Introduction

The Middle Branch Transportation Plan is a long-range guide to enhance the transportation system within Middle Branch communities. In order to improve access to Baltimore's waterfront, increase mobility for residents and visitors, and prepare for new economic development initiatives, a comprehensive strategy is needed to maintain and upgrade infrastructure. The overarching goal of the Middle Branch Transportation Plan is to assist in unlocking the economic potential of a 275-acre district anchored by the Middle Branch harbor. A comprehensive, multi-modal transportation system can serve as the backbone for a transitioning industrial waterfront and help remake the area into a livable, mixed-use collection of neighborhoods, spurring new jobs, housing and investment opportunities.

The vision is to open up Baltimore's waterfront, making the area more inviting and improving mobility for residents and visitors. The Transportation Plan comprises two areas - Phase 1 covers the Middle Branch Urban Renewal Area and the residential portions of the Cherry Hill and Westport. Phase 2 includes the Federal Hill and Locust Point communities. A map of the Phase 1 and Phase 2 study areas can be found in Figure 1.

The Transportation Plan is a comprehensive study that documents existing conditions and future impacts. To understand what residents experience daily, engineers studied sidewalks, bus stops, bike routes, streets, the MARC and light rail systems, and possible future streetcar routes. The plan's primary goals are to systematically identify infrastructure needs, prioritize recommended improvements, reduce the use of cars and promote other modes of transportation. The Plan also looks into the future to understand how major development plans, such as the Westport Waterfront could affect transportation patterns and traffic congestion.

The Middle Branch Transportation Plan proposes traditional traffic and roadway improvements, as well as solutions that will make the Middle Branch neighborhoods more

COMMUNITY GOALS

Understanding that residents want a transportation system that is safe, sustainable, and multi-modal, the following community goals, which are highlighted in the Middle Branch Master Plan, directed the efforts of the Middle Branch Transportation Plan:

- Promote new developments and renewal of existing communities to produce vibrant and secure public spaces, new housing, employment, and tax revenue
- Encourage walking, bicycling, water transport, and public transportation, particularly at major transit nodes and light rail stations.
- Enhance circulation within and around neighborhoods.
- Improve regional access to the Baltimore and Washington, D.C. metro areas for public and private transportation modes.
- Assess the usage and capacity of the current transportation infrastructure and add targeted capacity, facilities, and connections.
- Develop policies and procedures to guide future transportation planning, to implement the transportation strategies, and to manage and sustain the transportation system.

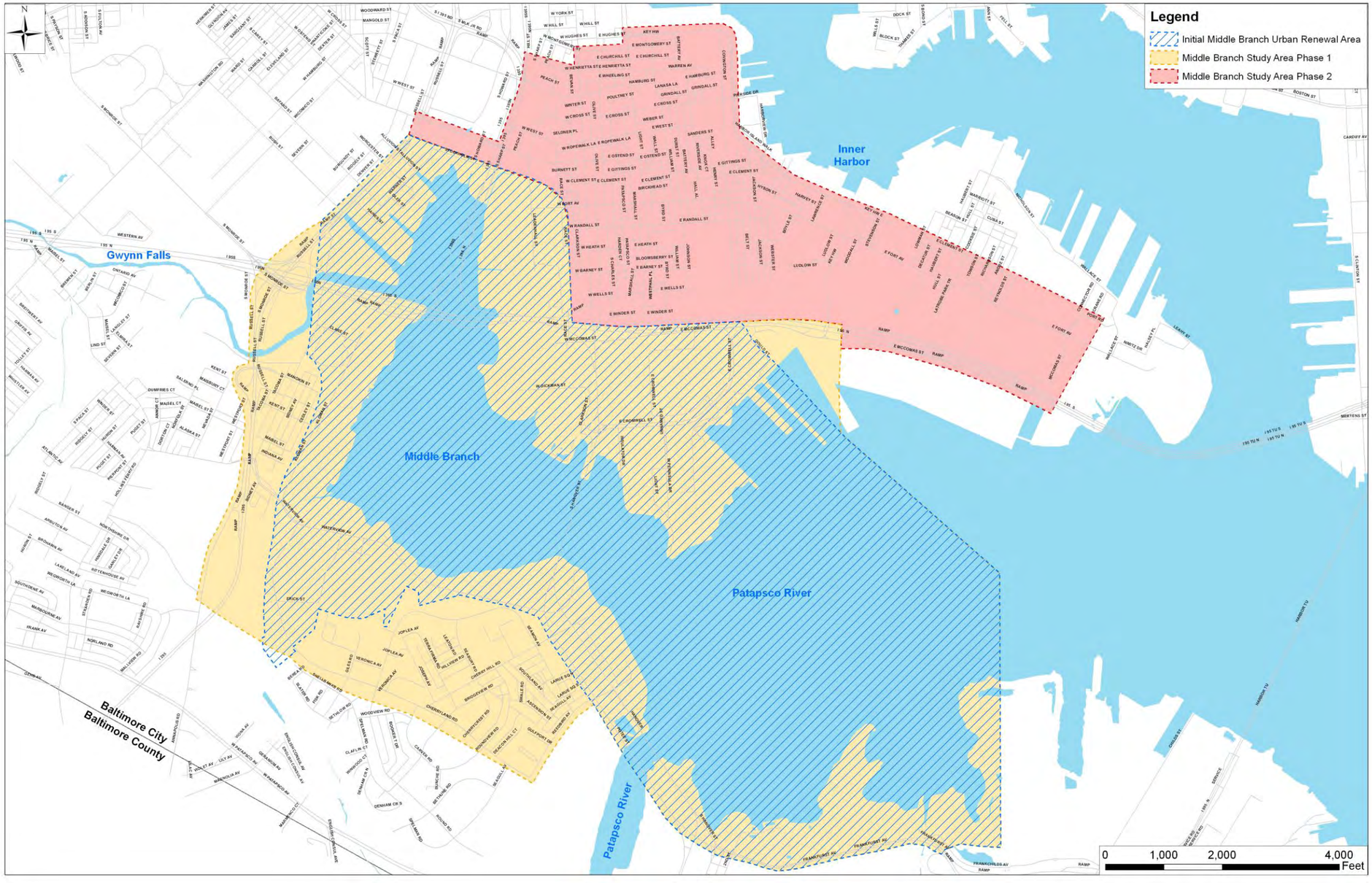
pedestrian-, bicycle- and transit-friendly. Carrying out the plan recommendations will create benefits for the area beyond simply improved transportation. Reduced environmental impacts associated with greenhouse gas emissions, reduced dependence on fossil fuels, lower transportation costs for working families, health benefits associated with active transportation, and improved community livability and sustainability are just some of those benefits of a balanced transportation network that supports all modes.

