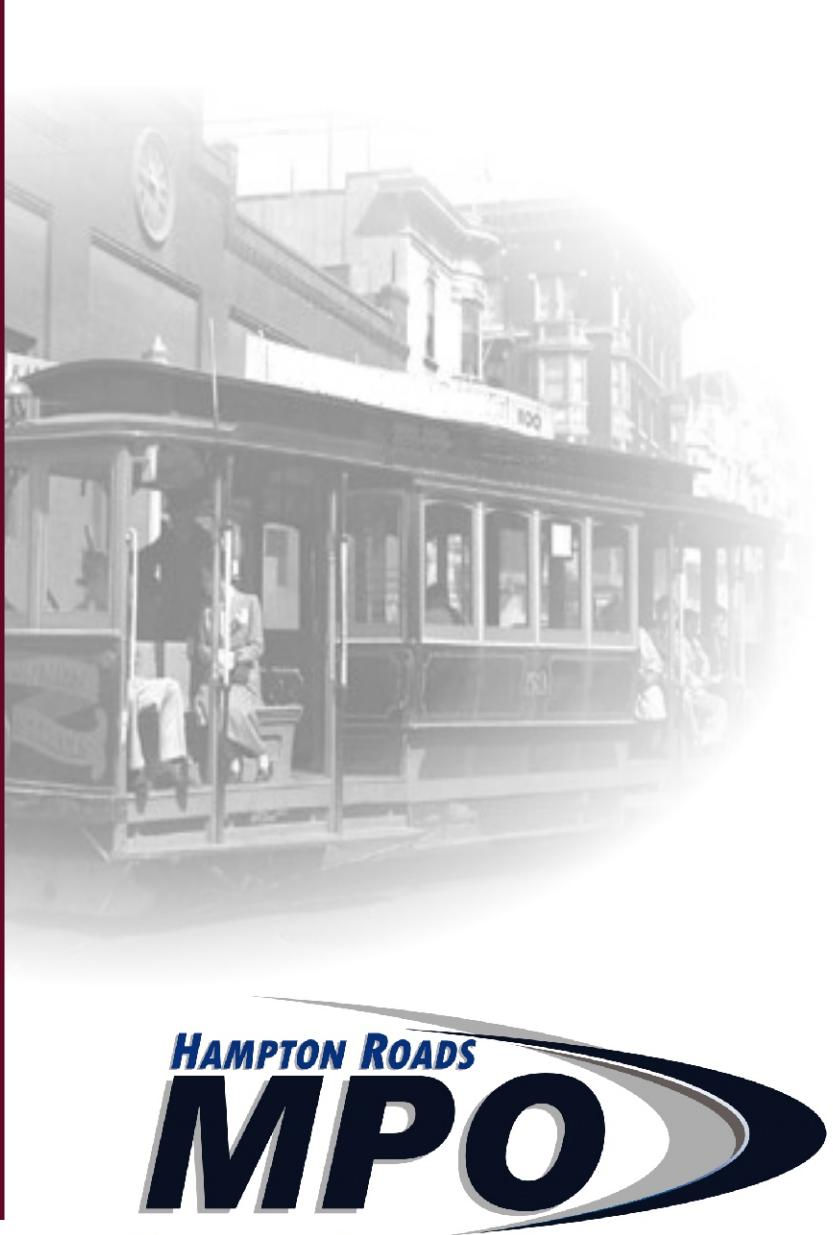


# Transit Shuttle Projects: A Literature Review and Best Practices



June 2008

T08-04

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# TRANSIT SHUTTLE PROJECTS: A LITERATURE REVIEW AND BEST PRACTICES

This report was included in the Work Program for Fiscal Year 2007-2008, which was approved by the Commission and the Metropolitan Planning Organization at their meetings of March 21, 2007.



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## REPORT DOCUMENTATION

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**ABSTRACT**

The purpose of this research study is to conduct a literature review of transit shuttle projects in regions throughout the nation that are comparable to Hampton Roads. Results, best practices, and factors needed to make a shuttle project successful are summarized in the report.

**ACKNOWLEDGEMENTS**

This report was prepared by the Hampton Roads Metropolitan Planning Organization (HRMPO) in cooperation with the U.S. Department of Transportation (USDOT), the Federal Highway Administration (FHWA), the Virginia Department of Transportation (VDOT), the Hampton Roads Transit (HRT), and the Williamsburg Area Transport (WAT). The contents of this report reflect the views of the staff of the Hampton Roads Area Metropolitan Planning Organization (MPO). The MPO staff is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the FHWA, VDOT, or HRPDC. This report does not constitute a standard, specification, or regulation. FHWA or VDOT acceptance of this report as evidence of fulfillment of the objectives of this planning study does not constitute endorsement/approval of the need for any recommended improvements nor does it constitute approval of their location and design or a commitment to fund any such improvements. Additional project level environmental impact assessments and/or studies of alternatives may be necessary.

**TABLE OF CONTENTS**

Report Documentation .....	i
<b>INTRODUCTION .....</b>	<b>1</b>
Background .....	1
Purpose .....	1
Report Organization .....	1
<b>DEFINITION .....</b>	<b>2</b>
Description .....	2
Implementation.....	3
Travel Impacts.....	3
Benefits and Costs.....	3
Equity Impacts.....	3
Applications .....	4
Stakeholders .....	4
<b>LITERATURE REVIEW .....</b>	<b>5</b>
Elements Needed to Create High Ridership Transit Systems .....	5
Strategies for an Intra-Urban Circulator System.....	5
Community Oriented Transit Best Practices .....	7
Identifying the Characteristics of Successful Local Transit Circulator Systems .....	8
Guidelines for Enhancing Suburban Mobility Using Public Transportation.....	9
<b>BEST PRACTICES .....</b>	<b>11</b>
Section Organization.....	11
Urban/Commercial Centers.....	12
Downtown Norfolk, VA: Norfolk Electric Transit .....	12
Old Town Alexandria, VA: King Street Trolley.....	13
Visitor-Oriented Markets .....	16
Virginia Beach, VA: VB Wave .....	16
Historic Triangle colonial communities, VA: Historic Triangle Shuttle.....	17
Special Events.....	20
Historic Triangle colonial communities, VA: America's 400 <sup>th</sup> Anniversary Weekend Shuttle.....	20
Indianapolis, IN: Indy 500 Park and Ride Shuttle .....	21
Transit-Captive Markets .....	23
Houston, TX: METROLift.....	23
Norfolk, VA: Naval Station Norfolk Shuttle .....	24
<b>SUMMARY AND CONCLUSIONS .....</b>	<b>27</b>
Appendix .....	31

## INTRODUCTION

### BACKGROUND

In March 2007, the City of Newport News ended the transit shuttle project (known as "Jump over Jeff") that was serving the newly developed City Center at Oyster Point and Port Warwick. City officials had hoped the shuttle service would attract interest in Port Warwick and City Center, but only a dozen people used it per day. The termination of this shuttle service was mainly due to a lack of ridership.

The Oyster Point shuttle service became operational in June 2006, to provide an alternative travel option between retail, business, and residential communities of City Center and Port Warwick. The service was funded with the regional Congestion Mitigation and Air Quality (CMAQ) funding program and operated by the Hampton Roads Transit (HRT) agency. In addition to providing an alternative mode of travel for residents, shoppers and visitors, the service was also aimed at reducing congestion and vehicle emissions along the heavily traveled Jefferson Avenue and study area corridors.

Since the inception of the CMAQ Funding Program in Hampton Roads, several localities have used this funding to implement and operate shuttle services between retail, business, and residential communities. In general, at the end of the three-year CMAQ funding, and due to low ridership, very few of those projects remain operational.

Recognizing this situation, the City of Newport News requested the HRMPO to conduct a literature review of transit shuttle projects in different regions of the country and determine what makes them successful. The study is part of the FY-2008 Unified Planning Work Program (UPWP).

### PURPOSE

Given the commitment of this region to provide its residents the most efficient alternative mode of travel, the purpose of this study was to assist Newport News and other localities in Hampton Roads with information on successful shuttle projects while providing examples of best practices from Virginia and other regions in the nation. The scope was limited to reviews of the literature and the state of practice in implementing efficient and successful transit shuttle projects.

### REPORT ORGANIZATION

This report is organized into the following sections:

- Definition
- Literature Review
- Best Practices
- Summary and Conclusions

## DEFINITION

In Hampton Roads, public transit services are provided by two agencies: Hampton Roads Transit (HRT) and Williamsburg Area Transit (WAT). Transit services include publicly shared vehicles that provide transportation on fixed or flexible routes. HRT serves the seven cities of Chesapeake, Hampton, Newport News, Portsmouth, Suffolk and Virginia Beach. WAT provides services to citizens of James City County, City of Williamsburg, and York County. For Hampton Roads, transit services include:

- Fixed Regular Service Routes (bus)
- Expressway Routes
- Trolley Routes (seasonal)
- Downtown Shuttle Services
- Paddlewheel Ferry service
- Handi-ride (Paratransit)
- TRAFFIX (Transportation Demand Management)

## DESCRIPTION

The online Transportation Demand Management (TDM) Encyclopedia defines Shuttle Services as a variety of transportation services that use small buses or vans to provide public mobility. They are a type of public transit and include :

- Circulating Shuttles – carry passengers for short trips along busy corridors, including business districts, employment centers, college campuses, and parks or recreation areas. They may connect major activity centers such as a transit station or a commercial center. Shuttle services may be provided during peak periods of high traffic demand, during special events and as an overflow parking solution. Such shuttles may be free or require a small fare.
- Demand-Response paratransit includes various types of flexible route transit service using small buses, vans or shared taxis.
- Special Mobility services are demand response paratransit to provide mobility to people with disabilities.
- Mobility-to-Work programs often involving special reverse-commute shuttle services between low-income neighborhoods and employment centers. These services may be operated by transit agencies, social service agencies, or private contractors funded through government grants.
- Some major commercial centers have a free transit service zone.
- Some colleges offer special late night Shuttle Services after regular transit service ends.
- Businesses offer Shuttle Services for their customers – hotels offering services for customers who arrive without a car.

## IMPLEMENTATION

In general, public shuttle services are implemented by a transit agency, downtown business association, developer, campus administration, or businesses. There are many funding sources, including transit budgets, local improvement districts, grants and revenues.

In Hampton Roads, shuttle services are operated by HRT or WAT. In general, they are initially funded with the regional CMAQ funding program for a minimum of three years. If the service remains operational after the end of the CMAQ term, the subject locality will subsidize part or the entire service.

## TRAVEL IMPACTS

Travel impacts vary depending on circumstances. Shuttles can substitute for part or all of a vehicle trip, and can support many other TDM strategies. Circulating shuttles in commercial centers for resort areas may allow more people and visitors to use alternative transportation rather than a car or taxi. This type of seasonal service has been in operation in the Virginia Beach resort area with measurable rate of success. Shuttle buses often increase use of public transit, ridesharing and non-motorized transport.

## BENEFITS AND COSTS

Shuttle service benefits depend on the type of service and the type of users. They can provide mobility for non-drivers and people, who use alternative modes, substitute for automobile trips, support other TDM strategies, and allow the use of off-site parking spaces. Since shuttle services are provided at times and places where demand is high, they can reduce congestion. They can reduce parking demand when they substitute for entire auto trips, or they shift parking to less expensive locations. They usually provide consumer savings, and increase transportation choices. They provide safety and environmental benefits by reducing total motor vehicle travel.

Costs are primarily the expenses of operating the shuttle services. However, in some cases, new buses or trolleys have to be purchased for a new service. In Hampton Roads, most transit shuttle services have used CMAQ funds for capital and operating expenses. It is widely known that since shuttle services themselves impose externalities (roadway costs, accident risks, pollution) they may provide little benefit if they fail to attract riders and do not reduce overall vehicular travel.

## EQUITY IMPACTS

Equity impacts vary depending on the type of service. Most shuttles serve the general public, although they usually benefit some groups more than others. Shuttle services often require subsidies, although some are self-financing. Some shuttle services provide affordable mobility to lower-income and transportation disadvantaged people. Many improve basic mobility by providing transport to education, employment, and medical services.

## **APPLICATIONS**

Circulating shuttles are most appropriate in activity centers during periods of high demand, particularly if there is significant traffic or parking problems. These activity centers include major commercial and employment centers, college campuses, and resort communities. The literature indicates that high density urban, medium-density urban/suburban, commercial centers, and resort/recreational areas rate very high for shuttle services.

## **STAKEHOLDERS**

Shuttle services require support of a lead organization, such as a transit agency or downtown association, and a funding source. Merchants groups, employers, and user groups may be involved in planning and supporting the service. Shuttle services require support and funding to remove barriers for implementation.

