions and situations not encountered inland.
  - All parts of the structure are outside and subject to the environment.
  - Seawater (water with salinity) has a dramatic affect on the service life of marine structural materials.
- Active management of waterfront infrastructure is key.

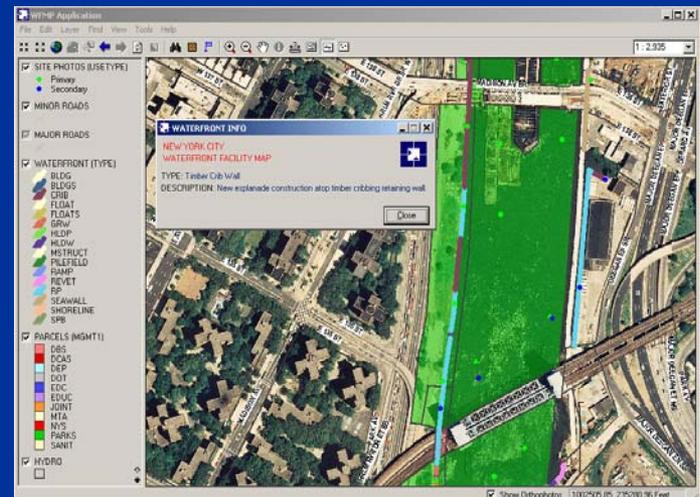
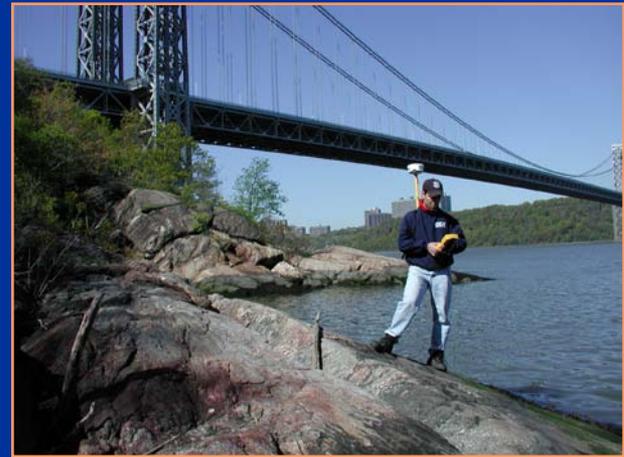


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# Project History

- 1998 - Development of Inspection Database
- 2001 - Phase I Mapping of Limited City-Owned Waterfront Parcels and Development of Map Viewer



# Project History

- 2006 - Phase II  
Mapping of All City-Owned Properties
- 2008 to Present -  
Development of  
Waterfront Facilities  
Maintenance  
Management System  
(WFMMS).