Study Area

The study area mimics that of the Middle Branch Master Plan, drafted by the Baltimore City Department of Planning, while also including Federal Hill, Locust Point, and the 295 corridor in Westport. Expanding the study area allows for a comprehensive, systematic view of the transportation network around the Middle Branch and allows us to see "barriers", or constraints of the system more clearly. If a resident wants to travel from Cherry Hill to Federal Hill, but he or she does not own a car, how will such a trip be accommodated in the future? This is just one of the questions this study can answer.

It is also important to note the differences between the Phase I and Phase 2 study areas. Due to intensive data collection efforts, the entire study was split into these two phases, however, while Phase 1 consists primarily of aging industrial/commercial land uses, vacant or underutilized waterfront parcels and major arterial routes, Phase 2 consists of dense residential neighborhoods and a grid style road network which carries mostly local traffic. The difference in character between the two study phases was considered when recommending various infrastructure improvements.

Figure 1 - Phase 1 and Phase 2 Study Areas



This summary document provides an overview of the recommendations. Detailed findings and the technical methodology outlining the approach can be found in the Technical Appendices.

This project builds upon several previous plans in the Middle Branch area that have been completed and approved by one of the following: the Baltimore City Department of Transportation, the Baltimore City Department of Planning or the Neighborhood Design Center. The plans have been viewed by the public. Recommendations from these plans are referenced throughout the Middle Branch Transportation Plan. The plans are as follows:

- Brooklyn and Curtis Bay Strategic Neighborhood Action Plan (SNAP)
- Middle Branch Master Plan
- Locust Point Plan
- Cherry Hill Master Plan
- Sustainability Master Plan
- Key Highway Waterfront Master Plan
- Annapolis Road Enhancement Study
- Westport/Mount Winans/Lakeland Plan SNAP

MIDDLE BRANCH MASTER PLAN

The Middle Branch Master Plan (MBMP) emphasizes the need to focus on walking, biking, and transit. Recommendations from the MBMP include:

- Enact design guidelines and develop street/path connectivity.
- Adopt a sustainable transportation policy to support walking, transit use and on-street bicycle networks, particularly at major transit nodes and light rail stations.
- Create a new comprehensive recreational path system that links existing and new communities, the waterfront, downtown, Masonville Cove, and the Gwynns Falls Trail.

Sustainability

The Middle Branch Transportation Plan supports a number of the transportation goals and objectives of the Baltimore City Sustainability Plan, adopted by the city in 2009. These sustainable transportation goals include:

- Improving Public Transit
- Accommodating and prioritizing bicycle and pedestrian modes
- Expanding the ride sharing program and accommodating shared vehicles
- Improving transportation equity to reduce transportation costs for residents who may not have access to an automobile
- Shift more funding away from auto capacity improvements towards sustainable modes

Existing Conditions

Like the Inner Harbor before it, the Middle Branch is poised to become a vibrant collection of mixed use waterfront neighborhoods. A major barrier to potential revitalization is the Middle Branch's transportation network. Primarily designed to serve heavy industrial traffic, it now needs to be readapted for a broad array of users, including new residents, bicyclists, recreational walkers/joggers, and commuters who prefer not to drive to work.

I. Public Green Space

The Baltimore City Department of Transportation (BCDOT) believes that the Middle Branch neighborhood is a prime candidate for community revitalization efforts that are friendly to pedestrians and bicyclists. A key to the area's successful revitalization will be to connect to the waterfront through improved access and public space. Developing new gathering places for residents and creating safe and convenient pathways to encourage use is fundamental to this effort.

In spite of being within a mile of downtown Baltimore, the Middle Branch area has a significant amount of green space. The Middle Branch park system preserves much of the Middle Branch shoreline for public access. The park system offers an opportunity to create a "green necklace" around the waterfront and provide passive recreational opportunities. This valuable resource could help the Middle Branch area to mirror the success of Baltimore's Inner Harbor, which offers many opportunities to see, hear, and experience the waterfront.

