

Prince William County

**Harbor Station
Multimodal Commuter
Station Study**

Final Report

ARUP

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Station Study**

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Executive Summary

The Harbor Station development, including a Town Center, proposed Virginia Railway Express (VRE) commuter station, and possible commuter ferry terminal, is planned on the Cherry Hill Peninsula, 30 miles south of Washington DC on the Potomac River in Prince William County, Virginia. As part of the Transportation/Land-Use Connections (TLC) Program, Arup was asked to investigate the feasibility and infrastructure needs for a multimodal station and active, walkable transit-oriented development (TOD) in Harbor Station's Town Center. To this end, a case study analysis first identified land use mix, density, transit amenities, parking regulations and other infrastructure present in a range of local and national urban and suburban TODs. A potential range of trip generation rates and mode splits were identified based on these studies, showing that a considerable vehicle trip reduction can be expected in the Harbor Station Town Center from what is generally assumed by in traditional transportation engineering handbooks.

Based on these precedents, an evaluation of the *Harbor Station Town Center Design Guidelines and Development Code* found many strong land use, connectivity and urban design features that would maximize overall station and site accessibility. This includes a good mix of uses and housing types along with higher densities within $\frac{1}{4}$ - $\frac{1}{2}$ miles from the station, a grid-like street pattern for good pedestrian connectivity and station access from gateway streets, a strong commercial corridor, and dedicated open space. Additional opportunities to better integrate transit, walking and biking into the development were found, including:

- Further concentrating activity along the major commercial corridor;
- Moving some residential units closer to transit to provide an even greater residential density within the primary station catchment area;
- Creating complete streets around the town commons;
- Considering alternative land use typologies that integrate/share parking;
- Realigning off-set intersections to improve pedestrian safety and traffic operations;
- Reducing some longer block lengths to 300 feet or less for pedestrian permeability;
- Providing bicycle lanes on major streets that extend into the greater Harbor Station development, and;
- Providing bicycle amenities including secure parking and lockers for bikes at the transit station, bus stops and office and residential buildings.

Three station area design scenarios were developed based on a typical transportation strategy for new developments: bus transit in the first scenario, the addition of commuter rail in the second scenario, and ferry service for the third scenario. This analysis assumed the possibility of some development in the Town Center occurring before VRE service becomes available. Regardless of which scenario is built out first, bus service should be considered a baseline requirement, providing access to local destinations and the regional rail and/or ferry service.

Finally, assuming both are technically feasible, an evaluation of two possible ferry terminal locations, at the proposed marina site or an intermodal Town Center station, showed that co-locating the ferry terminal with the VRE station in the Town Center best provides the opportunity to incorporate the ferry into a transit-oriented design. This location provides a built-in set of potential riders who are more likely to walk, bike, or ride a local bus to the ferry, and the surrounding land uses in the Town Center provide the opportunity to create an active intermodal station. Landside infrastructure could be shared among all the three transit modes and operators, thereby minimizing costs. Further study is needed to ensure that the land ownership issues and parking concerns are addressed such that the impacts on developable land and the walkability of the Town Center are not compromised.

1 Introduction

The Harbor Station development, including a Town Center, proposed Virginia Railway Express (VRE) commuter station, and possible commuter ferry terminal, is planned on the Cherry Hill Peninsula, 30 miles south of Washington DC on the Potomac River in Prince William County, Virginia. Bounded on the east by the Potomac, on the north and south by Powell's Creek and Quantico Creek, respectively, and on the west by the Route 1/I-95 corridor, the largely undeveloped peninsula is challenging to access. Regional vehicular access to the peninsula is possible from I-95 via Dumfries Road and from Route 1. Existing transit service from Potomac and Rappahannock Transportation Commission (PRTC) and vanpools do exist within the I-95/Route 1 corridor, but it does not reach into the proposed site. Additionally, the I-95/Route 1 corridor also serves as a physical barrier for east-west movement between the peninsula and the neighboring communities. It is an auto-oriented corridor and has few, if any, pedestrian, bicycle, and transit accommodations to support alternative transportation choice.

As part of the Transportation/Land-Use Connections (TLC) Program, Arup was asked to investigate the feasibility of creating a multimodal commuter ferry, bus and Virginia Railway Express (VRE) station in Harbor Station's mixed-use Town Center. The primary objective of the study is to identify the infrastructure needs for the station, which will meet both regional transport needs and the needs for the greater Harbor Station development, while also creating a walkable mixed-use Town Center that will enable local, mainly non-work, trips to be made by walking, biking, and taking public transit.

The goals of this report are to:

- Provide case study lessons from similar transit oriented developments (TOD) to understand lessons learned from actual developments
- Provide guidance for implementing TOD guidelines
- Assess the existing master plan and design guidelines for the Town Center and recommend modifications
- Develop three scenarios for the station area for bus, rail, and ferry
- Recommend the transportation infrastructure and facilities that are needed for the scenarios' transit services
- Recommend a preferred location for the ferry terminal within the Harbor Station site

Previous to this report, Arup conducted an existing conditions assessment and a detailed benchmark study, surveying towns and cities that have undertaken similar development projects around transit. Below is a summary of the existing conditions at Cherry Hill Peninsula, the site for the proposed Harbor Station. For more detail please refer to Appendix A. The benchmark study that was conducted can be used to understand possible trip generation rates, mode splits, and parking strategies that could be considered for Harbor Station. Results can be found in Appendix B.

1.1 Summary of Existing Conditions

The existing peninsula is primarily undeveloped, although there are some single-family residential developments and large, auto-oriented retail east of Route 1. Key elements of the existing transportation system include:

Pedestrians and Bicyclists

- There are no existing bike paths or lanes within the peninsula.
- The major arterials in the peninsula have sidewalks on both sides or at least on the side that has been developed, which provides a level of pedestrian friendly design within the communities.

Transit

- The proposed VRE and ferry stations would be far (i.e. greater than 2.5 miles) from Route 1 and I-95 and other communities in Prince William County. This may limit the catchment area from which the transit services can attract non-Harbor Station riders, although fast, frequent and reliable service that reduces total commute time also plays a role in transit attractiveness.
- Multiple local and commuter PRTC bus routes serve the existing residential communities, but service is infrequent and it is not expected to be expanded to accommodate Harbor Station. Specific frequencies of existing PRTC OmniRide and OmniLink services are provided in Appendix A, Section 2.2.2.

Streets

- Harbor Station is primarily undeveloped, but what exists is primarily auto-oriented, with wide intersections.
- Route 1 is a major physical barrier between the existing development and the peninsula. It is heavily auto-oriented with large retail centers and front parking. It is not a pedestrian or bicycle friendly road.
- The existing residential street pattern is mostly characterized by curvilinear streets that create indirect travel routes for vehicles, transit, bicycles, and pedestrians.

2 Case Studies in Transit Oriented Development

A typology framework can organize cities along a “spectrum” of sustainability strategies. The typology framework provides a logical way to order how cities differ in terms of sustainable transportation. Figure 1 is a graphical representation of the five typologies, moving from a low existing level of sustainability on the left, to the most sustainable on the right. Reading the figure from top to bottom, notional ideas about what contributes to sustainable transportation are provided. This includes the types of street network, land use and development intensity, transportation options, and mode share. Each typology suggests different opportunities and issues, and therefore different sustainable transportation strategies. These strategies can be phased and adopted in an incremental way. Characteristics of each of the five typologies are described in Table 1.

Table 1: Five Typologies of Sustainable Transportation

<p>Low Density, Auto Dependent</p>	<ul style="list-style-type: none"> • Highly curvilinear and discontinuous street pattern • Low density, large lots • Single use zoning • Unused sidewalks, physical barriers • Few transit options, not competitive • Free and abundant on/off-street parking
<p>Concentrated Auto Reliant</p>	<ul style="list-style-type: none"> • Primarily curvilinear street pattern • Single family densities, office park patterns • Commercial in city center/downtown core • Sidewalks, recreational bicycle paths • Bus ridership mostly serving peak period commute, station parking • Large supply of on/off-street parking
<p>Clustered with Transit</p>	<ul style="list-style-type: none"> • Large grid street pattern, major/minor designations • Moderate densities • Mixture of uses along corridors • Areas of high walking levels, on-street bicycle lanes • Corridor-based transit, commuter rail • Metered parking, pay garages
<p>Cores and Transit Corridors</p>	<ul style="list-style-type: none"> • Grid pattern producing high connectivity, low design speeds • Clustered development, incentive to reduce trip lengths • Mostly mixed use zones with some single use • Integrated pedestrian/bicycle infrastructure • Frequent bus and rail service • Metered on-street parking, market based rates, time limits
<p>Integrated Urbanism</p>	<ul style="list-style-type: none"> • Dense grid, actively managed street system • High density, focus on trip reduction and public realm • Mixed use and TOD based zoning • Exclusive pedestrian and bicycle facilities • System of coordinated rail and bus transit • Market-based approach to parking policy

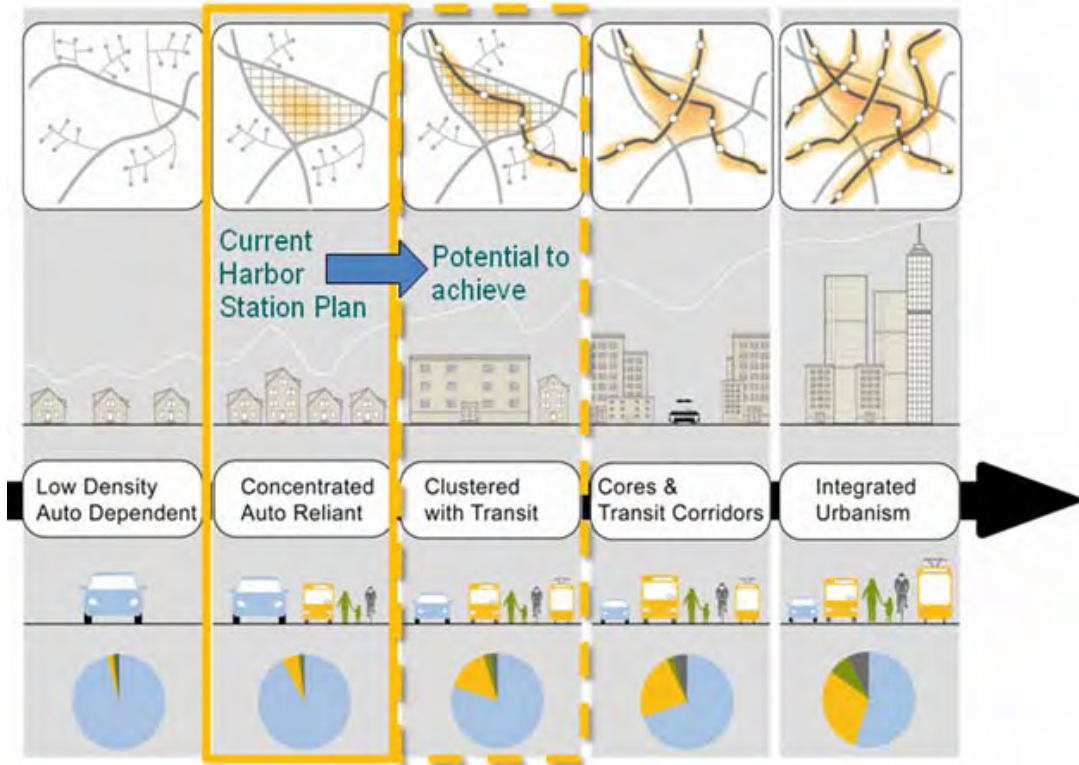


Figure 1: Five Typologies of Sustainable Transportation

As per the *Harbor Station Town Center Design Guidelines and Development Code*, Harbor Station’s Town Center, as planned, fits into the Concentrated Auto reliant typology based on the level of land use mix and street grid, with the surrounding area having lower density residential and office park development as it approaches Route 1. Large surface and structured parking lots are proposed throughout the Town Center and there are currently no plans for local or express bus service to extend into the development.

With some modifications to the existing plan to further encourage the use of public transit, the Town Center does have the potential to develop into a Clustered with Transit place type, locating itself on a major transit corridor and increasing the mode share for transit, pedestrians and cyclists. Adding on-street bicycle lanes, increasing site permeability by breaking up long street blocks, reducing parking by various strategies such as parking fees, sharing parking among different uses, or substituting bicycle parking will encourage people to consider leaving their car at home. Parking reductions would also allow for greater development in the town center. A local transit circulator that provides access along key shopping corridors and the proposed multimodal station would allow both work and non-work trips to be completed by non-automobile modes.

To understand how to make this transition, Arup expanded on two of the case studies in Appendix B where communities have successfully transitioned into a Clustered with Transit area. Downtown Palatine, Illinois was chosen as a strong suburban TOD around a commuter rail station with a comparable distance to Chicago as Harbor Station is to DC. Bay Farm Isle in Alameda, California (Bay Area) was chosen as an example of a master-planned suburban community with commuter ferry and a good mix of land uses. Geographically similar, both Harbor Station and Bay Farm are peninsulas that are somewhat isolated from adjacent neighborhoods and are two to three miles from the nearest major highway.

2.1 Clustered with Transit

2.1.1 Commuter Rail: Downtown Palatine, Illinois

Downtown Palatine, located 25 miles northwest of Chicago, provides a relevant example of a suburban Clustered with Transit development that has grown incrementally over the past 10 years around a renovated Metra commuter rail station. For several years, the Village had several failed attempts to gain the traction necessary to redevelop its downtown. It consisted of large, surface parking lots, vacant parcels and auto-oriented land uses surrounding the Metra station. In 1991, the Village created the Downtown Palatine Redevelopment Commission which developed a Downtown Palatine Revitalization Plan.

In 2000 the Village established a Downtown Tax Increment Financing (TIF) district, which is a method of financing redevelopment by using future gains from tax revenue increases (caused by the increase in property value of the redevelopment) to finance improvements. The Village hired a consultant who led a community design project with local residents and planners to develop a Downtown Land Use Guide, which specified densities, land uses, and other elements for the area. Since the surface parking lots were already Village-owned, there were no issues with land acquisition or consolidation. In this way the community was in agreement with any development that fit the detailed land use guide.

The Planned Development Zone is very flexible and has no underlying density restrictions or parking requirements. Therefore, if the Village liked a proposal and it fit with land use guide, it was approved.

In 2002, the Metra station was redeveloped and adjacent parking lots were consolidated into a large structured parking garage to the north of the station. Development quickly followed. Beyond the downtown, land use is primarily single family residential on small lots along an established and continuous street grid pattern. Higher, mixed use densities are found in the downtown with offices, apartment complexes, and restaurants. Between 2000 and 2008 the following were constructed:

- 976 residential units
- 120,000 square feet of office space
- 93,000 square feet of commercial/restaurant space
- 1,300 space parking deck (owned and operated by the Village of Palatine)
- Relocation and expansion of 3 existing businesses
- Town Square Park

Transportation Infrastructure

The existing street grid was an asset to the development, as no new streets were needed. Pace is the suburban bus service for Chicago with multiple routes serving Palatine. The transit spine provided by Metra is also a strong basis to enable development as it provided bi-directional service from 6am – midnight at 10 to 15 minute headways during peak periods in the peak direction. To maximize the use of commuter rail, transit accessibility and overall walking and bicycling permeability were vastly improved by:

- Building a shared use path (Rail Walk) along the rail and the length of the downtown
- Connecting pedestrian paths, improving sidewalks and crosswalks, and providing pedestrian-scale lighting, benches, landscaping, signage

- Consolidating unfriendly surface lots into a single parking structure with direct access to the rail platform via “skyways”
- Redeveloping the train station, adding a coffee shop and outdoor seating
- Addition of public art

Lessons Learned

Based on the interview the team conducted with the Village, a set of lessons learned was compiled. Prioritizing pedestrians in their planning effort was critical to their success and was achieved by understanding the typical travel patterns by local residents and incorporating them in the redesign of the station and catchment area. The Village conducted studies to understand the commuters' origins and found that the station would be best located on the north side of the tracks rather than the south where it was originally located as most people were arriving from the north. Sidewalk and crosswalk improvements, streetscape design, wayfinding, a redesigned train station, and the creation of a new shared use path for pedestrians and bikes were just a few of the considerations that account for about 40% of passengers now arriving by modes other than the private car. In addition to the pedestrian amenities, high frequency, bi-directional rail service presents a viable mode choice for all trips. Collaboration between agencies and with local residents and the ability to think beyond the existing planning and zoning regulations was also crucial to the Village's success.



Figure 2: Downtown Palatine, 1998

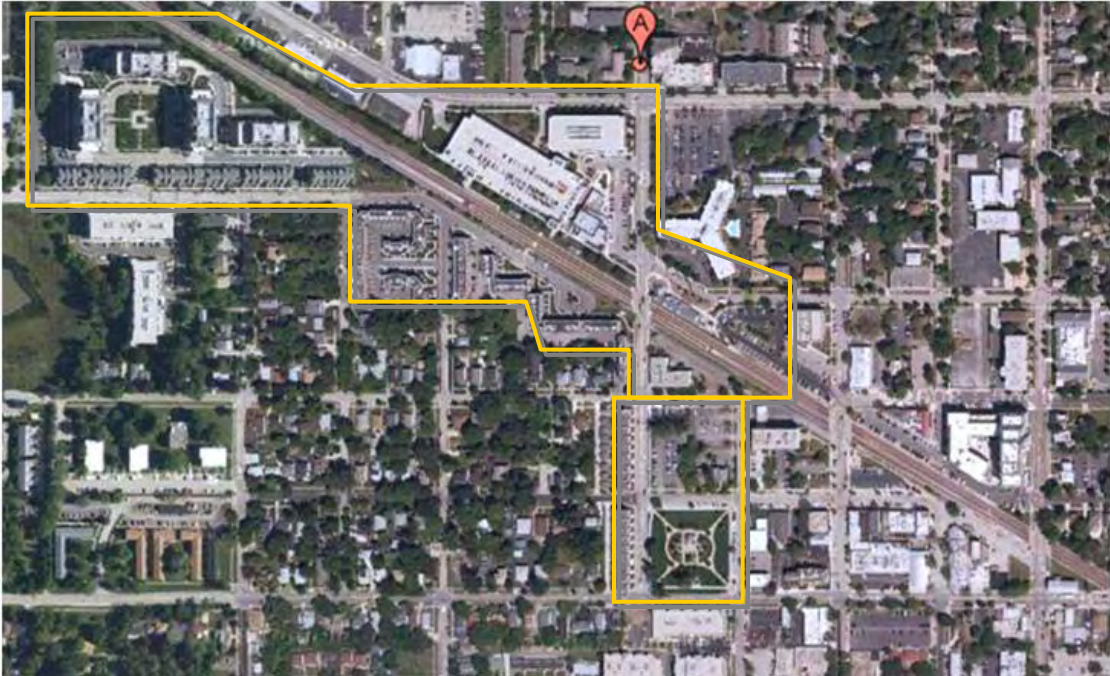


Figure 3: Downtown Palatine Today



Figure 4: Bird's Eye View of Existing Downtown Palatine Station Area

2.1.2 Bay Farm - Alameda, California

Alameda is a small, primarily residential city in Alameda County, adjacent to Oakland and across the bay from San Francisco. Spanning parts of two islands, Alameda and Bay Farm, are connected to Oakland via three bridges and two tunnels. Alameda is served by a comprehensive bus system that connects it to the Bay Area Rapid Transit (BART) regional transit. However, there is no heavy rail or commuter rail station on the island itself.

Bay Farm Isle, a peninsula that extends into the bay from Oakland, is a master planned community, with the original residential neighborhoods, or “villages” built in 1978. In 1992 the Alameda Harbor Bay Ferry began service as a three-year permit requirement to mitigate traffic after much of Bay Farm had been developed. However, most of the residential development within a ¼ mile walking radius of the ferry was built after the ferry terminal was in place. Similarly to Harbor Station, the nearest major road is several miles from the development.

The final development on Bay Farm includes a strong mix of residential, commercial and open space, including:

- Residential, primarily single-family housing (~3,000 homes)
- A shopping center with a grocery store and several restaurants
- 312 acre business park– office park of over 100 companies, agencies, organizations; hotels, restaurants (5 million square feet of facilities)
- Golf course
- Chain of lagoons and community parks including waterfront-greenbelt around the perimeter of the peninsula

The land uses are primarily single use on Bay Farm; detached, single-family homes on small lots and townhouses residential neighborhoods dominate the landscape with a mix of circuitous and grid-like streets. The shopping center is accessible by regular bus service with 15-20 minute headways throughout the day. Several elementary schools and a public library are also found on Bay Farm. Bicycle lanes and wide sidewalks are available on most major streets and a bicycle and pedestrian path circles the development. A chain of lagoons throughout the community further increases the high-quality pedestrian and cycling network.

The Community of Harbor Bay Isle Owners' Association is a non-profit corporation established to manage the residential communities and their commercial support area. The Harbor Bay Business Park Association is a separate, but related, entity. The Harbor Bay Business Park Association (HBBPA) provides services to businesses, property owners and employees within the business park. Services include landscaping, security, and transportation. As a nonprofit, HBBPA does not pay state or federal taxes. HBBPA monitors and reports annually on compliance with the Development Agreement with the City of Alameda that is critical to the ongoing entitlements of the property owners in the Business Park, and coordinates with the Departments of the City regarding the provision of public services to the Business Park.¹

Transportation Infrastructure

To fulfill obligations under the original approvals and entitlements for the development of the business park, HBBPA provides a private subsidy to the Alameda Harbor Bay Ferry Service, which is primarily funded by passenger fare box revenues and by public subsidies from state and regional government agencies and the City of Alameda. HBBPA also manages

¹ <http://www.harborbay.com/association.html>

and maintains the ferry terminal under a contract with the City, including a shelter, a 225-space surface parking lot and bicycle parking. Finally, HBBPA provides free shuttle service connecting the ferry terminal, Business Park and BART.

Existing transportation infrastructure that improves station access includes:

- A waterfront bicycle/pedestrian path
- A local bus route that serves the ferry station and connects to the local shopping center and to BART

Lessons Learned

Despite its geographic isolation, Bay Farm has a good balance of transit use, walking and cycling, in large part due to the land use mix that provides the most needed services for residents, including multiple schools, a shopping center, Business Park, library and other civic amenities. Harbor Station should consider providing a similarly diverse mix of uses that would enable residents to live, work and shop without having to leave the community.

The ferry service was added after the development was mostly complete. As a result, significant vehicle accommodations were made and still exist today. For example, pedestrian access is not optimal, as the surface parking lot surrounds the station. This could have been otherwise allocated to higher density development, which could have had positive impacts on ridership.

Perhaps as an attempt to solve the access issues, HBBPA has worked hard to facilitate transfers between the ferry and other modes. Free transfers to the local bus, BART tickets, and free shuttle bus connections to BART and local businesses provide end-of-trip services for those who choose to reach Alameda by ferry.



Figure 5: Bay Farm, 1993



Figure 6: Bay Farm Today



Figure 7: Bay Farm Ferry Terminal

2.2 Comparison with Harbor Station Development

Table 2 compares the land use and transportation characteristics of the Clustered with Transit case studies to the entire planned Harbor Station development as described by Prince William County. In terms of transportation services, the commuter rail service running through Palatine is bi-directional and includes late night and weekend service. The ferry service on Bay Farm is also bi-directional but serves only the peak commute hours with 3 trips per direction during each peak period. Additionally, both Palatine and Bay Farm rely on extensive bus networks, providing multiple transit options to reach local and regional destinations that are not accessible by rail or ferry.

