Development of a Service Plan for

Waterborne Transportation Service

in Miami-Dade County

MIAMI-DADE MPO Metropolitan Planning Organization

Kimley-Horn and Associates, Inc.

Purpose

- To develop a water transit service plan that
  - Builds upon a prior feasibility study
  - Intends to meet mobility goals
    - Attracting local commuters
    - Providing viable mobility options for visitors
- To perform an impartial review
- To estimate ridership
- To determine the expected implementation and operating costs of such a system

Study Background

- *Interest generated by Broward County Water Bus*
- *Rapid Mass Transit, Metro Aqua Cats proposal*
- *Feasibility of Utilizing Miami-Dade County Waterways for Urban Commuter Travel*

Data Collection and Analysis

- Water Transit Mobility Restrictions
  - Bridges (over canals and Biscayne Bay)
  - Spillways and Salinity Dams

Low bridge (9’ Clearance) over the Miami Beach Channel

Assumption:
Service frequency goals render the opening of drawbridges impractical, so routes were designed to avoid drawbridge openings

Venetian Causeway (12’ Clearance) as seen from Pace Park

Data Collection and Analysis

- Docking - Marinas and Parks

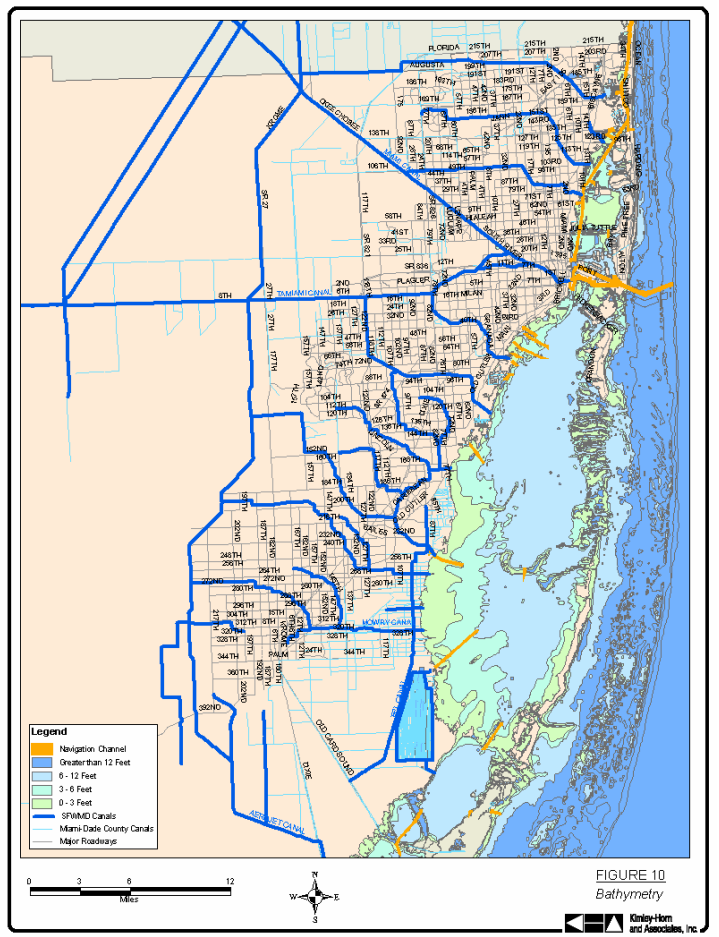
Large parking lot at the proposed Haulover Park Marina terminal, already served by Metrobus

Existing dock at Pelican Harbor Park on the Kennedy Causeway

Existing dock at Dinner Key Marina, adjacent to Coconut Grove activity center

Data Collection and Analysis

- Biscayne Bay Data (Constraints)
  - Manatee Protection Zones
  - Sea Grass Habitats
  - Shipping Channels
  - Bathymetry (water depth)
  - Reefs