EXISTING CONDITIONS

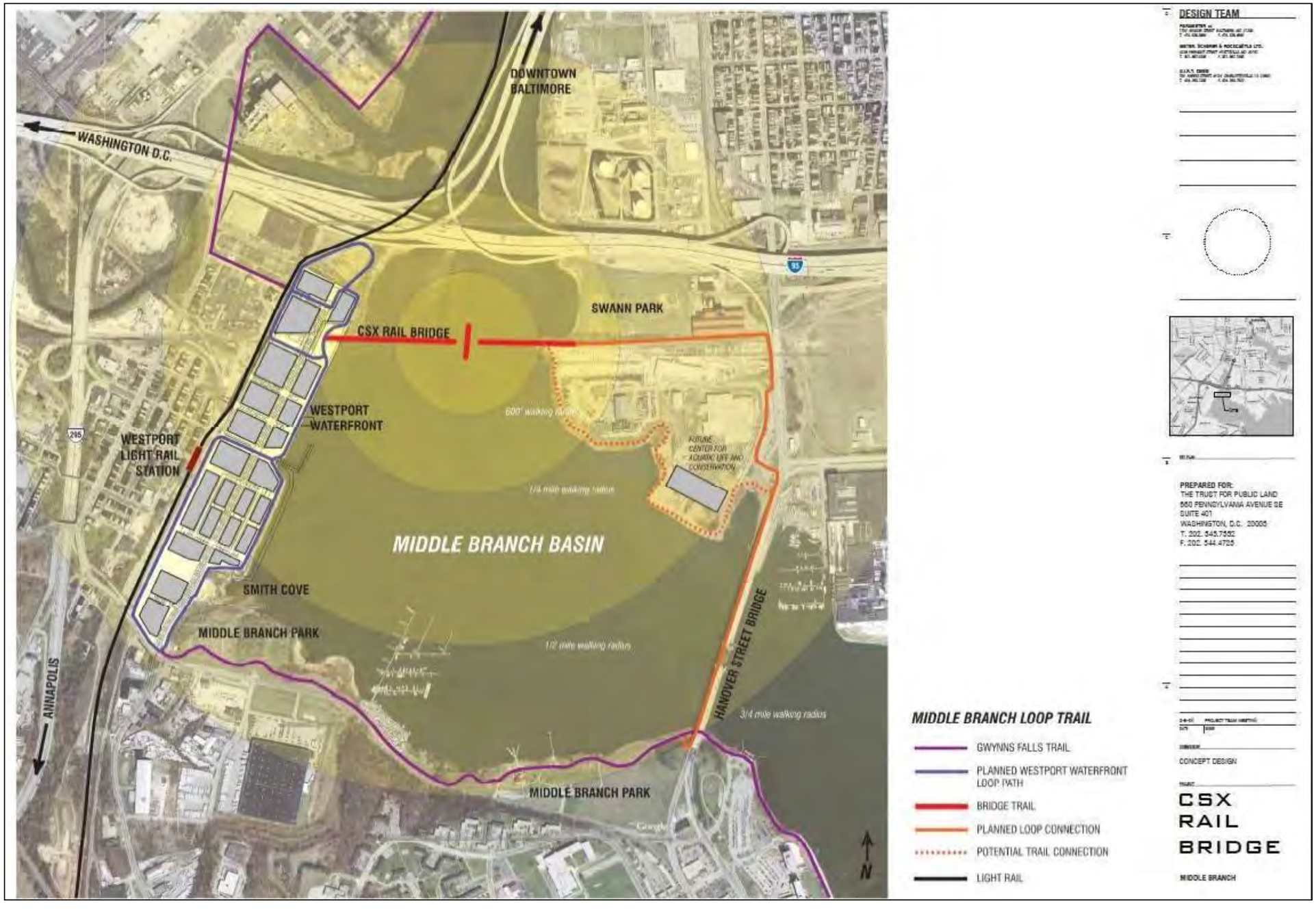
To determine existing conditions, engineers collected data for:

- Pedestrian and bicycle facilities
- Transit facilities
- Existing traffic volumes
- Crash History
- Pavement Condition
- Traffic Patterns
- Vehicular level of service for intersections

The park system includes the Middle Branch Estuary, which creates a sense of wilderness in the middle of the city. The Estuary is a corridor of open space connected by a series of bridges. The Estuary is the heart of the Middle Branch study area, not just geographically but also functionally.

The Gwynns Falls Trail (see Figure 2) is located along the southern shore of the Middle Branch, extending from the park and ride lot at I-695 in West Baltimore 15 miles to the Middle Branch and from the Inner Harbor one mile to the Middle Branch. The trail has potential for a series of loop trail systems around the Middle Branch waterfront, connecting habitat and eco-education locations with surrounding communities and the larger Baltimore community.

Figure 2 - Gwynns Falls Greenway



II. Pedestrian Pathways and Bicycle Facilities

It is envisioned that the entire Middle Branch waterfront will someday be safe and accessible for pedestrians and bicyclists, with a sparkling clean Middle Branch as a backdrop as residents, commuters and children travel on foot or by bike between Westport, Port Covington, Cherry Hill and South Baltimore. While Phase I and Phase II of the study area are different in character, connecting these sections of the city with safe and highly visible pedestrian and bicycle links will help close the mobility gap between Middle Branch neighborhoods and South Baltimore, and improve accessibility to jobs and recreation opportunities for residents of both areas.

The creation of seamless off-road shared-use trails is not without challenges. For instance, the landforms of the Middle Branch area and the constant presence of the harbor make disparate parts of the study area difficult to connect. Connections must take advantage of existing water crossings, so improvements to the CSX swing bridge and the Hanover Street Bridge are critical. These improvements will establish pedestrian/bicycle links that are necessary to the completion of a publicly accessible loop serving Middle Branch neighborhoods. Designated bike lanes are needed to help bicyclists travel safely through the area. Additionally, improvements to the existing sidewalk network are necessary to ensure access for persons of all abilities.

Connecting to the waterfront through improved access and public space will offer destinations and gathering places for residents. The CSX Swing Bridge, the Gwynns Falls Trail and proposed bike lanes would tie in with the planned residential and commercial development at Westport and provide an amenity for future waterfront development in the west Port Covington area.

III. Transit

The Middle Branch neighborhood is served by bus service, light rail, and the Maryland Area Regional Commuter (MARC) commuter train. A well-developed and integrated transit system can reduce congestion and support community revitalization through complementary land development patterns or "Transit-Oriented Development." This type of development pattern links surrounding residential and commercial areas to transit facilities. By extending the street grid to West Covington, Port Covington, and other greenfield and brownfield developments sites, improved neighborhood connectivity and better access for pedestrians and transit vehicles would result.

TRANSIT-ORIENTED DEVELOPMENT PRINCIPLES

- Planning for pedestrians is equally as important as planning for cars
- Train/Bus stations are a key feature of the community
- Homes, stores, offices and public facilities are located near train and bus stations
- Development is high density within a ¼ mile (10-15 minute) walk of the train/bus

In order to increase ridership on the bus system, pick up and drop off locations must be safe and convenient. The Transportation Plan documented that bus service is readily available in the Middle Branch neighborhoods, with 106 bus stops located within the Phase 1 and Phase 2 study area. To understand the perception of safety and convenience, an inventory was prepared noting the condition of each stop. Sidewalk conditions in the vicinity of stops were also recorded, as each transit rider begins and ends her/his trip as a pedestrian.

As new development projects come on line in the neighborhoods around the Middle Branch, the Middle Branch harbor should be utilized not only as a recreational and scenic resource, but as a major commuting route with frequent and reliable water taxi service. Far less marine traffic travels through the Middle Branch than the Inner Harbor, creating a unique opportunity to use the waterway to greatly reduce auto trips on the road network between Downtown and the South Baltimore and Middle Branch neighborhoods, including Hanover Street and Russell Street.