The VRE service that would stop at Harbor Station currently operates in one direction, serving only the peak direction during the weekday morning and afternoon commutes. Currently no bus service is planned to serve the station or provide access to other local and regional destinations.

The distance from Harbor Station to downtown Washington DC is comparable, although slightly further, to the distance between Palatine, IL and Chicago. Palatine has a slightly higher residential density (3.1 dwelling units per acre), not only in the downtown area but throughout the entire Village, than the proposed Harbor Station (2.0). As the Village of Palatine is over 4 times the size of Harbor Station, it benefits from a much larger ridership pool within the 3-5 mile station catchment area.

Bay Farm has a much higher residential density than either Downtown Palatine or Harbor Station of almost 7 D.U/acre and 4.2 D.U/acre in the larger City of Alameda. It is also almost half the distance from San Francisco than Harbor Station is from DC and has 5 million square feet of commercial development, much of which is contained in a large office park. This is much greater than the planned 3 million square feet of commercial development at Harbor Station. By ferry the commute time to San Francisco from Bay Farm is about 30 minutes, while the commute to DC from Harbor Station would be just over 50 minutes, as per the predicted run times listed in the Potomac River Commuter Ferry Service Study and Route Proving Exercise (September, 2009). It is possible that the ferry service to Washington DC could also compete with the proposed VRE service, unlike the Bay Farm ferry. When comparing all of these factors, Harbor Station should expect to see considerably fewer daily riders.

In both Downtown Palatine and Bay Farm, it is interesting to note that the number of parking spaces near the transit facilities is 50-60% less than the number of people boarding at that station. On Bay Farm, free transfers to frequent local bus service with connections to BART, and a free shuttle to the nearby office park improves the reach of the ferry into the community. In Palatine, high residential densities within a ¼-mile of the station and safe, well-lit and aesthetically pleasing pedestrian and bicycle paths encourage non-automobile access to the station. With a residential density comparable to these neighborhoods around the station, a high-quality pedestrian and cycling realm, and local transit feeder services, Harbor Station can look to reduce the parking supply needed to accommodate ridership demand. A more detailed parking analysis is provided in Section 3.4.

Table 2: Comparison of Palatine, Bay Farm, and Planned Harbor Station

	Downtown Palatine, IL	Bay Farm, CA	Planned Harbor Station development, VA
Distance to CBD	25 miles	18 miles	30 miles
Area	530 acres	900 acres	2,000 acres
Dwelling units	1,560	6,000	4,000
D.U / acre	3.1	6.7	2.0
Commercial	0.2 million sqft	5 million sqft	3 million sqft
Primary Transit Mode	Commuter Rail	Commuter Ferry	Commuter Rail and Ferry
Secondary Transit Mode	- Local bus - Dedicated parking for vanpools	Free Transfers to: - Local bus - Business park shuttle Connection to BART (via local bus)	Recommended: - Local bus and/or community bus
Parking Spaces at Primary Transit Facility	1,500	225	TBD
Daily Ridership	2,500	550	560-630 (VRE) (projected 2030) 693 (possible ferry) (projected 2030)
Average peak period frequency	10-15 min	60 min	30-35 min (VRE) (existing service) 30 min (ferry)
Direction of Service	Bi-directional	Bi-directional	Peak direction only
Off-peak service	Yes	No	No
Municipality	Village of Palatine	City of Alameda	Prince William County
Area	8,320 acres	6,900 acres	216,320 acres
D.U/Acre	3.1	4.2	1.3

3 Guidelines for Transit Oriented Development

The case studies allow for a qualitative analysis of the type of development that could be imagined at Harbor Station, particularly in the Town Center. However, as part of this study it is also important to understand quantitative factors such as land use densities, trip generation rates, mode choice assumptions and parking standards that can be assumed to achieve the vision of an active, transit-oriented development. Specific recommendations for on these metrics are outside the scope of this study; however, the below provides insight on typical TOD guidelines such that the county can create a dense, walkable, bikeable, transit-friendly community for its residents.

3.1 Transit Oriented vs. Transit Adjacent Developments

First, it is important to distinguish between a development that is oriented around transit rather than simply located adjacent to transit. Transit adjacent developments have high levels of transit service; however, they lack sufficient support from, and integration into, the surrounding street network and development to generate activity and ridership at a station. Transit adjacent communities would be those that have wide streets, auto-oriented land uses, abundant and free parking, and circuitous streets, while also providing transit service, such as in Tysons Corner. Conversely, transit oriented development integrates the station into a development where most people walk, bike or take local transit to access the major transit system, such as is seen on the Rosslyn-Ballston Corridor. The station is woven into the urban fabric surrounded by medium to high density, mixed used development. Local bus access is provided and stations front onto local streets used by pedestrians and cyclists to reach the station. Access to the station is along local roads rather than highways. Characteristic station amenities include bicycle and pedestrian connections, and medium land development density with a mix of commercial and residential uses. Parking management strategies minimize the number of spaces needed and encourage use of other modes. Table 3 describes differences between transit oriented and transit adjacent development.

Table 3: Comparison of Transit-Oriented and Transit-Adjacent Characteristics

	Transit-Oriented Development	Transit Adjacent Development
Pedestrians and Cyclists	Pedestrian- and bicycle-oriented design	Pedestrian and cycling access limited
Street Grid	Grid street pattern	Suburban street pattern
Density	Higher densities	Lower densities
Parking	Limited surface parking and efficient parking management	Dominance of surface parking
Land Use	Mixed housing types, including multi-family	Mainly single-family homes
	Horizontal (side-by-side) and vertical (within the same building) mixed uses	Segregated land uses
	Office and retail, particularly on main streets and close to transit	Gas stations, car dealerships, drive-through stores and other automobile-focused land uses
Source: Victoria Transport Policy Institute, <i>TDM Encyclopedia</i>		

3.2 Trip Generation Rates

Trip generation rates are used to determine the impact on the transportation system of a new development. The rates found in the Institute of Transportation Engineers Trip Generation Handbook (7th Edition), are based on surveys of suburban, auto-oriented developments that often over-estimate the number of vehicle trips that can be expected from a denser, transit oriented development where many work, shopping and recreational trips are made by walking, biking and transit. This inflated number of trips results in the overdevelopment of roadway capacity, which further encourages more vehicular trips that might otherwise have occurred. Many factors influence the demand for auto transportation, including:

- Residential density
- Parking availability
- Type of transit available
- Distance to transit
- Pedestrian/bicycle amenities
- Distance of the development to the CBD

In a study of 17 TOD developments, Dr. Robert Cervero found that, although all factors contribute, residential density is the most influential factor in vehicle trip reductions. Least influential is the distance from the development to the CBD. As shown in Table 4 below, the distance of each residential TOD to the CBD ranged from 11 to 40 miles yet each have achieved significant reductions in automobile trips from the ITE rate.

Table 4: Sample of Observed Residential TOD Trip Generation Rates

Location	# of Stories	Parking spaces / Unit	Distance in miles to:		Rail Service**	Peak Hour Trips / Unit		% Change from ITE Rate*	
			Transit	CBD		AM	PM	AM	PM
Fremont, CA (Mission Wells Apts.)	2 – 4	1.3	0.72	40	Heavy (BART)	0.48	0.487	-13%	-27%
Bethesda, MD (Avalon Apts. at Grosvenor Station)	4	1.5	0.19	11	Heavy (WMATA)	0.44	0.37	-20%	-45%
S. Orange, NJ (Gaslight Commons)	4	2.5	0.19	17	Commuter (NJ Transit)	0.40	0.46	-27%	-31%
Lansdale, PA (Station Square)	1 – 3	0.64	0.12	25	Commuter (SEPTA)	0.36	0.558	-34%	-17%
Beaverton, OR (Quatama Crossing)	3	n/a	0.38	13	Light (MAX)	0.30	0.487	-45%	-27%
Weighted Average from 17 TODs	1 – 16	1.16	varies	varies	varies	0.28	0.35	-49%	-68%

Source: Cervero, Robert, *Effects of TOD on Housing, Parking and Travel*. TCRP Report 128, 2008.
 *Rates from Institute of Transportation Engineers, *Trip Generation*. 7th edition, 2008.
 **Heavy Rail - A mode defined by its complexity and operational rigidity. Heavy rail systems typically consist of steel-wheeled, electric powered vehicles operating in trains of two or more cars on a fully grade-separated right-of-way. Stop spacing is generally 1 – 5 miles and supports urban and regional. (FTA)
 Commuter Rail - Commuter rail is an electric or diesel propelled railway for urban passenger train service consisting of local short distance travel operating between a central city and adjacent suburbs. The two examples given above provide bi-directional service at all times of the day/week.
 Light Rail – Light rail is relatively simple and provides operational flexibility. With an overhead power supply, light rail systems can operate in mixed traffic and widely ranging alignment configurations. (FTA)



Mission Wells – Fremont, CA



Grosvenor Station - Bethesda, MD



Quatama Crossing – Beaverton, OR



Gaslight Commons – South Orange, NJ

Figure 8: Range of TOD developments observed for trip generation

Given the uncertainty of the final land use mix and transit service being provided at Harbor Station, it is beyond the scope of this project to determine the exact trip generation rates to use for a future model. However, observed rates from several TOD housing developments across the US indicate a more appropriate range that should be considered. It can be assumed that for the Town Center's residential development, a reasonable percentage reduction from the ITE peak hour rate could be anywhere from 20 – 45% (or rates of 0.3 – 0.44 vehicles per hour).

3.3 Mode Split

Mode split is determined by the combination of land use mix and intensity, as well as the modes, capacity and quality of transportation infrastructure provided. If road capacity is built for a high-level of vehicles and ample parking providing, a high automobile mode share is guaranteed. However, if auto capacity is limited and a dense network of high-quality pedestrian, bicycle and transit is provided, a mode shift away from driving will occur, as alternative modes will become more convenient. Factors that most influence transit ridership are station proximity, transit quality and variety, and parking policies. Providing free or low-cost parking is a major deterrent to transit ridership. However the following can increase transit ridership:

- High quality transit services (described in more detail below)
- Paid parking and/or constrained parking supply
- Land use mix, density, and proximity to transit

- Variety of transit access modes (walking, cycling, local bus/transit) and provision of “last mile” service

Steps that transit agencies are taking to promote TOD include:

- Reconsidering replacement parking requirements at park and rides
- Advocating for zoning changes with TOD entitlements, land assembly, joint development, and educational efforts (e.g., producing TOD guidebooks)

What are “high quality” transit services?
 High quality transit, to provide a viable alternative to the car, should be reliable, frequent, convenient and comfortable. To be reliable and frequent, the transit vehicles need to run in a dedicated right-of-way, whether rail or a dedicated bus lane, so as not to be delayed by road congestion and able to stay on schedule. Off-peak services, including evening and weekend, provide an opportunity for non-work trips to be made by transit.

A convenient system includes multiple modes (such as rail and bus) that can serve a comprehensive network of both local and regional destinations. All residents and employees should be within walking distance (ideally ¼ mile) from a transit stop, and multimodal connections allow passengers to use transit to access regional stations rather than having to drive and park.

Finally, transit should be comfortable, both within the vehicle as well as at the stop or station by providing amenities including shelters, lighting, seating, maps and schedule information, and bicycle racks.

The following are observed mode splits in the Washington DC area. Most percentages are for TODs or corridors that provide multiple transit services. However, even the DC region as a whole has a fairly high transit ridership rate of 19%, although walking and biking is currently quite low (2%). TODs in the DC area however have the lowest automobile mode share and a pedestrian and bicycle share of 14%.

Table 5: TOD Mode Splits Found in Washington DC Metropolitan Area

Description	Source	Ped and Bike	Transit	Auto (SOV, HOV)
Heavy Rail MSA Ave.	Effects of TOD on Housing, Parking and Travel (2008)	2.8%	6.6%	90.6%
DC MSA	Effects of TOD on Housing, Parking and Travel (2008)	3.2%	9.4%	87.4%
DC Region	COG Survey (2004)	2%	19%	80%
DC TODs*	Effects of TOD on Housing, Parking and Travel (2008)	14.2%	30%	55.8%
Arlington	COG Survey (2004)	4%	33%	63%
Rosslyn/ Ballston Corridor	Arlington Commuter Services 2006 Survey	9%	39%	52%
*5 DC TODs surveyed: Avalon at Grosvenor Station (Bethesda, MD), Lenox Park Apartments (Silver Spring, MD), Gallery at Virginia Square (Arlington, VA), Quincy Plaza (Arlington, VA), and Meridian at Braddock Station (Alexandria, VA)				

3.4 Parking Strategies

Guidelines for parking requirements, such as those found in the ITE Parking Generation Handbook, are generally based on observations of peak demand for parking at single-use developments in low-density settings, with relatively little transit.² For more compact, mixed use places where not every trip is taken by car, these standards suggest parking requirements that exceed what is needed, resulting in overdevelopment of parking capacity and encouraging vehicle trips. Reducing the quantity of parking encourages non-automobile modes and increases development potential, both of which work to create an active, vibrant neighborhood where pedestrians are not forced to walk through a sea of parking to reach destinations. The following strategies could be applied in Harbor Station to reduce parking needs and gracefully integrate vehicles into the development.

Shared Parking

Shared parking is based on the concept that different destinations attract workers, residents and/or visitors at different times of day. Rather than calculating parking separately for each destination, it can be shared by developments with different peak parking periods. For example, an office with weekday parking can be shared with a restaurant whose peak demand is in the evening. Visitor parking for residential developments can also be shared with local retail or daycare centers. This can decrease the total number of spaces required for mixed-use developments, reducing development costs and allowing for more efficient use of land and better urban design.

Table 6: Peak Parking Demand for Different Land Use Types

Weekday Uses...	... can share parking with Evening/ Weekend Uses
<ul style="list-style-type: none"> • Banks and public services • Offices/employment centers • Park & Ride • Schools, daycare centers • Factories/distribution centers • Medical clinics • Professional services 	<ul style="list-style-type: none"> • Auditoriums • Restaurants, bars • Meeting halls • Hotels • Residential visitors • Retail • Religions institutions • Parks

Parking can also be shared among a group of employees or residents, rather than being assigned to individuals. For example, it has been found that 100 employees can share 60-80 spaces, since not all employees will drive to work at the same time.³

Relying on public parking facilities rather than having each building provide private off-street parking is also an option for the Town Center near the VRE head house. Each public parking space can serve many users and destinations in the Town Center. As a result, 100 public parking spaces can be equivalent to 150 to 250 private parking spaces.⁴ In Downtown Palatine, a structured parking garage serving the METRA commuter rail station is shared with a nearby restaurant.

Station Area Parking Rates

Table 7 compares the daily boardings at several commuter rail stations to the number of parking spaces provided. Except for the Rippon VRE station, where the number of parking spaces is greater than the number of daily riders, the number of parking spaces per

² EPA, *Parking Spaces / Community Places: Finding the Balance through Smart Growth Solution*, 2006.

³ Victoria Transport Policy Institute, *TDM Encyclopedia*, <http://www.vtpi.org/tdm/tdm89.htm>

⁴ *Ibid.*

passenger ranges from 15% to 60%. Note that South Orange provides only 513 spaces for over 3,000 riders. To achieve such high ridership despite the limited parking fairly high parking charges have been implemented, especially for non-residents. Parking pricing not only provides a revenue source but encourages riders to consider walking, biking or taking a local transit service to and from the station. Harbor Station’s projected daily VRE ridership rate is 560 – 630 by 2030. If Harbor Station plans to accommodate 60% of those riders with parking spaces, the total needed would be 336 – 378.

Table 7: Parking Supply at Commuter Rail Stations

Station	Ave. Daily Boardings	Parking Spaces	#Spaces/ Passenger	Structure or Surface	Parking Fee
Palatine, IL	2,500 (2009)	1,500	0.60	1,300 structure 200 surface	\$2/day (~\$400 annual)
Quantico, VA	410 (2008)	258 (78% full)	0.63	surface	\$0
Rippon, VA	572 (2008)	676 (62% full)	1.18	surface	\$0
S. Orange, NJ	3,364 (2009)	513 (100% full)	0.15	surface	\$300 (res annual) \$800 (non-res annual)

Further analysis is recommended to better estimate parking demand at Harbor Station. Because the parking lot at the neighboring Quantico station is only at 78% capacity, lowering the requirement for Harbor Station even further could be considered. On the other hand, the parking at Quantico includes lots leased from the Marine Corps which may not be available in the future. Additionally, access to the Quantico station is difficult, requiring a rider pass through the base gate. The VRE Harbor Station stop may shift some riders from Quantico to the new station.

Create active sidewalks through ground floor retail

While the previous sections discussed parking rate reductions, some amount of parking will still be necessary at the VRE station and to support the retail and office activity in the Town Center. Parking structures are preferred to surface lots to maximize developable area available for other uses, and to provide an active, dynamic streetscape. The following images are examples of well-designed parking structures that are wrapped by ground-floor retail, limited vehicular entrances to minimize sidewalk disruption for pedestrians, and provide a unique façade for the upper parking levels that enhance rather than detract from the urban realm. A third example incorporates a school playground on the garage rooftop.



Rendering of the I-485/South Boulevard Station, showing Sterling Elementary School and playground on the garage rooftop.

Figure 9: Context-Sensitive Parking Structures

3.5 Density and Land Use: One size does NOT fit all

Finally, in examining other TOD developments, it is clear that residential density can come in many forms, from single family neighborhoods on smaller plots, two-story row-houses, 3-4 story apartments with ground floor retail, or mid-high rise apartment complexes. In other words, TOD development need not replicate a dense, urban downtown in order to create an active neighborhood with high transit use. Instead it should be designed to fit the context in which it is being developed. Below are local, national and international examples of residential TODs.



Orenco Station, Portland, Oregon



Arlington, VA



Oakland, CA



Fruitvale- Oakland, CA



Portland, Oregon



Vancouver, BC

Figure 10: Range of TOD Housing Typologies

4 Evaluation of Town Center Plan

This chapter describes the strengths, issues and possible opportunities to maximize the TOD potential in the Harbor Station Town Center. Figure 11 shows the proposed land uses in the Town Center, with a high density of mixed-use development within a ¼ mile, or about a five-minute walk from the VRE station. A large retail space is proposed along Harbor Station Parkway, which is planned to be a grocery store. Just west of the Jack Nicklaus golf course, which has largely been developed, are single family homes, which transition to townhouses towards the core of the Town Center and Harbor Station Parkway.

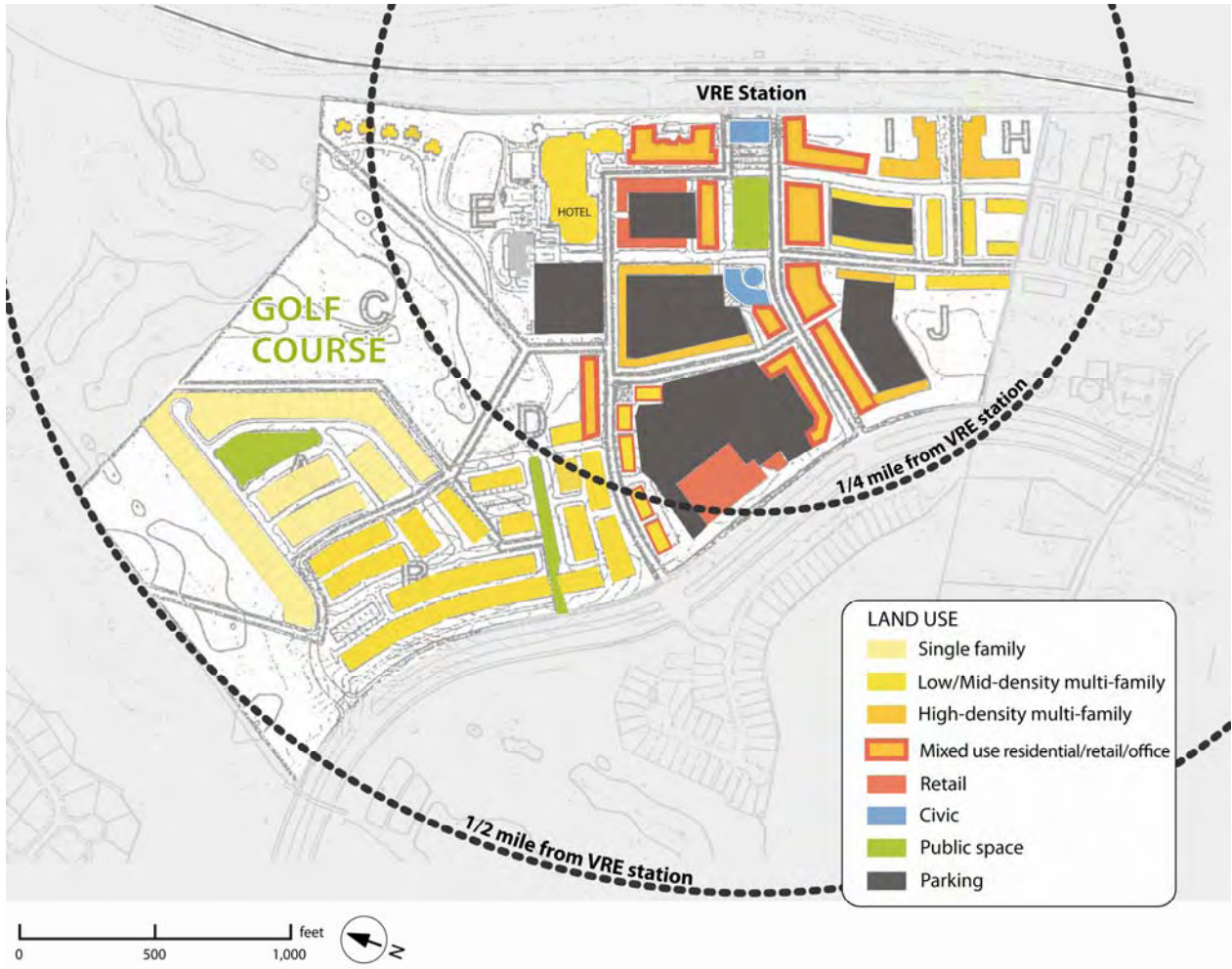


Figure 11: Harbor Station Town Center Plan

4.1 Strengths

The Development Code for the Town Center has many strong TOD characteristics that could move it towards a Clustered with Transit typology, as shown in Figure 12. In terms of land use, multi-family, office, and retail mixed-use buildings dominate the ¼ mile radius around the VRE station, along with a hotel and institutional use. A mix of housing typologies, including mid- to high-rise apartments, townhouses and single family homes could accommodate households of varying sizes and income levels.