# WFMMS Scope

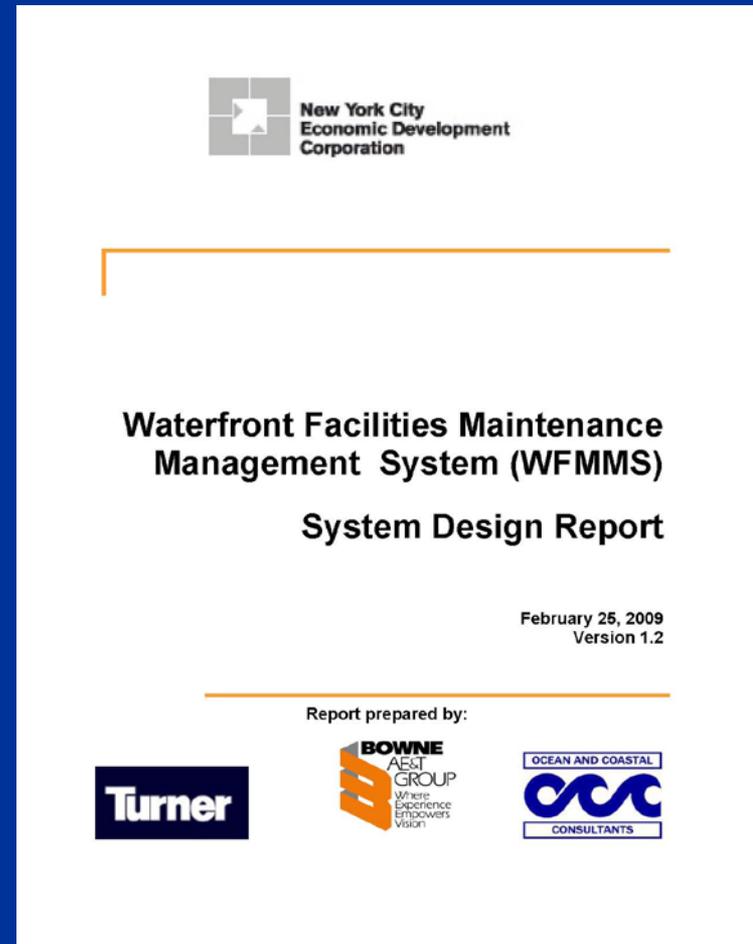
- Create a web-based application to manage NYC-owned waterfront infrastructure.
- Consolidate data from all previous phases.
- Integrate spatial data from variety of data sources in a comprehensive map.

# Project Team

- New York City Economic Development Corporation
- Turner Construction Company
- Bowne Management Systems
- Ocean and Coastal Consultants
- Subject Matter Experts from COWI, A.S. and Dynatest Consulting.

# Project Status

- Week-long project meeting in December.
- Application development underway
- Waterfront structure data conversion and migration underway



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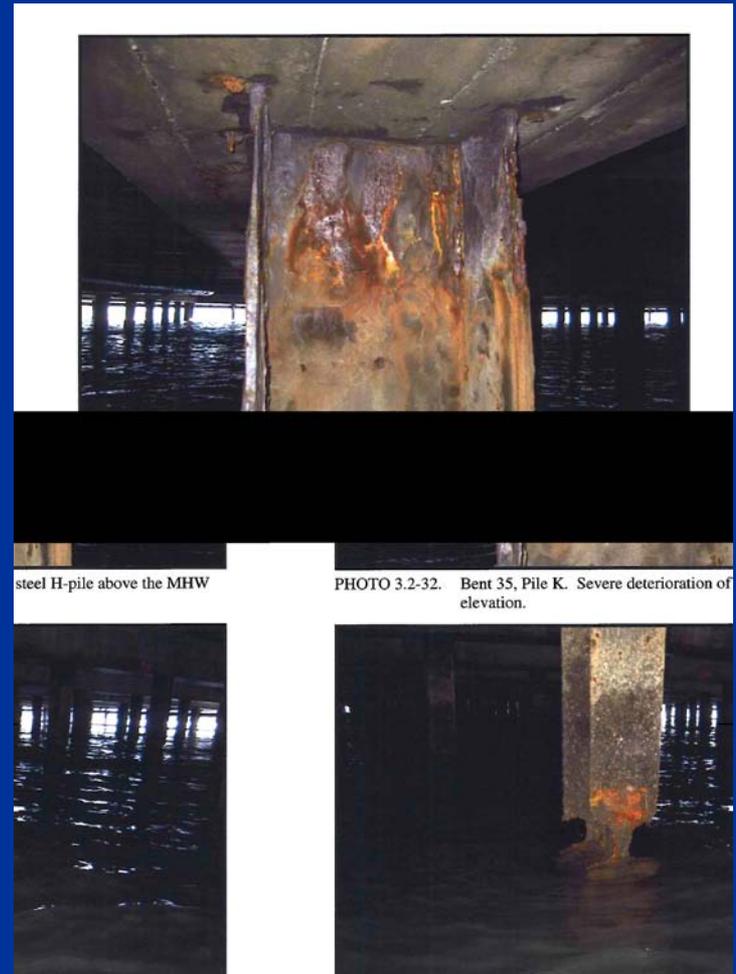
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# Waterfront Structure Data