In addition to addressing the above considerations, this Middle Branch Transportation Plan also evaluates the adequacy of MTA's existing Camden Station, provides analysis of potential streetcar routes, and assesses parking efficiency at transit facilities in the study area, particularly at the Cherry Hill Light Rail Station.

IV. Roadway Conditions

Safety: Department of Transportation records for the three-year period between January 2005 and December 2007 show that eight intersections in the Middle Branch area have a high concentration of crashes, and that there was a total of 618 reported crashes at 65 of the 67 major study intersections. (Crash data was not available for Annapolis Road at MD 295 southbound ramps and MD 295 northbound off-ramp at Waterview Avenue.) The intersections with the highest concentrations of crashes during the study period were (see Figure 3):

1. Russell Street at Bush Street (37 crashes)
2. Light Street at Cross Street (31 crashes)
3. Charles Street at Cross Street (28 crashes)
4. Key Highway at McComas Street (24 crashes)
5. Hanover Street at Hamburg Street (23 crashes)
6. Russell Street at Bayard Street (23 crashes)
7. Potee Street at Cherry Hill Road (22 crashes)
8. Potee Street at Reedbird Avenue (22 crashes)

Roadway Surface: Almost half of the streets in the Middle Branch neighborhoods were found to have poor pavement conditions. This is especially important because bicycle travel, which is strongly encouraged by the City, is particularly sensitive to uneven pavement. Almost half (46.8%) of the streets in the Phase 1 study area, were rated as poor, while 35.2% in Phase 2 were rated as poor. The fifteen streets determined to be most in need of repair are (see Figure 4):

1. Randall Street from Johnson Street to Webster Street
2. E. Fort Avenue from Andre Street to Steuart Street
3. Cherry Hill Road from Cherryland Road to Seamon Avenue
4. Covington Street from E. Cross Street to E. Gittings Street
5. Jackson Street from Key Highway to E. Barney Street
6. Frankfurst Avenue from 2nd Street to I-895 S. Ramps
7. E. Ostend Street from S. Charles Street to Light Street

E. McComas Street from Gould Street to I-95 N. Ramp

8. E. Clement Street from Light Street to William Street

Bridgeview Road from Cherryland Road to Seabury Road
S. Sharp Street from W. West Street to W. Ostend Street
Reedbird Avenue from Potee Street to S. Hanover Street
E. Fort Avenue from Battery Avenue to Henry Street
Annapolis Road from Ramp to Southbound MD 295 to Merchant Drive

9. E. West Street from Light Street to Riverside Avenue

Capacity/Level of Service: The quality of traffic service along major streets in Middle Branch was evaluated using Synchro software. Synchro is a traffic analysis program that simulates how vehicles operate on a roadway network based on traffic volumes, roadway geometry, and traffic signal timings. Synchro analysis was performed for all 67 key intersections in the study network. Performance measures of effectiveness include maximum volume-to-capacity (v/c) ratio, delay, and level of service (LOS). Levels of service range from "A" to "F" where "A" represents optimal conditions and "F" represents saturated or failing conditions. The volume-to-capacity ratio (v/c ratio) is the ratio of current flow rate to the capacity of the intersection, which is an important measure of is the quality of traffic service on a roadway. Generally speaking, a ratio of 1.0 indicates that the roadway is operating at capacity. A ratio of greater than 1.0 indicates that the facility is failing, as the number of vehicles exceeds the roadway capacity. All key intersections currently operate at acceptable levels of service ("D" or better) (see Figures 5a and 5b).

Traffic congestion occurs around the Middle Branch. For example, residents and commuters know that this occurs in the morning rush hour at the on-ramp to I-95/I-395 and at Russell Street, where cars have been observed periodically backing up well beyond the I-95 overpass from the traffic signal at Bush Street.