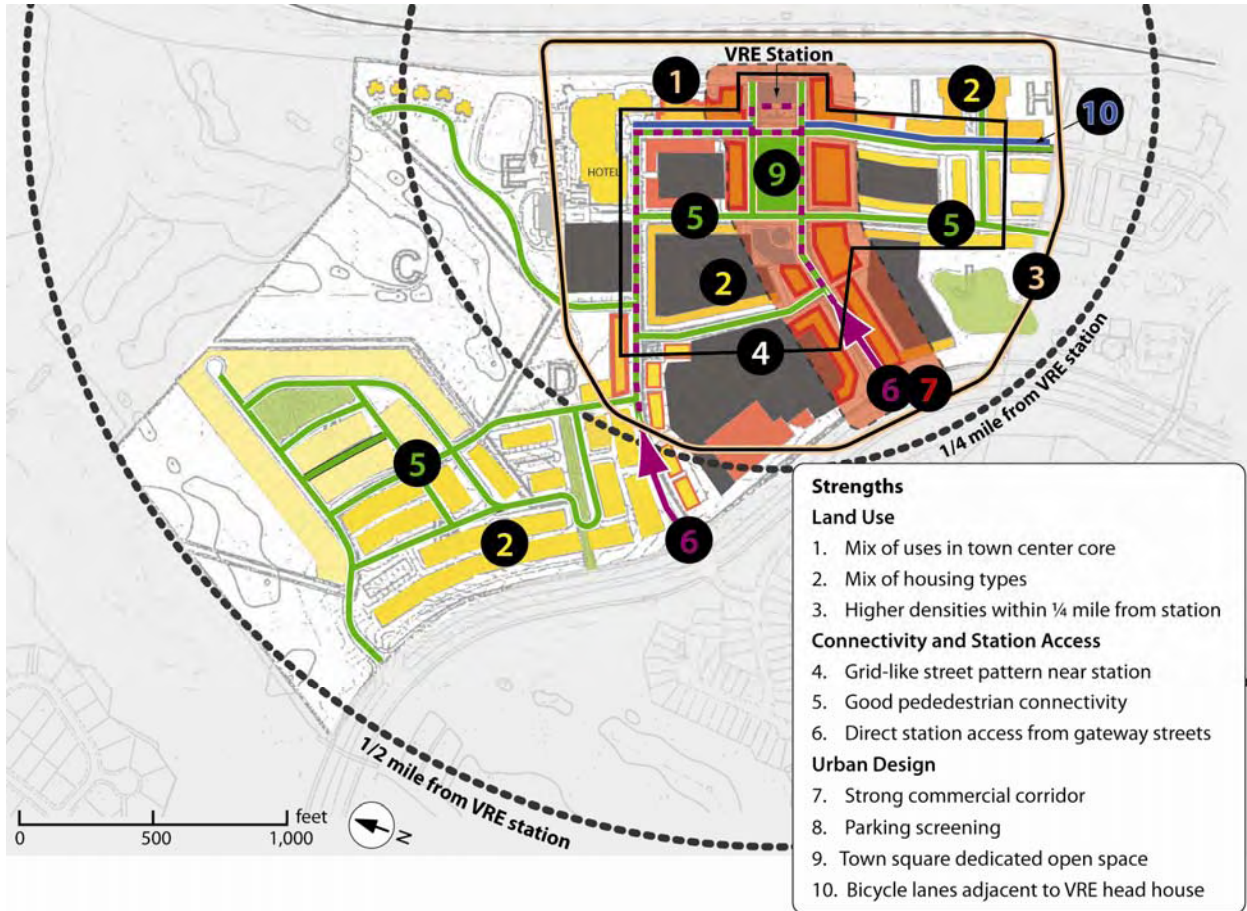


Figure 12: Town Center Strengths

In terms of connectivity and station access, there are many benefits of a regular street grid. Regular grid systems the most conducive to pedestrian trips, as they often provide the shortest walking distances and largest number of route choices. Right-angle intersections minimize pedestrian crossing distance and provide a high degree of predictability, which creates safe and legible environment for pedestrians, cyclists, and drivers alike.

In the Town Center plan, there is a street grid pattern within ¼ mile of the VRE station. Sidewalks are proposed on both sides of all streets , providing a high level of pedestrian connectivity and movement. Station access from Harbor Station Parkway is clear and direct via two major gateways.

The design of the urban fabric makes several bold moves. A clear commercial spine leads into the town center, passing a sizeable town square and terminating at the station. Consideration for bicycle lanes is also given on the roads adjacent to the VRE head house.

4.2 Weaknesses

While the density is quite high within the core, locating the residential development beyond the ¼ mile radius and providing only one major road into the town center core limits access to the VRE station and the commercial spine. Additionally, the major access street from the single-use housing development area creates an off-set intersection with the street that provides access to the large grocery store, thus generating considerable vehicular traffic. While off-set intersections may calm traffic, they are difficult for pedestrian crossings and have the potential to increase pedestrian/vehicle conflicts as well as traffic congestion. Other mechanisms could be developed that calm traffic while still providing safe and direct pedestrian crossings.

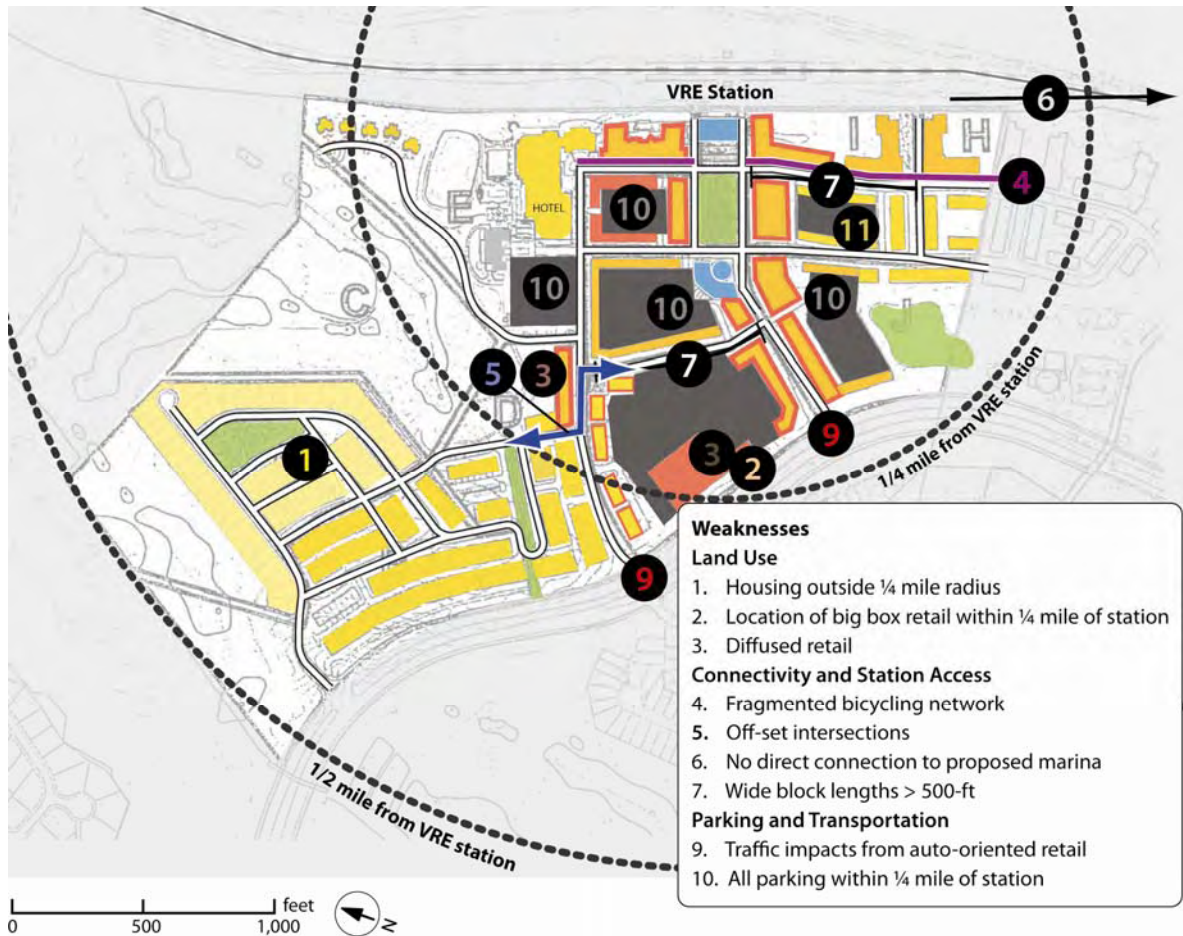


Figure 13: Town Center Weaknesses

Bicycle amenities are lacking in the development, with only one bicycle path along the eastern edge of the site. This was relocated from a previous plan to create a waterfront path which was determined to be infeasible. However, a single, disjointed bicycle lane that is just over ¼ mile in length will not encourage cycling in the community.

Long block lengths and a dominance of parking within the primary station catchment area give the Town Center a somewhat auto-oriented feel. Some block lengths in the development are over 500-ft long. It is generally recommended that block lengths be less than 300-ft to help reduce travel distances for all modes, especially pedestrians. Providing excessive parking will encourage car ownership and potentially excessive vehicle trips from within the Town Center as well as from the rest of Harbor Station.

4.3 Recommendations to Improve Harbor Station’s Town Center

The Town Center plan offers several opportunities to integrate transit, walking and biking into the development, as shown in Figure 14. To strengthen the commercial corridor, the grocery store could be shifted to front onto the commercial spine. The benefits are that it serves as an anchor to the development and creates a continuous strip of active streetscape unobstructed by surface parking. Combining the surface parking lot with the parking garage across the street, some of the residential development that is currently outside of the ¼ mile radius could be shifted inward, or perhaps more residential added, and the large block could be split to reduce the block length. Small service roads or alleys could bisect several of the larger blocks in the ¼ mile station radius to increase pedestrian permeability throughout the site and provide multiple routes to destinations. A slight realignment of the access road to the single family residential neighborhood could eliminate the off-set intersection and improve safety. A slight

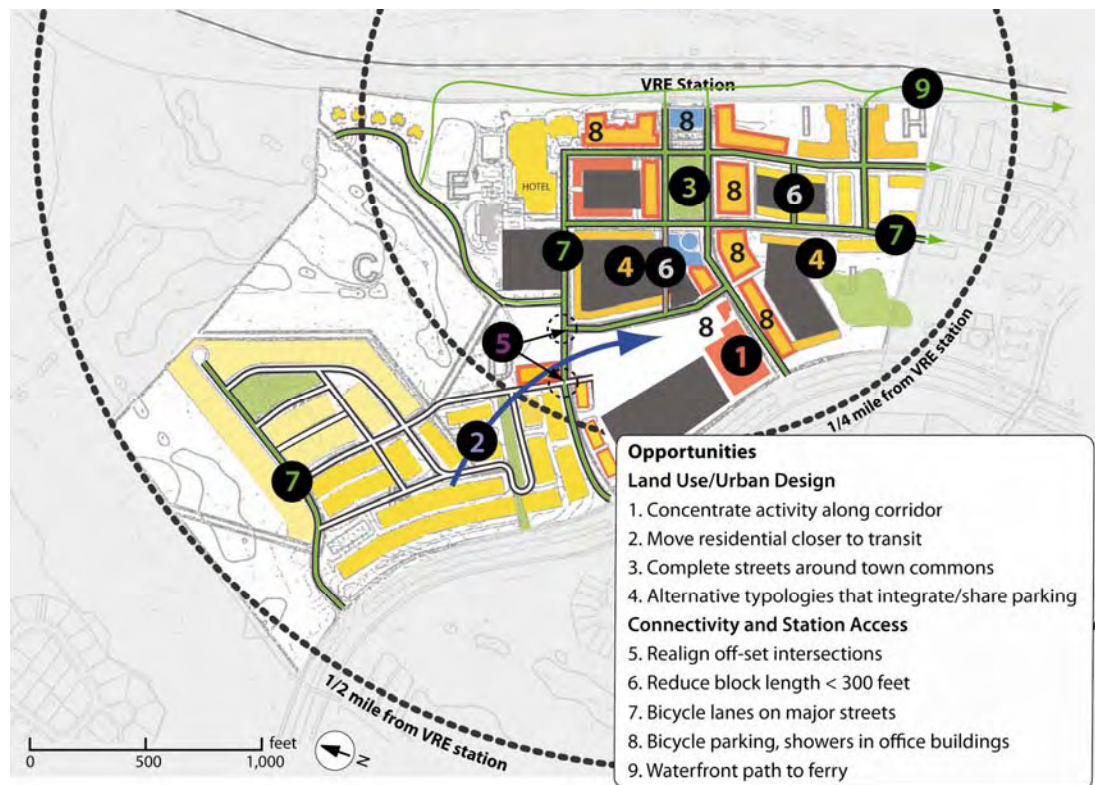


Figure 14: Town Center Opportunities

Bicycling is becoming an increasingly important mode considered by planners as a strategy to reduce vehicle trips. In order to make biking accessible for all ages and abilities, bicycle lanes should be implemented on the major streets entering the developing, and the remaining streets should be designed as complete streets, in which pedestrians, bicyclist and vehicles share the roadway at reduced speeds through traffic calming measures. On streets without a dedicated bike lane, appropriate on-street signage should be added to let drivers know they are sharing the road. In addition, bicycle racks and secured bicycle parking (bike lockers, indoor parking, etc) should be available at the transit station and in all retail, office and residential mixed use buildings. Office buildings should be required to provide showers and locker rooms for those who want to bike to work.



Figure 15: Bicycle Parking near Transit, New York City



Figure 16: Bicycle Parking in a Residential Building, Tokyo, Japan

Summary of Recommendations

1. Concentrate activity along corridor – Shift the grocery store onto the commercial spine to act as an anchor for major retail and office destinations.
2. Move residential units closer to transit – The residential density within ¼ mile of the station should be as high as possible to maximize ridership potential.
3. Complete streets around town commons – Activate the streets around the town commons and VRE station, where high pedestrian volumes will be passing.

4. Consider alternative typologies that integrate/share parking – Consider typologies that can share parking, such as residential visitor parking with retail. While some blocks do this successfully, such as the block adjacent to the town center, just east of the hotel, others (labeled “4” in Figure 14) could be redesigned to better accommodate parking. The figure to the right shows a mix of single family and multifamily housing with a shared parking accessed via alleys off of local streets. A central greenway provides an uninterrupted pedestrian path and shared recreational space.



5. Realign off-set intersections – By realigning two off-set intersections into a single, right-angle intersection, the potential for pedestrian-vehicular conflict is reduced.

6. Reduce block lengths to 300 feet or less – Several blocks in the proposed plan are over 300 feet long, the recommended maximum for good pedestrian circulation and permeability. Long block lengths are daunting for pedestrians and may result in longer, less direct trips.
7. Bicycle lanes on major streets – Bicycle lanes should be added to the major access streets to provide safe and direct access into the town center core and VRE station. To encourage biking in Harbor Station, additional off-street bicycle paths should be considered wherever possible throughout the greater development and especially within the Town Center.
8. Bicycle parking and amenities – Bicycle parking at the VRE station and all office, retail and residential buildings will help make cycling a more convenient mode choice. Showers in office buildings allow employees to bike to work and change into fresh clothing upon arrival.
9. Waterfront path to ferry – If the ferry is ultimately located at the marina site (discussed further in Section 5.3), a dedicated pedestrian and bicycle path, perhaps adjacent to the rail line, would improve station access from the Town Center.

5 Station Area Design Scenarios

Three station area design scenarios were developed based on a typical transportation strategy for new developments: bus transit in the first scenario, the addition of commuter rail in the second scenario, and ferry service for the third scenario. Bus service should be considered a baseline requirement for building a transit network that can provide both non-automobile travel within the new development as well as connections to the existing express bus routes, VRE and possible ferry service. Within the third scenario, two locations for the ferry terminal were evaluated. These scenarios correspond to the likely increase in demand for transit services as Harbor Station is gradually built and occupied by businesses and residents. At a workshop with Prince William County’s Department of Transportation and its Planning Office, PRTC, VRE, and MWCOG, it was suggested that rail may in fact precede bus service. If this is the case, the design alternatives presented here would still be valid, but the sequencing would be slightly altered. Regardless of which mode comes first, the VRE and/or ferry systems should be supported by local bus and an extensive bicycle and pedestrian network to help improve accessibility, given the location of the stations on a peninsula 2-3 miles from the regional road network.

5.1 Scenario 1: Buses

The first scenario would provide infrastructure for bus service only as it is possible that rail service may not be immediately available. During this interim period, to ensure that transit becomes standard for Harbor Station residents, transit service should be provided to connect with the existing regional transit system. Options for these connections are shown in Figure 18. The future VRE head house is a logical terminus for either a community bus that could provide temporary access to the Rippon, Quantico or Woodbridge VRE stations, or a new OmniRide Express bus with limited stops directly to downtown DC and other employment destinations in the region.



Figure 17: Distances and Travel Times for Possible Connector to Nearby VRE Stations

Beginning at the site of the future VRE station, either the community bus or the express bus could make two or three stops so that almost all residents of the Town Center are within a 1/4, or 5-minutes walk from a bus stop, as shown in Figure 19.

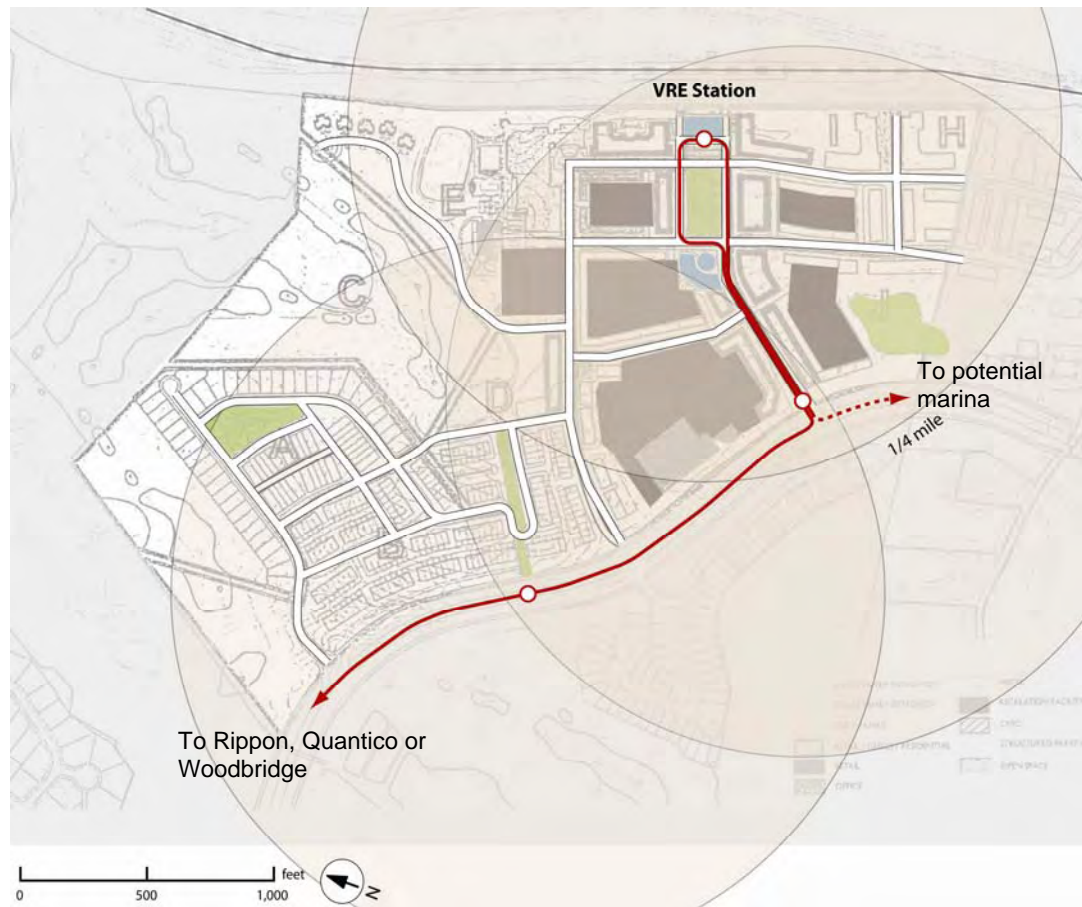


Figure 18: Potential Community or Express Bus Stops

The head house could accommodate bicycle parking, bus schedules, route maps, and ticket vending machines. Once the VRE service is in place, this facility could be shared by both rail and bus riders, and could provide a convenient transfer point between the two modes. The circulator would provide residents living further outside the 1/2 mile walking radius of the VRE station with rail access without having to drive and park.

As shown in Figure 20 below, a bus loading area could be located directly in front of the transit center or head house, with two parallel bus stops for layovers, pick-ups and drop-offs. A taxi drop-off could be located adjacent to the bus loading area, separating bus and taxi traffic. Vehicle drop-off, or kiss n' ride zones could be located along the major street, parallel to the bus and taxi drop-off, and on both sides of the street for maximum convenience during peak hours. Wide, paved cross-walks at the intersections approaching the station provide safe and convenient pedestrian access to the station from the kiss n' ride, park n' ride, and Town Center residences. The streets around the town commons will act as an active pedestrian and transit zone, similar to the 16th Street transit mall in Denver, Colorado, shown in Figure 21.

Bicycle parking should be provided at the park n' ride lot, at the station itself, and at bus stops along the route. The station and all stops should be accessible by wide, well-lit paths and unobstructed sidewalks, and the waiting area for passengers outside of the transit center should be covered to provide protection from rain and snow, and should include

sufficient lighting for passengers waiting for the bus at night. The redeveloped bus station in Shirlington, Virginia includes many of these features, including dynamic message signs as shown in Figure 22.