- Management Data (Tabular)
- Waterfront Data (Spatial)
  - EDC mapped and managed
  - EDC managed
  - Supporting waterfront data
- Inventory (Tabular and Spatial)

# Management Data

- Inspections  
(Fundamental Unit)
- Recommendations  
(Future Costs)
- Projects
- Permits
- Documents
- Journal Entries



# Waterfront Data - EDC Mapped

- Phase I and II mapped city-owned waterfront
  - Structure Type
  - Cursory Condition
  - Agency Responsibility
- Georeferenced Photos
- Block and Lot Data (Details on ownership)

# Waterfront Data - EDC Managed

- Mitigation Sites
- Soil Boring Locations
- Site-Specific Hydrographic Data

# Waterfront Data - Supporting

- NYC Department of Information Technology and Telecommunications (DOITT)
- NOAA Electronic Nautical Charts (ENCs)
- FEMA Digital Flood Insurance Rate Map (DFIRM) data
- NYS DEC's "NYS Coastal Atlas"

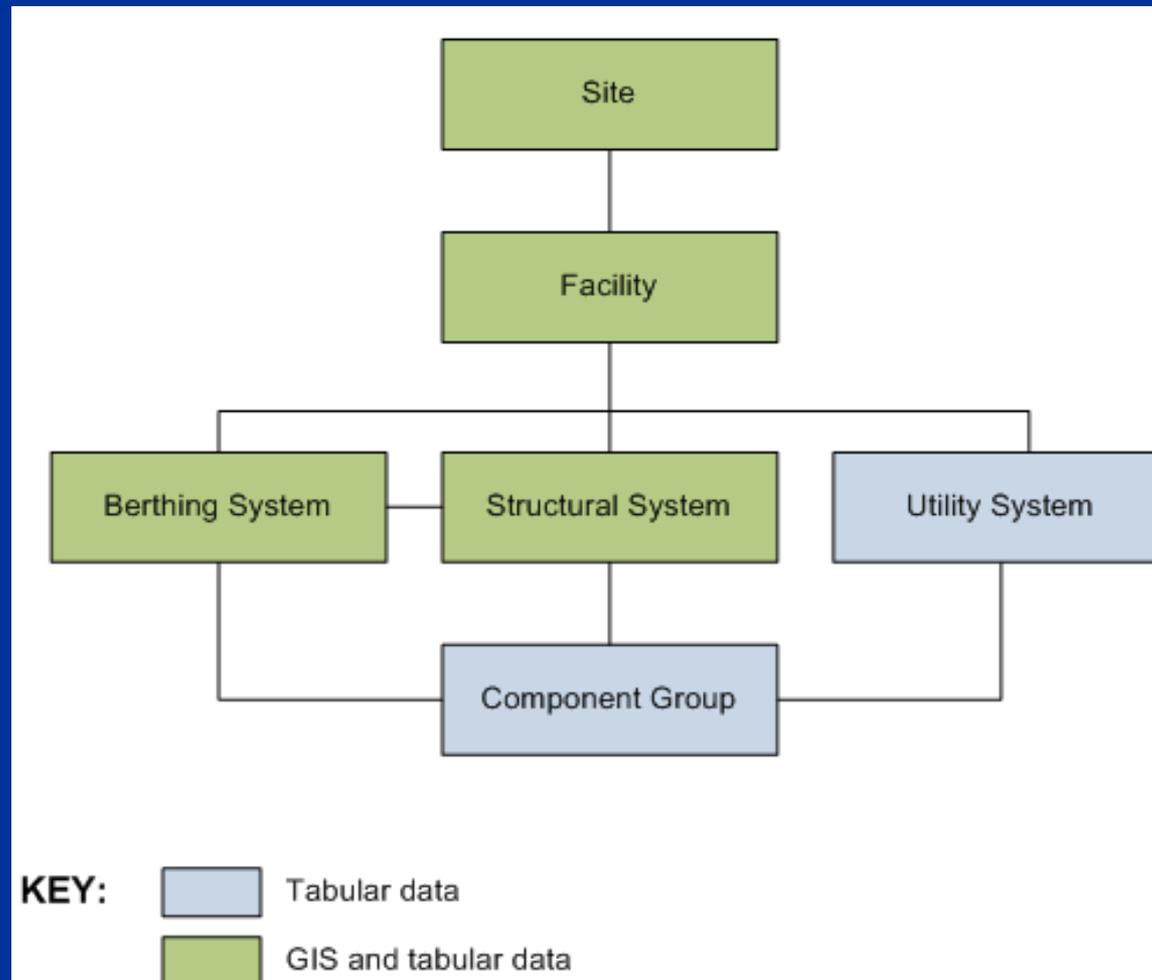
# Structure Inventory

- Waterfront structures are key to WFMMS
- NYCEDC manages their waterfront inventory 'Sites' by use, importance, and responsibility
- Challenge to reconcile the management hierarchy with spatial data.

# Hierarchy

- Sites - Groups a number of Facilities together in a definable unit based on use and distinct organizational boundaries.
- Facilities - Fundamental unit of the WFMMS where most of the key data will be tracked.
- Systems - Separates the Facility into distinct areas by Structure, Berth, & Utility.