Figure 3 - Intersections with Highest Concentrations of Crashes

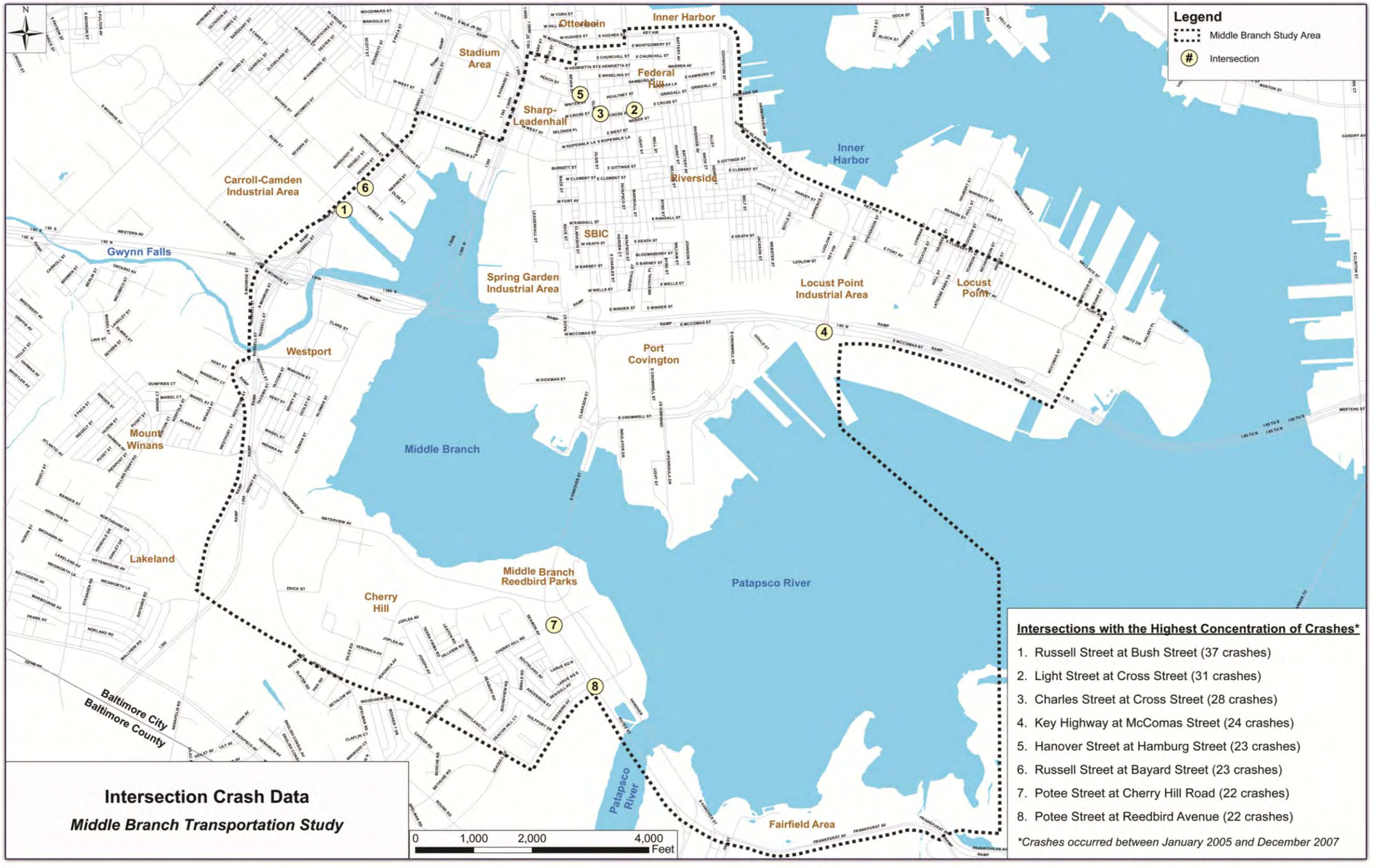


Figure 4 - Segments in Greatest Need of Repair