## LITERATURE REVIEW

An internet literature review was conducted by using the Google search engine. In addition, selected local and state transit planners were contacted to gather information on transit shuttle projects in Virginia. The following pages in this section of the report represent a brief summary of five documents that were selected from the literature review.

### **1. TRANSIT COOPERATIVE RESEARCH PROGRAM REPORT 111: ELEMENTS NEEDED TO CREATE HIGH RIDERSHIP TRANSIT SYSTEMS**

Developed by the Transit Cooperative Research Program in 2007, this report was written as a guideline to enable transit agencies to employ strategies for increasing and sustaining ridership. The guidelines identify and outline appropriate strategies that contribute to the goal of creating/retaining ridership including operating/service adjustments, partnership/coordination initiatives, marketing and information initiatives, and fare collection/structure initiatives.

A dozen U.S. transit agencies that have implemented various strategies to promote ridership growth were reviewed. The case studies focus on the internal and external elements that contributed to successful ridership increases and describe how the transit agencies influenced or overcame internal and external challenges to increase ridership. These agencies were carefully selected to represent:

1. a range of system size,
2. different modal combinations,
3. range of types of strategies, and
4. a variety of specific market orientations

A synthesis of the case studies was developed and as a result, the guidelines reported key findings which reviewed industry-wide ridership trends, discussed internal and external factors/elements affecting ridership, and categorized different types of strategies, actions, and initiatives that have been effectively utilized by transit agencies.

### **2. NATIONAL CENTER FOR TRANSIT RESEARCH AT CENTER FOR URBAN TRANSPORTATION RESEARCH: STRATEGIES FOR AN INTRA-URBAN CIRCULATOR SYSTEM**

Prepared by the National Center for Transit Research at the Center for Urban Transportation Research, the 2005 report addressed the need for guidelines for the implementation and operation of intra-urban circulator systems. Comprised of in-depth research and analysis of three existing circulator systems in Florida and other select systems around the country, this research facilitated in developing lessons learned and identified key characteristics for developing an effective circulator system as well as critical operating strategies.

The synthesis of existing circulator systems resulted in the identification of the key characteristics of successful circulators:

1. **Geographic Context** – Densely populated areas with mixed land uses ensure realistic travel time and assured demand for service.
2. **Socioeconomic Context** – Transit-dependent users typically include seniors, students, and low-income workers.

3. **System Elements** – “Coordinated intermodal connection” or linking the intra-urban circulator to the main transit system.
4. **Vehicle Appearance and Marketing** – Circulator vehicles should have an appealing look, provide an innovative, aesthetic sense to the riders, as well as be linked to an attractive marketing campaign.
5. **Public Information** – Provision of adequate public information regarding the service is a highly desirable addition to the service.
6. **Funding and Organization Structure** – Pooling creative resources through the formation of unique partnerships such as local transportation agencies, the business community, and existing transit service providers increase the chances of developing a successful circulator system. This type of collaborative environment promotes interlocal service agreements and synergistic sharing of resources and major facilities.
7. **Funding** – Capital and operational costs to fund circulator systems generally derive from a mixture of funding from several federal, state, local and private sources.

The guidelines outline nine considerations and strategies for success when planning and operating intra-urban transit circulators:

1. **Service Goals** – Since intra-urban circulators are unique to their service areas, it is imperative a community determine what purpose the circulator system will serve.
2. **Service Characteristics** – Circulator service should be customized to the purpose it is serving and to the character of the community it operates.
3. **Fares** – As trips are typically shorter, fares should have a lower rate than the primary transit service in the area.
4. **Service Delivery Method** – It is important for the operator of the service to be accountable for the provision of service that meets the stated goals and purpose of the circulator and to tailor the service to meet that end.
5. **Connectivity** – To increase the overall transit availability for riders, it is recommended to provide a well-linked circulator system to other existing transit service as well as other modes or pedestrian-oriented facilities and attractions.
6. **Identity** – The circulator can become an integral part of the community by solidifying the identity and creating a distinct image of the circulator.
7. **Marketing** – Marketing strategies for intra-urban circulators differ from the traditional methods transit services have typically promoted. By recognizing and addressing this essential factor, the success of the system being a part of the community it serves is ensured.

8. **Partnerships** – Establishing and maintaining local partnerships in the planning, development, and operation of intra-urban circulators is essential.
9. **Funding** – At all levels of government and in the private sector, there are multiple public and private sources of funding available to secure funding for an adequate circulator system.

### **3. TRANSIT RESOURCE CENTER: INDEPENDENT ASSESSMENT STUDY OF DISTRICT 2 TRANSIT SERVICES, WORKING PAPER #1: COMMUNITY ORIENTED TRANSIT BEST PRACTICES**

Collaborating with the Alameda-Contra Costa District in California, a study was conducted in 2004 to assist the cities of Fremont and Newark as they consider implementing community-oriented transit services. After reviewing six U.S. transit oriented communities that have exhibited significant mobility management, the consulting team prepared a working paper featuring industry best practices applicable to the Fremont/Newark area. The analysis revealed seven strategic themes that can best be used to serve the transit needs of its market area:

1. **Matching Services to Market Needs** – Match appropriate service delivery methods to market needs and community objectives.
2. **Customer Service and Community Orientation** – Good customer service includes reliability and responsiveness. Establish community orientation through branding.
3. **Maintaining a Cost-Effective Cost Per Passenger** – Maintaining reasonable costs per passenger and pricing of services is an incentive to transit utilization.
4. **Collaborative Partnerships to Leverage Resources and Engender Local Ownership** – Bringing stakeholders and different private interests together under one umbrella can produce strategic and innovative partnerships that can develop into win-win situations.
5. **Integration with Regional Transit Service Backbone** – A successful public transportation system thrives off a comprehensive system that includes a well-connected community-oriented service with the regional transit service.
6. **Flexibility to Meet Needs** – As communities are constantly changing, community transit services need to remain adaptable and flexible in order to meet these changing needs.
7. **Entrepreneurial Management with Leadership of Key Person** – It is essential for the community oriented transit agency to have a leader who is able to implement successful mobility management practices.

#### **4. NATIONAL CENTER FOR TRANSIT RESEARCH AT CENTER FOR URBAN TRANSPORTATION RESEARCH: IDENTIFYING THE CHARACTERISTICS OF SUCCESSFUL LOCAL TRANSIT CIRCULATOR SYSTEMS IN RESIDENTIAL AREAS OF SOUTHEAST FLORIDA**

Prepared in 2004 by the National Center for Transportation Research at the Center for Urban Transportation Research, this research study identifies the key factors that determine the success of a community shuttle system by focusing on the Community Bus Program operating in Broward County, Florida.

The research included a review of literature, feedback from passengers, bus operators and service administrators, and census data analysis and GIS mapping. The objective was to learn lessons that might be valuable to other areas considering the establishment of similar services. The research indicates that the elements of density, income, and car ownership remain significant to local circulators as do connections with regional transit service. The research also indicated that the composition of passengers is also significant.

For purposes of this research study, “successful” is defined by how many passengers per hour are carried by the local circulator. Broward County is paying for a large portion of the expenses of these services, and it wants to be sure it is investing its funds purposefully.

The study identified five factors needed to have a successful local circulator:

1. **Demographics** – There was a strong positive correlation between transit use and population density for local circulators that were studied. In short, the higher the density, the higher the transit ridership per hour for local circulators. Not too far behind in terms of relationships was the high positive correlation between lack of car ownership and transit use. As expected, there was also a strong negative correlation between income and transit ridership per hour. In other words, the higher the income, the lower transit ridership per hour was in the local circulator system.
2. **Management Technique** – It was concluded that the private versus in-house issue is not a major determinant of success as measured by passengers per hour.
3. **Marketing Techniques** – The study summarized that most of the cities surveyed used the same methods for promoting their services including direct mail notification to households, local newspaper advertisements, placing bus route maps and schedules at all city facilities, placing local circulator information on city websites, meeting with community groups, placing brochures and maps in major supermarkets, press releases, newspaper articles, and advertisements on cable television and public access cable channels.
4. **Market Segmentation** – The study has found that the local circulators are being used by senior citizens, students, and low-wage workers.
5. **Fares** – The literature reflects that even small fares can have surprisingly dramatic effects on ridership.

## 5. TRANSIT COOPERATIVE RESEARCH PROGRAM REPORT 55: GUIDELINES FOR ENHANCING SUBURBAN MOBILITY USING PUBLIC TRANSPORTATION

This report, prepared by the Transit Cooperative Research Program in 1999, identified, assessed, and documented best practices applicable for transit operators to improve their bus networks to better serve suburban travel needs. Eleven U.S. and Canadian transit operators interviews and on-site visits were conducted to gather information needed to develop this study. Realizing that each environment represents a distinct operating setting that poses unique transit challenges, the report identified, defined, and classified the types of suburban operating environments and the applicability of individual types of transit service to each. Furthermore, it established the correlation between the types of operating environment and the different types of suburban transit services serving these particular environments. With this information, the researchers were then able to provide valuable policy insight about future transit services might be designed to better service suburban markets. Specifically, the report described some of the common features of successful transit strategies for serving suburban marketing by outlined twelve key findings:

1. Develop services around focal points
2. Operate along moderately dense suburban corridors. Connect land-use mixes that consist of all-day trip generators
3. Serve transit's more traditional markets such as lower income, blue-collar neighborhoods
4. Link suburban transit services, especially local circulators and shuttles, to the broader regional line-haul network
5. Target market appropriately
6. Economize on expenses
7. Adapt vehicle fleets to customer demand
8. Creatively adapt transit service practices to the landscape
9. Obtain private sector support
10. Plan with the community
11. Establish realistic goals, objectives, and standards
12. Develop supportive policies, plans, and regulations

The report defined three generic types of local area circulators: fixed-route circulators, route deviation services, and demand response or dial-a-ride services. The study found that fixed route systems are configured to meet the needs of the community being served and are characterized as being non-linear, connecting multiple origins and destinations in the area. Such services have short headways given the scope of service and are to serve as complementary services in a regional network. The second type of service is the route deviation service, where a specific route design is in place through deviations at the drivers' discretion. These services provide transit opportunities in neighborhoods where conventional fixed-route services do not work because of terrain, density, or an inability to compete favorably with automobile travel. The third type of local area circulators as defined in the report are

demand response or dial-a-ride services. These types of systems are used as circulators in a number of settings and are generally applied in areas of low to moderate density where the number of transit trips and size of the area would probably be insufficient to justify a network of fixed-route services. Demand response services are intended to provide greater area coverage with fewer vehicle resources than a fixed-route network. They provide door to-door drop-off and pickup within a designated service area, are available to the general public, and generally operate throughout the day.

A key element to success captured in this report, is that of awareness and local involvement. There is vital need for potential users of a service to have full information concerning routes, schedules, and other nuances of service. Extensive cooperation with the local elected officials, city staff and residents involved when implementing and operating service is instrumental to success.

## BEST PRACTICES

Shuttle service benefits depend on the type of service, the type of users, and other factors. Shuttle services can provide mobility for non-drivers and people who use alternative modes, substitute for automobile trips, and allow the use of off-site parking spaces. Since shuttles are most often provided at times and in places where demand is high, they can provide significant congestion reduction benefits.<sup>1</sup> Transit shuttles are most complementary in activity centers including large commercial and employment centers, college campuses, and visitor-oriented communities. Many expand basic mobility options by providing transport to education, employment and medical services. Some shuttles provide affordable mobility to transit-captive market riders such as the lower-income, elderly, disabled persons, and transportation disadvantaged people.

### SECTION ORGANIZATION

This section examines selected best practices from Virginia and other regions in the country. For organizational purposes, best practices are divided into four categories with two best practices for each category:

- Urban/Commercial Centers
  - Downtown Norfolk, VA: Norfolk Electric Transit
  - Old Town Alexandria, VA: King Street Trolley
- Visitor-Oriented Markets
  - Virginia Beach, VA: VB Wave
  - Historic Triangle, VA: Historic Triangle Shuttle
- Special Events
  - Historic Triangle, VA: America's 400th Anniversary Weekend Shuttle
  - Indianapolis, IN: Indy 500 Park and Ride Shuttle Service
- Transit-Captive Markets
  - Houston, TX: METROLift
  - Norfolk, VA: Naval Station Norfolk Shuttle

The following best practices follow the same format:

1. Description of Service
2. Performance Statistics
3. Operating Environment
4. Funding Sources

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<sup>1</sup> Victoria Transport Policy Institute: TDM Encyclopedia. Shuttle Services – Shuttle Buses, Jitneys and Free Transit Zones. Available at: <http://www.vtpi.org/tdm/tdm39.htm>

## **URBAN/COMMERCIAL CENTERS**

In an urban and/or major commercial center where demand is high and parking is scarce, shuttles or circulators can reduce parking demand when they substitute for entire car trips and provide safety and environmental benefits to the degree that they reduce total motor vehicle travel. Shuttles that service this type of market predominantly service office workers, tourists, shoppers, and residents.