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Patronage Estimation

- Linear regression analysis using demographic data from cities with existing water transit systems
- Using an assumed route structure based on navigable waterways analysis
- Full implementation
  - About 600,000 (base year)
  - About 1,700,000 (at 5-year maturity)
- Demonstration Route
  - About 250,000 annual patrons

System Needs & Characteristics

- Vessels
  - Shallow draft vessels
  - Low wake wash
  - Maximum height
  - Vessel capacity
  - Manatee-detection equipment

- Catamarans used in other metropolitan areas
  - Brisbane, Australia
  - Sydney, Australia
  - London, England
  - Amsterdam, Holland

System Needs & Characteristics

- Routes
  - West Shoreline Route / Coconut Grove Route
  - North Beach Route
  - South Beach Route
  - Key Biscayne Route
  - *Downtown Circulator**
- Terminals
  - Downtown/CBD
  - Suburban
  - Downtown Circulator Stops

Circular Quay; Sydney

Typical Suburban Terminal; Brisbane

Full System Recommendation - Routes and Terminals

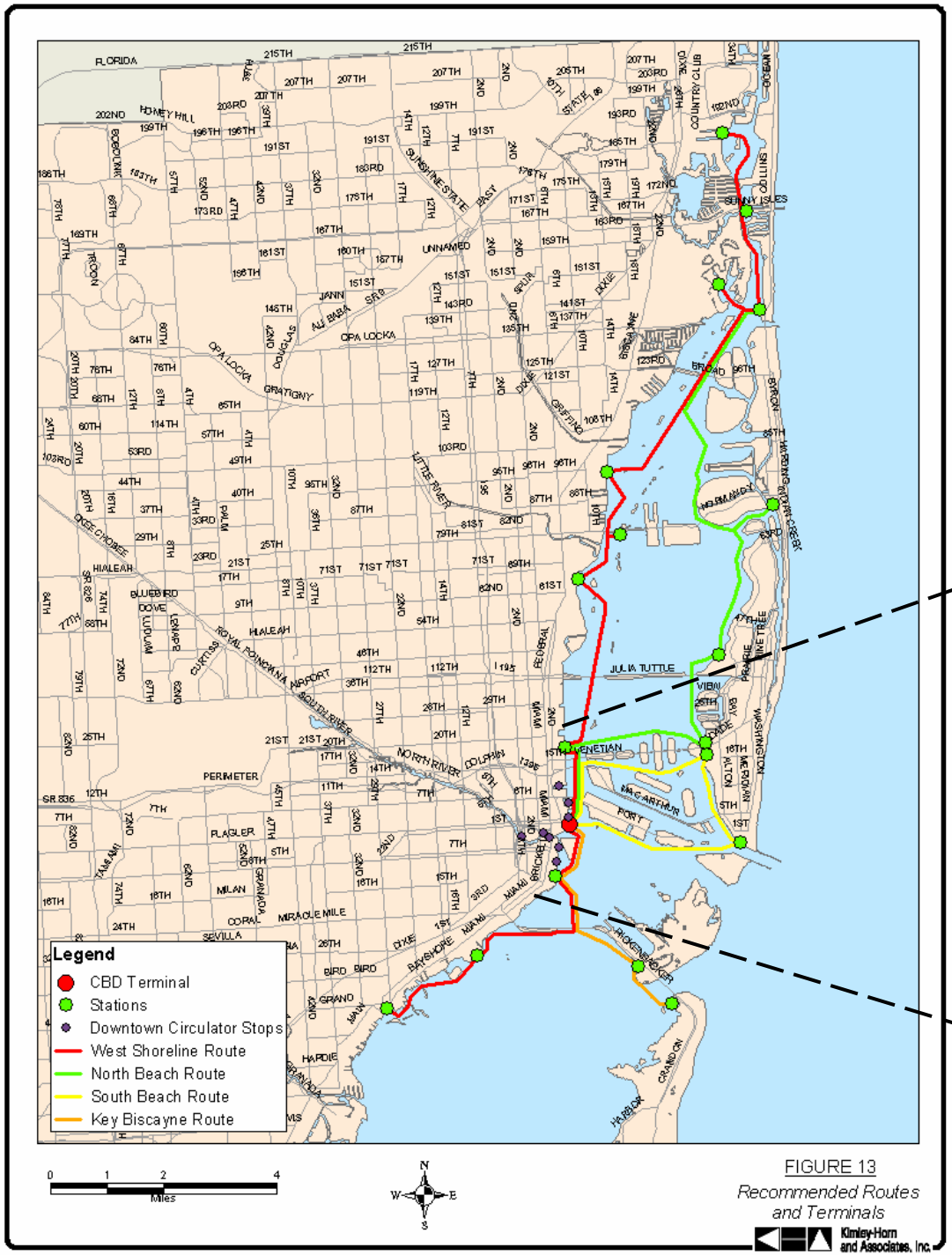
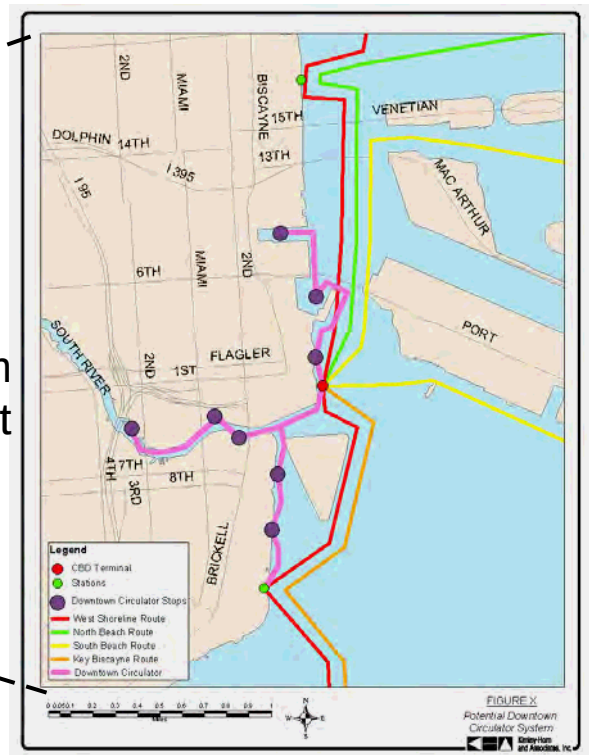