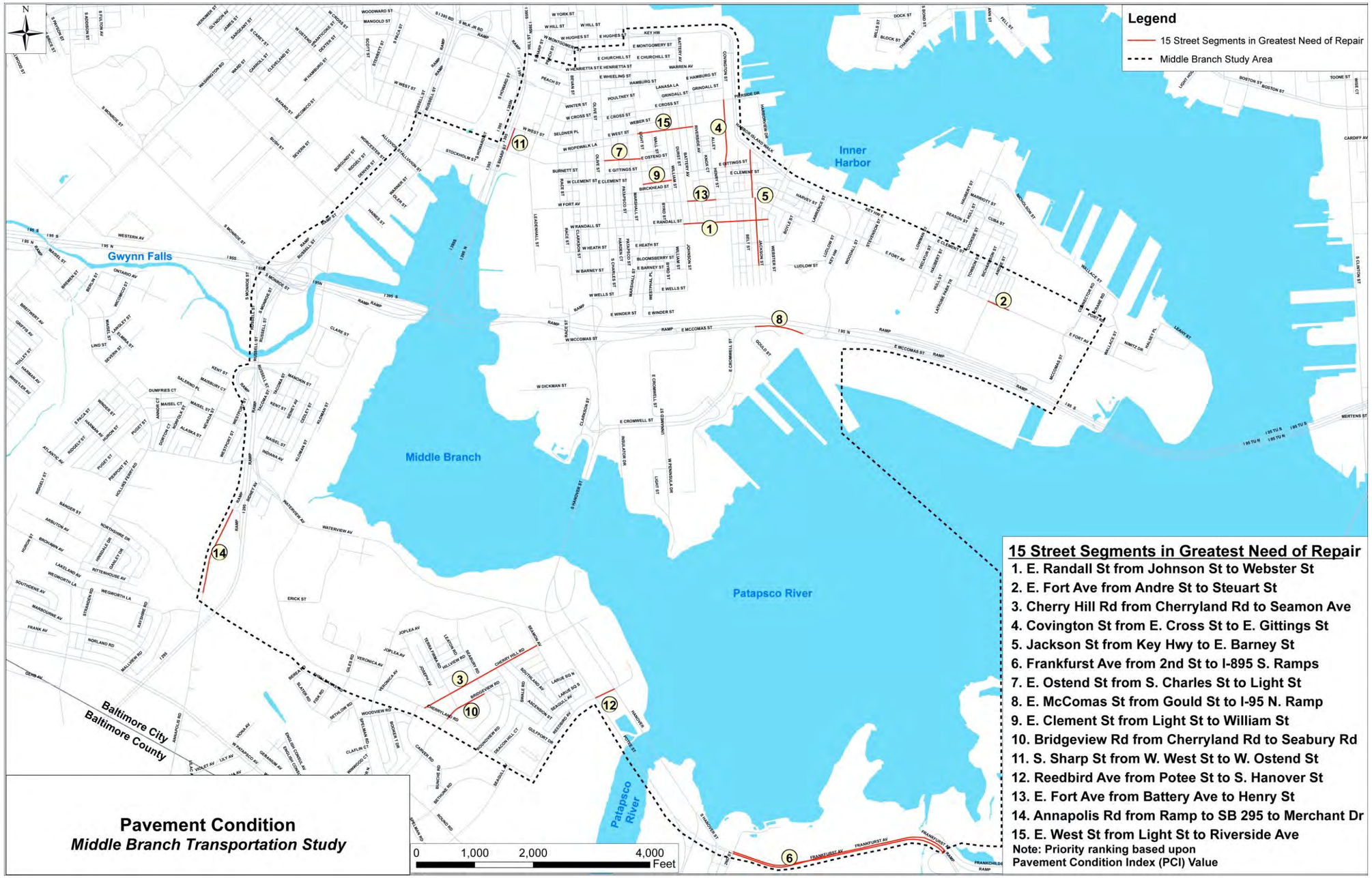


Figure 5a - Existing Level of Service: Phase 1 Study Area

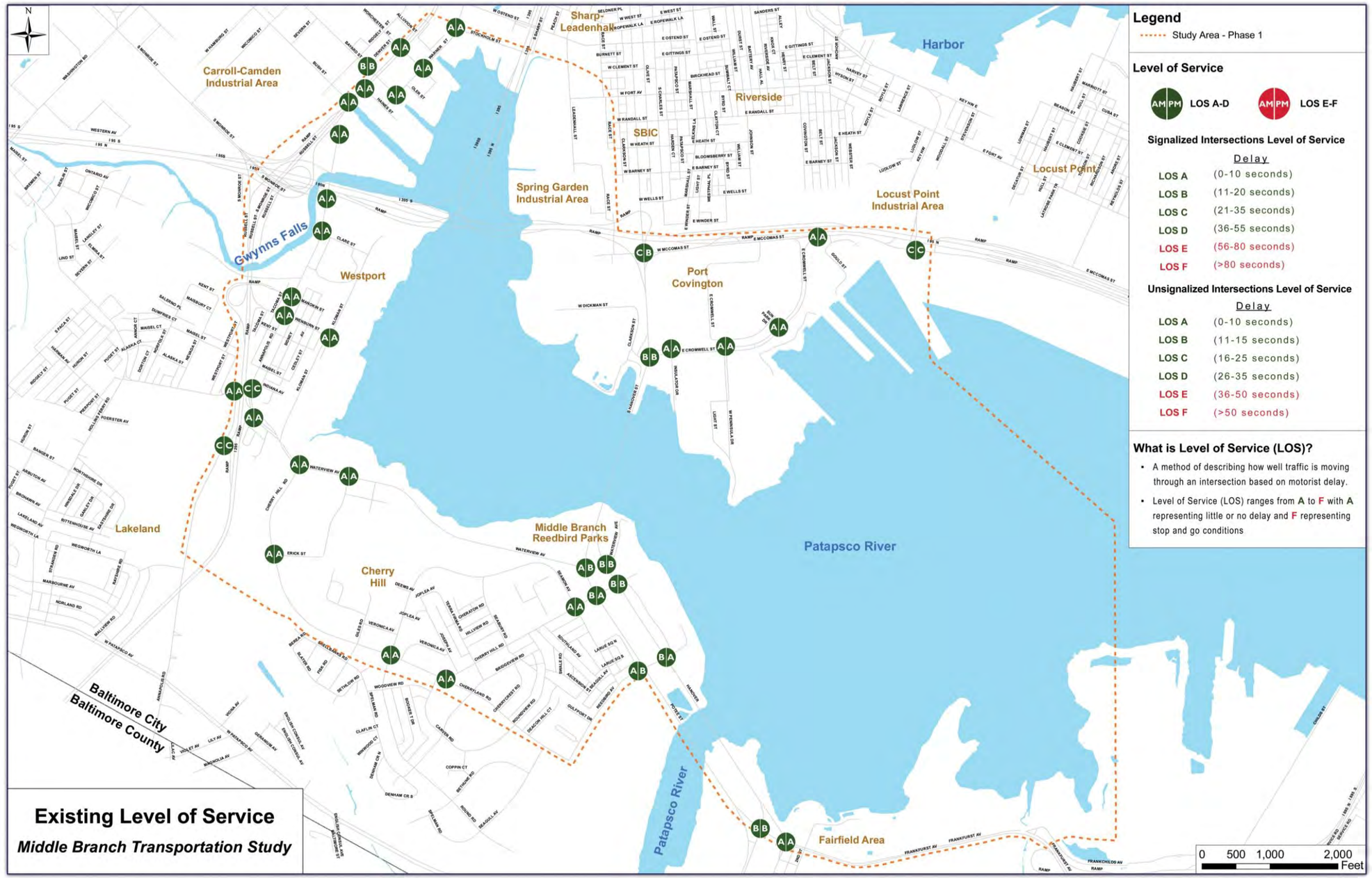
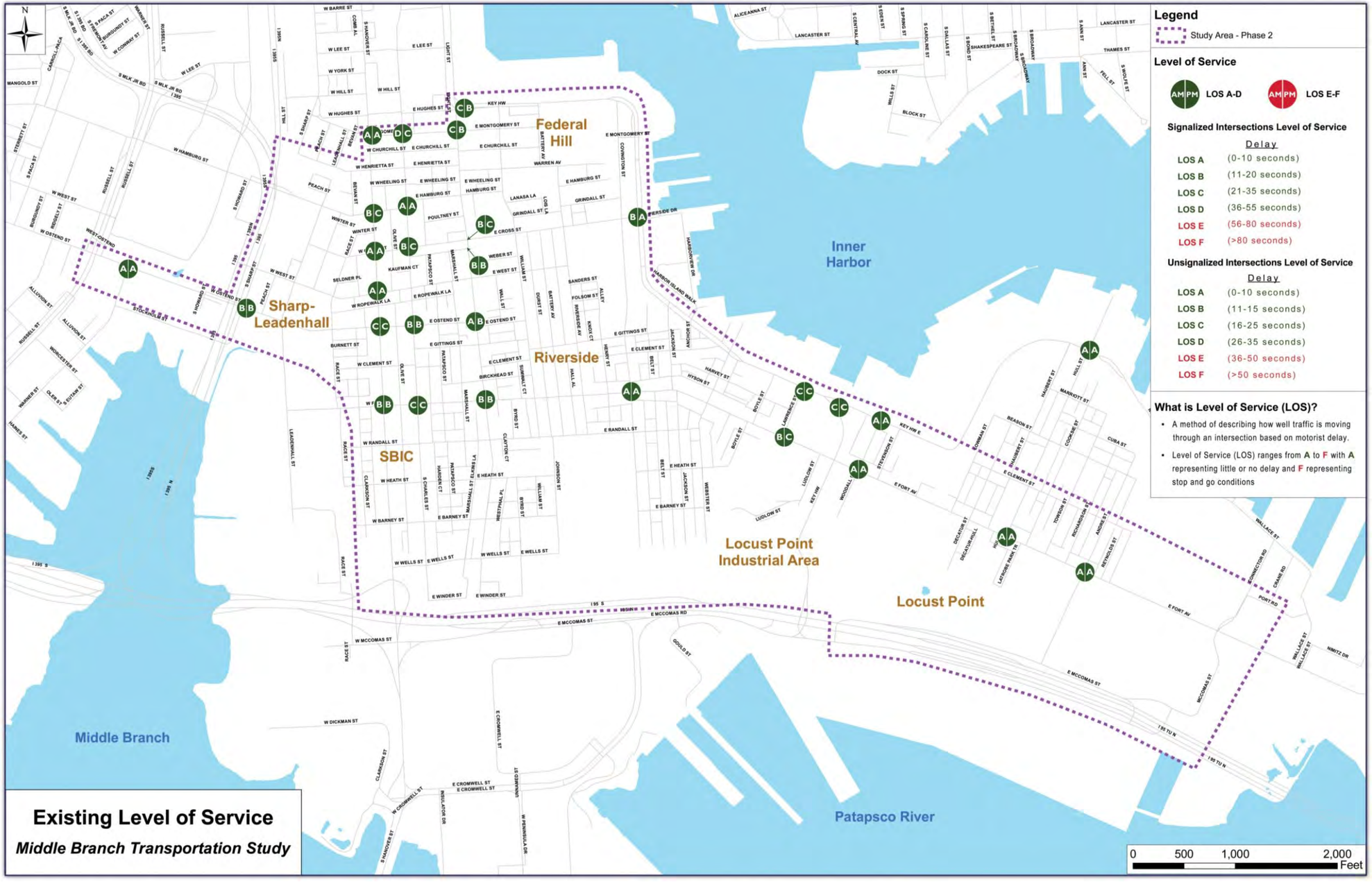