# Hierarchy



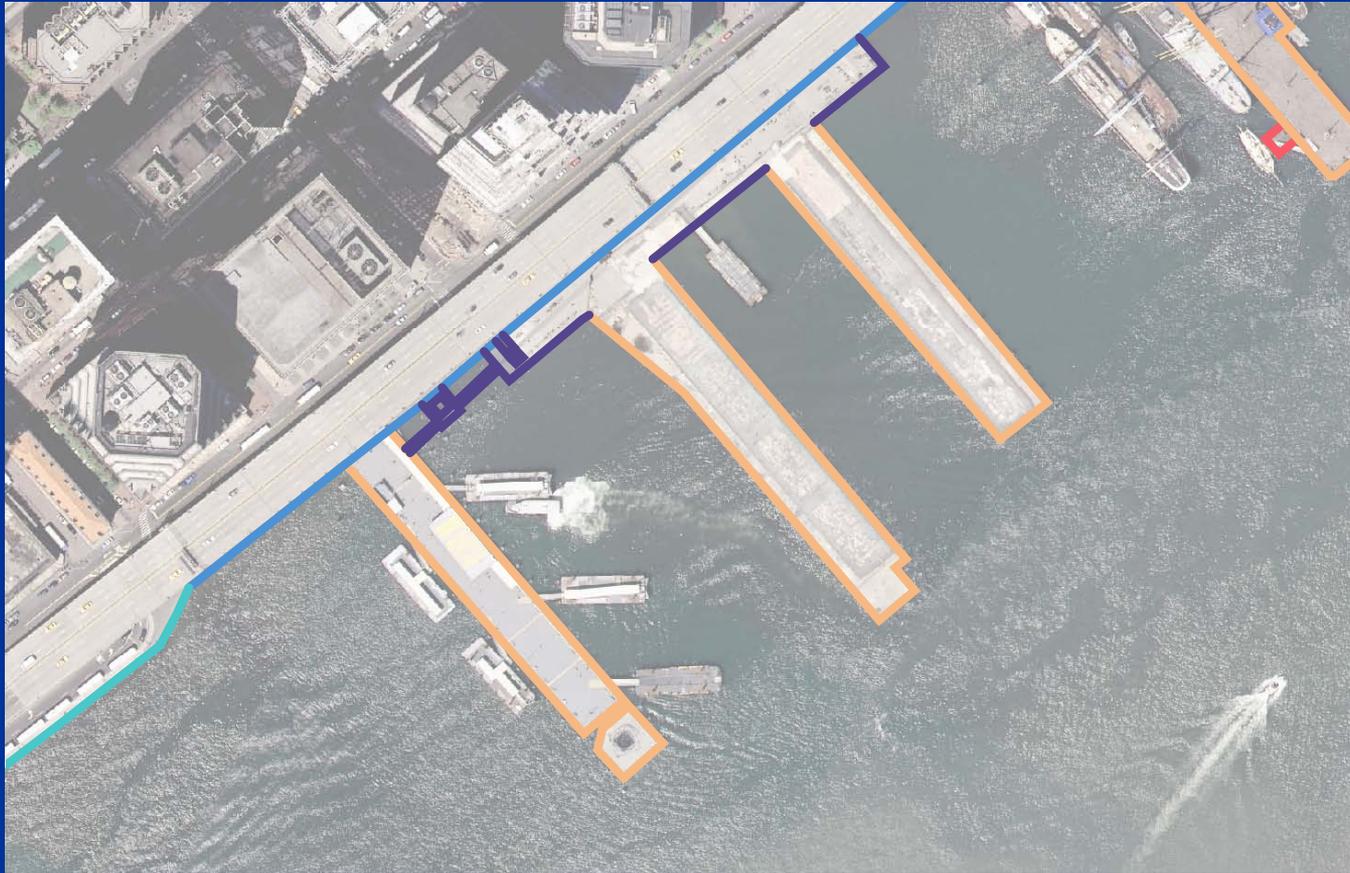
# Hierarchy - Spatial

- Sites - Area feature class
- Facilities - Area feature class
- System level data is not all linear.
  - Bulkheads and shoreline are linear, but piers and wharves are best represented by areas.
  - Berths are represented by area.
- Component - No spatial attributes.