FIGURE 13
Recommended Routes and Terminals

Downtown Inset



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Costs and Revenues

- Capital Cost Estimate for "Phase 1" System
  - $125 to $150 million

    (Vessels, Improved Terminals, and Land Acquisition)
- Operating Cost Estimate for "Phase 1" System
  - $22 million at 5-year system maturity

    (Personnel, Fuels, Maintenance, Administrative)
- Annual Operating Deficit
  - $11 to $18 million
  - Farebox Recovery approximately 40%

Business Model

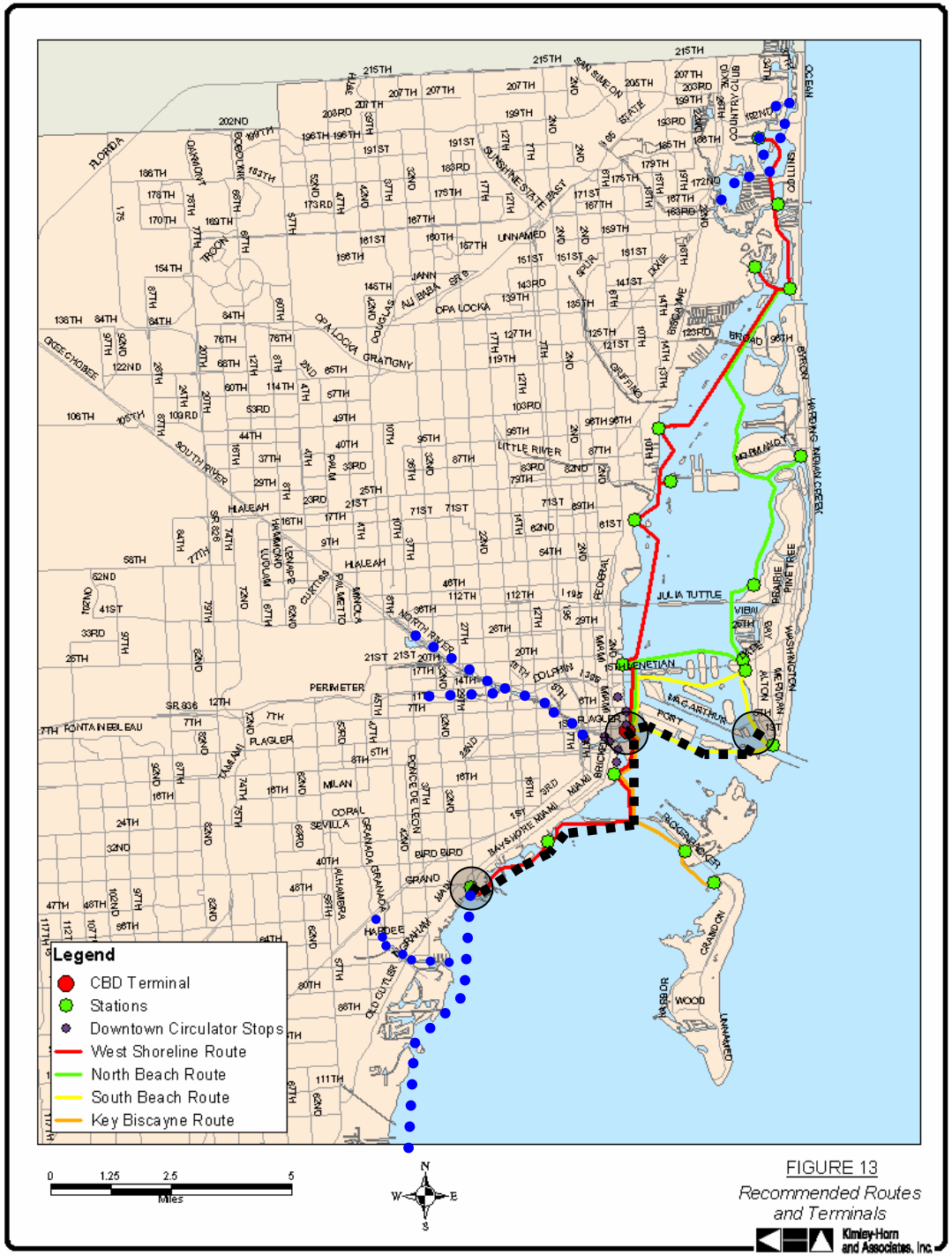
- Public / Private business model recommended
  - Public Sector Role
    - Initial Capital Investment
    - Operating Subsidy
    - Oversight Management
  - Private Sector Role
    - Waterborne Operation Experience
    - Day-to-Day Operations

Summary

- Prior waterborne transportation services have failed locally
- Study identifies necessary elements to attract local commuters
- Australian systems are closest to those needed to meet system objectives
- System is meant to integrate with existing Metrobus and Metromover routes
- Parking vital to the success of most water transit terminals
- Capital costs relatively low, operating costs relatively high
- Local funding source will be key to implementation
- *Demonstration route recommended as first step*

Recommendation

- Demonstration route
  - To judge short-term acceptance and gauge possibilities for long-term success of larger system
  - "South Beach Route" shown as part of the "Phase I" system, plus service to the Dinner Key Marina in Coconut Grove
  - Allow enough time for a fair assessment of the demonstration route



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Potential Water Transit System in Miami-Dade

Demonstration Route

Phase I Routes

Potential Future Expansion Beyond Phase I

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Thank you for your attention.

KHA (and MPO staff)
would be pleased to entertain
questions or comments you may have.