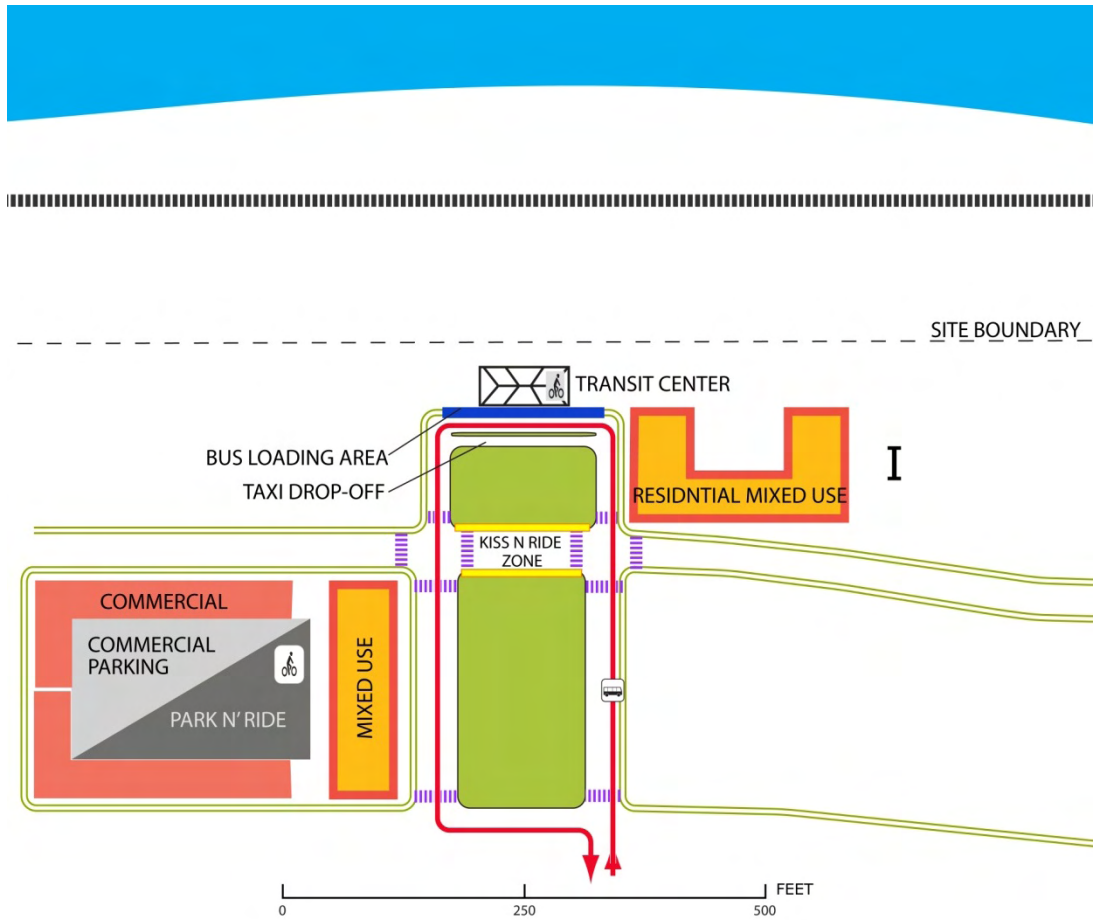


Figure 19: Scenario 1 - Bus Only Station Area Concept



Figure 20: 16th Street Mall, Denver, CO



Figure 21: Shirlington Station, Arlington, VA

5.2 Scenario 2: Rail and Bus

In the second scenario, VRE service would be added to Harbor Station. Residents who previously would have been shuttling to a nearby VRE station could easily transition to this more direct route into downtown DC. Much of the infrastructure will have already been developed as a part of the first scenario and can be shared, including pedestrian and bicycle access and amenities, the park n' ride lot, and transit station. The transit center, previously used for the bus service, would accommodate rail passengers and would include ticketing for VRE. From the transit center, a pedestrian walkway with elevator and stairs would connect the station to the rail platform, which is at a lower elevation than the rest of the development, adjacent to the waterfront. A grade separated pedestrian path across the rail tracks will be needed to access the eastern platform closest to the River. It is VRE's plan to include dual platforms at the time the Harbor Station VRE station is constructed. The station platforms should provide shelters, lighting, seating, and a system map. A CCTV or other active safety system should be added to the platform as it will be at a different elevation from the head house and therefore will not have the same level of passive security as seen at other VRE stations. Examples of a platform area with passenger amenities and of a passenger overpass are shown in Figure 24 and Figure 25

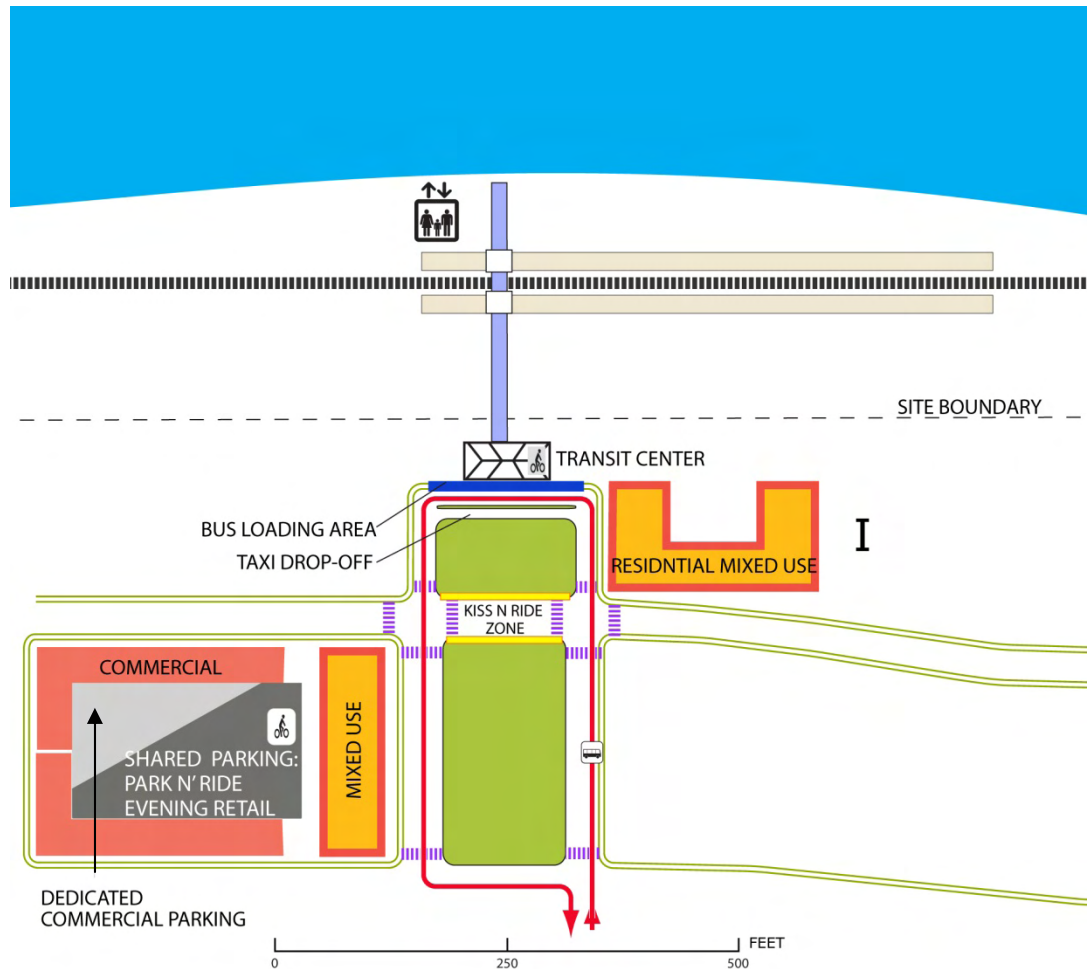


Figure 22 Scenario 2: Bus and Rail Station Area Concept



Figure 23: Diridon Station, San Jose, CA (CalTrain)



Figure 24: Pedestrian Overpass, Woodbridge, VA (VRE)

5.3 Scenario 3: Ferry, Rail and Bus

One of the major objectives of this study was to understand the feasibility of a multimodal station that incorporates bus, commuter rail, and ferry. This section analyzes the benefits and concerns of the two possible locations: Location A would be at the proposed marina and Location B would be within the Town Center at the proposed VRE station. It is important to note that only the landside feasibility was considered. A full engineering assessment of the waterside location is well outside the scope of this study.

The first location (Location A) that was assessed was the proposed marina, as was outlined in the special use permit. This location is about a mile from the VRE station and the Town Center and was selected by the developer prior to this study. This special use permit recently expired, however, and there is now interest in understanding the opportunities posed by other locations.

To access the site prior to full build out of Harbor Station, Harbor Station Parkway would need to be extended, and a grade-separated crossing would be necessary for vehicle access per VRE future conditions. A community shuttle could provide transfer service between the two stations, and could potentially extend further into the Harbor Station development. This would be similar to what is provided by the association at Bay Farm. The most direct path for pedestrians would be along the waterfront, or perhaps on the inland side of the rail, with a grade separated crossing over the rail at the marina to ensure pedestrian safety. The previous developer proffers included construction of grade-separated roadway access to the marina site. Additional residential development is planned in proximity to the ferry, and this could provide a convenient mode choice and unique open space area for these residents and visitors to enjoy.

Because of the distance from the VRE station, it would not be possible to combine the train station/ferry terminal. A separate terminal and necessary infrastructure would be needed with a drop-off area for cars, buses and taxis. As many ferry passengers would likely arrive by car, parking would be needed as well.

5.3.1 Location A: Harbor Station Marina

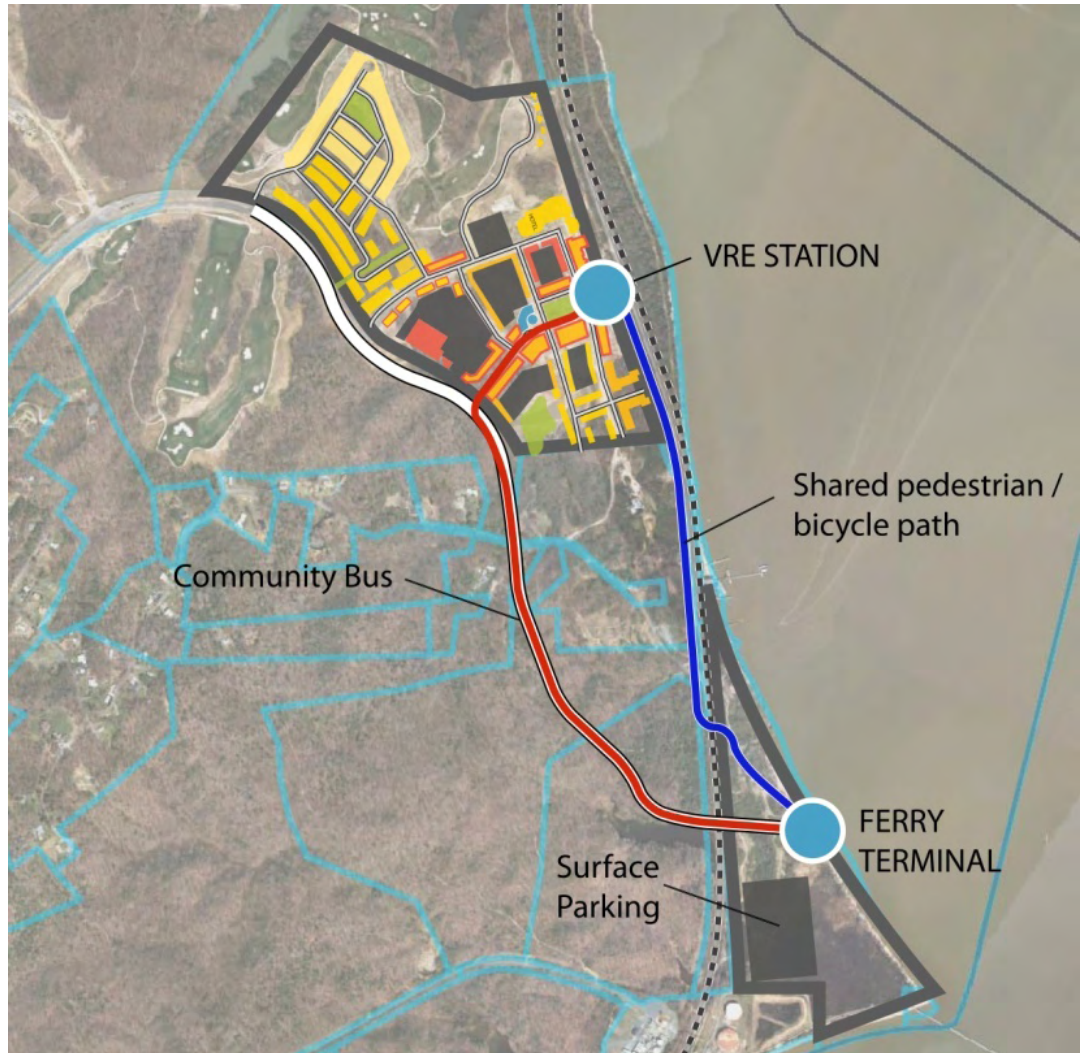


Figure 25 Location A: Ferry Terminal at a Marina



Figure 26: Rendering of Proposed Ferry Terminal Within a Marina

5.3.2 Location B: Intermodal Station

The second location (Location B) would provide an opportunity to co-locate the ferry terminal with the VRE station in the Town Center. The ferry landing would be located immediately adjacent to the rail platforms and would be a detached entity, as shown in Figure 29. This land is currently owned by CSX and would require the purchase of the land by the developer, as well as coordination with VRE and other rail companies to access the parcel. The same overpass that would be used to cross the VRE tracks for northbound riders could provide access to the ferry landing.

Sharing the station with multiple modes will increase the station's activity level and potentially encourage transfers. However, as both the proposed ferry service and VRE would mainly serve regional commuters, it is unlikely that there would be significant transfers between ferry and rail. However, co-locating with either PRTC local bus service or a Harbor Station community circulator would provide the opportunity for transfers from bus-rail and bus-ferry. Additionally, residents and employees would have a greater degree of travel choices, and access to the ferry station will be along active, pedestrian friendly streets.

Lastly, as VRE projects 560-630 daily riders boarding at Harbor Station by 2030 and the ferry projects almost 700 daily riders, an increase in parking would be necessary in the Town Center. While this could be done appropriately, perhaps by providing shared parking with adjacent retail development, conscientious efforts would be needed to provide parking without impeding on the pedestrian nature, developable property, and the overall tight fabric provided by the existing design.



Figure 27: Examples of Existing Standalone Ferry Terminals

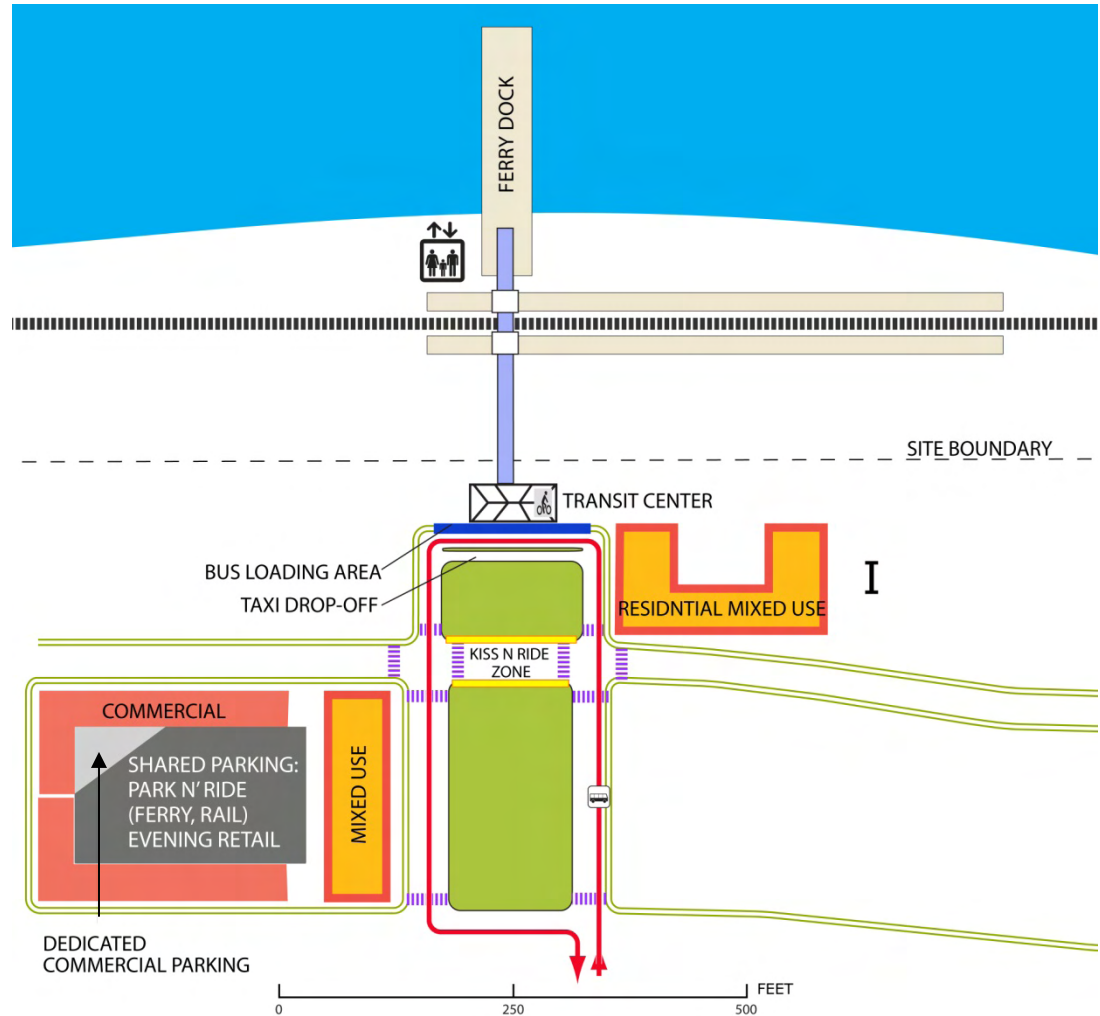


Figure 28: Location B: Ferry Terminal in Town Center

5.3.3 Comparison of Locations

Based on the locations outlined above, an assessment of the landside benefits and concerns of each location is provided in Table 8. As the ferry terminal should add to the transit oriented nature of the Town Center and serve a viable link in a future regional ferry system, the two ferry locations were evaluated based on the following criteria: access to the location, transportation infrastructure, property ownership and adjacent land use, parking, capital costs, and ferry operations. Benefits are listed with a green plus sign, while concerns are listed after a red minus sign. Benefits for each evaluation criteria are listed first, followed by concerns. As this is a very conceptual assessment of the location, a much more detailed analysis of both the waterside and landside elements would be necessary to select a ferry terminal location.

Table 8: Comparison Table of Ferry Locations

Evaluation Criteria	Proposed Harbor Station Marina	Town Center Intermodal Station
Access	<ul style="list-style-type: none"> + Different catchment area than VRE, therefore greater potential to increase riders on regional transit - Long walking distance (>1 mile) from the densest area of development (Town Center) - Located east of railroad tracks, which could create a barrier for all access - Community circulator or PRTC buses would be needed to connect Town Center and ferry terminal - Ferry terminal located over 3 miles from Route 1, impacting ridership potential beyond Harbor Station/Cherry Hill Peninsula. 	<ul style="list-style-type: none"> + Walkable, bikeable access to ferry terminal + Close and convenient transfers to PRTC and/or community circulator + Provides three transit choices for Town Center residents - Elevated pedestrian overpass needed to access ferry slip
Transportation Infrastructure	<ul style="list-style-type: none"> + Shared waterside infrastructure with privately built marina - Separate landside facilities (parking, terminal) duplicates infrastructure for regional transit - Extensive road and transit infrastructure expansion needed prior to beginning ferry operations - PRTC express buses would need two stops within Harbor Station to allow transfers 	<ul style="list-style-type: none"> + Shared landside infrastructure, including transit center and pedestrian overpass + No new road infrastructure needed beyond Town Center plan + PRTC express buses and/or community circulator would serve both ferry and rail with a single stop - Separate waterside infrastructure needed in Town Center
Property Ownership and Adjacent Land Use	<ul style="list-style-type: none"> + Land is privately held by the developer - Surrounding land use is currently proposed as single family residential, which is on the west side of the railroad tracks. 	<ul style="list-style-type: none"> - Land east of the railroad tracks is currently held by CSX and would have to be purchased to create ferry terminal + Town Center land use is transit-oriented
Parking	<ul style="list-style-type: none"> +Plentiful space to meet parking needs 	<ul style="list-style-type: none"> - Limited space in Town Center to add additional parking that is necessary for ferry terminal (ferry parking would be in addition to VRE parking requirements)
Capital Costs	<ul style="list-style-type: none"> +Cost savings to public sector due to utilizing development's marina infrastructure 	<ul style="list-style-type: none"> + Shared costs of transit center between VRE and ferry service - Capital cost of landing cannot be shared with marina development
Ferry Operations	<ul style="list-style-type: none"> - Potential for conflicts with recreational boats entering/exiting the marina - Reduced marina capacity for boat storage 	<ul style="list-style-type: none"> + Less potential conflict with marina operations

5.4 Preferred Ferry Location and Station Area Infrastructure Recommendations

Based on the benefits and concerns presented in Table 8, co-locating the ferry terminal with the VRE station in the Town Center (Location B) best provides the opportunity to incorporate the ferry into a transit-oriented design. Location B provides a built-in set of potential riders who are more likely to walk, bike, or ride a local bus to the ferry. The surrounding land uses in the Town Center provide the opportunity to create an active intermodal station. Landside infrastructure would be shared among the three transit modes and operators, thereby minimizing the costs to the ferry provider. However, substantial additional planning is needed to ensure that the parking concerns are addressed such that the impacts on developable land and the walkability of the Town Center are not compromised. While the waterside infrastructure costs are greater for Location B, as it would not be incorporated with the private marina, it may be offset by the reduced landside infrastructure costs, although further study would be needed to understand this potential tradeoff. It appears that the main benefit of building the ferry terminal at Location A would be to share the infrastructure costs with the private marina. However, Location A's surrounding lower density land use, distance from that development due to the location of the railroad tracks, and distance from the higher density Town Center and Route 1 would reduce ridership and TOD opportunities.

Using the three different scenarios outlined previously, including Location B for the ferry terminal, Table 9 provides a summary of the infrastructure recommendations for Harbor Station's station area. Due to its co-location, a significant amount of the infrastructure can be shared among the various modes and operators.

Table 9: Summary of Scenario Infrastructure Needs

	Infrastructure	Scenario 1: Bus	Scenario 2: Rail	Scenario 3: Ferry at Town Center
Station	Head house/terminal building	shared		
	Seating, ticket/parking kiosk, restrooms, lighting, real time information, map(s)	shared		
	Public art	shared		
Access	Crosswalks at station entrances	shared		
	ADA accessible pathways	shared		
	Bike Parking (lockers)	shared		
	Taxi Drop Off/Kiss N Ride	shared		
	Paid vehicle parking possibly with ground floor retail	shared		
	Wayfinding	shared		
Bus Stop	100 feet dedicated space for bus stop (2 buses)	✓		
	At curb: lighting, seating, map, schedule	✓		
Rail Platform	Platform: shift to accommodate direct connection from parking (depending feasibility due to track geometry)		✓	
	Shelter, seating, lighting, ticket kiosk, schedule, map(s), CCTV or other active security system		✓	
	Pedestrian bridge to platform from head house and from parking area (CSX as host railroad will approve all overhead/bridge structures over the railroad. The location and number of pedestrian bridge crossings will be determined at the time of design/implementation)		shared	
Ferry Slip	Gangway/pier and ferry slip			✓
	Waiting area (minimum overhead protection and on 3 sides for wind)			✓
	CCTV or other active security system			✓

6 Next Steps

The limited scope of this study has brought to light additional future work that is necessary. The following is a list of possible studies that could be taken by MWCOG, Prince William County, and/or the Harbor Station developer. Within the description of the studies, we have identified the organization that would most likely be responsible for undertaking the study. The studies include:

- **Technical Feasibility Study of the Ferry Terminal:** A more detailed identification and evaluation of multiple locations, including, but not limited to the two locations assessed above. This study should include a full analysis of waterside and landside engineering and environmental elements and costs.
Responsibility: Prince William County or MWCOG
- **Transport Plan for Entire Harbor Station Development:** Undertake traffic, parking, and transit analysis using the TOD trip generation rates, parking guidelines across uses, mode shares, and other TOD guidelines to ensure that Harbor Station as an entire community encapsulates TOD principles.
Responsibility: Prince William County
- **Study of Ferry, VRE, and PRTC OmniLink Ridership Potential for Harbor Station:** Undertake a joint planning study to ascertain the potential ridership demand and service overlap between the various modes that could serve Harbor Station. This would clarify the potential demand for each mode in light of the provision of other modes from the same area.
Responsibility: Prince William County or MWCOG
- **Parking Demand Study for Harbor Station:** Based on the estimated demand from the above study, parking requirements for the different transit options could be completed. This would also take into account the various TOD examples presented above, along with others, to ensure that an oversupply of parking is not provided in the Town Center.
Responsibility: Prince William County

Appendix A

Existing Conditions

Prince William County

**Harbor Station
Multimodal Commuter
Station**

Existing Conditions
Memo

January 2010

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This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party

Job number 211774-00

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Appendix A

Introduction

The Harbor Station development, including a proposed Virginia Railway Express (VRE) commuter station and possible ferry terminal, is planned on the Cherry Hill peninsula, 30 miles south of Washington DC on the Potomac River in Prince William County, Virginia. Bounded on the east by the River, on the north and south by Powell's Creek and Quantico Creek, respectively, and on the west by Route 1, the peninsula is largely undeveloped. As the largest riparian forest in Northern Virginia, the topography and soil makes development challenging, with steep slopes of 15% or more, and highly erosive marine clay soils along the Potomac.¹ However, a new Town Center, with medium to high density, mixed use residential, retail and office development has been proposed, which could potentially support a new Virginia Railway Express (VRE) station (along the line shown in Figure 1). Regional vehicular access to the peninsula is facilitated through an exit from Route I-95 onto Dumfries Road, and there are several access points from US-1. However, Route 1 is also a physical barrier between the peninsula and the neighboring developments as it is not a pedestrian or bicycle friendly road and the land-uses are auto- oriented.