### **Downtown Norfolk, VA: Norfolk Electric Transit**

#### **1. Description of Service**

Put into service in 1999, the Norfolk Electric Transit (NET) serves as a free downtown connector linking satellite parking facilities to downtown Norfolk, servicing residents, visitors, shoppers, and commuters. This shuttle service is funded by the City of Norfolk and operated by HRT to enhance the transportation alternatives in Downtown Norfolk. The NET is an integral part of the City's ongoing effort to link Norfolk's many downtown attractions with parking facilities within and in the outskirt of downtown.

The NET was identified initially in the 1997 Downtown Norfolk Update as a top need and priority for the continued revitalization of Norfolk. An electric vehicle system was selected as the preferred option for an improved and efficient people-moving shuttle linking major employment, retail and activity centers with parking throughout downtown Norfolk. An electric system was favored for a number of reasons including air quality benefits and also its innovative image to complement the theme for the area.

The NET buses are air-conditioned, hold up to 22 passengers and make a total of sixteen stops along a 2.2-mile route throughout the downtown area, beginning at Cedar Grove Parking Lot, running along Granby Street to Main and Water Streets, then to Harbor Park and City Hall, and finally circling back again. NET stops are conveniently located and displayed prominently throughout the city. The air-conditioned buses run every six to eighteen minutes on Monday through Friday from 6:30 a.m. until 11:00 p.m.

The NET weekend route makes a total of nine stops throughout the downtown area and stops at Harbor Park only during Tides games. Figures 1A and 1B in the Appendix section show the NET routes. In conjunction with The Tide, the Norfolk light rail transit (LRT) service which will be operating in 2010, the NET service will be modified to circulate through the downtown Norfolk area and to/from the Cedar Grove parking lot on Monticello Avenue. Service to Harbor Park baseball stadium will be replaced with LRT.

#### **2. Performance Trends**

The Hampton Roads Transit reported that in 2007 the NET service drew 332,262 riders with a monthly average of 27,000 riders.

#### **3. Operating Environment**

Downtown Norfolk, the heart of the Hampton Roads region, offers a mix of cultural attractions and entertainment for citizens and tourists.

The downtown office market experienced tremendous growth since 1999, spurring new construction to accommodate the growing market. There are over 3.3 million square feet of office space and approximately 30,000 employees located in Downtown Norfolk. As of 2007, an estimated 3,700 residents live in Downtown.<sup>2</sup> This is projected to grow as more apartments and condominiums are being developed. There are currently approximately 2,500 housing units in downtown and close to 1,000 either on the drawing board or coming out of the ground.<sup>3</sup>

Attractions, including the MacArthur Center, the USS Wisconsin at Nauticus, the Cruise Terminal, and festivals, have increased the appeal of Downtown as a tourist destination. As a result, the tourism industry in Downtown Norfolk hosted over 1,650,000 visitors as well as 90,000 cruise ship passengers and 45,000 crew members in 2007.

#### 4. Funding Sources

In 1999, the City of Norfolk requested and received slightly over \$2 Million to purchase eight electric vehicles and cover operating expenses. The original capital investment was funded with federal and state Grants, primarily Regional Congestion Mitigation and Air Quality (CMAQ) money. Those funds were only available for three years and at the end of year three, the City decided to continue the service and cover the operating expenses.

The NET is operated by the Hampton Roads Transit and funded by the City of Norfolk and supplement with federal and state aid. The total service cost for the NET in Fiscal Year 2008 was \$1,300,891. The City of Norfolk funded \$617,460, roughly half of the total service cost. Funds received from the City of Norfolk's Parking Division, which manage the city's parking system, support the NET system in making the downtown a "park once" experience. The remaining \$683,431 was provided by Federal Maintenance and State Operating Assistance funds.<sup>4</sup>

Additionally, during the 2007 Virginia General Assembly session, \$6.1 million from General Funds were approved for hybrid-electric buses and expanding the NET's service beyond Downtown Norfolk. The state money would pay for 12 hybrid buses to replace the eight NET buses.<sup>5</sup>

### **Old Town Alexandria, VA: King Street Trolley**

#### 1. Description of Service

The King Street Trolley transports residents, visitors, and those who work in Old Town Alexandria between the King Street Metrorail Station and the Old Town waterfront. This expanded service replaced the old weekend DASH About bus service, effective April 1, 2008. As a no-charge service, the King Street Trolley operates seven days a week from 10 a.m. to 10 p.m. year-round, with limited winter service. Four trolley vehicles circulate on

2 Downtown Norfolk Council. 2007 Downtown Norfolk Growth Report. Available at: <http://www.downtownnorfolk.org/documents/GrowthReport2007.pdf>

3 Ibid.

4 Hampton Roads Transit. Approved Budget for the 2008 Fiscal Year. Available at: <http://www.gohrt.com/pdf/budget/BudgetFY2008.pdf>

5 The Virginian-Pilot. Beach endorses HRT's plan for hybrid buses. Available at: <http://hamptonroads.com/node/297611>

King Street in order to maintain the 15-minute intervals. The trolley can accommodate about 32 passengers at a time. As seen in Figure 2 in the Appendix section, riders can board at the unit block of King Street near the Potomac River waterfront, the King Street Metrorail station, or at any of the 18 designated stops along King Street, which are approximately two blocks apart.

The former DASH About service was a no-charge service, oriented to serve visitors instead of commuters or other residents. As an expanded service, the King Street Trolley service is part of the City's continuing efforts to manage congestion and reduce mobile emissions through encouraging residents, commuters, and visitors to choose travel options outside of driving alone.

## 2. Performance Statistics

The new King Street Trolley service drew a record 41,000 riders in its first month of operation.<sup>6</sup> Latest weekly ridership data available shows 12,893 riders for the week of May 19<sup>th</sup>, 2008.<sup>7</sup>

## 3. Operating Environment

Old Town Alexandria is a historic district located in the city of Alexandria, on the other side of the Potomac River from Washington, DC. Today it is a revitalized waterfront with cobblestone streets, colonial houses and churches, museums, shops and restaurants. This historic center is a major draw for tourists. King Street has a total commercial inventory of about 1.4 million square feet of office and retail space, including 833,000 square feet of retail use in more than 300 stores and restaurants.<sup>8</sup>

The King Street Trolley service was created as part of a series of improvements to Old Town in response to the opening of National Harbor, a 300-acre new urbanist mixed use waterfront development located directly across the Potomac River in Prince George's County, Maryland.<sup>9</sup>

At completion, National Harbor will include a 7,300,000 square feet of master plan mixed-use community, five new hotels with 4,000 hotel rooms, 470,000 square foot convention center, 1 million square feet of retail, dining and entertainment space, 2,500 residential units, 500,000 square feet of class A office space, two marinas, and a new location for the National Children's Museum. The trolley is intended to link up with a water taxi, which will make the trip between the Alexandria City Marina and a pier at National Harbor. National Harbor is expected to bring hundreds of tourists and visitors to Old Town via water taxi, among other methods.<sup>10</sup> The water taxis, in operation since April 1, 2008, are operated by a private firm that hopes to transport 500 to 1,000 tourists per day to Alexandria.<sup>11</sup>

6 The City of Alexandria: Office of Transit Services and Programs. King Street Trolley - Making the connection from Metro to Old Town. Available at: <http://www.alexandriava.gov/localmotion/info/default.aspx?id=11280>

7 Phone discussion with City of Alexandria Chief of Transit Services Jim Maslanka at 703.838.3800 on 5.30.08

8 City of Alexandria. King Street Retail Strategy. Available at: <http://alexandriava.gov/planning/info/default.aspx?id=6960>

9 Examiner.com. Alexandria shuttle could switch to trolley system. Available at: [http://www.examiner.com/a-779923-Alexandria\\_shuttleCouldSwitchToTrolleySystem.html](http://www.examiner.com/a-779923-Alexandria_shuttleCouldSwitchToTrolleySystem.html)

10 The Washington Post. Alexandria approves funds for trolley line on King Street. Available at: <http://www.washingtonpost.com/wp-dyn/content/article/2007/09/19/AR2007091900600.html>

11 The Washington Post. Tourism hopes riding on Alexandria trolley. Available at: [http://www.washingtonpost.com/wp-dyn/content/article/2008/03/31/AR2008033102669\\_pf.html](http://www.washingtonpost.com/wp-dyn/content/article/2008/03/31/AR2008033102669_pf.html)

#### 4. Funding Sources

Originally budgeted over a six-year period for \$7 million through the Northern Virginia Transportation Authority (NVTA), the Alexandria City Council agreed to fund the trolley service when the NVTA lost its ability to collect revenue.<sup>12</sup> This loss of significant NVTA funding compelled the Alexandria City Council to reprioritize the current budget to compensate for the lost revenue. The City Council also increased the restaurant meals tax from 3% to 4% and increased the hotel occupancy tax from 5.5% to 6.5%.<sup>13</sup> These tax increases will help compensate for lost NVTA revenues that would have funded the new King Street trolley and other initiatives.

The Alexandria City Council approved the \$141,000 allocation from money designated for National Harbor-related initiatives to fund the trolley through the end of Fiscal Year 2008. Funds from the DASH About service, which was replaced by the trolley, will also be used. The city council appropriated \$1 million for Fiscal Year 2009 to cover the operating costs of running four trolleys from the river to the Metro stop from 10 a.m. to 10 p.m. seven days a week.<sup>14</sup>

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12 City of Alexandria. Alexandria City Council adopts general fund operating budget of \$542 million for FY 2009. Available at: [http://www.alexandriava.gov/news\\_display.aspx?id=12590](http://www.alexandriava.gov/news_display.aspx?id=12590)

13 Ibid.

14 City of Alexandria. Budget Memo: FY 2009. Available at: <http://alexandriava.gov/uploadedfiles/budget/info/budget2009/memos/memo133.pdf>

## VISITOR-ORIENTED MARKETS

Shuttles in resort or recreational areas reduce automobile traffic and improve transportation options for recreational travel. Providing alternative transportation permits continued growth in tourism without continued growth in traffic congestion and vehicle emissions. At the same time, it enhances the visitor experience by providing a convenient and less stressful alternative to driving.

### **Virginia Beach, VA: VB Wave**

#### 1. Description of Service

Operating since 2004 by the Hampton Roads Transit, the VB Wave is a hybrid-electric shuttle service in the City of Virginia Beach that operates during the summer season and provides an inexpensive and alternative mode for tourists, visitor and residents in the resort area. The VB Wave shuttles charge \$1 per person per way, but also have various multiday passes.

The service runs three Oceanfront routes collectively known as VB Wave, as shown in Figure 3 in the Appendix section. The Atlantic Avenue Route loops Atlantic Avenue with stops at restaurants, shops, and museums. This route is available daily, beginning May 1 until September 30, from 8 a.m. until 2 a.m., with 15-minute frequencies. The Shopper's Shuttle route brings riders to the trendy, upscale Hilltop area for shopping and dining, and to Virginia Beach's premier shopping experience, Lynnhaven Mall. This route is available daily, beginning Memorial Day until Labor Day, from 10 a.m. until 9 p.m., with 60-minute frequencies. The Aquarium & Campground Shuttle runs from the resort to campgrounds on General Booth Boulevard. This route is available daily, beginning Memorial Day until Labor Day, from 8 a.m. until 2 a.m., with 20-minute frequencies.

#### 2. Performance Statistics

As reported by the Hampton Roads Transit, the VB Wave has experienced a growing increase in ridership since it began operating in 2004 with its first season recording 486,438 riders. Since then, ridership has remained strong, with ridership steadily growing at an average of 3.75% increase each season. The 2007 season reached its highest ridership to date at 542,928.

#### 3. Operating Environment

The Virginia Beach oceanfront stretch is a major asset that serves as a main attraction of visitors to the hotels, restaurants, shop, and amusements that are located along Atlantic and Pacific Avenues, for approximately forty blocks. The trolley service runs along the Atlantic Avenue Route with multiple stops at various tourist and entertainment centers. The service also connects to the Virginia Aquarium & Marine Science Center, Ocean Breeze Waterpark, the Shops at Hilltop, and Lynnhaven Mall.