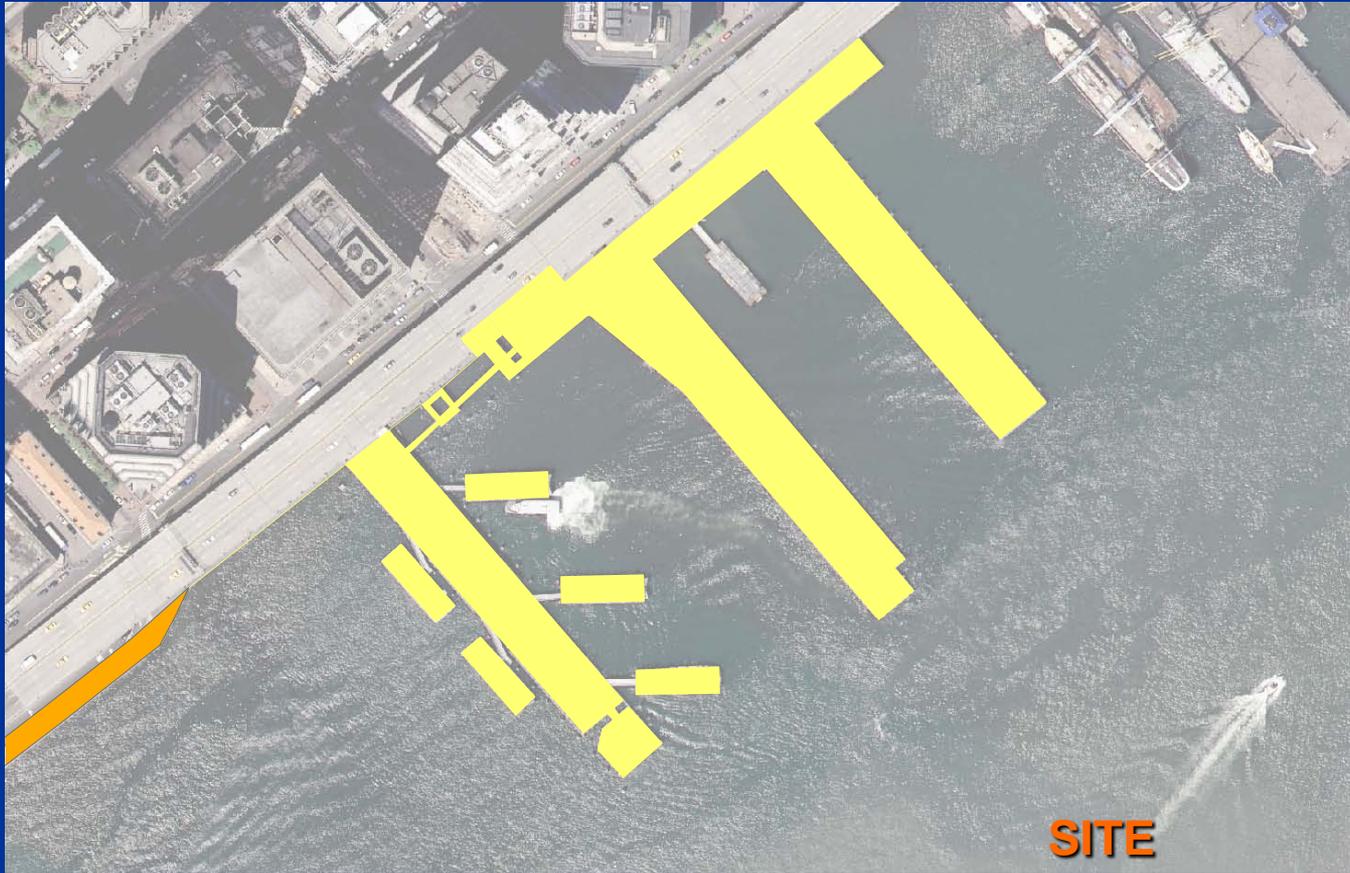
# Topology for Hierarchy

- Need topology rules for hierarchy levels to maintain database relationships spatially.
- Facility Topology Rules (Example)
  - Must be covered by 'Sites'
  - Must cover 'Systems'
  - Must not overlap
  - Must not have gaps