The Harbor Station Multimodal Commuter Station project is moving forward based on the existing/adopted land use changes as outlined in the Harbor Station Plan. The purpose of our overall project is to identify transportation infrastructure and service needs for the proposed development and identify what is possible for this type and location of development based on local and national precedents.

Due to the recession, funding issues have prevented construction from moving forward. However, should the development proceed in the future, the appropriate land use and transportation infrastructure should be designed to support access and encourage use of the VRE station. To this end, an analysis of the current and proposed future conditions on the site is underway. This memo summarizes the team's findings with respect to the land use and transportation networks on the peninsula and in context with the greater DC metro area.

1 Prince William Conservation Alliance,
<http://www.pwconserve.org/issues/cherryhill/request2designate.html>



Figure 1: Rail ROW Looking North on the Cherry Hill Peninsula

Key elements of the existing transportation system include:

Pedestrians and Bicyclists

- There are no existing bike paths or lanes
- The major arterials in the peninsula have sidewalks on both sides or at least on the side that has been developed.

Transit

- The proposed VRE and ferry stations are far (i.e. greater than 2.5 miles) from Route 1, which may limit the catchment area from which the stations can attract non-Harbor Station riders.
- Multiple local and commuter PRTC bus routes serve the existing residential communities, but service is infrequent.

Streets

- Study area is primarily undeveloped, but what exists is primarily auto-oriented, with wide intersections.
- Route 1 is a major physical barrier to the peninsula as it is not a pedestrian or bicycle friendly road and the land-uses are auto- oriented.
- The existing residential street pattern is mostly characterized by curvilinear streets that create indirect travel routes for vehicles, transit, bicycles, and pedestrians.

1 Land Use

1.1 Existing Conditions

The site of the proposed Harbor Station and Town Center is largely undeveloped. A golf course has been completed along the northern edge of the peninsula, and a Catholic school was built south of Harbor Station Parkway. Just east of Route 1, several existing single-family residential developments are connected by a system of curvilinear streets. Further into the site, single-family residential units have been built along Cherry Hill Road, east of the school, extending to the edge of the River. Following Cherry Hill Road to the water leads to Tim's Rivershore Restaurant, accessible by car and boat via an active pier behind the restaurant. The Board of County Supervisors has approved a proposed marina that would accommodate commuter ferry service, located southeast of the planned town center and Cherry Hill Road. State and federal permits are in process.

An aerial image of the site is shown in Figure 2 below.



Figure 2: Aerial Image of Harbor Station Site on the Cherry Hill Peninsula

1.2 Proposed Harbor Station Development

The Long Range Land Use Map from the 2008 Comprehensive Plan for Prince Williams County (see Figure 3) shows that much of the Cherry Hill Peninsula planned for suburban residential development and Regional Employment Centers (REC), with some additional office, commercial and flexible employment center (office park) development. The suburban residential development density ranges from 1 – 4 dwellings per acre in Suburban Residential-Low areas to 10-16 dwellings per acre in Suburban Residential-High areas. The Regional Employment Center, which can include mid- to high-rise office, research and development facilities, lodging, residential, retail and mixed use projects, are so named because they are located close to an interstate highway for regional vehicular access. In this area, multifamily housing is allowed at a density of 16-30 dwelling units per acre. A minimum office building height of 4-6 stories is preferred.

Refer to Appendix A for the land use definitions from the Long Range Land Use Plan.

The proposed Harbor Station Town Center is located within the REC zone. The Town Center is planned to include a total of 3,987 residential units, a maximum of about 650,000 sq. ft of retail, and a total nonresidential area ranging between 2,400,000 sq. ft and 3,122,880 sq. ft. The development lies on either side of Harbor Station Parkway, with most of the area less than a mile away from the potential VRE line.

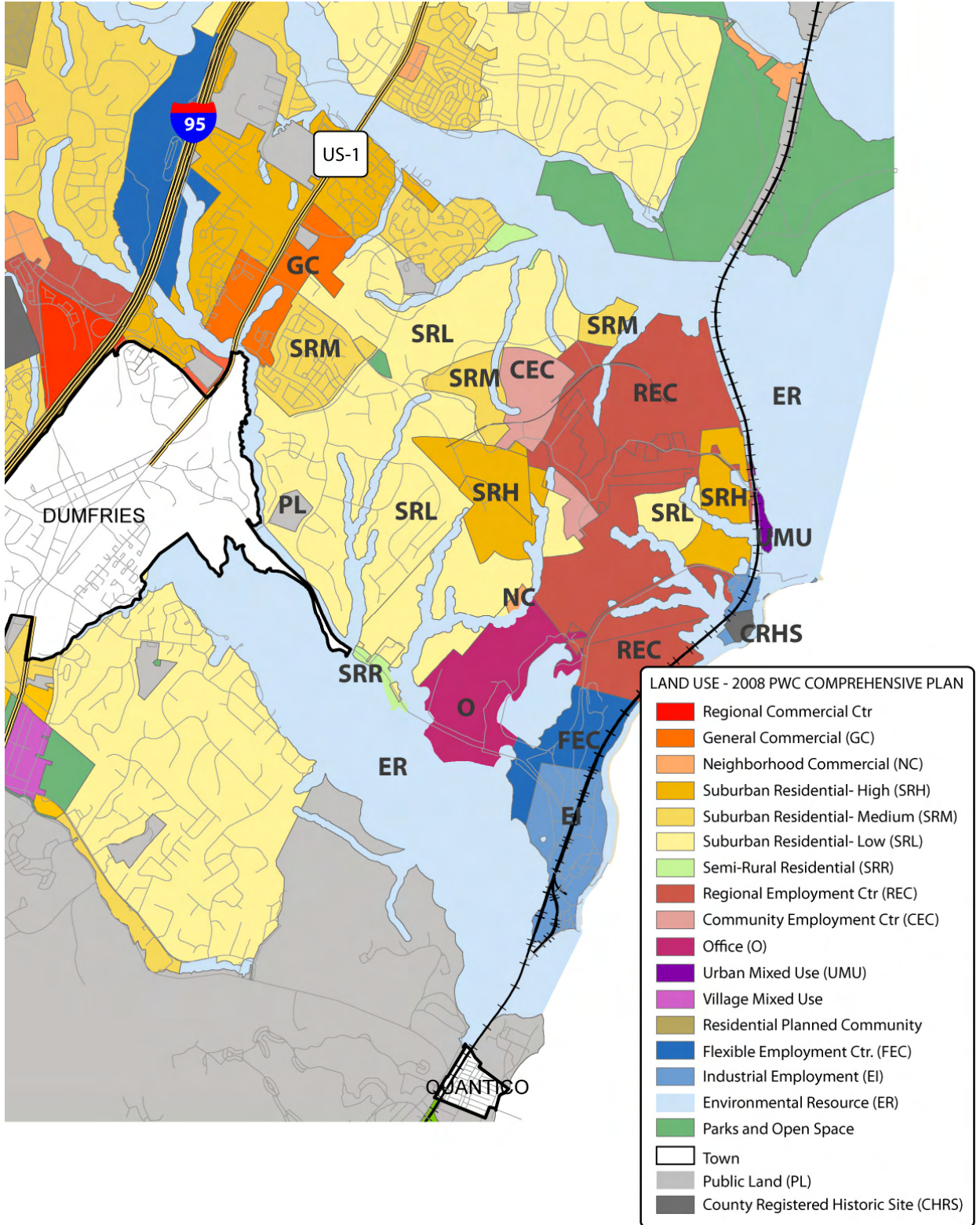


Figure 3: Long Range Land Use Map from Prince William County 2008 Comprehensive Plan

2 Transportation Networks

2.1 Pedestrian and Bicycle Network

Most of the streets in the developed residential areas along Route 1 have sidewalks on either one or both sides of the street, as shown in Figure 4. Harbor Station Parkway also has sidewalks on both sides of the street, which will facilitate pedestrian access to the proposed VRE station. Many of the streets that access the River, including Cherry Hill Road and Cockpit Point Road, are 2-lane streets with no sidewalks. While traffic volume is currently low, pedestrian circulation and safety will be improved by ensuring all streets have sidewalks on at least one side of the street and preferably on both sides.

At the present time there are no bicycle lanes or paths on the Peninsula. However, as discussed further in section 2.5.1, several trails are proposed along Route 1 that could connect to future bicycle trails on the Peninsula.

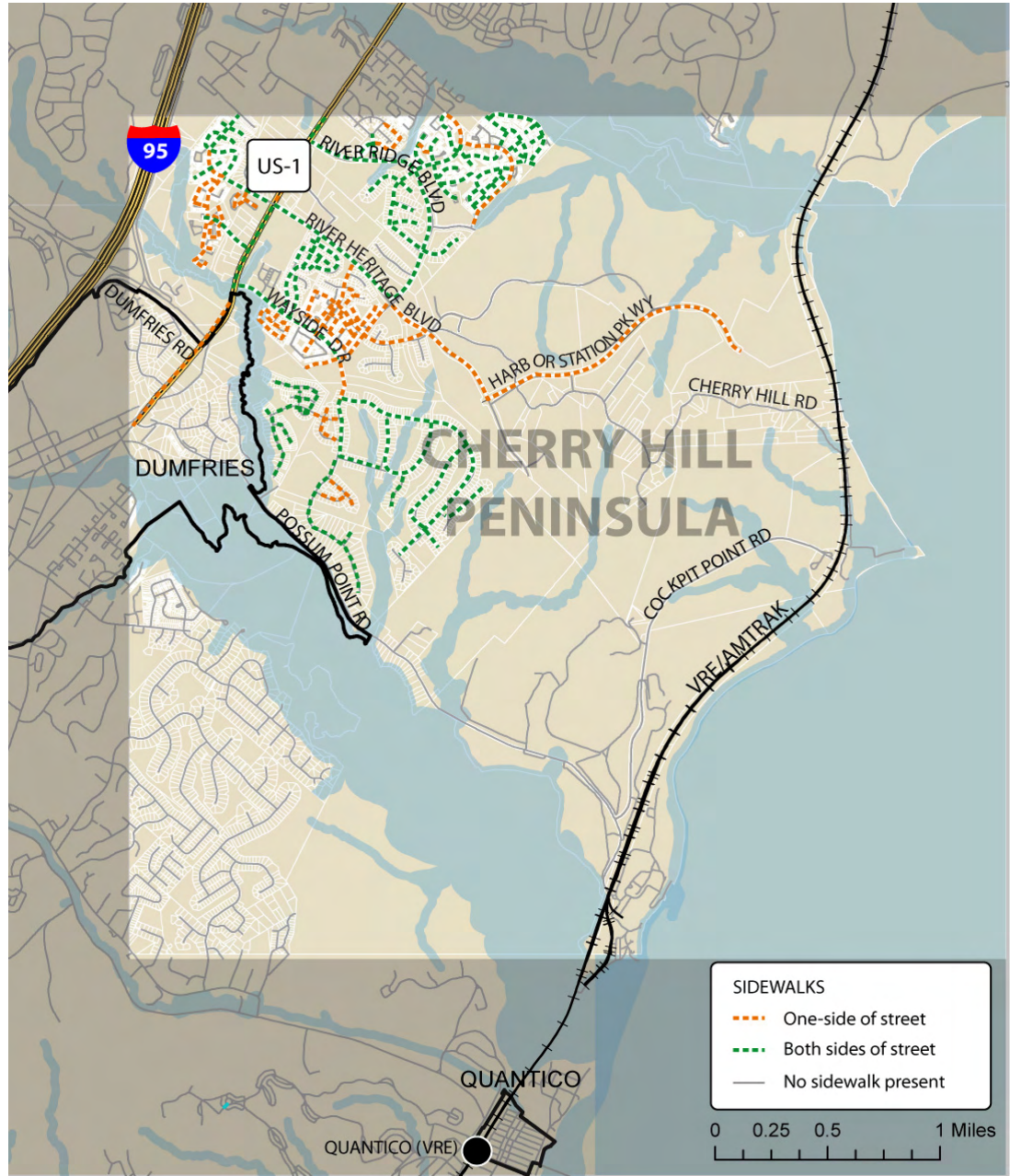


Figure 4: Existing Pedestrian Network

1.1.1 Pedestrian Connectivity to Surrounding Neighborhoods

Pedestrian connections across multi-lane roads such as Route 1, shown in Figure 5 and Figure 6, are challenging due to wide crossing widths and dispersed land uses. Walking distance between destinations is long, and there are few pedestrian amenities such as lighting, seating, landscaping or small retail shops, to encourage walking. These conditions lead to a highly auto-centric area, limiting pedestrian access to the Cherry Hill peninsula.



Figure 5: Long Pedestrian Crossings near Cherry Hill Peninsula



Figure 6: Missing Crosswalks, Auto-Oriented Land Use on River Heritage Blvd

2.2 Bus Network

Just bordering the Cherry Hill Peninsula are several local and commuter bus routes run by the Potomac and Rappahannock Transportation Commission (PRTC), as shown in Figure 7.

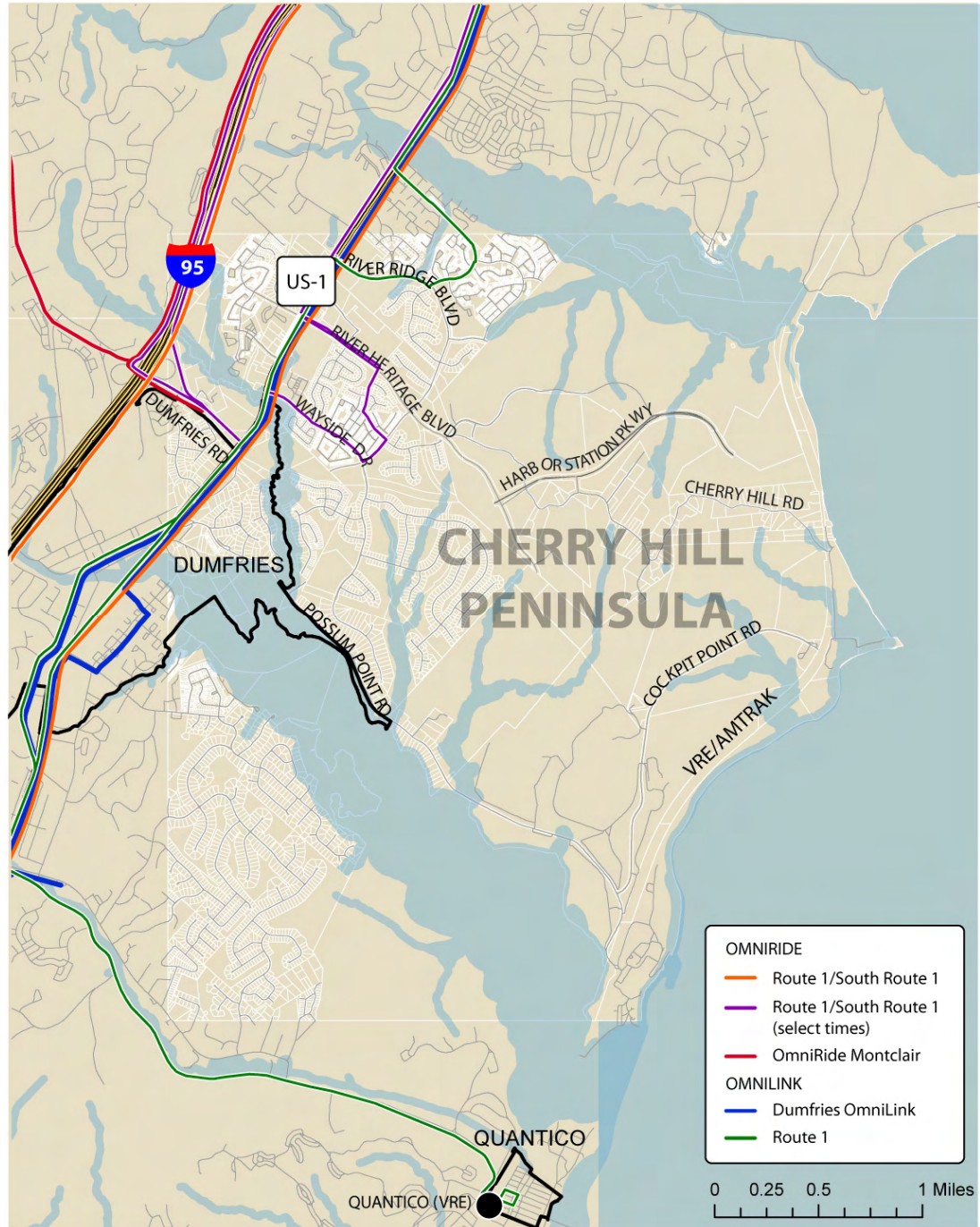


Figure 7: Existing Bus Routes

Four types of bus services are offered by the PRTC:

- **OmniLink:** Demand-responsive local buses serving Eastern Prince William County and Manassas. Buses stop at posted OmniLink bus stops, on-demand stops, and scheduled pick-up or drop-off locations. Hours of operation are weekdays from 5:30AM to 10PM, and Saturdays from 7:30AM to 10PM.

- **OmniRide:** Weekday commuter buses connecting to Northern Virginia and Washington DC. Service is uni-directional towards DC during the morning commute and south towards Virginia in the evening.
- **Metro Direct:** Buses connecting to Metrorail Stations.
- **Cross-County Connector:** Bus service between Eastern Prince William and Manassas.

There is no direct service into the Harbor Station area, as the site is currently largely undeveloped. However, several OmniRide and OmniLink routes pass just west of the Harbor Station site, primarily along Route 1.

2.2.1 Bus Routes

OmniLink

- **Dumfries:** Travels along Route 1, starting at Quantico Terrace Apartments and ending north at the PRTC Transit Center
Average weekday boardings: 782 in November, 2009
Average Saturday boardings: 305 in November, 2009
- **Route 1:** Travels between the Quantico VRE Station, passing through Triangle and up along Route 1, ending at the Woodbridge VRE Station
Average weekday boardings: 347 in November, 2009
Average Saturday boardings: 158 in November, 2009

OmniRide

- **Montclair:** Starts at Center Plaza in Dale City and travels south, turning onto Route 234 towards I-95, stopping at the commuter parking lot. It then travels up Route 95 past the site, into Washington DC
- **Route 1:** Starts at Route 1 and Squire Lane and travels the Route 1 corridor north, past the Cherry Hill Peninsula, entering I-95 at State Route 123. It follows same local routing in the morning and afternoon, serving the Pentagon and Washington, DC.
- **South Route 1:** Starts at Route 1 and Fox Lair Drive and travels south along the Route 1 corridor, past the Cherry Hill Peninsula and including stops along River Heritage Boulevard and Wayside Drive. It serves the Route 1 and 234 Commuter Lot and then enters onto I-95, serving the Pentagon and Washington, DC. Local routing reverses in the afternoon, travelling the Route 1 corridor northbound to Route 1 at River Ridge Boulevard.

OmniRide annual ridership increased steadily between 1998 and 2009 as shown in Figure 8. Ridership levels have more than tripled, increasing by 366% during this time. After 2009, ridership growth is predicted by PRTC to remain relatively flat, between 2.2 million and 2.4 million riders per year.

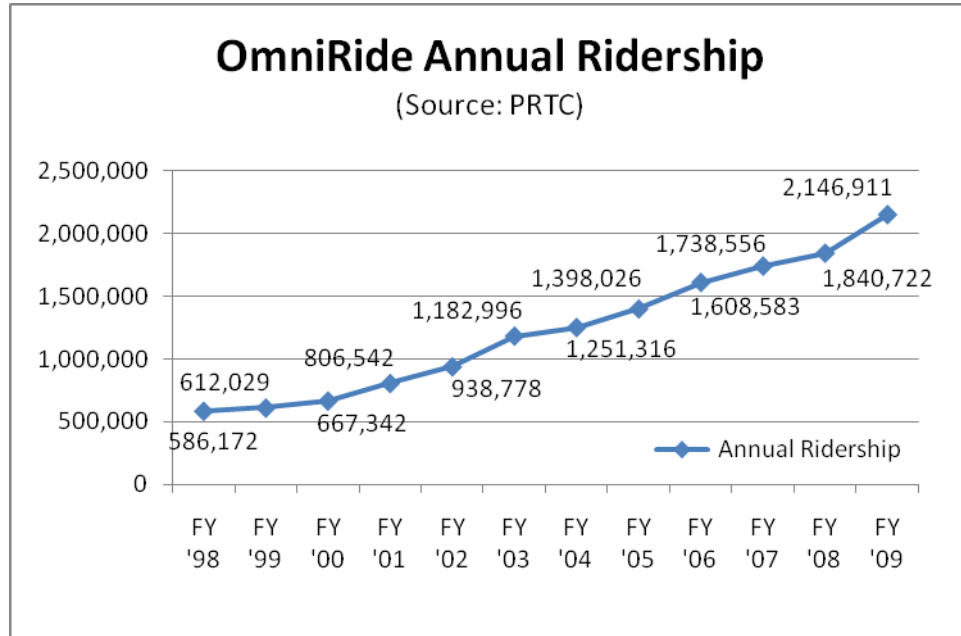


Figure 8: OmniRide Annual Ridership (1998 - 2008)

2.2.2 Service Frequency

OmniRide is a commuter service, making most trips during the weekday morning and afternoon commutes. OmniLink has continuous service throughout the weekday and limited service on Saturday. Table 1 summarizes the service frequency for each route.

Table 1: Bus Service Frequency and Hours of Operation

	OmniLink		OmniRide	
	Dumfries	Route 1	Montclair	Route 1 / South Route 1
Service hours	5:30AM – 1:15PM	5:30AM – 1 PM	4:30AM – 9AM	5AM – 8:45AM
Number of trips	11	7	11	5
Frequency	30 – 45 minutes	About 60 minutes	10 – 35 minutes	40 – 60 minutes
Service hours	1:15PM – 10:30PM	1PM – 11PM	2PM – 7:30PM	3PM – 7:30PM
Number of trips	13	9	12	7
Frequency	30-45 minutes	45 – 60 minutes	15 – 70 minutes	40-80 minutes

2.3 Commuter Rail

Running along the Potomac River is the Fredericksburg Line of the VRE commuter rail. Beginning at 5:15am, six trains run during the morning commute towards employment areas in Alexandria, Crystal City, and Washington DC. One train runs south from DC mid-day, and then the six trains make the reverse trip towards Fredericksburg starting at 3:30pm, with the last train leaving DC at 6:40. No service is available on the weekend, and there is no reverse commute service. There is currently no VRE station at the Harbor Station site.

Figure 9 shows the VRE route that passes through the site.

