

Potomac River Commuter Ferry Feasibility Study & RPE Results

Chapter 1 Executive Summary

1.1 Introduction

The Prince William County Department of Transportation conducted a route proving exercise (RPE) and feasibility study of a proposed commuter ferry service on the Potomac River between April 1, 2009 and July 31, 2009.

The primary goal of this project was to determine likely ferry service travel times between potential docking locations, assess potential environmental impacts resulting from a ferry service, prepare preliminary capital and operational costs of a ferry service and define the operational parameters necessary to provide optimal ferry service between points in Virginia, Maryland and Washington DC. Another project goal was to determine a preliminary estimate of ferry service travel demand and operational revenue as well as assess the need to further analyze travel demands through market studies and updated trip generation models.

The project team developed an approach to the project specifically designed to meet the stated goal. The project team prepared a methodology to procure a ferry vessel and execute the three days of runs and testing making up the RPE. The project team then recorded the observations and results of the RPE. Next, the project team analyzed the results of the RPE to develop ferry vessel characteristics and plausible service plans. Based on these service plans, the project team estimated the likely capital and operational costs associated with the ferry service. The project team then determined the fare and ridership numbers necessary to recover a specified percentage of the operational expense (termed the “fare box recovery”) selected after reviewing the cost recoveries of other modes of transit serving Prince William County and ferry services across the United States. Based primarily on fares, in-vehicle travel times and out-of-vehicle travel times, the project team updated ridership estimates produced in a 2000 VDOT ferry feasibility report, employing the same ridership model. Finally, the project team drew conclusions regarding a potential ferry service on the Potomac River and provided recommendations for next steps.

Many previous commuter ferry feasibility studies conclude that ferry service on the Potomac River is feasible. However, no high-speed ferry service has been implemented on the Potomac. A recent water-taxi service between Alexandria, Virginia and National Harbor, Maryland has begun in the last year and is operating with no public subsidy.

1.2 RPE Methodology

In order to ensure that all necessary data was collected during the RPE, the project team developed a well-defined methodology for conducting the RPE. Service points were selected based on project goals and on input from regional transportation officials from Virginia, Maryland and Washington D.C. A total of thirteen service points were tested during the RPE. Of the thirteen service points, five points were located in Prince William County, three points were located in Maryland, three points were located in other Virginia localities and two points were located in Washington D.C.

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The ferry vessel was selected to perform the RPE was the Provincetown III out of Boston, Massachusetts. The Provincetown III was selected because it had been on the Potomac River previously, it met the criteria for a potential ferry vessel on the Potomac River and it was available during the selected RPE dates.

The project team prepared a schedule of runs for the three days of the RPE that optimized the use of the vessel while on the Potomac. The schedule was developed to allow for unanticipated delays and allowed for inclusion of passengers during many of the runs.

The project team prepared a timing plan during the RPE that included the use of GPS monitoring to capture run times at five second intervals throughout the course of the RPE. Manual recording of times was also planned as a back-up in the event of a GPS system failure.

The project team prepared a wave/wake testing plan that relied primarily on an underwater pressure sensor that was placed at two locations within the Potomac to measure the wave heights generated by the wake of the vessel at different speeds. The purpose of the wave testing was to determine likely impacts the wake from a passenger ferry vessel might have on marinas and sensitive shorelines along the Potomac River.

The project team prepared a noise testing plan that resulted in the use of two noise testing teams on the banks of the Potomac River. Noise tests were conducted at 10 locations along the Potomac River in Maryland, Virginia and Washington D.C. to gauge the likely impacts that noise from a ferry vessel might have on residences and recreational areas along the banks of the Potomac River.

1.3 RPE Observations and Results

The RPE was executed between Monday, May 4, 2009 and Wednesday May 6, 2009. On May 4, 2009, each of three planned runs was made. On May 5, 2009, each of the two planned runs was made. On May 6, 2009, two of the three planned runs were made. One run was cancelled due to excessive debris in the Potomac resulting from heavy rain over the previous two days. Multiple runs were made between most pairs of service points in order to average the run times and determine run time variability.

Timings for all runs were recorded using a GPS system. To summarize run times, trips were broken into twenty-nine segments. The segments could then be assembled in different combinations to determine travel times from any service point to any service point.

The vessel had an average cruising speed of between 32 and 34 mph. Slower than anticipated times were recorded for two primary reasons:

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- 1) Relatively shallow water depths on the Occoquan River prevented the ferry vessel from operating at cruising speed. This had a large affect on travel times from Prince William Marina, Occoquan Harbour Marina and Belmont Bay Marina.
- 2) Wake restrictions on the Potomac River along the Alexandria, Virginia waterfront and on the Anacostia River and Washington Channel in Washington D.C. obligated the ferry vessel to slow to speeds of 5 to 10 mph. As will be discussed in more detail, the project team concluded that these restrictions must be waived in order for a ferry service to provide trip durations similar to those being offered by other modes of mass transit.