Routes and Terminals

- Selection factors included ease of implementation and travel characteristics
- Multimodal connections
- A route south of Coconut Grove not included in “Phase I”
  - Environmental concerns
  - Lower density near the coast
  - Fewer appropriate service locations
  - Travel times not competitive with Metrorail

Downtown Water Transit Hub Area

Short walk to Bayfront Park Metromover Station from proposed CBD Terminal – Chopin Plaza

Riverwalk and developing & proposed new development would be appropriate downtown circulator stops

Existing docking facility at Chopin Plaza, adjacent to Bayfront Park

The Biscayne Bay Environment

- Biscayne Bay presents unique environmental challenges
  - Manatees
  - Seagrasses
  - Shallow depths
- Several slow speed zones in Biscayne Bay
  - To reduce the severity of manatee collisions
  - To reduce wake wash
- Effects on potential water transit service
  - Significant environmental design features are a MUST
  - Catamarans would NOT be competitive with automobiles at slow speeds

The Manatee Challenge

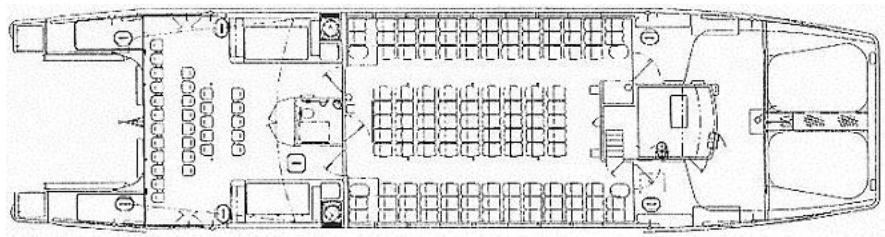
- Manatee reserves and sanctuaries exist in large part because conventional vessel technology is not environmentally friendly with respect to manatees.
- Slow-speed zones and idle-speed zones of manatee reserves gravely downgrade the commercial viability of a ferry system.
- The challenge is very similar to wake/wash issues of high-speed ferries.

The Demonstration Route Vessel – Testbed of a Potential Solution

- The solution is very similar to the solutions for the wake wash issues of ferries, which permit speed exemptions in low wake wash waters, namely:
  - Provide technological advances to the ferries that make them environmentally friendly with respect to manatees at their design speeds.
  - Conduct the onboard and in-water research and testing necessary to prove and to specify the required vessel technology.

Environmental Design Features

- Two long, slender demi-hulls
  - Significantly reduces wake wash
  - Higher speeds at lower wake levels



- U-shaped hull sections
  - No hard corners to reduce manatee injuries
  - Proven low wake wash design
- Manatee-friendly propulsion system
  - Waterjets with intake grates
  - Propellers with protective shrouds

- Blunt, hemispherical bows
  - Decreases wave resistance and wake wash energies
  - Vertical motion reduction
  - Useful for the mounting of acoustic transducers