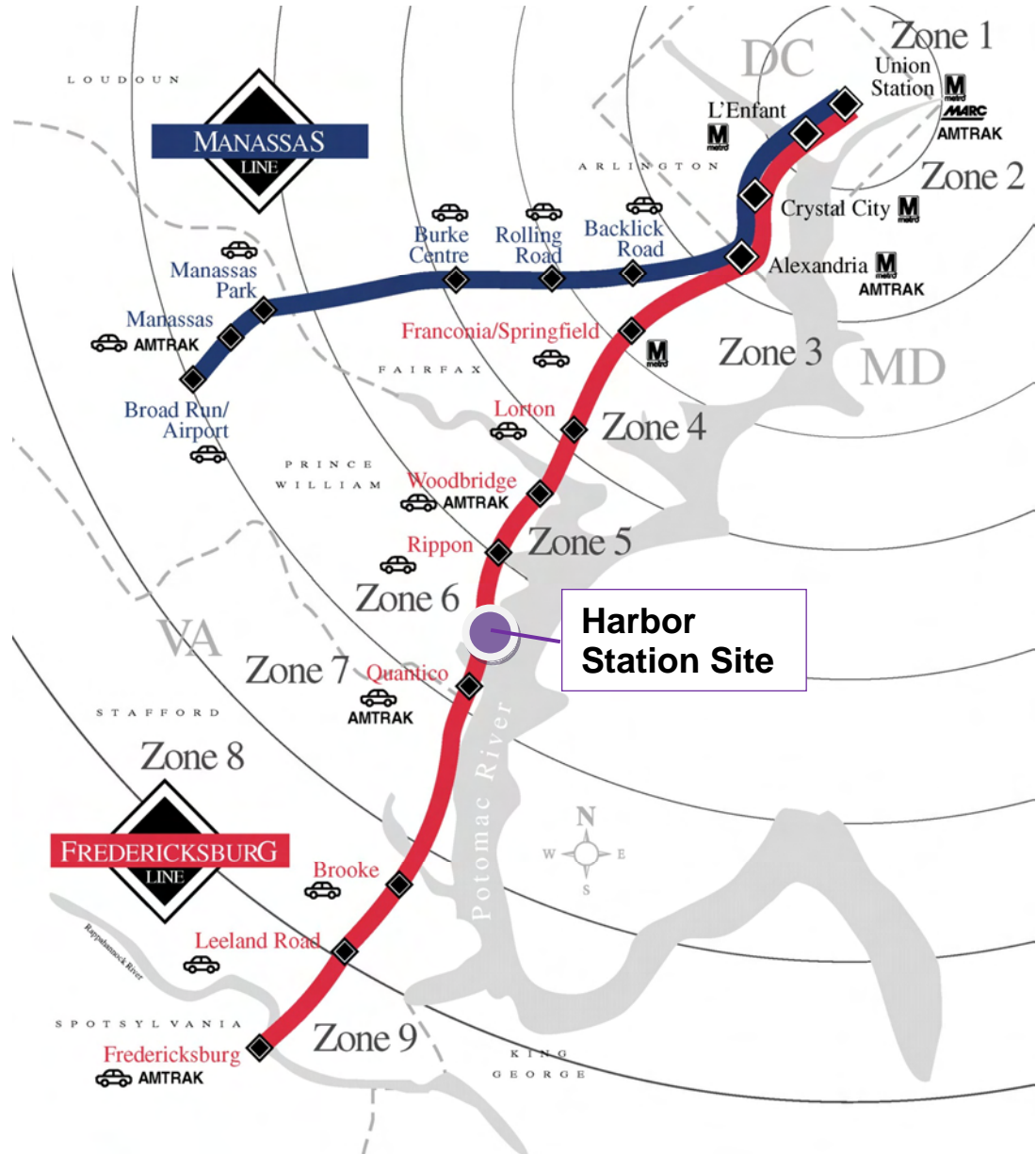


Figure 9: Virginia Railway Express Lines

2.3.1 VRE Ridership

Quantico Station and Rippon Station are located to the north and south of the Harbor Station site. At both stations there has been a steady increase in ridership between 2001 and 2008 as shown in Table 2.

Table 2: Average Daily Station Boardings²

	Quantico Station	Rippon Station
Average Daily Boardings: 2001	265	377
Average Daily Boardings: 2008	410	572
Percent change in boardings	155%	152%

During a sample week in 2008 (9/29 – 10/03), trains during the morning commute were running at least at 80% capacity, with one train running at 103% capacity and one at 68.5% capacity. During the PM commute, trains leaving Washington DC between 4pm and 5:15pm operated at over 90% capacity, while the later trains operated between 60% and 70% capacity.³



Figure 10: Woodbridge VRE Station, 2 Stops North of Proposed Harbor Station

² VRE Station Counter Data, received from PWC
³ Amtrak Data, received from PWC

2.4 Road Network

While the Harbor Station Town Center and VRE station developments are on hold, many of the main arterials have already been constructed, as shown below in Figure 11.

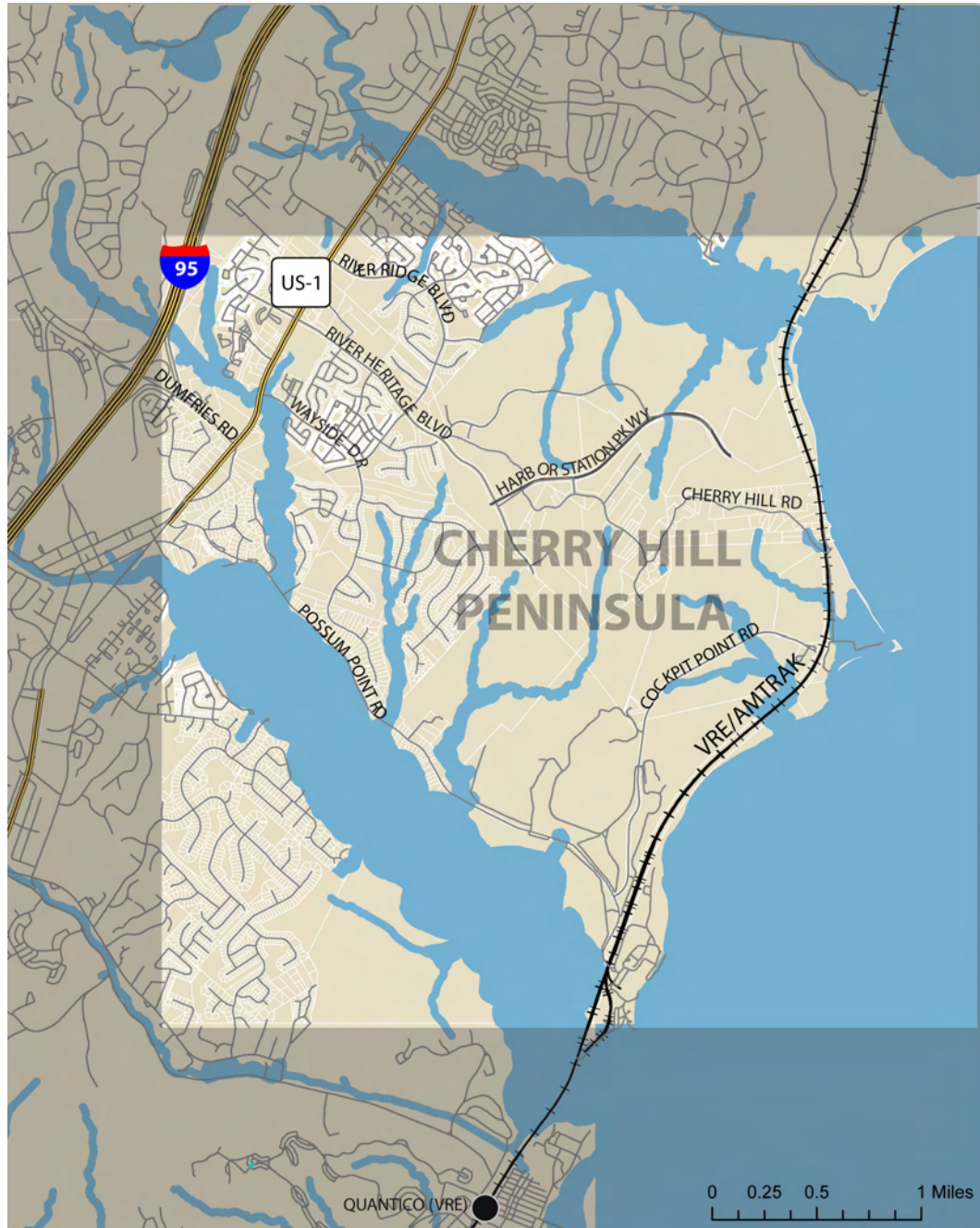


Figure 11: Existing Road Network

Cherry Hill Peninsula has access to the regional road network via US Route 1 and I-95. Route 1 is a four-lane major arterial that is two miles from the proposed Town Center. In Prince William County, Route 1 parallels I-95 and serves as a major local north-south link between the smaller towns and suburban centers along the I-95 corridor. In this area, there are a number of big box stores and strip malls, small commercial buildings, and access to a number of major arterials and collector streets. A third of a mile west of Route 1 is I-95,

which is a six-lane, limited access freeway with two center-running HOV lanes. It provides the main connection between Washington DC and Richmond, Virginia and provides high-speed access to many key retail and employment destinations in the region.

Several roads link the Cherry Hill Peninsula to Route 1. The major road is River Heritage Boulevard/New Cherry Hill Road, which is a four-lane road. It connects to Harbor Station Parkway, a six-lane access road, which will provide access to the proposed VRE station. A network of residential streets has also been built in anticipation of future development.

2.5 Possible Infrastructure Improvements

1.1.2 Pedestrian and Bicycle Network

TransAction 2030, the long range regional transportation plan developed by the Northern Virginia Transportation Authority, has identified projects along the I-95/Route 1 corridor, to introduce pedestrian and bicycle trails to the region. Between Stafford County and Arlington County, the proposed projects include the construction of the following trails, which could be accessible from the Cherry Hill Peninsula:

- A trail along US Route 1 from Stafford County to the Beltway.
- The Potomac Heritage Trail from Wharton Drive to Jefferson Davis Highway (Route 1).
- A trail along the Potomac Parkway from Old Stage Coach Road to New Cherry Hill Road (in plan as River Heritage Blvd).

1.1.3 Cherry Hill VRE Station and Parking Lot

A Cherry Hill commuter rail station, parking facility and access road is planned for the Harbor Station development. The parking facility would be designed to support commercial development in the area as well as VRE passengers. A VRE feasibility study (Draft Feasibility Study, June 2009) estimated the Cherry Hill Station would generate 150 to 200 boardings per day upon opening in 2015, increasing to 550 to 650 boardings per day by 2030.

VRE is completing environmental analysis and preliminary engineering for a third mainline track from Powell's Creek to south of the Marine Corps Base Quantico which would serve the proposed Cherry Hill station. That work is estimated to be complete in early 2010. Funding for final design and the first year of construction of the third track segment has also been identified.

The access road to the proposed station, Harbor Station Parkway, has been largely built, but currently terminates in a cul-de-sac 0.3 miles from the VRE corridor. The design and construction of the commuter rail station and parking facility was to be provided by the Harbor Station developer. Due to the current fiscal climate, station and parking design and construction are on hold pending future development of Cherry Hill.

1.1.4 Ferry

A study was conducted to determine the physical feasibility of a commuter ferry system along the Potomac River. The study included a stop at the Harbor Station South Marina, on the southern edge of Cherry Hill along the Potomac. Travel between this station and Washington DC would be over 50 minutes. Still in the analysis phases, plans to design and construct the system are on hold due to the economic climate. However, there is a desire by Prince William County to create a multimodal station among the proposed VRE station, the proposed ferry station, and local and commuter bus routes. This vision would be dependent on the ultimate development of Harbor Station.

1.1.5 Bus

TransAction 2030 also proposes priority bus service throughout Prince William County, although it is not yet clear if this would affect services near Route 1.

2.6 Mode Split

At the time this report was issued only regional mode split information was available. In 2005, 70% of all commuters in the Washington-Baltimore-Northern Virginia metropolitan area drove alone to work. 4.6% rode the bus, 5.3% took the subway and 26,000 people (0.6%) traveled by rail.⁴ The average travel time to work was lowest for those who drove alone and it was about 30 minutes. Those who commuted by transit (bus, trolley or other transit mode), on average spent about 47-48 minutes per trip, which was more than 15 minutes longer than single occupant vehicles. This encourages driving to be the preferred transportation option for commuting trips and therefore, traffic congestion has continued to increase in the region and total vehicle miles traveled (VMT) are expected to increase 37% by 2030.⁵ To curb this trend, a shift towards a comprehensive, high-frequency transit network is essential to encourage drivers to leave their car at home.

Table 3 shows a more detailed summary of the commuting mode split of the over 4 million residents in the region.

Table 3: 2005 Commute Mode Split in the Washington-Baltimore-Northern Virginia Region

Mode	Number (2005)	Percent (2005)
Drove alone	2,836,432	70.4
2-person carpool	331,585	8.2
3-person carpool	71,822	1.8
4-person carpool	26,584	0.7
5-or-6-person carpool	11,036	0.3
7-or-more-person carpool	10,255	0.3
Bus or trolley bus	183,428	4.6
Streetcar or trolley car	3,506	0.1
Subway or elevated	213,816	5.3
Railroad	26,010	0.6
Ferryboat	55	0.0
Bicycle	12,448	0.3
Walked	99,458	2.5
Taxicab	8,105	0.2
Motorcycle	5,998	0.1
Other means	28,384	0.7
Worked at home	159,761	4.0

⁴ American Community Survey, 2005 Transportation Profile

<http://ctpp.transportation.org/production/Washington-Baltimore-Northern%20Virginia,%20DC-MD.htm>

⁵ PRTC Long Range Bus Plan Preparation, presentation

While this data was gathered at the regional level, based on the existing land uses and transportation infrastructure in and near the Cherry Hill Peninsula, it can be inferred that the mode split would be similar, if not more skewed towards driving. With the planned mixed-use Harbor Station development and the addition of a VRE station, new or extended bus routes, and a ferry station, it is possible that walking, biking, and transit use could be more prevalent in the new community.

Appendix A

A1 Appendix: Land Use Code Definitions

Regional Employment Center (REC). The purpose of the Regional Employment Center classification is to provide for areas located close to and/or with good access from an interstate highway where intensive regional employment uses are to be located. REC projects* should be planned and developed in a comprehensive, coordinated manner. Primary uses in the REC are mid-rise and/or high-rise office (including government offices – particularly those for Prince William County agencies), research and development facilities, lodging, and mixed-use projects. Retail, retail service and/or residential uses shall represent no greater than 25 percent of the total REC project area. Retail and retail service use(s) shall be so located within a building or on a site that their primary purpose is to support the needs of those employed within that REC project or living or working within the mixed-use building(s). Drive-in/drive-through uses are discouraged. Shared/structured parking is encouraged. The acceptable housing type within any mixed-use REC project is multifamily, at a density of 16-30 dwelling units per gross acre, less the ER-, Environmental Resource-designated portion of a property. Development in REC projects shall occur according to a phasing plan, described in Action Strategy 31 of this chapter. The intent of the phasing plan is that mixed, employment and residential and/or retail uses shall be provided at every stage of the project's development. Office development in REC areas is encouraged to be in accordance with the *Illustrative Guidelines for Office Development*, provided as a supplement to the Community Design Plan chapter of the Comprehensive Plan and available from the Planning Office. A minimum office building height of 4-6 stories is preferred.

Regional Commercial Center (RCC). The purpose of the Regional Commercial Center classification is to provide for areas, located close to and/or with good access to/from an interstate highway, where large-scale retail projects that serve a regional – rather than local – market are to be located. RCC projects should be planned and developed in a comprehensive, coordinated manner. Primary uses include regional retail malls, mixed-use projects, and large single-user retail buildings. Local-serving retail, retail service and/or residential uses shall be considered secondary uses and shall represent no greater than 25 percent of the total RCC project area. Drive-in/drive-through uses are discouraged. Residential uses shall, with the exception of Residential Elderly, be part of a mixed-use building. Shared/structured parking is encouraged. The acceptable housing type within any mixed-use RCC project is multifamily, at a density of 16-30 dwelling units per gross acre, less the ER-, Environmental Resource-designated portion of a property. Development in RCC projects shall occur according to a phasing plan, described in Action Strategy 31 of this chapter. The intent of the phasing plan is that mixed, employment and residential and/or retail uses shall be provided at every stage of the project's development.

General Commercial (GC). The purpose of the General Commercial classification is to recognize areas of existing commercial activity along major County roadways – such as those along Route 1, Route 234, Route 28, and at the Minnieville Road - Smoketown Road intersection – that serve a local market rather than a regional market. Access to GC uses shall be limited to abutting arterial or collector roadways, rather than from lesser abutting roadways, except where interparcel connections are provided between abutting GC sites. Pedestrian access to adjacent and nearby residential areas – where appropriate – shall be encouraged. Primary uses in the GC are retail, retail service, and lodging uses. Office use shall be considered a secondary use and shall represent no greater than 25 percent of the total GC project area. Infill and redevelopment of areas identified as GC are encouraged, particularly with new or relocated commercial uses that are of a scale similar to surrounding uses. Designation of new GC areas is discouraged. Office development in GC areas is encouraged to be in accordance with the *Illustrative Guidelines for Office Development*, provided as a supplement to the Community Design Plan chapter of the Comprehensive Plan and available from the Planning Office. Office buildings in GC areas are preferred at a height of at least 2-3 stories.

Flexible Use Employment Center (FEC). The purpose of the Flexible Use Employment Center classification is to provide for areas of employment uses situated on individual sites or in campus-style “parks.” Primary uses in the FEC classification are light manufacturing, “start-up” businesses, small assembly businesses, and office uses (including government offices, particularly those for Prince William County agencies). Retail and/or retail service uses shall be considered secondary uses and shall represent no greater than 25 percent of the total FEC project area. These retail/retail service uses shall be so located on a site that their primary purpose is to support the needs of those employed within that FEC project. Warehousing, wholesale, storage and/or distribution uses shall also be considered secondary uses within any FEC project. Outdoor storage shall also be considered a secondary use and shall be limited to no more than 25 percent of the land area of the FEC project. Within an FEC-designated project, the more intense uses shall be located in the core of the area and the less intense uses (excluding outdoor storage) at the periphery, to act as a transition between the FEC project and adjacent areas designated or developed for different uses. Office development in FEC areas is encouraged to be in accordance with the *Illustrative Guidelines for Office Development*, provided as a supplement to the Community Design Plan chapter of the Comprehensive Plan and available from the Planning Office.

Community Employment Center (CEC). The purpose of the Community Employment Center classification is to provide for areas of low- to mid-rise offices (including government offices, particularly those for Prince William County agencies), research and development, lodging, and mixed-use projects planned and developed in a comprehensive, coordinated manner. CEC projects shall be located at or near the intersection of principal arterials and major collector roads, or at commuter rail stations. Retail, retail service and/or residential uses shall be considered secondary uses and shall represent no greater than 25 percent of the total CEC project area. Retail and retail service use(s) shall be so located within a building or on a site that their primary purpose is to support the needs of those employed within that CEC project or living or working within the mixed-use building. Drive-in/drive-through uses are discouraged. Single-family attached or multifamily housing – including elderly housing – is permitted, at a density of 6-12 units per gross acre, less the ER-, Environmental Resource-designated portion of a property. Development in CEC projects shall occur according to a phasing plan, described in Action Strategy 31 of this chapter. The intent of the phasing plan is that mixed, employment and residential and/or retail uses shall be provided at every stage of the project’s development. Office development in CEC areas is encouraged to be in accordance with the *Illustrative Guidelines for Office Development*, provided as a supplement to the Community Design Plan chapter of the Comprehensive Plan and available from the Planning Office. A minimum office building height of 3-5 stories is preferred.

Office (O). The purpose of this classification is to provide for areas of low-to high-rise, offices or research and development activities. Projects developed in this classification shall be for office use, with retail and retail service uses discouraged. Any retail and/or retail service uses shall be contained within the office or research and development building whose tenants and employees those retail/retail service uses would serve. Less intense O uses – such as neighborhood-scale offices – shall be located at the periphery of the O project, to act as a transition between the O project and adjacent residential areas. Office development in O areas is encouraged to be in accordance with the *Illustrative Guidelines for Office Development*, provided as a supplement to the Community Design Plan chapter of the Comprehensive Plan and available from the Planning Office. A minimum office building height of 3-5 stories is preferred.

Neighborhood Commercial (NC). The purpose of the Neighborhood Commercial classification is to provide commercial areas to serve surrounding residential neighborhoods. NC-designated areas shall be planned and developed in a comprehensive, coordinated manner. NC project shall not be nearer than one mile from any other NC area or project, or any GC or Convenience Retail (CR) area or project. The site orientation of an NC project shall be toward surrounding neighborhoods, with

project access from primary neighborhood-serving roadways, rather than from roadways serving pass-through/pass-by traffic. Pedestrian access to and from the surrounding neighborhood, where appropriate, shall be encouraged. Primary uses in the NC classification are the retail and retail service uses permitted in the B-2, Neighborhood Business zoning district and/or mixed-use buildings that combine retail/retail service uses on the first floor only and residential uses on no more than two additional floors, with a special use permit. In order that the neighborhood-serving function of NC uses can be maintained, maximum NC project size shall be 15 acres and the maximum size of nonresidential uses shall be 120,000 gross square feet, with no single use (other than a grocery store, general store, or drug store) to be larger than 12,000 gross square feet.

Suburban Residential High (SRH). The purpose of the Suburban Residential High classification is to provide for areas of a variety of housing opportunities at the highest suburban density. The preferred housing type in this classification is multifamily (apartments and condominiums). The density range in SRH projects is 10-16 dwellings per acre, less the ER-, Environmental Resource-designated portion of a property.

Suburban Residential Medium (SRM). The purpose of the Suburban Residential Medium classification is to provide for a variety of housing opportunities at a moderate suburban density, greater than that of the SRL classification. The preferred housing type in this classification is single-family detached, but up to 25 percent of the total land area may be single-family attached. The density range in SRM projects is 4-6 dwellings per gross acre, less the ER-, Environmental Resource-designated portion of a property. Cluster housing and the use of the planned unit development concept may occur, provided that such clustering and planned district development furthers valuable environmental objectives as stated in EN-Policy 1 and EN-Policy 4 of the Environment Plan.

Suburban Residential Low (SRL). The purpose of the Suburban Residential Low classification is to provide for housing opportunities at a low suburban density. The housing type in this classification is single-family detached, but up to 25 percent of the total land area may be single-family attached. The density range in SRL projects is 1-4 units per gross acre, less the ER-, Environmental Resource-designated portion of a property. Cluster housing and the use of the planned unit development concept may occur, provided that such clustering and planned district development furthers valuable environmental objectives as stated in EN-Policy 1 and EN-Policy 4 of the Environment Plan.

Residential Planned Community (RPC). The Residential Planned Community classification includes areas zoned RPC, Residential Planned Community. This classification is intended for planned developments not less than 500 contiguous acres under one ownership or control in those areas of the County where provisions for sanitary sewers, sewage disposal facilities, adequate highway access, and public water supply are assured. Within such planned communities, the location of all residential, commercial, industrial, and governmental uses, school sites, parks, playgrounds, recreational areas, commuter parking areas, and other open spaces shall be controlled in such a manner as to permit a variety of housing accommodations and land uses in an orderly relationship to one another.