Wave measurements taken on the Potomac River indicate that at cruising speed, the ferry vessel generated a wake of approximately 7 inches. Based on review of base line wave data, a wave height of 7 inches is commonly generated by wind on the Potomac River.

Noise measurements taken along the banks of the Potomac River indicate that at eight of the ten measurement locations, there was no appreciable increase in noise as a result of ferry vessel operations. Only two measurement locations, NSF Indian Head and Piscataway Park in Maryland had noise increases as a result of ferry operations.

1.4 Proposed Ferry Service Characteristics & Plan

Based on the data collected during the RPE, the project team developed proposed characteristics for a ferry vessel on the Potomac River. The ideal Potomac ferry vessel would be multi-hulled, have a draft of no more than 3.5 feet, have an average cruising speed of 34 mph, be single deck and hold 99 people. In addition, the project team recommends that amenities such as Wi-Fi, a snack bar and televisions be installed in the proposed ferry vessel.

Both measured and anticipated travel times between selected service points are shown in Table 1.1. Anticipated travel times are based on the proposed vessel characteristics outlined above and the acquisition of a waiver of no-wake zone restrictions on the Potomac River at Alexandria, Virginia and Washington D.C.

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Table 1-1 – Actual & Anticipated Travel Times between Selected Service Points

Service Point Combinations	Actual Travel Times (minutes)	Anticipated Travel Times (minutes)
Quantico Marine Base to Washington D.C. (Southwest Waterfront)	76.0	57.4
Quantico Marine Base to Washington D.C. (Anacostia Waterfront)	79.4	57.8
Harbor Station to Washington D.C. (Southwest Waterfront)	70.7	52.1
Harbor Station to Washington D.C. (Anacostia Waterfront)	74.1	52.5
Prince William Marina to Washington D.C. (Southwest Waterfront)	103.1	61.2
Prince William Marina to Washington D.C. (Anacostia Waterfront)	106.5	61.6
Occoquan Harbour Marina to Washington D.C. (Southwest Waterfront)	97.1	58.1
Occoquan Harbour Marina to Washington D.C. (Anacostia Waterfront)	100.5	58.5
Belmont Bay Marina to Washington D.C. (Southwest Waterfront)	89.4	51.4
Belmont Bay Marina to Washington D.C. (Anacostia Waterfront)	92.8	51.8
Marshall Hall, Maryland to Fort Belvoir, VA (Gunston Cove)	8.5	6.9
Marshall Hall, MD to Quantico Marine Base	35.5	32.2
Harbor Station, VA to NSF Indian Head	14.0	9.3
Marshall Hall, MD to Old Town Alexandria	27.4	20.7
National Harbor, MD to Old Town Alexandria	16.9	11.0
National Harbor, MD to Reagan National Airport	31.4	24.0
Old Town Alexandria to Reagan National Airport	16.3	13.4
Marshall Hall, MD to Reagan National Airport	41.9	33.7
Washington D.C. (Anacostia Waterfront) to Reagan National Airport	26.6	20.1

Based on a travel time of 59 minutes and headways of 30 minutes, the project team prepared proposed ferry service plans for runs between Prince William County and Washington D.C. as well as runs between Marshall Hall, MD, Fort Belvoir, VA and Washington D.C. The Prince William schedule requires the use of five vessels and results in a total of 23 round trips being made between Prince William County and Washington D.C. The Marshall Hall schedule requires the use of three vessels and results in a total of 22 round trips between Marshall Hall, Fort Belvoir and Washington D.C. Each schedule allows for a total of 15 minutes of drop-off and pick-up time at each stop.

The project team researched potential impacts to ferry service. Impacts such as ice, fog, high waves and debris in the river could all have impacts on ferry service. In most cases, these impacts would result in slower travel times during these events. River ice, however, could require suspension of service. Based on research of past weather records, conditions have not been present over the last three winters that would cause total icing of the Potomac. Additionally, most of these impacts are predictable several days in advance, so notification of passengers could take place in enough time to allow for alternate travel arrangements.

1.5 Capital Costs

Based on observations during the RPE, the project team estimated the likely capital costs associated with ferry service start-up. Water-side and land-side infrastructure upgrade costs were estimated at each service point. Water-side infrastructure included items such as docks and dredging. Land-side infrastructure items included such items as parking lot expansion, pedestrian improvements and waiting shelters. Transportation costs were also estimated. Transportation costs included items such as vessel purchase and ticketing system. Based on the proposed ferry service plan from Occoquan Harbour Marina to Washington D.C. (Anacostia Waterfront), the current total estimated capital cost for ferry service start-up is between 21.8 million and 29.8 million dollars. The current total estimated capital cost for ferry service between Marshall Hall, MD, Fort Belvoir, VA and Washington D.C. is between 15.7 million and 20.9 million dollars.