Approximately 2.75 million people visit Virginia Beach annually with the majority of the visitors coming during the height of the summer and the shoulder months of May and

September, making tourism the largest economic industry in the city.<sup>15</sup> Over 70%, or 7,830, of the city's hotel rooms are located in the oceanfront.<sup>16</sup>

The resort city is one of the nation's premier year-round meeting destinations. The new Virginia Beach Convention Center was completed in January 2007, offering meeting planners over 500,000 sq. ft. of flexible meeting space. In 2007, the convention center hosted 413 events with 475,000 attendees.<sup>17</sup>

#### 4. Funding Sources

Operated by the Hampton Roads Transit and funded by the City of Virginia Beach along with Federal and State aid, the total service cost for the VB Wave in Fiscal Year 2008 was \$2,494,173. VB Wave's farebox revenue recovered approximately 36% of the total service cost, leaving \$1,603,169 to be funded by the City of Virginia Beach and federal and state aid. The City of Virginia Beach's share was \$756,616 or 30%, and the remaining \$846,553 was covered by Federal Maintenance and State Operating Assistance funds.<sup>18</sup>

Additionally, in June 2007, HRT proposed to utilize \$5 million of acquired federal grants to purchase ten hybrid shuttles and begin replacing the aging fleet of 32 traditional red trolleys, which have been previously used to operate the VB Wave.<sup>19</sup> A dozen trolleys will still run at the resort, at least until HRT finds the money to replace them. The new shuttles were incorporated into VB Wave's system at the beginning of the 2008 summer season. The new 29-foot-long hybrid diesel-electric shuttles will be decorated with a blue and green color scheme and a surfer upon his board.

### **Historic Triangle, VA: Historic Triangle Shuttle**

#### 1. Description of Service

The Historic Triangle Shuttle initiated as a demonstration program to evaluate demand and feasibility in the summer of 2004 in preparation for the 400th anniversary of the settling of Jamestown in 2007. It is part of a cooperative agreement between the National Park Service, Colonial Williamsburg, and Williamsburg Area Transport. The Association for the Preservation of Virginia Antiquities, the Jamestown-Yorktown Foundation, and York County provide additional assistance.

The Historic Triangle Shuttle, the transportation service connecting America's Historic Triangle of Jamestown, Williamsburg and Yorktown, operates daily between March 17 and October 31 in 2008. Provided as a free service by the National Park Service, the 32-passenger buses leave the Colonial Williamsburg Visitors Center each day on two routes: to Jamestown, with stops at the National Park Service site and the Jamestown Settlement, a

15 Virginia Beach Convention and Visitors Bureau. 2008 Virginia Beach Fact Sheet. Available at: <http://vbfun.com/pressroom/mediakits/VB2008/pdfs/2008FactSheet.pdf>

16 Virginia Beach Convention and Visitors Bureau. Hotel meeting sites. Available at: <http://www.vbfun.com/conventionCenter/planners/hotelSites.asp>

17 Virginia Beach Convention and Visitors Bureau. Winter 2008 Newsletter. Available at: [http://www.vbgov.com/file\\_source/dept/cvd/Documents/VBNewsletter-Winter08-F.pdf](http://www.vbgov.com/file_source/dept/cvd/Documents/VBNewsletter-Winter08-F.pdf)

18 Hampton Roads Transit. Approved Budget for the 2008 Fiscal Year. Available at: <http://www.gohrt.com/pdf/budget/BudgetFY2008.pdf>

19 Hampton Roads Transit. Fall 2007 Newsletter. Available at: <http://www.hrtransit.com/>

re-creation of the fort; and to Yorktown, with stops at the Revolutionary War battlefield and the Yorktown Victory Center. Both shuttles follow the Colonial Parkway, the 23-mile main thoroughfare of Colonial National Historical Park, which is illustrated in Figure 4 in the Appendix section.

The two routes of the Historic Triangle Shuttle depart every 30 minutes from the Colonial Williamsburg Visitor Center.<sup>20</sup> Although there is no charge for the shuttle service, riders must show a ticket to one of the destinations; boarding passes for Jamestown Settlement, Historic Jamestowne, the Yorktown Victory Center and Yorktown Battlefield are available at the Colonial Williamsburg Visitor Center as well as at the four sites.

## 2. Performance Statistics

The Historic Triangle Shuttle has experienced a significant increase in ridership since its launch in summer 2004. According to the National Park Service, its first season served 6,187 tourists with service operating from May to September, running every two hours. In 2005, annual ridership grew to 14,675 with service running hourly. In 2006, ridership increased to 67,519 with service running every 30 minutes as well as a lengthened season from April to October. The Historic Triangle Shuttle provided 172,199 rides to Williamsburg area visitors from March to October 2007, more than double the ridership of the previous year.<sup>21</sup>

## 3. Operating Environment

As one of America's popular vacation destinations, the Virginia Historic Triangle attracts more than 4 million tourists each year.<sup>22</sup> The Historic Triangle includes the colonial communities of Jamestown, Colonial Williamsburg, and Yorktown, with many restored attractions linked by the Colonial Parkway in James City and York counties and the City of Williamsburg. The Historic Triangle shuttle seamlessly moves visitors between the Colonial Williamsburg Visitors Center, Jamestown, and Yorktown.

## 4. Funding Sources

The foundation museums participated in a new transportation service in summer 2004 that connected Colonial Williamsburg and Jamestown and Yorktown attractions from Memorial Day weekend through Labor Day. Funded by a federal transportation enhancement grant and the result of a cooperative agreement between the National Park Service, foundation museums and Williamsburg Area Transport, the Historic Triangle Shuttle was funded and managed by National Park Service's Colonial National Historical Park and operated by the Colonial Williamsburg Foundation. In 2004, the test pilot shuttle program ran a limited service every two hours from May to September, with service costs totaling \$102,450. Funding for the 2004 service year derived from the Fiscal Year 2003 Public Lands Highways (PLH) Program funding package that totaled \$1.8 million. A significant portion of this money went towards the infrastructure work required to accommodate alternative transportation at the overflow parking area and at the new visitor center. The initial transit capital investment

20 National Park Service. Historic Triangle Shuttle Schedule 2008. Available at: <http://www.nps.gov/colo/parknews/historic-triangle-shuttle-schedule-2008.htm>

21 Ibid.

22 Huh, Jin. Tourist satisfaction with cultural/heritage sites: The Virginia Historic Triangle. Available at: <http://scholar.lib.vt.edu/theses/available/etd-05142002-171010/unrestricted/Thesis.pdf>

needed to purchase the shuttles was funded through Federal Transit Administration's Major Capital Investment (Section 5309) program.

In 2005, the service was expanded to run hourly. With this expanded service, the total service costs increased to \$155,892. Due to a growing demand, service was expanded from April to October running every half-hour in 2006. Service costs increased to \$588,074 with this operation expansion. Service costs for both 2005 and 2006 were covered by funds appropriated through the United States Department of Transportation Section 117 earmarks. Demand continued to grow and service was expanded in 2007 to run from March through October every half-hour, increasing the total service cost to \$680,855. In 2008, the anticipated operating costs are expected to be \$735,486. The Historic Triangle Shuttle program received considerable federal funding, with \$2,373,145 set aside for operations for Fiscal Years 2007 through 2010.

## SPECIAL EVENTS

Shuttle services may be provided during periods of unusually high demand, during Special Events that may generate heavy traffic and as an overflow parking solution. Special event shuttle services encourage the use of alternative travel modes to occasional events that draw large crowds, such as festivals, games and fairs, which may create temporary transportation problems. This can reduce traffic and parking problems, improve safety and security, reduce stress, and provide alternative travel modes.

### **Historic Triangle, VA: America's 400<sup>th</sup> Anniversary Weekend Shuttle**

#### **1. Description of Service**

Jamestown 2007 was a collection of more than 100 events, major and small, that commemorated the 400th Anniversary of the establishment of the first permanent English settlement in North America on the shores of the James River in 1607. These events took place between the fall of 2006 and the spring of 2008 across the Commonwealth of Virginia. The vast majority of these activities was relatively small in size and localized in scope. Most events that took place in the Historic Triangle (Jamestown, Williamsburg, and Yorktown) area created somewhat busier than average peak visitation levels. The premier signature event of Jamestown 2007 was the America's 400<sup>th</sup> Anniversary Weekend, a three-day spectacular event held at the Jamestown sites on May 11 – 13, 2007. During the Anniversary Weekend, no public parking was permitted at the Jamestown sites. To ensure an enjoyable visit, visitors were directed to park in satellite parking lots, as seen in Figure 5 in the Appendix section, and use the free shuttle service to the event venues.

Williamsburg Area Transport (WAT) served as the lead transportation agency for Anniversary Weekend, coordinating the transportation shuttle system. The agency reviewed all resources for innovative ways to supply a large quantity of buses for the event and school buses were chosen as the most cost-effective source of supply.<sup>23</sup> By acquiring exclusive use of the Colonial Parkway between Williamsburg and the Jamestown Settlement, WAT assured the seamless operation of school buses from six school systems and the Colonial Williamsburg Foundation to transport visitors smoothly between nine Park & Ride lots and Anniversary Park over the three-day kickoff period.<sup>24</sup> The number of school buses to shuttle visitors per day for the 3-day event is as follows: 330 on Friday May 11<sup>th</sup>, 304 on Saturday May 12<sup>th</sup>, and 373 on Sunday May 13<sup>th</sup>. Shuttle bus hours operated from 8:30 a.m.-11:00 p.m. on May 11<sup>th</sup> and May 12<sup>th</sup>, and 7:30 a.m.-11:00 p.m. on May 13<sup>th</sup>.<sup>25</sup>

#### **2. Performance Statistics**

Bus transportation to get visitors in and out of the area handled a total of 68,124 one-way trips over the three-day celebration for the anniversary of the country's first settlement in Jamestown. In detail, the Williamsburg Area Transport reported that there were 14,421 one-way trips on May 11<sup>th</sup>, 34,342 on May 12<sup>th</sup>, and 19,461 on May 13<sup>th</sup>.

23 School Transportation News. Jamestown 2007 and the Yellow Bus... a perfect match. Available at: <http://www.stnonline.com/cgi-bin/artman/exec/view.cgi?archive=61&num=6746>

24 James City County Community Services. FY 2007 Annual Progress Report. Available at: <http://www.jccegov.com/pdf/socialservices/FY07ComServAnnRept.pdf>

25 Jamestown 2007. Anniversary Weekend Satellite Parking and Shuttle Transportation System. Available at: <http://www.jamestown2007.org/transportation/anniversary-weekend-transportation.cfm>

### 3. Operating Environment

The America's Anniversary Weekend hosted between 65,000 and 70,000 visitors for a three-day period. The event was the product of a collaborative effort in which the Jamestown-Yorktown Foundation worked closely with the Jamestown 2007 organization and other state, local and federal partners. Jamestown Settlement's visitor parking area was transformed into a gateway to the three Anniversary Weekend venues – Anniversary Park, Jamestown Settlement and Historic Jamestowne.

Both Jamestown Settlement and the Jamestown Island Visitor Center reconfigured and augmented their existing parking facilities to accommodate the America's Anniversary Weekend anticipated parking demands. In order to accommodate the transportation demands of the event, it was necessary to intercept the vast majority of arriving visitors some distance from the event venues and accommodate their access to Jamestown Island and/or Jamestown Settlement by instituting remote parking and offering shuttle bus services to the venues.

During the Anniversary Weekend, no public parking was permitted at the Jamestown sites. Visitors were guided to park in one of the nine satellite parking lots and ride the free shuttle service to travel the event venues. Satellite parking lots were located conveniently in James City County, York County, and Surry County.

### 4. Funding Sources

The Anniversary Weekend Shuttle was allocated almost \$1.4 million to fund the service for the Jamestown 2007 three-day weekend. The total project cost was \$1,388,000, which consisted of local transportation allocations with matching state allocations.<sup>26</sup> Specifically, the project cost consisted of a 50% match of \$270,500 in Regional Surface Transportation Program (RSTP) funds, \$423,500 in Regional Congestion Mitigation and Air Quality (CMAQ) funds, and \$694,000 in non-federal match provided by Jamestown 2007 Inc. The budget included funds for preparation and signage of nine park and ride lots, payment of bus service provided by six school divisions and contract management of transportation shuttle by Transportation Management Services.

## **Indianapolis, IN: Indy 500 Park and Ride Shuttle Service**

### 1. Description of Service

The Indianapolis Public Transportation Corporation, commonly known as IndyGo, operates the public transit system for the city of Indianapolis, Indiana. With 400,000 people and vehicles in a three-mile area close to the speedway attending the largest single-day sporting event in the world, offering transit options are necessary in order to compensate for limited parking at the Indianapolis Motor Speedway. The IndyGo system began offering a nonstop shuttle service to the Indianapolis 500 annual speedway event more than 20 years ago, with numerous people from out of town driving into Indianapolis to the park-and-ride sites located in Downtown and the Indianapolis International Airport.