Semi-Rural Residential (SRR). The purpose of the Semi-Rural Residential classification is to provide for areas where a wide range of larger-lot residential development can occur, as a transition between the largest-lot residential development in the Rural Area and the more dense residential development found in the Development Area. Residential development in the SRR areas shall occur as single-family dwellings at a density of one dwelling per 1-5 gross acres. Where more than two dwellings are constructed – as part of a residential project in the SRR classification – the average density within that project should be 1 dwelling unit per 2.5 acres on a project-by-project basis. Cluster housing and the use of the planned unit development concept may occur, so long as the

resulting residential density is no greater than that possible under conventional development standards and provided that such clustering furthers valuable environmental objectives such as stated in the Environment Plan and is consistent with fire and rescue service objectives. The lower end of the density range for the SRR classification should be proposed with a rezoning application. Higher densities shall be achieved through negotiation at the rezoning stage, not to exceed average densities established in this category.

Environmental Resource (ER). This classification is explained and defined in detail within the Environment Plan. Therein are located goals, policies, action strategies, and other Plan components designed to protect the sensitive nature of the identified resources. Environmental Resources include all 100-year floodplains as determined by the Federal Emergency Management Act (FEMA) Flood Hazard Use Maps or natural 100-year floodplains as defined in the Design and Construction Standards Manual and resource protection areas (RPAs) as defined by the Chesapeake Bay Preservation Act. In addition, areas shown in an environmental constraints analysis submitted with a rezoning or special use permit application with wetlands; 25 percent or greater slopes; areas with 15 percent or greater slopes in conjunction with soils that have severe limitations; soils with a predominance of marine clays; public water supply sources; and critically erodible shorelines and stream banks are considered part of the Environmental Resource designation.

County Registered Historic Sites (CRHS). This classification is designed to protect important cultural resources. Cultural resources include architectural, archaeological, and historical resources. CRHS designations that are mapped on the Long-Range Land Use Plan Map include existing sites and districts that have a preservation easement or are listed on the National Register of Historic Places or Virginia Historic Landmarks Register; are incorporated into the County Zoning Ordinance as an Historic Overlay District or Special Public Interest District; are recorded as part of the Historic American Building Survey or the Historic American Engineering Record; or has been selected for inclusion in the annual evaluation and update of such list by the Historical Commission and approved by the Board of County Supervisors. Development in this designation that would potentially impact these resources shall occur in accordance with the standards and criteria set forth in the Cultural Resources Plan.

Parks and Open Space (POS). The purpose of this classification is to designate existing and projected parks and recreational areas of the County. The Parks, Open Space and Trails Plan contains a complete inventory of existing federal, state, and local parks, and of planned parks within the County.

Public Land (PL). The purpose of identifying public lands in the Comprehensive Plan is to provide an indication of existing and planned public facilities, institutions, or other government installations such as – but not limited to – detention/correctional facilities, government centers, judicial centers, and related facilities. The appropriate Comprehensive Plan chapter (Telecommunications, Potable Water, Sewer, Transportation, Fire and Rescue, Libraries, Police, or Schools) should be consulted for a more complete presentation regarding these public facilities. Where necessary, public facility reviews with public comment – as outlined in the Virginia Code – shall be conducted to determine conformance of specific proposed facilities with the Comprehensive Plan. A public facility review with public comment shall be mandatory where a public facility is not addressed in the Comprehensive Plan, unless such facility is exempt from review by that code section.

Appendix B

Benchmark Study

To	Prince William County	Reference number
		211774/NH
cc		File reference
From	Arup	Date
		March 10, 2010
Subject	Benchmark Study	

Introduction

Harbor Station is planned to be a transportation hub and relatively dense activity node in Prince William County. As a part of the Harbor Station Multimodal Station study Arup will identify the transportation facilities and services needed to supplement possible commuter rail and ferry services, balance the needs between vehicular parking and other modes, and plan for a high level of access for walking, biking, and public transit trips. Case studies are an important tool that can provide tangible information about costs, benefits, and lessons learned from actual projects in similar cities. As a first step in analyzing what is feasible, Arup has conducted a benchmark study, surveying towns and cities that have undertaken similar projects around transit stations.

The case studies represent what we think would be a reasonable transportation phasing strategy for Harbor Station: Bus transit for phase one, the addition of commuter rail for phase two, and ferry service for the final phase and full Harbor Station build out. These phases would correspond with increasing transit service demand as Harbor Station is gradually built and occupied by businesses and residents.

We have selected the following case studies for each phase:

1. Bus Only

Reston Town Center- Reston, VA / Fairfax County

Reston, Virginia is a strong local example of a planned community with express and local bus transit, similar to what could be seen at Harbor Station in the initial phase. It is part of the metropolitan DC area, located about 22 miles from Washington DC (compared to about 32 miles from the Harbor Station site) with a population of about 56,000 (2000). Reston Town Center is a Central Business District, with office space and a mix of high- and low-rise commercial buildings that house retail, restaurants, a movie theater and a hotel. Although there is currently no commuter rail in Reston, an extensive network of local and express buses provide connectivity within Reston and to the larger Metro system. Two Metrorail stations are planned in Reston upon completion of the extension to Dulles Airport.

2. Commuter Rail and Bus

Downtown Palatine- Village of Palatine, IL (Chicago)

Palatine is an excellent example of suburban transit-oriented development that has grown incrementally over the last 10 years around a renovated Metra commuter rail station. Palatine is a village about 30 miles northwest of Chicago with a population of about 67,000 (2005). A mix of medium- to high-density residential, retail and office space was built around the station itself on a combination of vacant land and parking lots. Suburban buses connect the more residential areas of Palatine to the rail station.

3. Ferry

Bay Farm – City of Alameda, CA (San Francisco)

Alameda is a small, primarily residential city in Alameda County, adjacent to Oakland and across the Bay from San Francisco. Spanning parts of two islands, Alameda and Bay Farm, three bridges and two tunnels connect this city of 72,000 (2000) to Oakland. Alameda is served by a comprehensive bus system that connects to the Bay Area Rapid Transit (BART) regional transit. On Bay Farm Island a small ferry terminal, well connected by pedestrian paths, local bus and a parking lot for vehicles allows quick and direct access to San Francisco, primarily for local Alameda residents.

Key Findings

1. Transportation and Land Use Integration

In two of the case studies, Alameda and Reston, transit services were added after the development was mostly complete. As a result, significant vehicle accommodations were made and still exist today. The Reston Town Center has large parking structures in a majority of its buildings. Had it been planned around transit, space could have been allocated to other, more transit-friendly, uses. In Alameda a surface parking lot surrounds the ferry terminal. This could have been otherwise allocated to higher density development, which would have had positive impacts on ridership. Harbor Station is taking a more forward thinking approach in considering the connection between transportation and land use at the beginning of the project.

2. Pedestrians First Approach

Palatine prioritized pedestrians in their planning effort by understanding pedestrian needs when they redesigned the transit station and surrounding catchment area. They conducted studies to understand where commuters were coming from and found that the station would be best located on the north side of the tracks rather than the south where it was originally located. Sidewalk and crosswalk improvements, streetscape design, wayfinding, a redesigned train station, and creation of a new shared use path for pedestrians and bikes were just a few of the considerations that account for about 40% of passengers now arriving by modes other than the private car. In addition to the pedestrian amenities, high frequency, two-way daily service presents a viable alternative to driving.

While primarily automobile accessible, the master plan for the Reston Town Center was designed around a large public plaza and pedestrian-only corridor. In addition, a comprehensive signage plan was created that specified wayfinding requirements (directional signs, maps, etc) and design standards for the entire development. This helped to create an area where walking is the preferred mode for internal trips.

3. Collaboration and Creativity

Collaboration between agencies and with local residents and the ability to think beyond the existing planning and zoning regulations were crucial to the success of these projects. A collaborative effort between the Fairfax County Planning, Transportation and Zoning departments was required to develop the Reston Town Center master plan. Four rezoning efforts were needed to allow a development of significantly greater density than what currently existed in the area. Similarly, downtown Palatine was also built on a framework of collaboration. The Village developed a Downtown Land Use guide in partnership with residents and business owners that specified densities, land uses and design guidelines for the area. The underlying zoning was extremely flexible, allowing the Village to easily approve any developer proposals that fit with the land use guide. In Alameda, the Harbor Bay Business Park Association collaborates with local transit authorities and private transportation providers to facilitate transfers between the ferry and other modes. Free transfers to the local bus, subsidized Bay Area Rapid Transit (BART) tickets, and free shuttle bus connections to BART and local businesses provide end-of-trip services for those who choose to reach Alameda by ferry.

The following pages provide detailed results of the surveys. Before and after aerial imagery shows the walking radii around the transit station or stop as well as site photos are included to help understand the station layout and the type and density of development within walking distance of transit.

Harbor Station Benchmarking Survey – Reston, VA

Location / Municipality: Reston, VA / Fairfax County	Miles from CBD: 22
Project Name/Location: Reston Town Center (RTC)	
Contact: Fairfax County Planning and Zoning- Planner of the day Email/Phone: 703-324-1380	
<p>1. <i>What type of transit is the TOD centered around? (existing bus/rail, potential future rail stop, etc) What are the frequencies of service and average number of daily riders?</i></p> <ul style="list-style-type: none">• The RTC was not originally designed around transit, so there is extensive free parking in large structures throughout the development. However it does exemplify some of the hallmarks of TOD, including high density development with a mix of uses, a pedestrian and bicycle-friendly environment and well designed streetscape. Today the RTC is served by buses with several routes connecting the community to a DC Metro station. The future Metro extension will include a station at the Town Center in 2016, and its location near the Dulles Toll Road makes it particularly accessible for cars and buses. There is ample parking throughout the development.• The following operators and routes serve the RTC:<ul style="list-style-type: none">○ Fairfax Connector routes 505, 574, 605 and 950- Connections to park n' ride lots, West Falls Church Metro station (15 miles away)<ul style="list-style-type: none">▪ 30 minutes weekdays and weekends. Weekdays from 4:30 am to 12am. Saturday 8am to 1am, Sunday 8am to 11pm (both 30 min headways)○ RIBS (Internal Reston Circulators) routes 1, 2, 3 and 4<ul style="list-style-type: none">▪ 1st bus at 5am, 30 minutes between 6am and 8pm, then hourly until midnight. Weekdays + Saturday from 5am to midnight, Sundays hourly service 6am to 9pm	
<p>2. <i>What elements are included at the transit facility(ies)? If multiple transit modes serve the area, how are the facilities designed to allow for multi-modal transfers?</i></p> <p>Bus Terminal facilities</p> <p><u>Major Structures</u></p> <ul style="list-style-type: none">• 8 indented bus bays and 2 on-street bus stops (1 parallel, 1 indented)• 4 bus shelters to protect riders from the elements• Connector Store - small retail outlet for ticket and fare media sales as well as schedules, maps and other information <p><u>Pedestrian and Bicycle Facilities</u></p> <ul style="list-style-type: none">• Crosswalks connect the station to a network of sidewalks• Information / wayfinding- schedules and maps at Connector store• Pedestrian scale lighting <p><u>Vehicle Facilities</u></p> <ul style="list-style-type: none">• No parking at the bus terminal- large parking structure across the street	

Transfer facilities

- Pedestrian overpasses located east and west of the station connect to developments south of the RTC
- 45-mile east-west Washington and Old Dominion bicycle trail

3. *What is the mix of uses planned/developed around the station? Over what period of time?*

Developed

- High-rise and low-rise commercial buildings with +50 shops, 30 restaurants, offices, a cinema, and a hotel
- Over 1 million square feet (93,000 m²) of office space
- High-rise condos and apartments
- Phasing - The RTC was developed in phases, with the first phase consisting of 4 blocks and a large plaza that opened in 1990.

Planned

- RTC phased incrementally. Office towers south of Market St being constructed now.
- RTC Transit Station opened in 2006. Metro station part of Dulles extension- will likely change development.

4. *What planning framework was in place (zoning, land use plan, streamlined process, proactive planning board, etc) to facilitate the development?*

- Planned Residential Community with 5 villages and 1 town center
- Mid-1960s planned community. The town center was not the first piece to be created but was always part of the greater vision. It was the subject of 4 rezonings to allow for higher density development.
- It was a combined effort of planning/transportation/zoning master plans

5. *What transportation infrastructure was in place to support the station and surrounding development, and what was added? (roads, local buses, pedestrian paths, bike paths, bike and vehicle parking, etc)*

- Major road infrastructure on 3 sides for vehicle accessibility - Dulles Toll Road, Fairfax County Parkway
- Added – bus station and shifted routes to pass through station
- Significant amounts of free parking
- Shared use path - Washington and Dominion Railroad Trail
- RTC streets, sidewalks and public plazas. Within the RTC there are wide sidewalks with brick pavers, planters, lighting, etc. with a few pedestrian-only streets north and south of the main public plaza on Market Street, the main commercial boulevard of the development. A wide, brick-paved pedestrian plaza crossing links the northern and southern plaza areas across Market Street.
- Comprehensive signage plan that specifies wayfinding requirements (directional signs, maps, etc) and design standards for the entire development
- Planned – Metro Extension with Reston station (2016)

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6. *Who was responsible for any additional infrastructure (developer, transit agency, etc)?*

- Developer responsible for bus station in exchange for zoning amendments/higher density allowance

7. *What is the station catchment area (< 0.5 miles, >1 mile, 1-3 miles, >3 miles)? How do these riders access the station and about how many? How many trips are captured internally by the development?*

- Mostly walk or bus transfer

8. *Any tips or lessons learned for maximizing transit access that you would suggest to other municipalities looking into TOD around commuter rail/ferry stations?*

- For the future Metrorail station, access facilities being planned include:
 - 2 station entrances (both sides of Dulles Toll Road)
 - Pedestrian bridge crossing toll road and airport access highway
 - Bus drop-off/pickup (both entrances)
 - Kiss & Ride (both entrances)

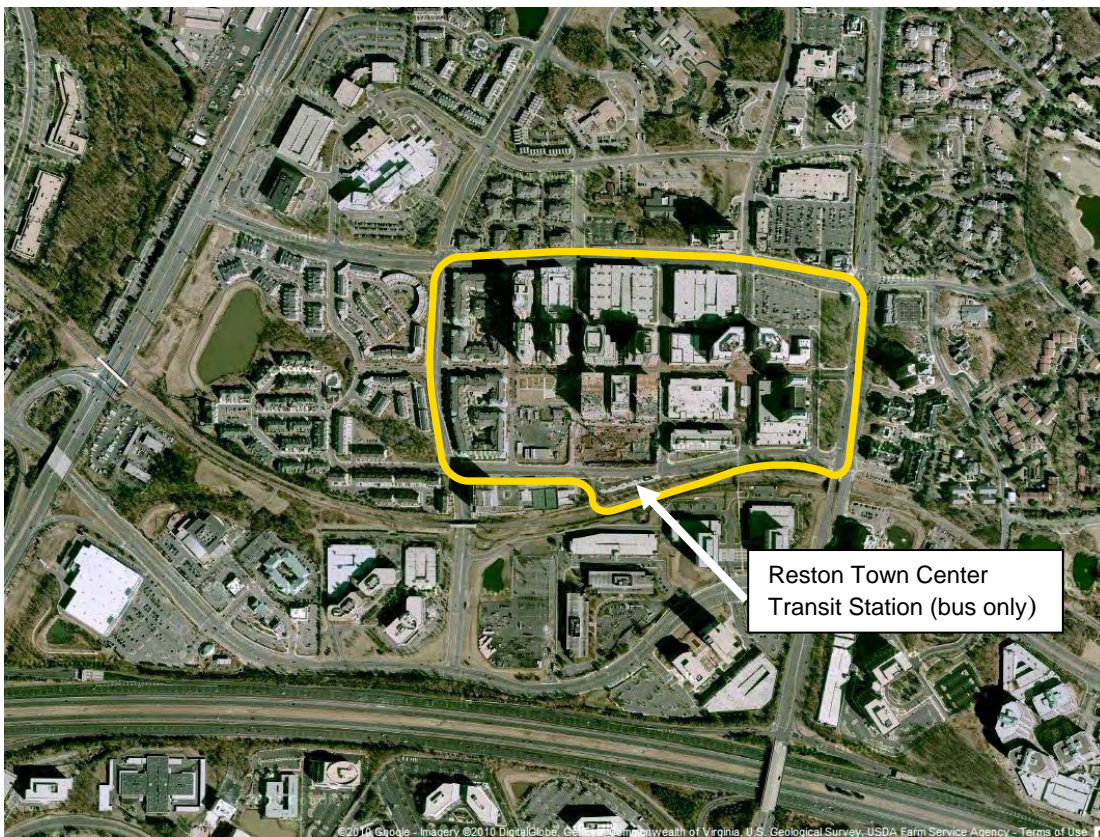
9. *How have current economic conditions affected transit ridership at this station?(Ex. Increase in ridership, decrease due to job loss, vacant housing, etc)*

- Have not seen a real slowing in development at least over the last 5 years- lots of new structures still being built

Imagery

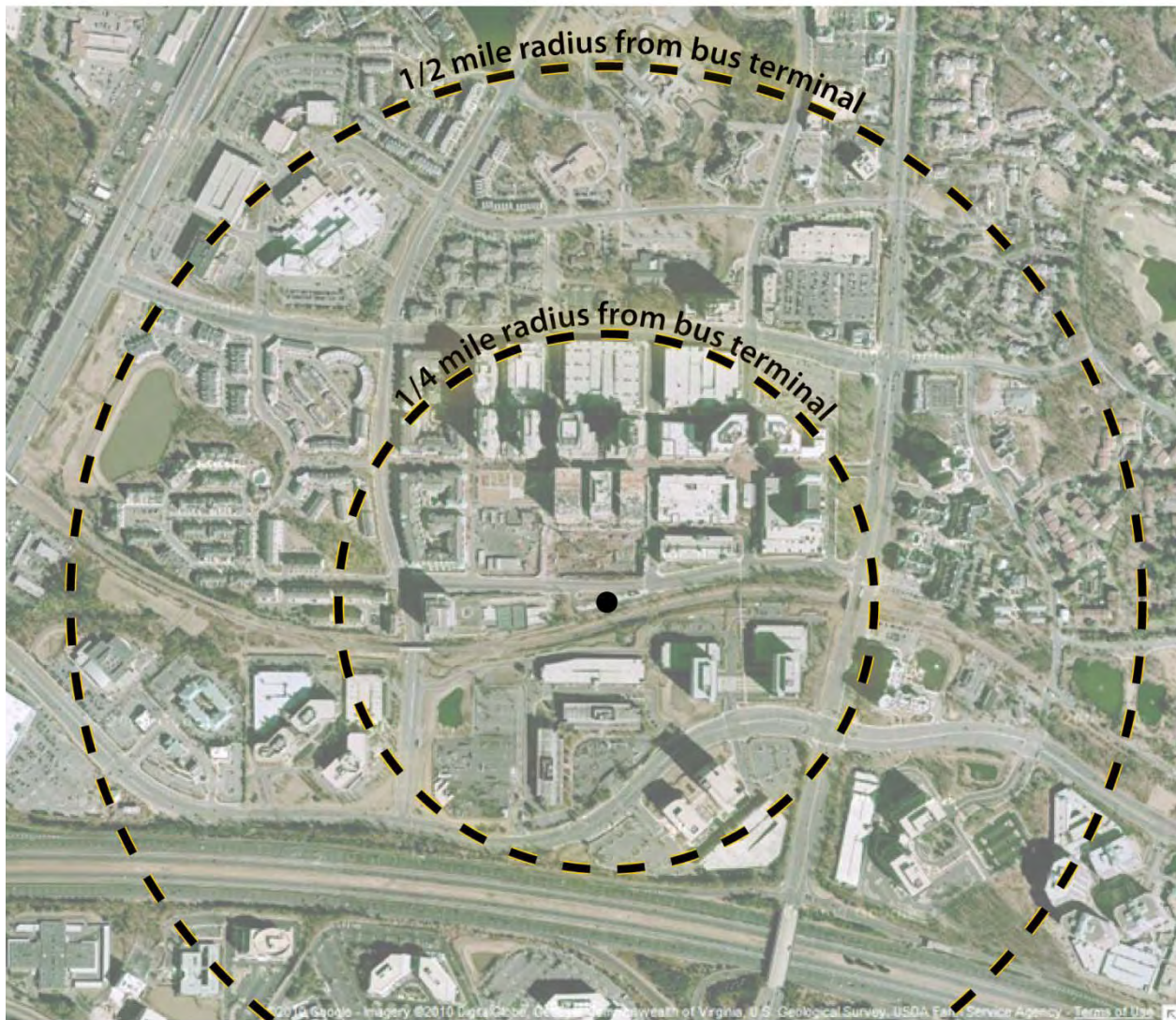


Reston Town Center Area – 1998 (USGS map from <http://msrmaps.com/>)

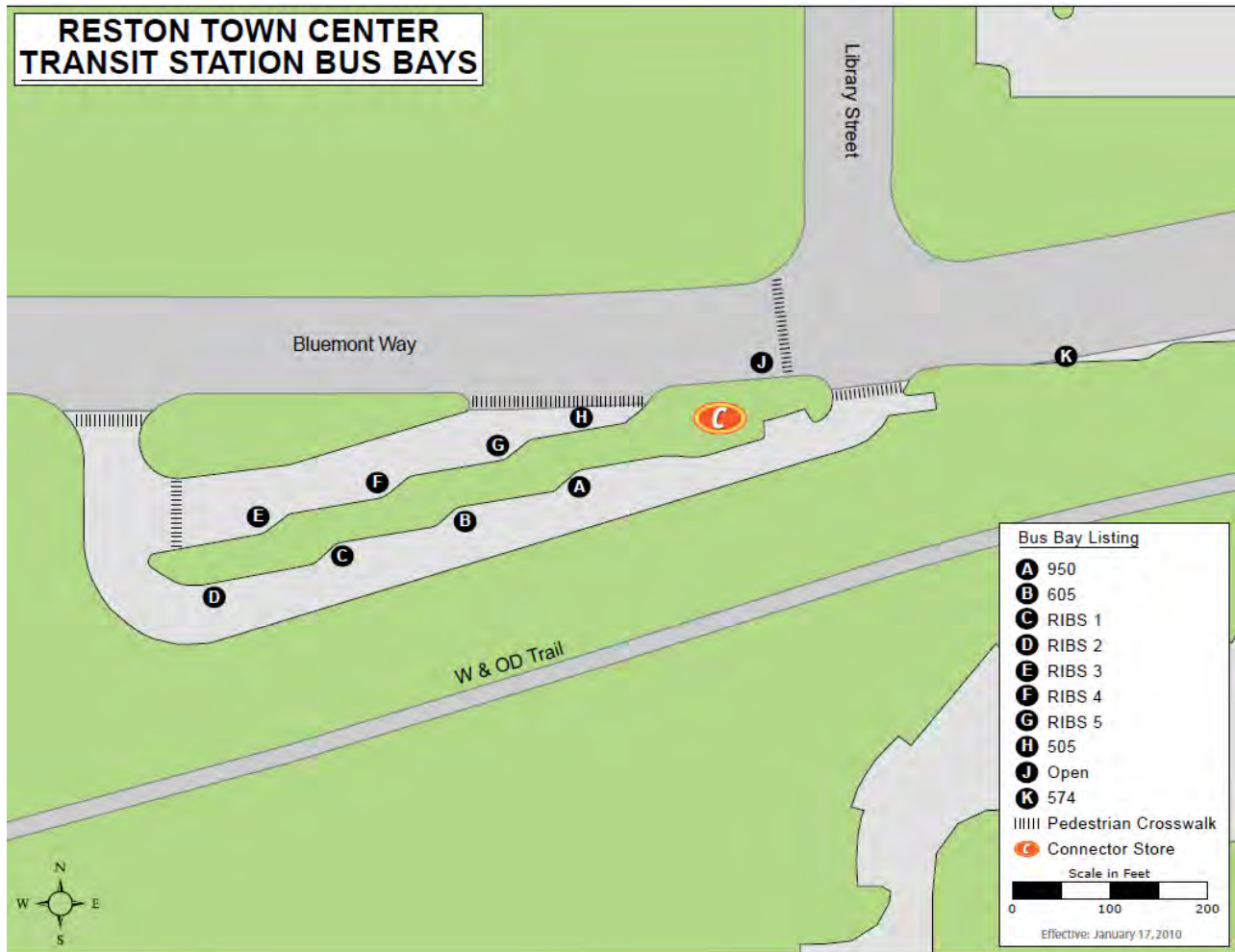


Reston Town Center
Transit Station (bus only)