Figure 5b - Existing Level of Service: Phase 2 Study Area



Future Development Impacts

Future development is expected to cause an increase in travel by all modes in Middle Branch. Following is a list of planned or potential developments included in the analysis.

- 1901 S. Charles Street
- Lofts at Creek Alley
- McDean West Ostend Street
- McHenry Row
- Tide Point
- UMMC Ambulatory Care Center
- Westport Waterfront (Inner Harbor West)
- Baltimore Casino
- 1111 Light Street
- 1201 S. Charles Street
- Aquarium Center for Aquatic Life
- GE Site
- General Ship
- Harborview and Harborview South
- Main Steel
- Port Covington
- Ruppert Homes
- Waterview TOD

Figure 6 shows the locations of major development opportunities in the Middle Branch area. To determine how changing development patterns might affect traffic volumes, two build-out scenarios were assumed – Low Build and High Build.

- The low density, or "Low Build", scenario refers to the most feasible level of development at each site, which is comparable to other similar projects in the Baltimore metropolitan area.
- The high density, or "High Build", scenario refers to the maximum level of development that could be expected at each site. This scenario was created to make sure Middle Branch Transportation Plan infrastructure recommendations can accommodate any type of development which may occur within the next few decades.

FUTURE CONDITIONS

Future traffic conditions were forecasted from proposed development information. To perform this analysis, engineers considered:

- Trip generation
- Trip distribution
- Mode Choice
- Traffic assignment
- Historical traffic and origin-destination patterns
- Engineering judgment and knowledge of the roadway network

The process of forecasting future travel from these developments consisted of four general steps:

- **Trip generation**: How many trips per day (of all modes: pedestrian, bicycle, transit, and motor vehicle) will start or end at a particular site. In the case of development sites under consideration, trip generation was calculated separately for each land use within that site.
- **Trip distribution**: Where each of those trips will begin and end. This was estimated using engineering judgment, historical traffic and origin-destination patterns, and knowledge of the transportation network.
- **Mode choice**: Which of the four modes noted above the traveler will choose for each trip. The types of models used for this study do not explicitly model mode choice.
- **Traffic assignment**: Which route the traveler will choose for each trip. Similar to trip distribution, traffic assignment was estimated using engineering judgment and knowledge of the transportation network. It was balanced between multiple routes to determine paths of shortest travel time and minimal congestion.

Although traffic engineers may use accurate data and sophisticated models to estimate future travel behavior, it is important to remember that, in the end, we are predicting the future. As such, there are likely to be many changes in study area conditions, policies, and travel behavior over time that will affect those forecasts. In a mature urban area like Baltimore City, it is not unusual for travel forecasts to overestimate future congestion. Because the estimated congestion will build over time, travelers will typically make adjustments to their travel behavior to avoid it. For example:

- **Traffic assignment**: Travelers may choose less congested alternate routes where they are available.
- **Mode choice**: Travelers may choose to walk, bike, or ride transit rather than driving in congested areas.
- **Trip distribution**: Over time, travelers may change their destinations by selecting work, shopping, child care, etc. that are more convenient to home, especially by means other than driving.
- **Trip generation**: Travelers may also choose not to make as many trips, or may shift those trips to times outside the peak hours when congestion is less prevalent.

Of the 67 study intersections, 63 were analyzed under 2030 Low Build and High Build scenarios with optimized signal timings and no proposed geometric improvements. The remaining four study intersections are proposed for reconstruction as part of adjacent development projects.

Figures 7a and 7b provide future level of service under Low Build conditions. As indicated, 13 intersections are projected to operate at a less-than-acceptable level of service during at least one peak hour under low build conditions, with an additional two intersections (Light Street at Key Highway/Hughes Street and Lawrence Street at Key Highway) anticipated to operate at LOS "E" under high build conditions.