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26 Jamestown 2007 Steering Committee. 2005 Annual Report. Available at: <http://www.jamestown2007.org/pdfdocs/2005%20-20Jamestown%202007%20AnnualReport.pdf>

For the May 25, 2008 event, there were a total of four boarding locations – two at the Indianapolis International Airport and two in Downtown Indianapolis, as shown in Figure 6 in the Appendix section.<sup>27</sup> The express shuttle service transported passengers to the Speedway beginning at 9 a.m., four hours before the official start of the race.<sup>28</sup> Passengers were dropped off within a couple of blocks of the speedway on Main Street near Gilman Street, which also served as the pick-up location after the race. Shuttle service was scheduled to continue for three hours after the official end of the race. Roundtrip shuttle tickets for the Indianapolis 500 cost \$15. Children age 2 and under ride free. Tickets were available at all boarding locations the day of the Indianapolis 500.

## 2. Performance Statistics

For many years, IndyGo has provided Park and Ride shuttle services from downtown and the Indianapolis International Airport to the Indianapolis Motor Speedway, providing between 16,000 to 18,000 passenger trips annually.

## 3. Operating Environment

The Indianapolis Metropolitan Statistical Area (MSA) had a 2006 population of 1.66 million people, ranking 7<sup>th</sup> largest MSA in the Midwest and 33rd in the United States. The Indianapolis 500 is an American automobile race, held annually over the Memorial Day weekend at the Indianapolis Motor Speedway in Speedway, Indiana. The town of Speedway is a complete enclave of Indianapolis.

The Indianapolis 500 event, billed as "The Greatest Spectacle in Racing", is one of the oldest motorsport events, and is considered one of the three most significant motor racing events in the world. While the official attendance is not disclosed by Speedway management, with a permanent seating capacity for more than 257,000 people and infield seating that raises capacity to an approximate 400,000 it is the largest single-day sporting event in the world.

## 4. Funding Sources

As a break-even venture, IndyGo charges a ticket fee to maintain the shuttle service offered at the Indy 500 event. In 2007, total operating costs for the one-day event amounted to \$115,525. Revenue generated from the roundtrip shuttle \$15 tickets totaled \$124,515.

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<sup>27</sup> IndyGo. Park and Ride on IndyGo to the Indianapolis 500. Available at:

[http://www.indygo.net/special\\_events/2008\\_IMSraces.htm](http://www.indygo.net/special_events/2008_IMSraces.htm)

<sup>28</sup> IndyGo. Waiver permits Indy 500 shuttle service. Available at: <http://www.indygo.net/news.asp?ID=177>

## TRANSIT-CAPTIVE MARKETS

Transit captive riders are often associated with characteristics such as being low income, elderly or children, having disabilities, families whose travel needs cannot be met through car use, and those who chose not to own or use personal transportation.<sup>29</sup> Shuttle services that serve the transit-captive market typically are located in markets with fixed-route services such as military bases and college/university campuses, and in markets with flexible route transit services like demand-response paratransit serving disabled riders.

### Houston, TX: METROLift

#### 1. Description of Service

The Metropolitan Transit Authority of Harris County (METRO) began the METROLift service in 1979 to provide specialized paratransit services to individuals with special needs. As a mode of demand-response transit and shared-ride public transit service, METROLift provides pre-scheduled, curb-to-curb transportation for persons with disabilities who cannot board, ride, or disembark from a regular METRO fixed-route bus, even if that bus is equipped with a wheelchair lift or ramp. METROLift eligibility requires physician approval and an in-person evaluation conducted at METRO in order to become certified to use METROLift services.

The METROLift buses use a wheelchair lift, four-door sedans and/or minivans to provide service. In FY 2007, there were 117 paratransit vehicles<sup>30</sup>

One METROLift ticket or a monthly pass is required for each one-way trip. The cash fare for one-way tickets cost \$1.15 which can be purchased at all METRO RideStores and METROStops. The METROLift ADA I.D. Q Card allows certified METROLift patrons to board and ride METRO's fixed-route bus and rail service for a reduced cost of 50% of the regular fare. Eligible riders are advised to call one day in advance to schedule a ride. Trips are scheduled on a first-call, first-scheduled basis between 8 a.m. and 3 p.m. Monday through Friday, 9 a.m. to 1 p.m. Saturday and 1 p.m. to 5 p.m. Sunday.

#### 2. Performance Statistics

METRO has experienced a steady increase in demand for METROLift service since its inception in 1979. In 1985, the METROLift system averaged approximately 25,000 passengers per month. By 1992, monthly ridership had grown to some 50,000, and by 1999, approximately 93,700 riders per month were using the system. During the period from 1989 through 2004, paratransit passenger trips served more than doubled to 1,502,572.<sup>31</sup> METROLift averaged 1.44 million boardings in 2007 maintaining a rolling average of 120,000 riders a month to individuals with special needs in the Houston area.

29 Krizek, Kevin and Ahmed El-Geneidy. Segmenting Preferences and Habits of Transit Users and Non-Users. Available at: <http://www.nctr.usf.edu/jpt/pdf/JPT%2010-3%20Krizek.pdf>

30 The Metropolitan Transit Authority of Harris County, Texas. 2007 Annual Report. Available at: <http://www.ridemetro.org/AboutUs/Publications/Pdfs/2007-AnnualReport.pdf>

31 Texas Transportation Institute. Assessment of METROLift Paratransit Scheduling System. Available at: <http://ntl.bts.gov/lib/17000/17200/17225/PB2001100374.pdf>

### 3. Operating Environment

The Metropolitan Transit Authority of Harris County, Texas (METRO) operates bus, light rail, future commuter rail, and paratransit service METROLift service in Harris County, Texas, which includes the city of Houston. As the largest county in Texas, Harris County has a total area of 1,778 square miles with a 2006 estimated population of 3,886,207. In 2007, METRO recorded a transit boarding<sup>32</sup> of 101,310,353 with a service area encompasses 1,285 square miles.<sup>33</sup>

In 1979, METROLift was the sole METRO service for people with disabilities. METROLift served 16,135 passenger trips in its 50 square mile service area in 1979; 10 years later, as the passage of ADA approached, these numbers had reached 588,028 trips in a 398 square mile service area. As shown in Figure 7 in the Appendix section, the METROLift service area nearly doubled to 752 square miles, primarily in order to serve the new area receiving fixed-route services.<sup>34</sup>

### 4. Funding Sources

In 1978, Houston-area voters created METRO and approved a 1% sales tax to support its operations including METROLift. In Fiscal Year 2007, METRO reported \$32,215,665 as METROLift's operating expenses. A portion of the funds obtained from the regional sales tax, plus \$1,066,281 in METROLift fare revenue and \$5,830,132 Federal Transit Administration Section 5307 grant money funded the operating costs for METROLift in Fiscal Year 2007.<sup>35</sup>

Additionally, in 2004, the METRO Board approved a \$7 million contract with National Bus Sales & Leasing Inc. to replace the entire METROLift van fleet with 118 vehicles. The July 2005 fleet replacement was financed with 83% federal funds and 17% local funds. METRO and its paratransit contractor, First Transit, increased the useful life of METROLift vans from about 120,000 miles to 300,000 miles since 1990. This is due largely to METRO's stringent manufacturing criteria and maintenance programs.<sup>36</sup>

## **Norfolk, VA: Naval Station Norfolk Shuttle**

### 1. Description of Service

Naval Station Norfolk (NSN) has offered a free shuttle to designated areas on the military base since 2003. The shuttle service provides a complete transportation program for NSN commuters. Having a convenient shuttle service eliminates the need to drive to work to get to another destination on base.

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<sup>32</sup> An unlinked passenger trip is a transit boarding — each time a passenger enters a transit vehicle counts as an unlinked passenger trip.

<sup>33</sup> The Metropolitan Transit Authority of Harris County, Texas. 2007 Annual Report. Available at: <http://www.ridemetro.org/AboutUs/Publications/Pdfs/2007-AnnualReport.pdf>

<sup>34</sup> Texas Transportation Institute. The role of private-for-hire vehicles in transit in Texas. Available at: <http://tti.tamu.edu/documents/0-5545-1.pdf>

<sup>35</sup> RideMetro. 2007 Annual Report. Available at: <http://www.ridemetro.org/AboutUs/Publications/Pdfs/2007-AnnualReport.pdf>

<sup>36</sup> The Metropolitan Transit Authority of Harris County, Texas. 2004 Annual Report. Available at: <http://www.ridemetro.org/AboutUs/Publications/Pdfs/2004ar.pdf>

In a coordinated effort between the U.S. Navy and the Hampton Roads Transit (HRT) to alleviate traffic congestion on NSN military installation, HRT expanded its fixed-route bus service to and from the base by adding a new shuttle system on the base itself. The new service, called "The Navigator", was initiated on June 2<sup>nd</sup>, 2003, and was a free service operating every 30 minutes.<sup>37</sup> The new shuttle service allowed more people to move around the base without a car, alleviating traffic and simultaneously decreasing security concerns. The free shuttle provided a valuable service to active-duty and civilian personnel and permitted them to commute around the base easily, while fulfilling congestion mitigation efforts to decrease traffic flow and parking requirements.

In 2005, the shuttle service was re-instated as the "Naval Station Shuttle" and has expanded with HRT operating the Route 76 shuttle every 15 minutes and the Navy operating the Route 77 shuttle every 20 minutes. There is no charge to ride either shuttle and both are available weekdays only and no holidays. As shown in Figure 8 in the Appendix section, Route 76 operates along Gilbert Street, services the piers and the Navy Exchange Service Command. Route 77 provides service between 8<sup>th</sup> Avenue in front of Stayton Hall, along Gilbert Street to Bacon Avenue. Persons may transfer between the two shuttles with no charge.

## 2. Performance Statistics

As reported by the Hampton Roads Transit, between July 2006 and June 2007, Route 76 carried a total of 45,304 passengers and Route 77 carried 37,585 persons.

## 3. Operating Environment

The Naval shuttle operates exclusively on base. NSN is the largest naval base in the world, situated on approximately 4,300 acres in Norfolk, Virginia. The complex is the combined home to the headquarters for Commander Naval Base Norfolk, Allied Command Transformation and United States Joint Forces Command, as well as the Defense Department's largest supply center, and Naval Air Station Norfolk. NSN includes approximately 4,000 buildings, 20 piers, and an airfield, as well as 65,000 active duty personnel, 69 home-ported ships, 16 squadrons and 132 aircraft.

## 4. Funding Sources

In May 2003, HRT applied for and received \$168,245 in Regional Congestion Mitigation Air Quality (CMAQ) funds for one year and the Navy provided the local match of \$33,649 to enhance the Navy's shuttle service by providing increased frequency and expanded span of service. Funding for years two and three utilized State CMAQ dollars and was received for a period of two years with allocations of \$565,000 per year for operating and \$50,000 for marketing the service. Service was expanded to two routes upon receipt of State CMAQ dollars for the second year of operation. It should be noted between years two and three, there was a funding gap, and until funding could be received the Navy operated both routes for a short period of time. The Department of Rail and Public Transportation, in cooperation with the Virginia Department of Transportation, included funding for an expanded Naval

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<sup>37</sup> Virginia Transit Association. News Brief, September 2003. Available at: <http://www.vatransit.com/news/Releases/News%20Briefs%20September%202003.pdf>

Station Shuttle Service in the FY 2005-2008 Transportation Improvement Plan (TIP) utilizing Statewide CMAQ funds.

## SUMMARY AND CONCLUSIONS

The eight best practices presented in the previous section and the literature review of community oriented transit reveals six key themes that are of particular importance as consideration is taken for the implementation of community oriented shuttle services.

### 1. Matching Services to Market Needs

Matching services to market needs is a key element in successfully implementing shuttle services in a community. As stated in the "Guidelines for Enhancing Suburban Mobility Using Public Transportation" report, the success or failure of shuttle services clearly depends on finding a very specific problem or need in the community and then designing a service around that need. Services implemented for general mobility purposes in areas without specific needs, and specifically without conditions inhibiting automobile use, have no record of success. Developing strategies which target specific transit users and/or markets has ensured the success of implementing shuttle systems in different types of operating environments.

The common purpose of shuttle services is to improve mobility within and around a defined local area for internal trip making and for regional trips via transfers to the regional transit network. As shuttle services can operate in many different types of communities and serve a wide variety of users, it is crucial the characteristics of the shuttle service are customized to match the needs of the community it is servicing. Shuttle services are unique to their service areas and should be implemented as such. Findings from the literature review indicate a strong emphasis is placed on determining what the shuttle service goals and purpose are as well as analyzing the shuttle service's operating environment geographic and socioeconomic character to facilitate tailoring a shuttle service to match its community's needs. The shuttle service markets that are intended to be served must be thoroughly evaluated in order to establish the parameters such as span of service, frequency, types of vehicles, marketing strategies, and funding sources.