Reston Town Center – 2010



Walking Radii from Reston Town Center Transit Station- All of Reston Town Center within ¼ mile walk



<http://suburbanista.wordpress.com/2009/06/18/paint-on-pavement/creative-bike-parking-reston-town-center/>



RTC Transit station (Bus)



Reston Town Center: Wide pedestrian crossings with brick pavers, on-street parking generally on 1 side of street



Unique architecture, parking with ground floor retail to preserve pedestrian experience at street level, pedestrian scale lighting, wide, tree-lined sidewalks



Wide sidewalks, tree-lined streets and planters, benches for seating

Harbor Station Benchmarking Survey – Palatine, IL

Municipality: Village of Palatine	Miles from CBD: ~30
Project: TOD around Palatine METRA Commuter Rail station	
Contact: Mike Jacobs (Planning and Zoning department) Email: mjacobs@palatine.il.us	
<p>10. <i>What type of transit is the TOD centered around? (existing bus/rail, potential future rail stop, etc) What are the frequencies of service and average number of daily riders?</i></p> <ul style="list-style-type: none">• METRA commuter rail line. Weekday Service: Starting around 6AM, 10-15 minute headways during AM, PM peaks. Hourly during off-peak until midnight. Saturday Service: Hourly service from 6AM to noon, every 2 hours from noon until 10PM Sunday Service: Every 2 hours between 9AM and 9PM• Station served by PACE suburban bus system every 30 minutes during peak hours and between 40 and 90 minutes during off-peak, 6AM to 9PM. No weekend service.• 2,500/day average weekday ridership	
<p>11. <i>What elements are included at the transit facility(ies)? If multiple transit modes serve the area, how are the facilities designed to allow for multi-modal transfers?</i></p> <p>A. Rail facilities</p> <p><u>Major Structures</u></p> <ul style="list-style-type: none">• Station building• 2 rail platforms• Cafe with outdoor patio <p><u>Pedestrian and bicycle amenities</u></p> <ul style="list-style-type: none">• At-grade crossings over tracks• Shared use path (Rail Walk) along rail and extending the length of the downtown• Benches• Platform shelters on north platform but not south platform because METRA stated platform is too narrow to accommodate snow removal with the presence of the shelter• Bicycle racks• Information / wayfinding- standards developed as part of Downtown Land Use Guide• Lighting• Public art <p><u>Vehicle amenities</u></p> <ul style="list-style-type: none">• Parking Structure- 1,300 spaces shared with Gateway Center. Surface parking north and south of	

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the station tracks were consolidated to open up development opportunities south of station. Direct pedestrian access to station platform from “skyways” at 2nd level of garage (at platform grade), ramps and stairs from 1st level of garage (below platform grade). Must pay for space

- Surface Parking- about 150 spaces
- Drop-off facility in front of station for buses and cars

B. Transfer facilities

- PACE bus route 696 to station- however not well coordinated with rail schedule.
- PACE operated rideshare and vanpool programs with spaces reserved in parking garage

12. *What is the mix of uses planned/developed around the station? Over what period of time?*

Developed

1,000 condo units with ground floor retail was the first project, built on village-owned surface parking lots. Since then infill development continues including office space (Gateway Center) and commercial use (restaurant and music venue). Both share 1 parking deck due to different peak hours

Phasing-

- 1991: Creation of the Downtown Palatine Redevelopment Commission
- 1994: Village Council accepts the Downtown Palatine Revitalization Plan (Final Report)
- 1999: Downtown TIF District Created
- 2000: Village Council approves the Downtown Land Use Guide
- 2002: Palatine Train Station redevelopment, the Groves of Palatine (residential), Gateway Center (office and restaurant), several other residential buildings
- 2004: Village Council approves an update to the Downtown Land Use Guide; also Palatine Station, The Brownstones, The Benchmark (all residential); Emmet’s (restaurant); The Providence (mixed use residential); Lamplighter Inn (hotel)
- 2008: The Preserve, Metropolitan, Heritage (all residential)

Final mix (2000-2008)

- 976 residential units
- 120,000 square feet of office space
- 93,000 square feet of commercial/restaurant space
- 1,300 space parking deck
- Relocation & expansion of 3 existing businesses

13. *What planning framework was in place (zoning, land use plan, streamlined process, proactive planning board, etc) to facilitate the development?*

- In 2000 the Village established a Downtown Tax Increment Financing (TIF) district. TIF is a method of financing redevelopment by using future gains from tax revenue increases (caused by the increase in property value of the redevelopment) to finance improvements. The Village hired a consultant who led a community design project with Village residents and planners to develop a Downtown Land Use Guide, which specifies densities, land uses, etc for the area. Since the surface parking lots were already village-owned, there were no issues with land acquisition or consolidation. In this way the community was in agreement with any development that fit the detailed land use guide.
- The Planned Development Zone is very flexible and has no underlying density restrictions or parking requirements; if the village liked the proposal and it fit with land use guide, it was approved
- The Village advertised the TIF district to developers and issued an RFP for the village-owned land. Developers were mostly large, local residential developers such as Toll Brothers. Many developers took on more than one project

14. *What transportation infrastructure was in place to support the station and surrounding development, and what was added? (roads, local buses, pedestrian paths, bike paths, bike and vehicle parking, etc)*

Existing (2000)

- Train station
- Surface parking lots
- Grid street network

Added

- Redeveloped train station- moved to north side of tracks
- Surface lots consolidated into single parking structure
- Shared use path (Rail Walk)
- Pedestrian Improvements - connecting paths, lighting, benches, landscaping, signage
- Public art

15. *Who was responsible for any additional infrastructure (developer, transit agency, etc)?*

- Some improvements were private: undertaken by developers, including streetscape and sidewalk improvements adjacent to their development
- Others were village initiatives: pocket park, signage/design specs created as a result of collaboration with community, new brick-paved crossings

16. *What is the station catchment area (< 0.5 miles, >1 mile, 1-3 miles, >3 miles)? How do these riders access the station and about how many? How many trips are captured internally by the development?*

- Over 3 miles catchment area - the next station outbound is 6 miles away, so many people drive from neighboring municipalities
- Good mix of walking and driving – daily rail ridership is 2,500 and there are only 1,500 commuter spaces
- Internal Trip Capture: not calculated, but there are a good mix of uses within walking distance.

17. *Any tips or lessons learned for maximizing transit access that you would suggest to other municipalities looking into TOD around commuter rail/ferry stations?*

- Take a pedestrian friendly approach
- Study where riders are coming from- Palatine is considering an additional parking deck on south side of tracks due to a high number of riders coming from the south
- Create an urban feel
- Make sure platforms wide enough to accommodate shelter and any needed services (ex snow removal) – i.e. coordinate effort with rail authority

18. *How have current economic conditions affected transit ridership at this station?(Ex. Increase in ridership, decrease due to job loss, vacant housing, etc)*

- Parking passes selling at the same rate, so there is not a noticeable decrease in ridership

Imagery

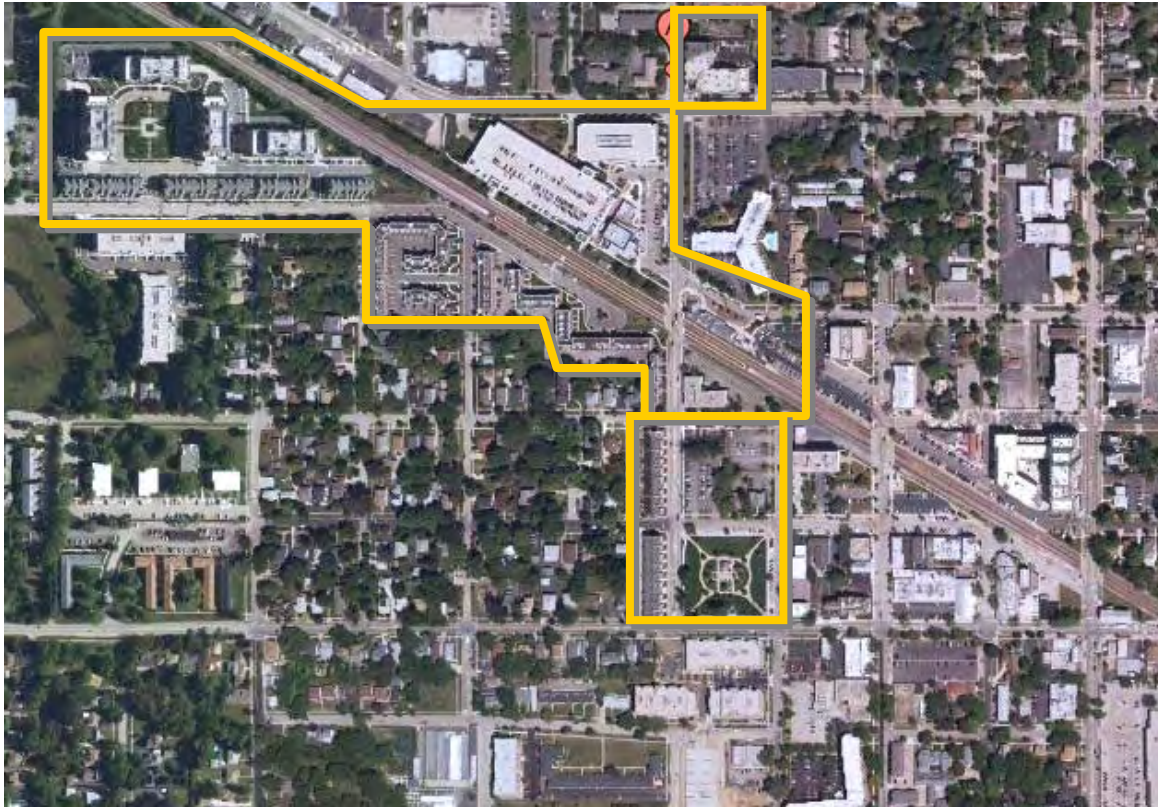


Palatine Station with two vehicular drop-offs, shared parking garage with “skyways” to platforms, pedestrian crossings to residential development

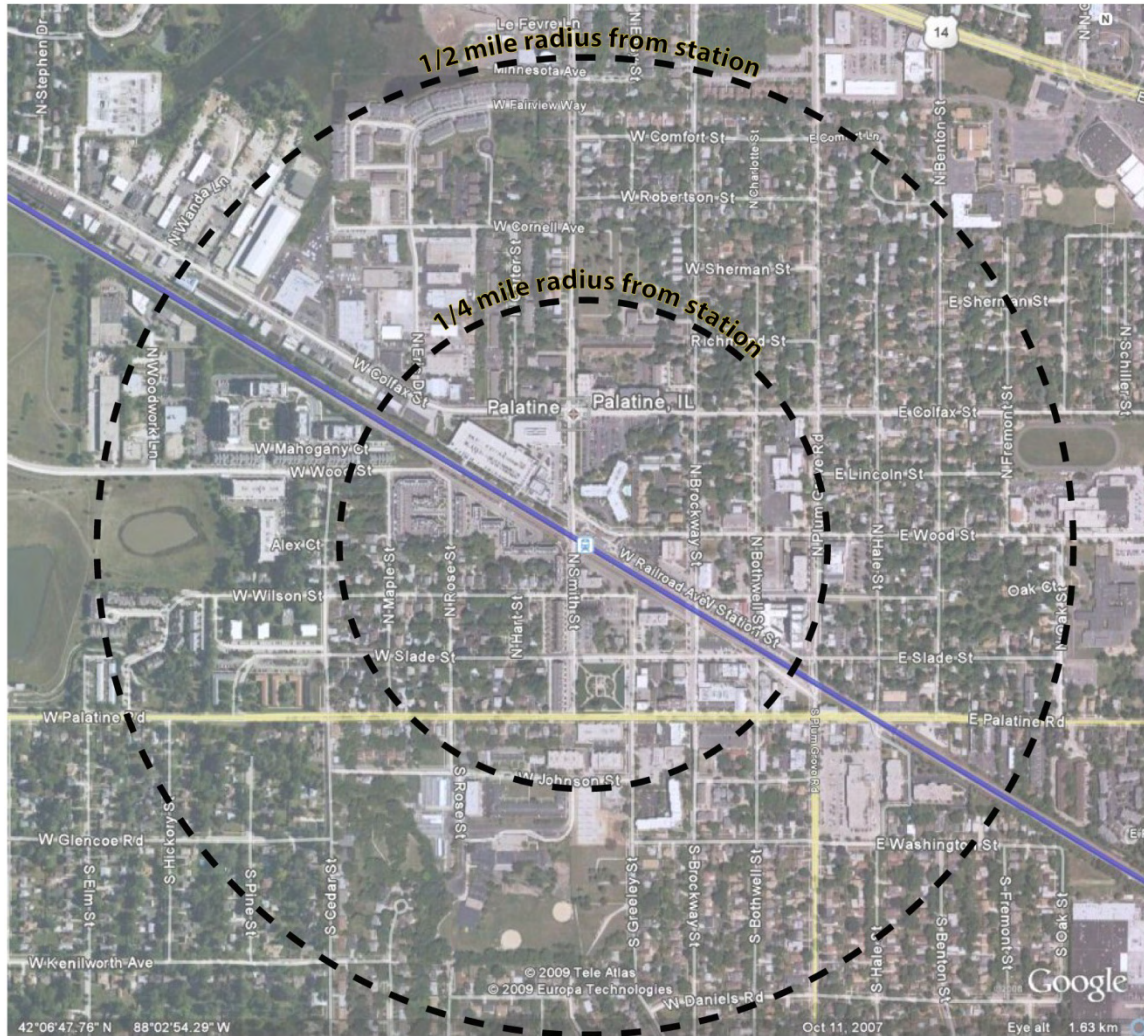
DOWNTOWN PALATINE, 2002



DOWNTOWN PALATINE, 2009



1/4 and 1/2 mile walking radii (5- and 10-minutes) from Palatine Station



1. Town Square Park



2. Palatine Train Station



3. Office and Commercial: Gateway Center and Dirty Nelly's



4. Residential: The Groves of Palatine



5. Residential: The Brownstones



6. Residential / Retail: The Providence



7. Residential: Palatine Station



Harbor Station Benchmarking Survey – Alameda, CA

Municipality: City of Alameda	Miles from CBD: 15 by car
Project/Station Name: Bay Farm Peninsula and Harbor Bay Isle Ferry Terminal	
Contact: Ernest Sanchez – Land Development and Transportation Division - Ferries Email/Phone: (510) 749-5840	
<p>1. <i>What type of transit is the TOD centered around? (existing bus/rail, potential future rail stop, etc) What are the frequencies of service and average number of daily riders?</i></p> <p>The Harbor Bay Isle ferry terminal was built after much of Bay Farm had been developed, thus it is not truly a TOD. However, most of the residential development within a ¼ mile walking radius of the ferry was built after the ferry terminal was in place.</p> <p><u>Ferry Terminal</u> – Weekday 2-way commute trips only. Hourly during the AM and PM peak (6 trips per day per direction). 25 min to downtown San Francisco</p> <p>Bus stop in front of dock with service every 15 minutes between 5am and 8pm, 30 minute frequencies 8pm-12am, including weekend service. Serves ferry, Alameda town center, 3 BART stations, Oakland Airport.</p>	
<p>2. <i>What elements are included at the transit facility(ies)? If multiple transit modes serve the area, how are the facilities designed to allow for multi-modal transfers?</i></p> <p>Ferry facilities</p> <p><u>Major structures</u></p> <ul style="list-style-type: none">• Ferry slip• Gangway• Large shelter (overhead protection and on 3 sides for wind) <p><u>Pedestrian and Bicycle Amenities</u></p> <ul style="list-style-type: none">• Bicycle racks and electronic lockers• Lighting• ADA accessible standards met <p><u>Vehicle Amenities</u></p> <ul style="list-style-type: none">• Surface parking lot – 225 parking spaces (free)• Drop-off area for buses and cars <p>Transfer facilities</p> <ul style="list-style-type: none">• Bus stop in front of dock with free transfers to AC transit and a local bus with connections to BART• Waterfront pedestrian/bicycle path• Wayfinding – Signs off of I-880, not much in terms of wayfinding• Free shuttle bus to Harbor Bay Business Park• Bus stop / drop off area in front of dock	

3. *What is the mix of uses planned/developed around the station? Over what period of time?*

Developed: 912 acre master planned community on Bay Farm

- Residential, primarily single-family housing (~3,000 homes)
- Shopping center
- 312 acre business park– office park of over 100 companies, agencies, organizations; hotels, restaurants (5 mill sq ft of facilities)
- Golf course
- Chain of lagoons and community parks including waterfront- greenbelt around perimeter of the peninsula

Phasing:

- Residential complete in 1978
- Business park started in 1983, opened in 1984, finished in 1998
- Ferry station opened in 1992

4. *What planning framework was in place (zoning, land use plan, streamlined process, proactive planning board, etc) to facilitate the development/transit system?*

- Bay Farm/Harbor Bay is a master planned community with the original residential neighborhoods, or “villages” built in 1978. In 1989 a Development Agreement between the City of Alameda and the Harbor Bay Isle developers was signed to clarify responsibilities for provision of the public facilities by the applicants, including a fire station and public school site; the completion, improvement, and maintenance of public open space; and to provide a funding source for a portion of the costs of certain infrastructure including major arterial roads. In 1992 the Alameda Harbor Bay Ferry began service as a 3-year permit requirement to mitigate traffic.
- The Business Park Association (non-profit) helps fulfill obligations under the original approvals and entitlements for the development of the Business Park to mitigate traffic by promoting transportation systems management initiatives to support public transit:
- Provides Shuttle Bus connection to BART and ferry terminal through a contract with Altrans
- Provides subsidized BART tickets, AC Transit tickets, and private subsidy support for the Alameda Harbor Bay Ferry Service.
- 6 or 7 approvals were required to develop the land-side and water-side aspects of the ferry terminal across both Alameda and Oakland. Included Audubon Society, City of Alameda Public Works, etc.

5. *What transportation infrastructure was in place to support the station and surrounding development, and what was added? (roads, local buses, pedestrian paths, bike paths, bike and vehicle parking, etc)*

- Residential was built in 1978, ferry opened in 1992
- Roads already laid out to access ferry terminal as well as waterfront ped/bike path
- Bus route 50 extended to ferry terminal
- Bicycle and vehicle parking added during ferry terminal development

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6. *Who was responsible for any additional infrastructure (developer, transit agency, etc)?*

Business Park Association

- Provides a private subsidy to the Alameda Harbor Bay Ferry Service, which is primarily funded by passenger farebox revenues and by public subsidies from State and Regional government agencies and the City of Alameda. The ferry passenger service is operated by Harbor Bay Maritime, Inc., a private company with headquarters in the Business Park.
- Manages and maintains the ferry terminal under a contract with the City of Alameda. 225 parking spaces (free) at the station, bicycle parking
- Provides free shuttle through business park to ferry and BART

7. *What is the station catchment area (< 0.5 miles, <1 mile, **1-3 miles**, >3 miles)? How do these riders access the station and about how many? How many trips are captured internally by the development?*

- Catchment Area: Bay Farm / Alameda community, which is 1-3 miles
- Drive, bus
- Internal Trip Capture – not available. However, some residents of Alameda/Bay Farm do work in business park

8. *Any tips or lessons learned for maximizing transit access that you would suggest to other municipalities looking into TOD around commuter rail/ferry stations?*

- Take care to work out issues with Public Utility Commission or equivalent, they can affect:
 - Location of station
 - Rate approval – had to consider fare rates for minority groups

9. *How have current economic conditions affected transit ridership at this station?(Ex. Increase in ridership, decrease due to job loss, vacant housing, etc)*

- Have not seen a significant drop in ridership. Ridership increased slightly in 2009. Businesses located in the businesses park have not been affected.

Imagery



Bay Farm Island, 2010 (Alameda to the North, Oakland to the East)



Bay Farm Island, 1993 (USGS map from <http://msrmaps.com/>)



Bay Farm Island, 2010



Large surface parking lot increases walking distance to residential development



Harbor Bay Ferry Terminal http://www.cable-car-guy.com/ferry/images/harbor_bay_terminal_0403.jpg

Variable Matrix for Harbor Station Multimodal Station Study

Project	Location/ Municipality	Land Use				Transportation							
		Population density (per sq mi) 2008	Residential	Commercial	Open space	Primary Mode	Primary Mode Daily Ridership	Pedestrian access/ amenities	Bicycle access / amenities	Secondary Transit access / amenities	Vehicle access	Wayfinding	Catchment Area
Reston Town Center Transit Center	Reston, VA/Fairfax County	1,500	Total units N/A: several mid- to high-rise condos	-360,000 sq ft retail -2,100,000 sq ft office	-Outdoor skating rink -2 Large public plazas -Pedestrian-only streets	Local and regional Buses	N/A	-Sidewalks -Crosswalks with pavers -Pedestrian bridge -Bus shelters -Seating -Lighting -Pedestrian-only streets	-Regional bicycle trail -Bicycle parking	-Bus transfers -Connector store (ticket sales, maps, schedules)	-Parking garages at town center (free)	-Connector store -Uniform signage defined in master plan	< 1 mile
Downtown Palatine	Village of Palatine, IL	5,000	1,000 units: mix of townhouses, mid-rise condos with ground floor retail	-120,000 sq ft office -93,000 sq ft other commercial (retail, etc)	-Shared use path -Town Square park -Pocket parks	Commuter rail - supported by local bus	2,500	-Sidewalks -Crosswalks with pavers -Shared use path -Platform shelters -Seating -Lighting	-Shared use path -Bicycle racks	-Bus transfers -Vanpools with dedicated parking	-2 Kiss-n-ride locations - 1,500 spaces in shared parking lot	Wayfinding design standards (part of land use guide, required by developers)	over 3 miles
Bay Farm- Harbor Bay Isle Ferry	City of Alameda, CA	3,000	3,000 units: single family homes	-5,000,000 sq ft business park with over 100 companies, hotels, restaurants -115,000 sq ft shopping center	-Chain of lagoons and community parks -Waterfront greenbelt around island -Golf course	Ferry - supported by local bus, connection to rail	~550	-Sidewalks* -Crosswalks* -Shared use path -Terminal shelter -Seating -Lighting *adjacent to terminal parking lot, not directly connected to terminal	-Shared use path -Bicycle racks and electronic lockers	-Bus transfers (free) -Shuttle to rail and Harbor Bay Business Park (free)	-225 surface parking spaces (free) -Kiss-n-ride	Limited- signs from highway	1-3 miles