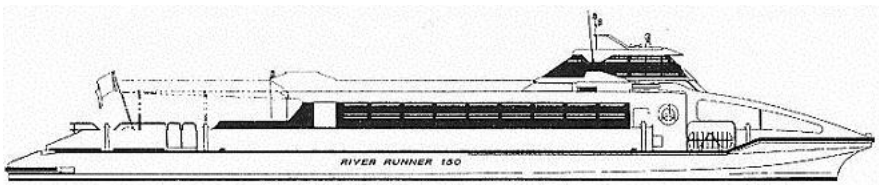
Environmental Design Features

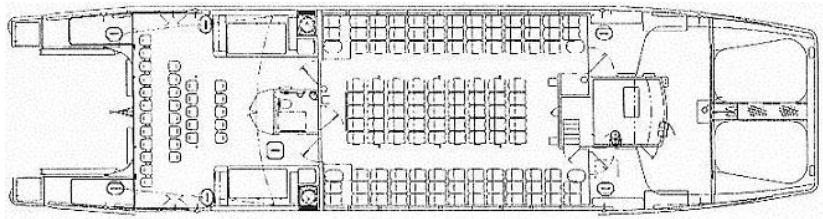
- Manatee detection and avoidance
  - Provide on-board technologies to supplement manatee-friendly vessel design
- Recent manatee avoidance technology research
  - Passive Acoustic Detection of Manatee Sounds to Alert Boaters - University of South Florida, 2002.
  - Design for a Manatee Finder: Sonar Techniques to Prevent Manatee-Vessel Collisions - Hubbs SeaWorld Research Institute, 2004.
  - Boater Manatee Awareness System - Nova Southeastern University, 2002.
  - System for Warning Boaters of the Presence of Manatees – Univ. of Florida, 2002.
  - Proof-of-Concept for Off The Shelf Technology to Identify Acoustic Signature to Detect Presence of Manatees - Lampl-Herbert, 2002.
  - Manatee Proximity Indicator - W. Randolph Warner, 2003.
  - Manatees, Bioacoustics and Boats - Edmund R. Gerstein, 1999

Summary of Future Manatee Avoidance Technology Research

- Boat hull and propulsion system **design modifications** that would minimize injuries to manatees in the event of a collision.
- **Alerting boaters** to the presence of manatees through boat-mounted infrared imaging detection systems, effective day or night, allowing boaters to take evasive action.
- **Alerting boaters** to the presence of manatees through a boat-mounted active imaging sonar system, allowing the boats to take evasive action.
- **Alerting boaters** to the presence of manatees through buoy or piling-mounted passive or active sonar systems that activate a light stick, signaling boaters to take evasive action.
- **Alerting manatees** to the presence of boats through a boat's bow-mounted acoustic projector, allowing the manatees to take evasive action.

The Design That Meets the Requirements of the Demonstration Ferry Vessel





- The design is known as a "Low Wash Catamaran," with its long, slender, low-draft, U-shaped, bulbous-bowed demi-hulls.
- Do these ferries exist presently in the United States? No, but these ferries operate in Brisbane, Sydney, London, Lisbon, Rotterdam, Ireland, and Bora Bora.
- Can this ferry type be designed and built in the United States? Yes, U.S. Naval Architects and Shipbuilders have the abilities to design and construct these Low Wash Catamarans.
- Is the design a "high-speed ferry"? No, "high-speed" is defined as 30 knots and above. These ferries operate in the 20-24 knot range, i.e. moderate speeds.

Recommendation

- Demonstration route
  - To judge short-term acceptance and gauge possibilities for long-term success of larger system
  - "South Beach Route" shown as part of the "Phase I" system, plus service to the Dinner Key Marina in Coconut Grove
    - Chopin Plaza or Bayfront Park to serve as CBD Terminal
  - Allow enough time for a fair assessment of the demonstration route
    - Experience shows at least 2 to 3 years

Capital Cost Options for a Demonstration Ferry Vessel

- Capital cost of demonstration ferry vessel?
  - Approximately $6 million for 2 vessels
- Is traditional leasing an option?
  - No, because ferry leasing companies are virtually non-existent in the United States, and the obtainment of a used ferry vessel would not have the required qualities of shallow draft, no chines, bulbous bows, low wake wash properties, 20-24 knot service speeds, and would not likely be compliant with the 2007 EPA emission requirements.
- Could the ferry be sold if the service was found to be unfeasible?
  - Yes, demand and cost recovery would be excellent for such a state-of-the-art ferry: approximately 67%, so the net capital cost would be only $1.1 million.

Operating Costs of the Demonstration Ferry Vessel

- Infrastructure improvements to piers
  - Approximately $700,000
    - Shelters, Signage, Railings, ADA Compliant Brow
- Demonstration route operating costs
  - Approximately $2 million annually
    - Labor, Fuel, Maintenance, Administrative Costs
- Farebox Recovery
  - Approximately 40 percent

Funding Opportunities

- U.S. DOT Maritime Administration
  - Loan program pursuant to Title XI of the Merchant Marine Act
- Ferry Boat Discretionary (FBD) Program
  - Approximately $18 million annually
- Research Grants
  - Universities could assist in applying for grants to test marine technologies
- Local Match
  - A local match source will be necessary, especially for potential implementation of a larger more comprehensive route system beyond the demonstration route