### Market Profile

Developing a comprehension of the characteristics and travel needs of diverse ridership markets is a vital factor in identifying the most suitable ridership growth strategies and initiatives. As described in the "Elements Needed to Create High Ridership Transit Systems" report, the key elements in identifying unmet needs and potential markets include the following:

- Conducting analysis of demographics and travel patterns within the area or region; this analysis is used to identify:
  - gaps in transit service coverage, focusing on areas with the potential to support transit services (e.g., based on development density, activity centers, and concentrations of transit-dependent residents)
  - the size of the current and projected travel markets (e.g., based on travel volumes to major regional employment centers)
- Conducting market research which identifies
  - key market segments

- both current riders' and non-riders' service preferences and tendencies to ride improved transit service

A market profile which identifies unmet needs and potential transit markets will establish the current and potential shuttle users and determine whether there is a potential demand in that particular market to support public transportation. Recognizing the importance of this analysis will facilitate in determining which strategies to apply to a specific market.

### Density

First and foremost, there must be enough people in the area to justify providing service. There is a very strong relationship between transit use and population density for the local circulators. However, the type of shuttle service needed will vary according to the level of density. The characteristics of the shuttle system in an urban setting differ greatly from one in a suburban or tourist-oriented market. Population and employment density in central business districts include a large segment of the ridership market in urban centers than of those riders located in lower density areas. Typically, traditional shuttle services in an auto-dominated suburban environment without a major central business district will struggle and it can be difficult to serve travel patterns as trip origins and destinations are spread out. In order to be successful, suburban services should make an extra effort to provide an innovative array of services where services are tailored to match the demands of very specific markets.

### Service Parameters

The operational characteristics of each shuttle system include the number of circulator routes, service span (service days of the week and hours of operation), headways (measure of service frequency), fares, and vehicle types (number of seats). In order to meet the mobility needs of the community, each shuttle system should be designed with operational services that accommodate their mobility patterns. These parameters should be influenced by passenger demand to maximize system productivity. Additionally, according to the "Guidelines for Enhancing Suburban Mobility Using Public Transportation" report, it is necessary to recognize how land uses in the community serviced by the transit shuttle influence service parameters and passenger demands. Mixed-use urban environments generate a transit demand throughout the day to serve employees, shoppers, residents and visitors, while suburban settings produce a transit demand that varies throughout the day depending on the type of use the service is providing. For instance, a suburban office park will have high employment-related peaks, whereas a shopping center will have midday and evening peaks. To maintain reasonable levels of service effectiveness, shuttles should orient their service patterns and operate according to their service environment.

## **2. Define Goals and Objectives**

The goals and objectives must be clearly defined as communities engage in the process of developing shuttle services. While there is a general consensus that shuttle services are a positive contribution as they provide an alternative mode of transportation, specific goals must be set and can vary according to operating environments as cited in the "Strategies for an Intra-Urban Circulator System" report.

### Connectivity

One strategic goal of implementing a shuttle system is to create logical linkages between local origins and destinations. This link can be between the target area and the larger transit system and/or multiple and active local destinations within the target area. As detailed in the report, it is important for shuttle services to have good connections to other existing transit service as well as other modes such as pedestrian friendly areas and parking facilities. Connections to the local or regional transit system increases the overall transit availability for a wide variety of transit users and can result in an increase in transit trips. Convenient connections can be an appealing method of travel for visitors to explore to area attractions while such connections may be more feasible for commuters to utilize the comprehensive transit system for their work trips.

### Congestion Mitigation

Another objective for consideration is traffic congestion, parking constraints and parking rates. These are the main influences that will support shuttles to encourage users to more fully utilize public transit and reduce demand for parking; thereby reducing traffic congestion, impacts on local neighborhoods, and air pollution. Shuttle systems can be incorporated as travel alternatives that can accommodate a variety of system users and be utilized as a strategic method for alleviating congestion since they can improve vehicle and pedestrian mobility by reducing the number of single occupancy vehicles. For instance, downtown shuttle systems can serve riders who drive to the peripheral parking lots and utilize the shuttle service to their final destination. For every trip made within downtown on the shuttle that would have otherwise been made by an automobile, emissions are reduced. The shuttle service provides a necessary link from transit stops to the workplace, and an enhanced system can further reduce short midday vehicle trips.

## **3. Service Delivery Operator**

Deciding which organization will operate the shuttle system ultimately will depend on the individual circumstances of the community. Since the needs of communities can vary greatly from one another, it is necessary to determine which operator will best implement the particular services needed. Typically, due to their experience in providing public transportation, local transit agencies are chosen to operate shuttle services. However, it has been shown in other instances, where the local government, tourist bureau, or other entities operate and/or privately contract for the shuttle service.

## **4. Identity and Marketing**

Special consideration should be taken to create an identity for the shuttle system and apply marketing techniques to solidify the system as part of the community. The particular identity of the shuttle system will differ depending on its function as communities uphold unique goals and purposes. Identifying and targeting services to existing, potential, and emerging ridership markets can be done through service promotion and marketing to develop public awareness. Typical marketing strategies include direct mailings, distribution of fliers, advertising campaigns, and radio jingles.

Combined with marketing that targets its potential riders while promoting the destination, the shuttle can be a mode used to promote a historic area or utilized as an efficient means of

transportation for commuters and shoppers. Employing appropriate and creative marketing techniques is a valuable strategy to ensure community recognition and attract ridership.

## 5. Fares

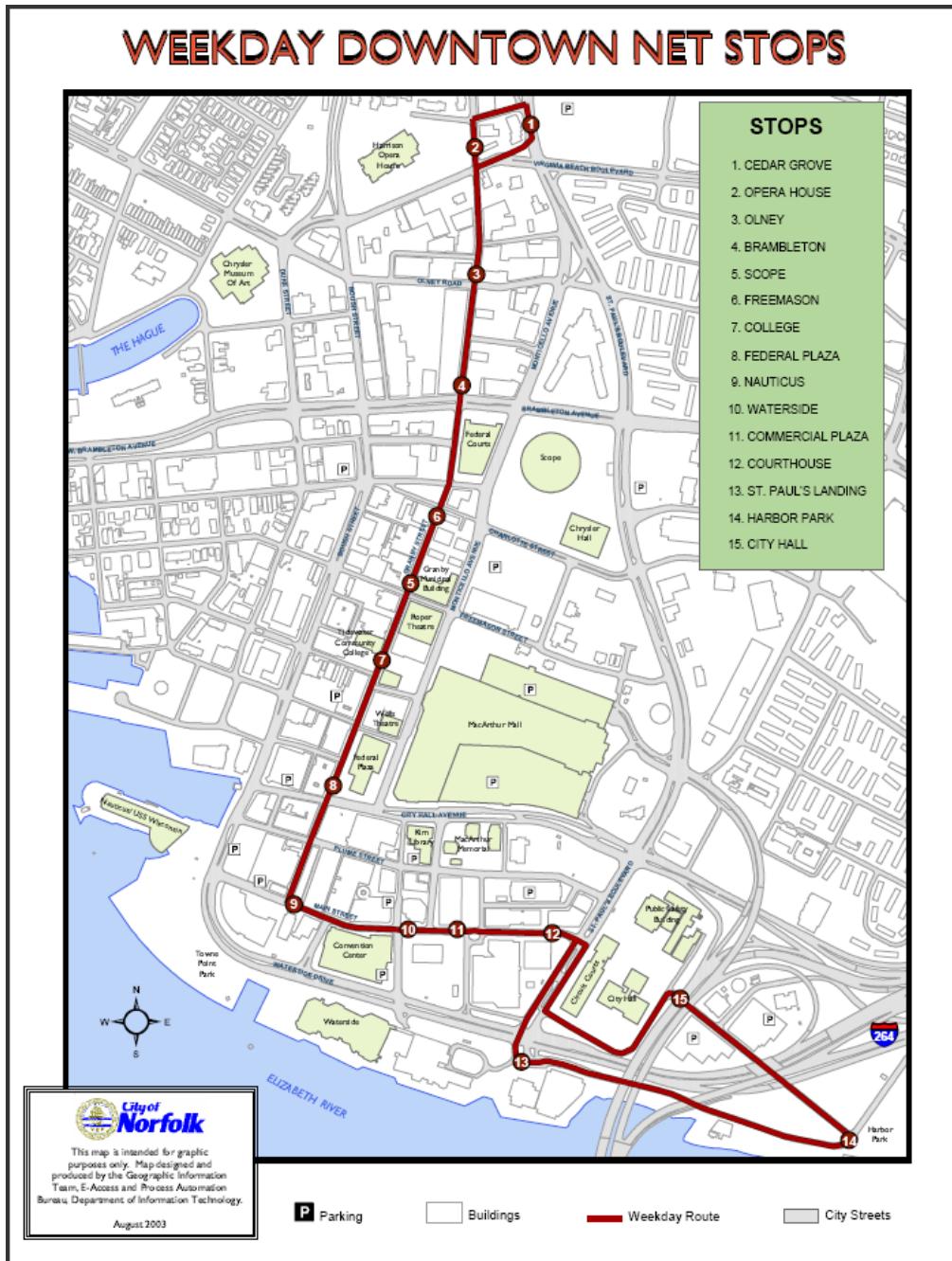
The decision to institute a fare policy depends on the type of strategy each community wants to employ for attracting ridership as well as the amount of funds available to offset the operating costs. In general, because shuttle trips are likely to be shorter in distance, most shuttle systems charge a nominal fare compared to the primary transit service in the area, while others provide a fare-free service. Typically, fare-free services increase the appeal as well as boarding efficiency, thus resulting in higher ridership. Instituting a fare can be used as a tool to secure funding for the service and to control passenger capacity should it become an issue. Charging a nominal fee has its tradeoffs. It can aid in offsetting any financial gaps through fare revenue generation. However, it can also deter riders and thereby lower ridership. As each community's goals, demands, and conditions are distinct, so will the strategy of the fare structure.

## 6. Funding

Traditionally, funding for shuttle systems are mainly acquired from municipal, state, federal or private entities as well as farebox revenues and transit agency operating funds which can contribute to the shuttle operating costs. Additionally, applying innovative financing techniques such as using parking fees, local taxes, or general city revenues can considerably expand the means of securing funding. All in all, identifying funding sources through the variety of partnerships and stakeholders and leveraging an array of funding resources to establish a stable funding stream to support a community shuttle service will ultimately determine how the available transit funding can best be used to serve the transit needs of the community's population.

**APPENDIX**

Figure 1A: Downtown Norfolk NET Weekday Routes and Stops .....	32
Figure 1B: Downtown Norfolk NET Weekend Routes and Stops .....	33
Figure 2: Old Town Alexandria King Street Trolley Route and Stops .....	34
Figure 3: VB Wave Shuttle System Routes and Stops .....	35
Figure 4: Historic Triangle Area Map .....	36
Figure 5: Anniversary Weekend Satellite Parking and Shuttle Map .....	37
Figure 6: Indy 500 Parking and Shuttle Service Boarding Locations.....	38
Figure 7: Houston, TX METROLift Service Area .....	39
Figure 8: Naval Station Norfolk Shuttle Routes .....	40