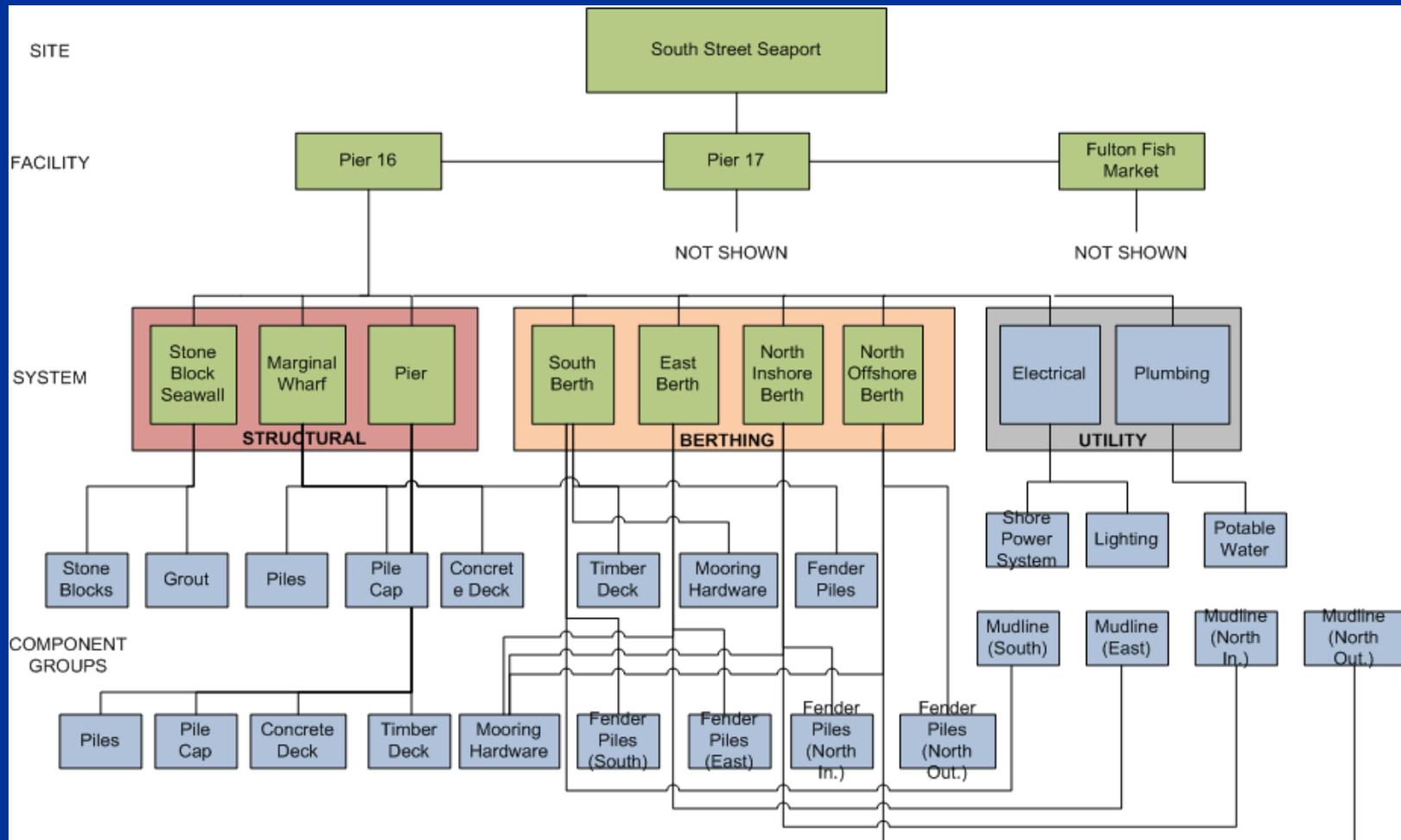
# Existing Data



# New Data



# Sample Hierarchy



# Current Project Workflow

- Hierarchy Development (for EDC Review)
- Topology Mapping