1.6 Operational Costs

The project team estimated the likely operational costs of ferry service based on the previously defined ferry service schedule. Assumptions used in the operational cost estimate include that a total of 6 boats would be utilized for the service with one boat being kept in reserve. Also, the project team assumed that operations would only be conducted on weekdays and that a typical vessel crew would consist of one captain and one deckhand. It should be noted that vessel manning requirements are carrying capacity-dependent. Finally the project team estimated total fuel usage of 1,000,000 gallons per year. The total annual estimated operational cost (current dollars) for ferry service between Prince William County and Washington D.C. is 3.9 million dollars. The total annual estimated operation cost (current dollars) for ferry service between Marshall Hall, MD, Fort Belvoir, VA and Washington D.C. is 3.0 million dollars.

1.7 Fare Determination

The project team set a round trip fare for ferry service at \$11.00 in order to closely mirror the fares currently being charged by VRE. Based on an individual fare of \$11.00 the project team calculated that approximately 280,000 person-trips per year would need to utilize the ferry service in order to meet the targeted fare box recovery of 40%. The project team chose 40% after reviewing the fare box recoveries of PRTC's OmniRide commuter bus service, VRE and other ferry services around the country, opting for an assumed recovery that falls within that range.

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1.8 Travel Demands & Final Analysis

The project team reviewed the data contained in the 2000 commuter ferry feasibility study conducted by the Virginia Department of Transportation. The model utilized in the report yields travel demand estimates based primarily on three factors, in-vehicle time, out-of-vehicle time and fare. The project team applied current existing conditions and the pertinent aspects of the proposed service plan to produce an updated estimate of the number of potential commuter ferry passengers based on the same model, which amounts to approximately 340,000 person-trips per year. As noted in the opening section of this report, the purpose of this exercise was to determine if additional analysis of travel demands through market studies and a new travel model is warranted. Sole reliance on the travel demand results in this report is not advisable as the model used to predict the travel demand cannot account for some current conditions not in existence at the time of model development. Examples of current conditions that cannot be accounted for in the existing model include direct commuter bus service from Woodbridge to the Navy Yard Metro Station and the addition of HOT lanes on I-95.

The project team also performed a cursory review of potential modal shift from other forms of mass transit to ferry service as well as the potential impacts of the HOT lanes

Utilizing an estimated ridership number of 340,000 person-trips per year, the project team compared final fare box recovery and cost per passenger trip to compare passenger ferry service to VRE train service and PRTC commuter bus service. The results of the comparison are shown in Table 1-2.

Table 1-2 – Transit Service Cost and Revenue Comparisons

Statistic****	PRTC Commuter Bus Service	VRE Commuter Train Service	Proposed Ferry Service
Annual Operating Cost	\$12,408,491**	\$46,192,429*	\$3,885,000
Annual Fare Revenue	\$5,641,332**	\$19,685,561*	\$1,905,750
Fare Box Recovery Percentage	45.5%**	42.6%*	49.1%
Annual Operating Subsidy	\$6,767,159**	\$26,506,860*	\$1,979,250
Unlinked Annual Passenger Trips	\$1,738,556**	3,386,974*	337,838***
Operating Subsidy/Passenger Trip	\$3.89**	\$7.83*	\$5.86

* As published in the National Transit Database

** As provided by PRTC

*** 95% of ferry riders assumed to take ferry both to and from work. Remaining 5% assumed to travel only one way on ferry and take alternate transportation home

**** Statistics for PRTC Commuter Bus Service and VRE Commuter Train Service are system-wide and are not specific to their respective routes between Woodbridge and Washington D.C.

1.9 Conclusions & Recommendations

As a result of this study, the project team developed the following conclusions:

- 1) The commuter ferry service described in this report will require public financial support.

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- 2) Based on the data and analysis contained herein, a Potomac River ferry operation has the potential to offer a commuting option to the public that in terms of travel time and service between the area of Occoquan, Virginia and SE Washington DC would be competitive with those commuter services offered by PRTC and VRE. Public commuter ferry service between points in Maryland and Virginia appears to be especially promising given the significant amount of travel time saved as a result of ferry usage.
- 3) The estimated travel demand derived from the application of current-day existing conditions to the demand model contained in the VDOT 2000 feasibility report suggests that additional analysis of travel demands through market studies and a new trip generation model is warranted. As noted in this report, sole reliance on the travel demand results in this report is not advisable as the model used to predict the travel demand cannot account for some current conditions not in existence at the time of model development.
- 4) No significant noise or wave impacts associated with ferry service are anticipated given the operating parameters specified herein.

Should this opportunity be pursued further, the project team makes the following recommendations:

- 1) Coordination with the proper authorities to obtain speed restriction waivers along the Potomac River should be initiated.
- 2) A more rigorous market analysis should be undertaken to analyze prospective demand by market in order to account for all the significant variables bearing on usage and estimated ridership diversions by mode.
- 3) Continued coordination with local governments and military installations that front the Potomac River should be pursued. While commuter ferry service from Prince William County to Washington D.C. appears viable, there is great potential for a ferry operation to serve cross-river commuters between Southern Maryland and Virginia
- 4) Initial investigations into an authority to oversee ferry operations should also be discussed with those counties and cities that might have an interest in commuter ferry service.