**Figure 1A: Downtown Norfolk NET Weekday Routes and Stops**

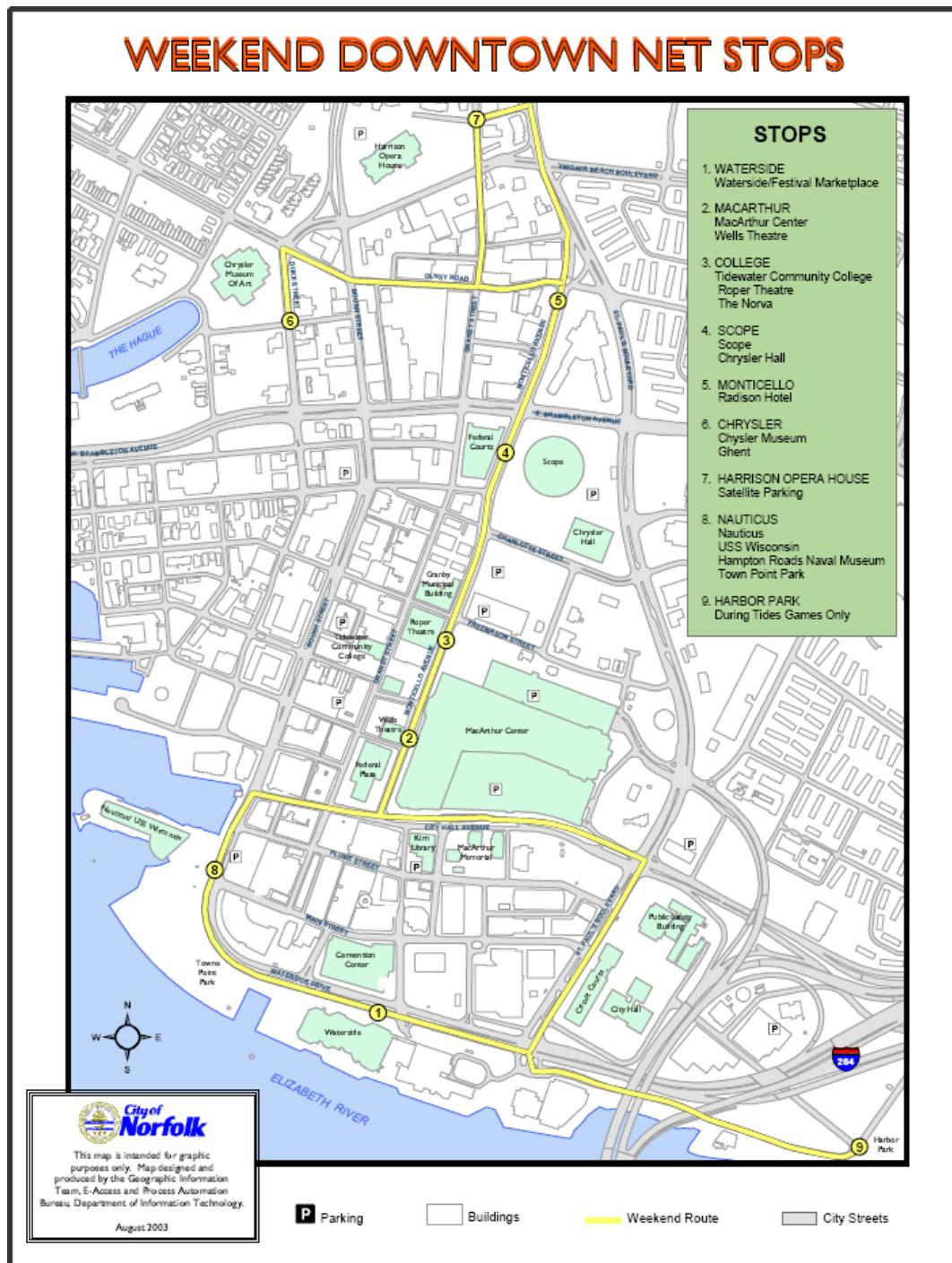


Figure 1B Downtown Norfolk NET Weekend Routes and Stops

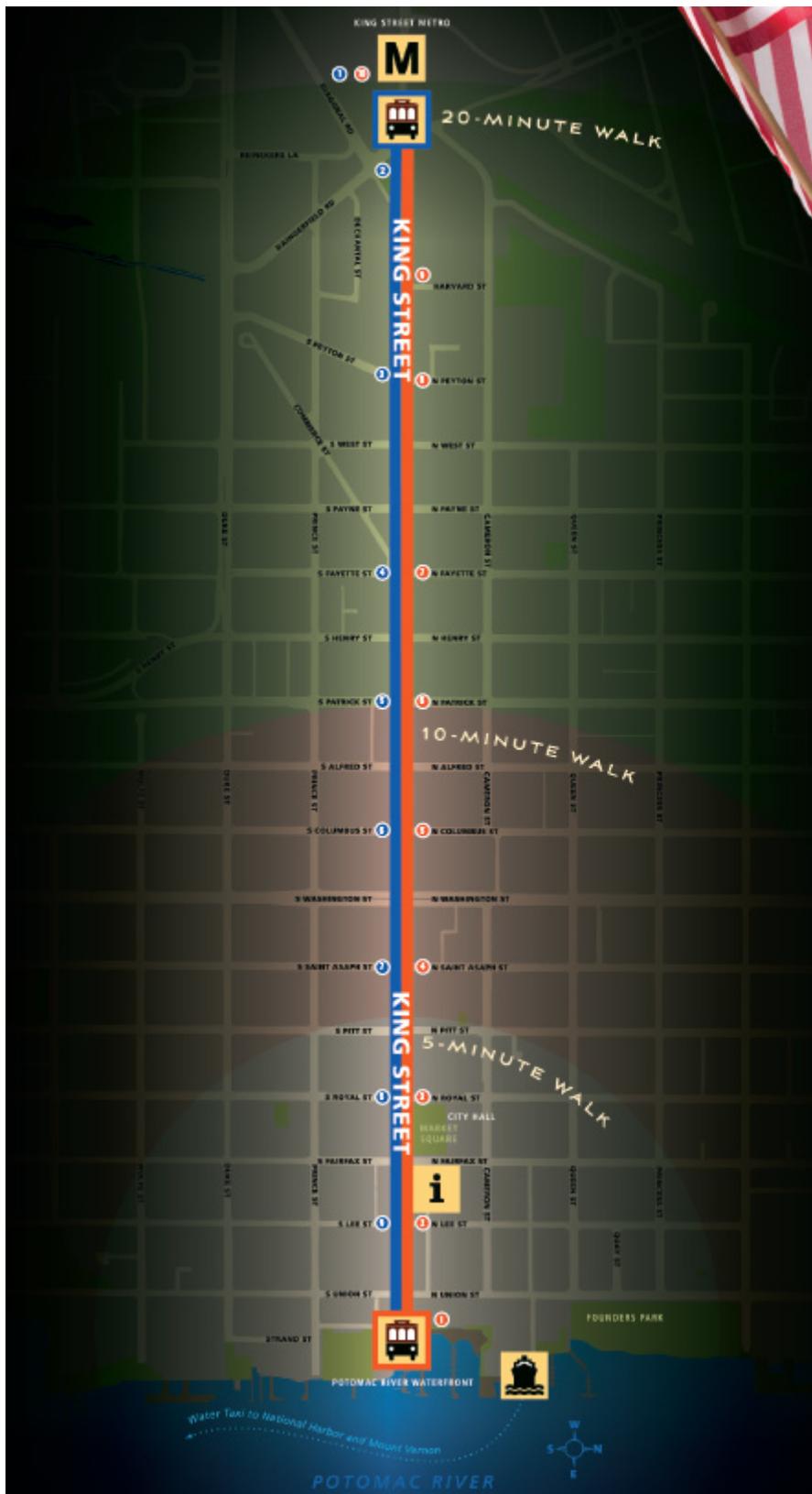
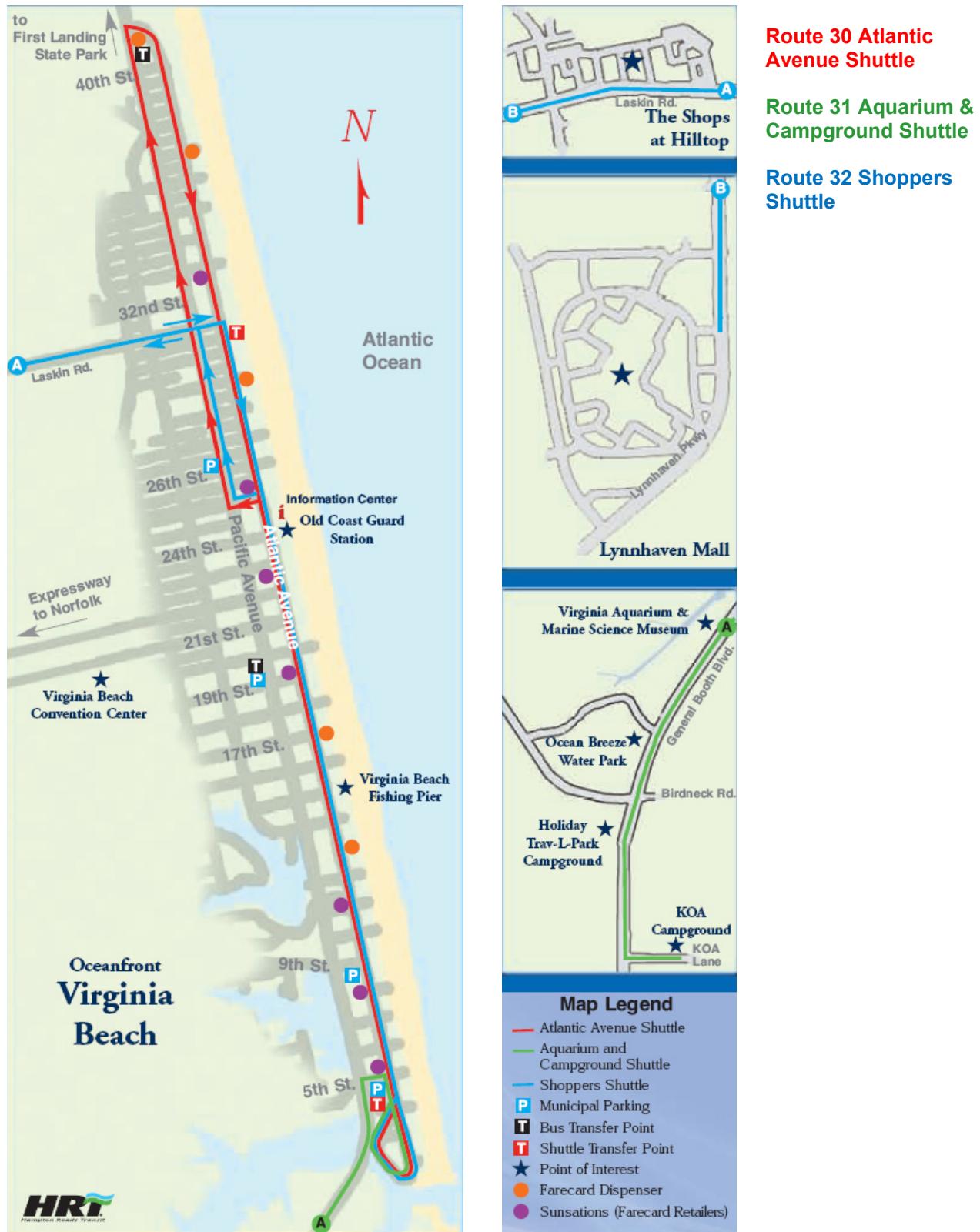
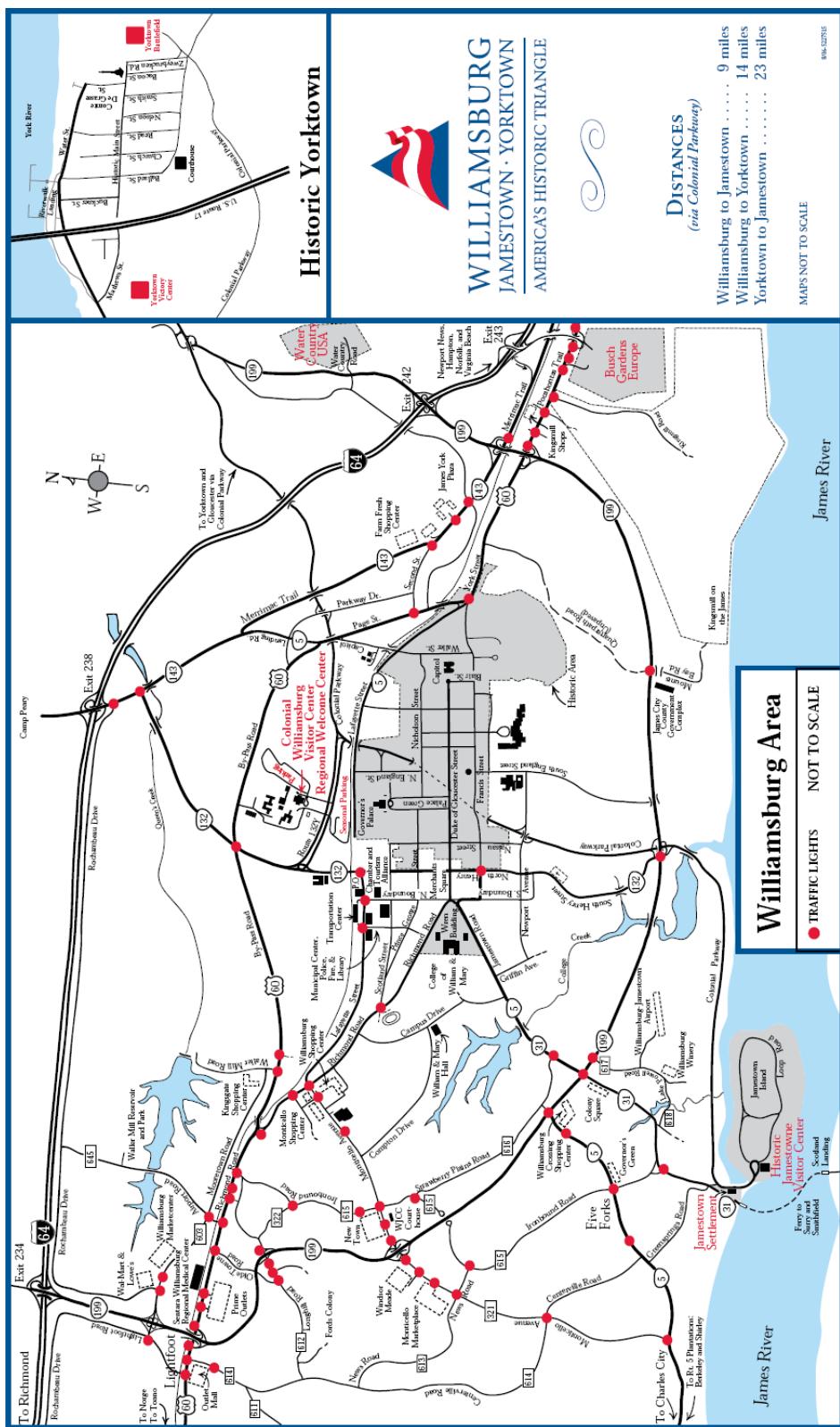