- Review of Existing Tabular Data
- Migrate Existing WFMMS Data

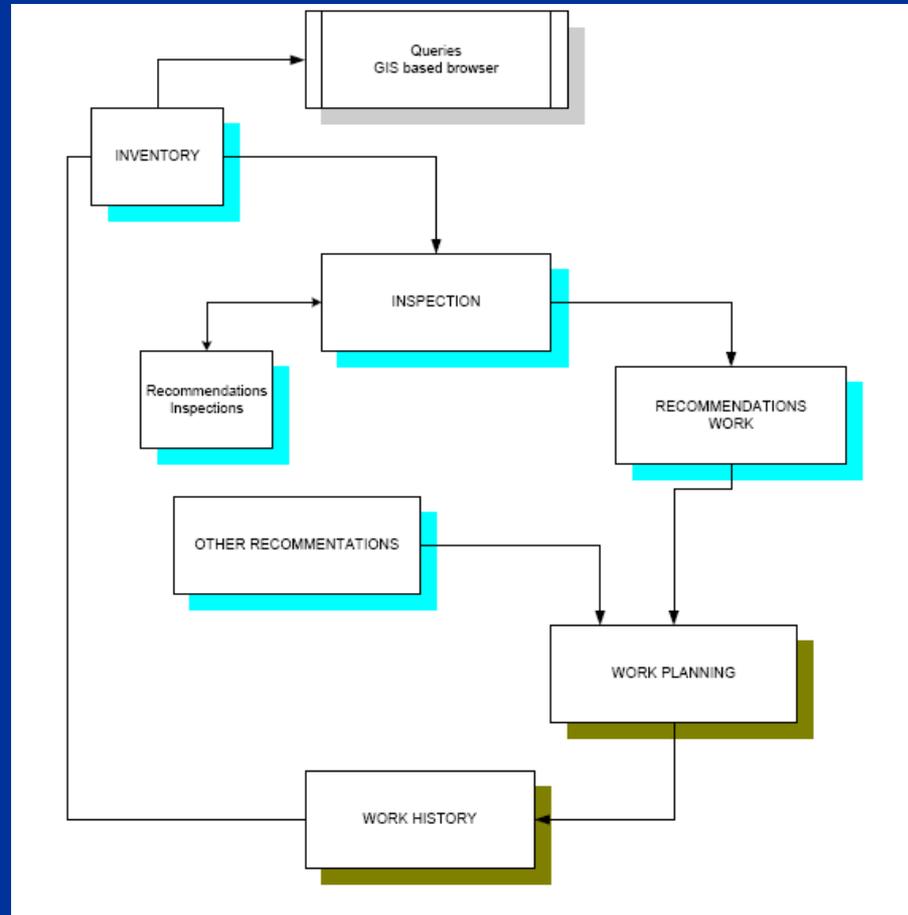
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# High-Level Overview