Figure 2: Old Town Alexandria King Street Trolley Route



**Figure 3: VB Wave Shuttle System Routes and Stops**



**Figure 4 Historic Triangle Area Map**

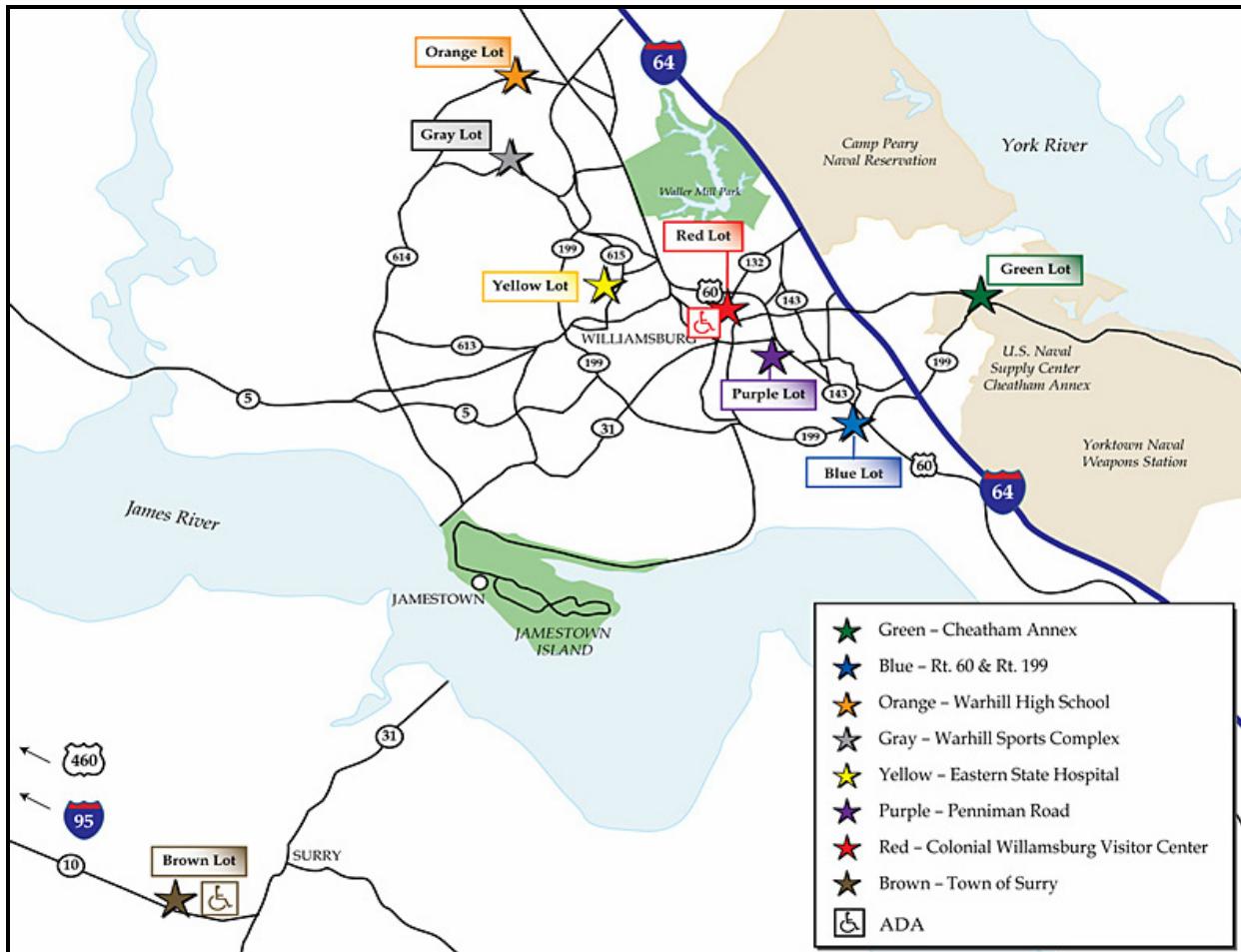


Figure 5 Jamestown 2007 Anniversary Weekend Satellite Parking and Shuttle Map

### IMS Boarding/Exit Location



### Airport Boarding Locations



### Downtown Boarding Locations



Figure 6 Indy 500 Parking and Shuttle Service Boarding Locations

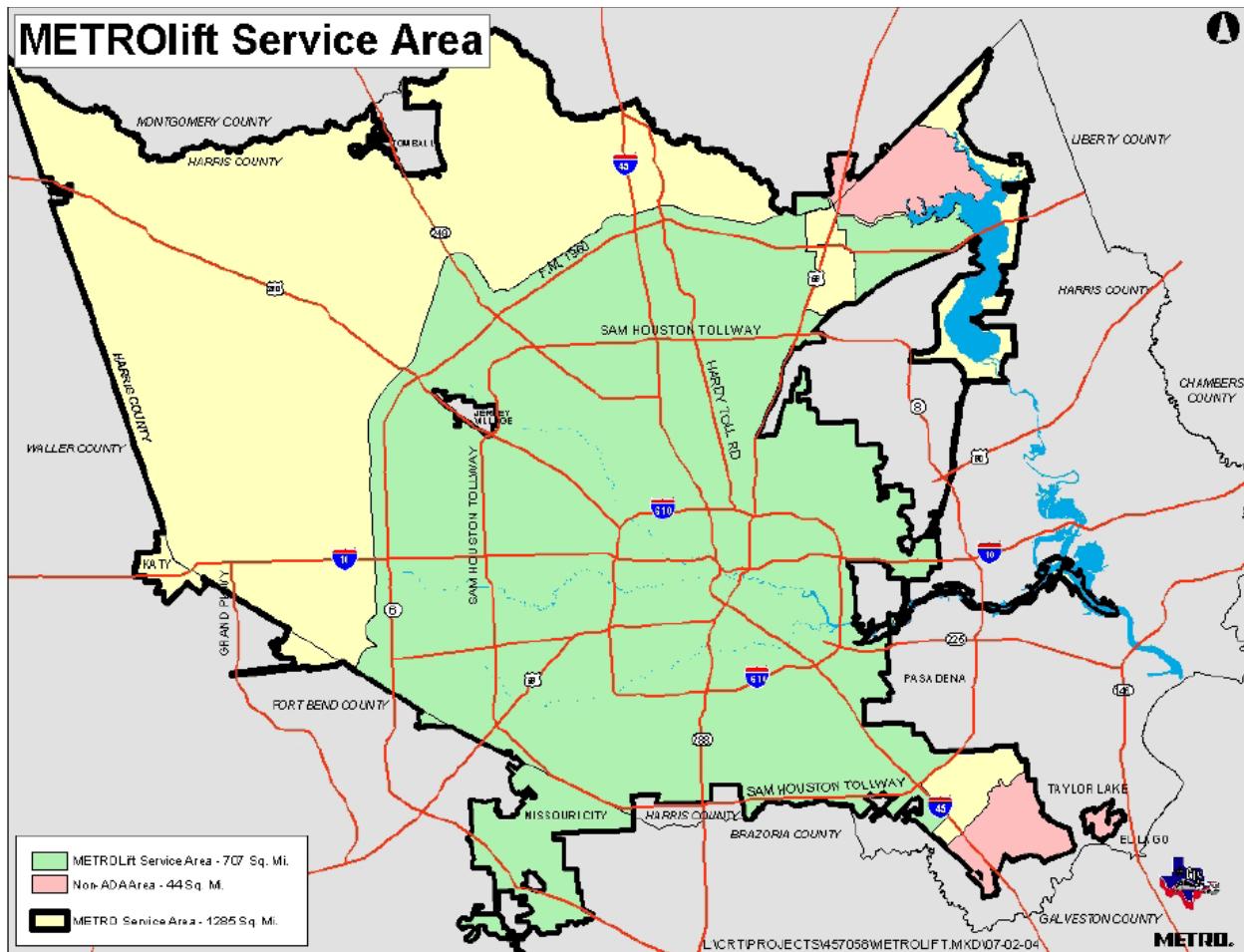
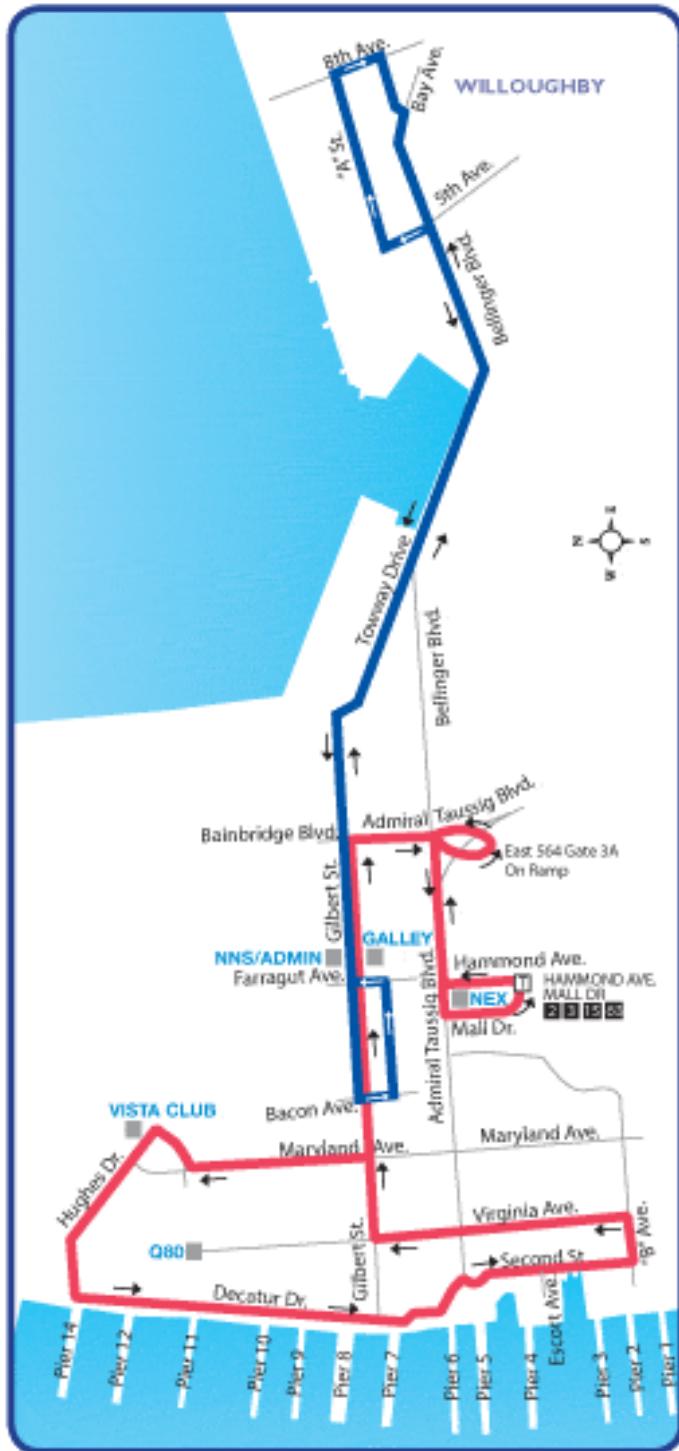


Figure 7 Houston, TX METROLift Service Area



**Figure 8 Naval Station Norfolk Shuttle Routes**