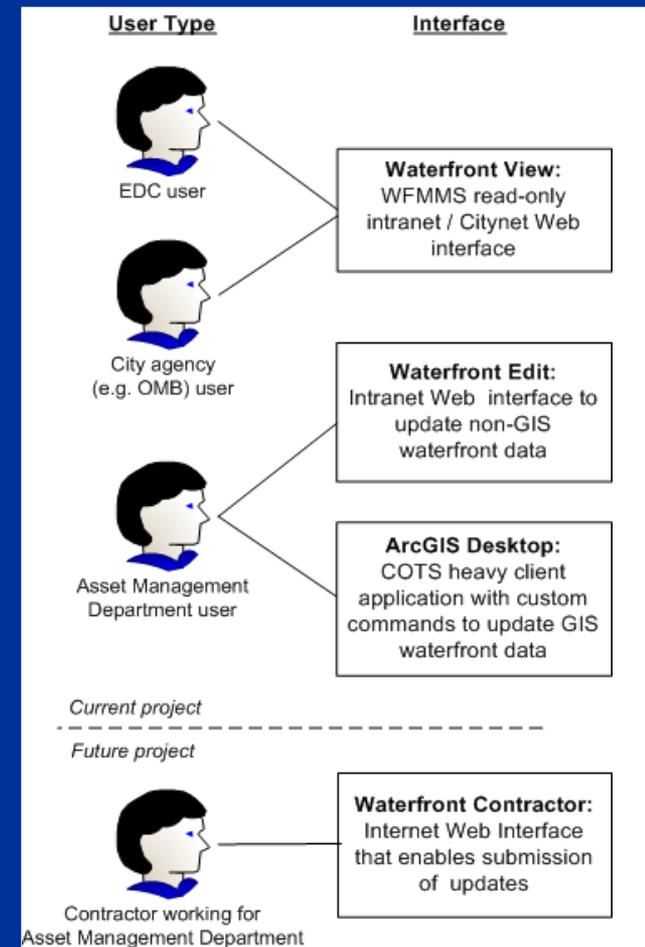
- Review and query spatial and tabular data describing the NYCEDC's digital inventory of waterfront sites, facilities and systems
- Manage permits and status
- Plan inspections
- Manage recommendations and create budgets
- Review documents (reports, as-builts, etc.)
- Log journal entries for running history.

# EDC Workflow



# Application

- Web-Based 'Waterfront View'
  - Management application
  - Map Centric
  - Data editing limited to tabular data
- Desktop-Based 'Waterfront Edit'
  - Limited users
  - ArcGIS desktop based
  - Spatial data editing.



# Application Users

- EDC User – Waterfront View.
- City agency user – Waterfront View.
- Asset Management Department user – Waterfront View and Edit.
- Contractor/Consultant working for Asset Management Department – Future module.

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# Closing

- Planning to obtain and manage spatial waterfront structure data requires careful planning.
- WFMMS presentation at Coastal Geotools 2011.