Figure 6 - Major Development Opportunities

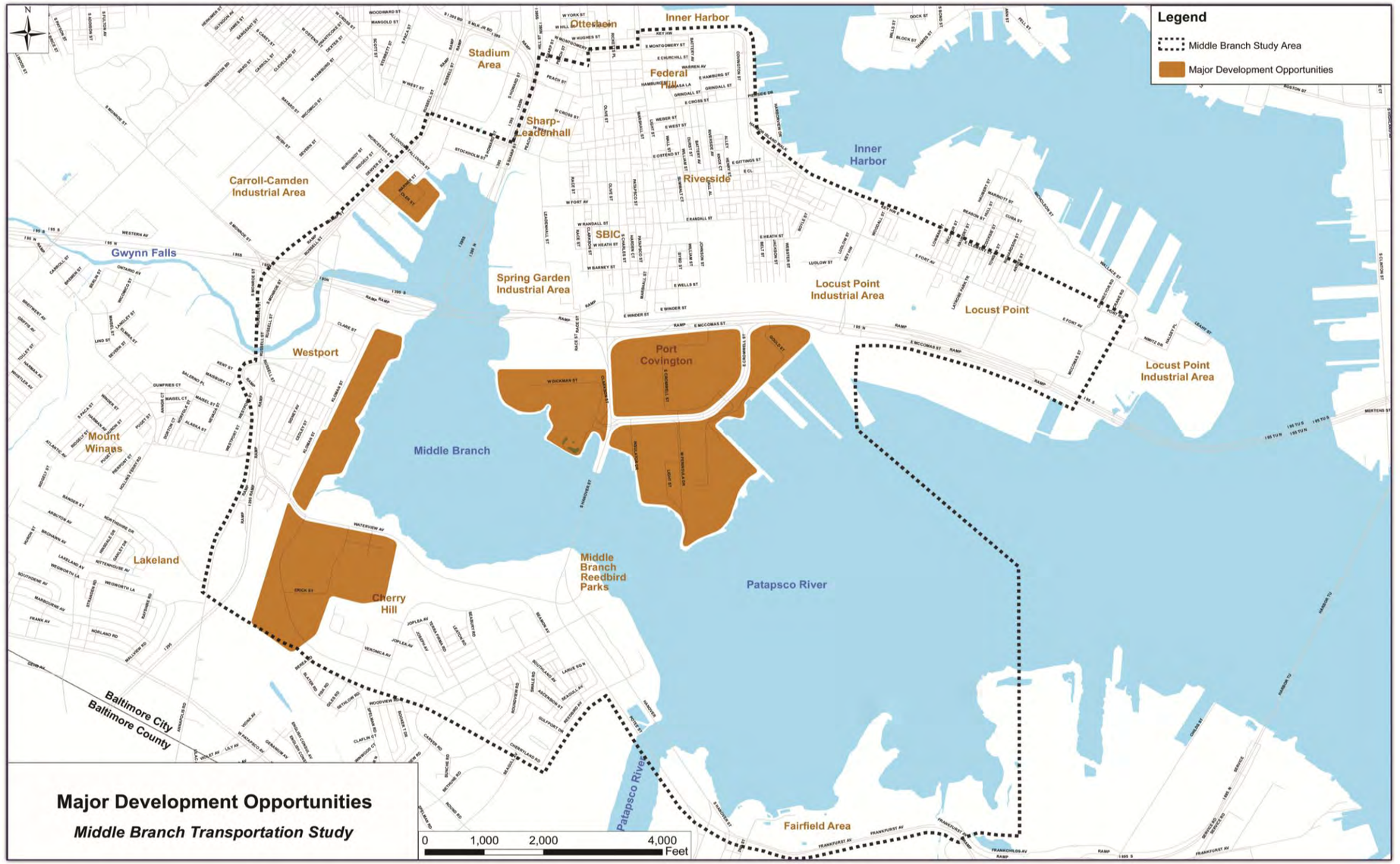


Figure 7a - Future Level of Service with No Geometric Improvements: Phase 1

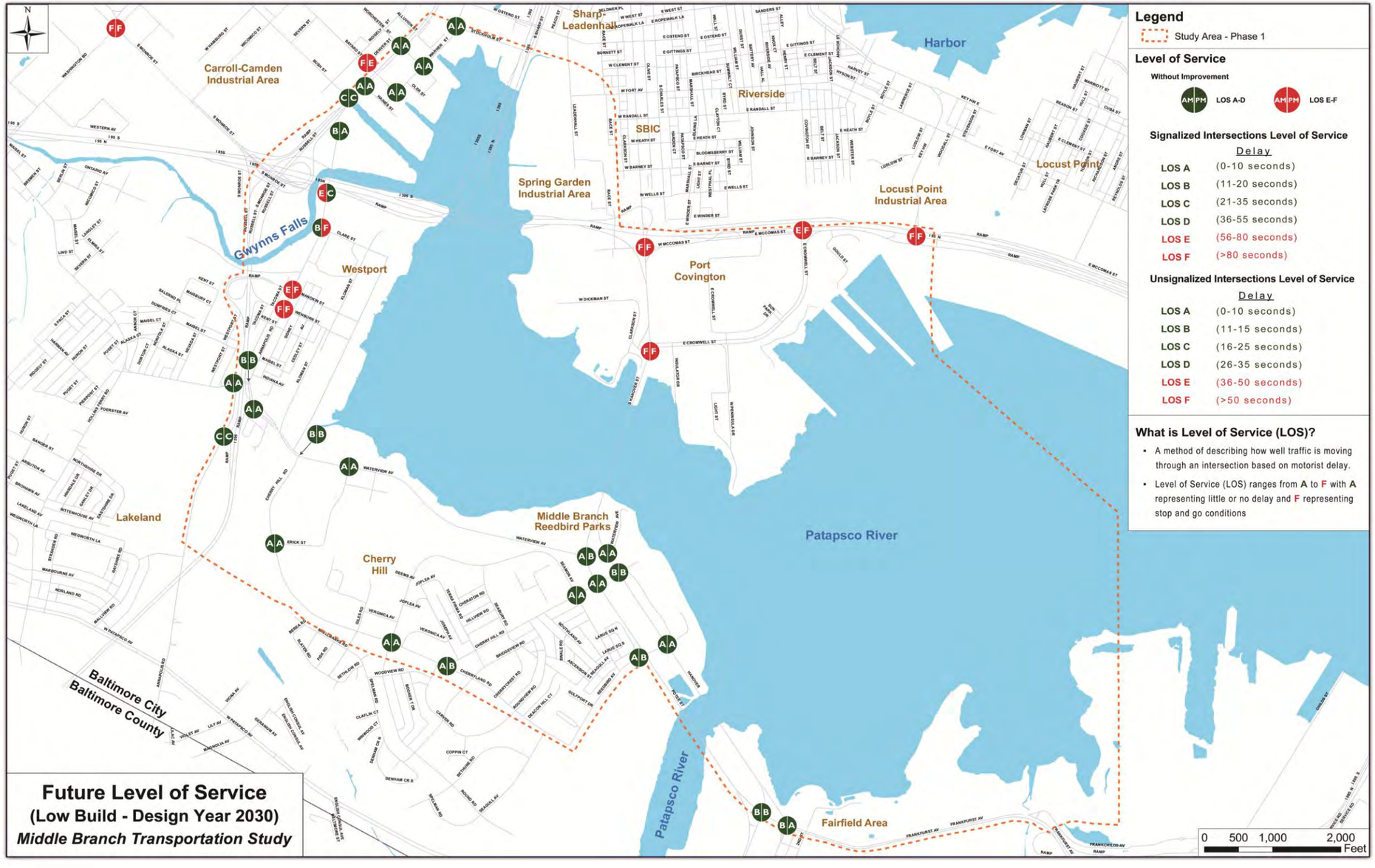
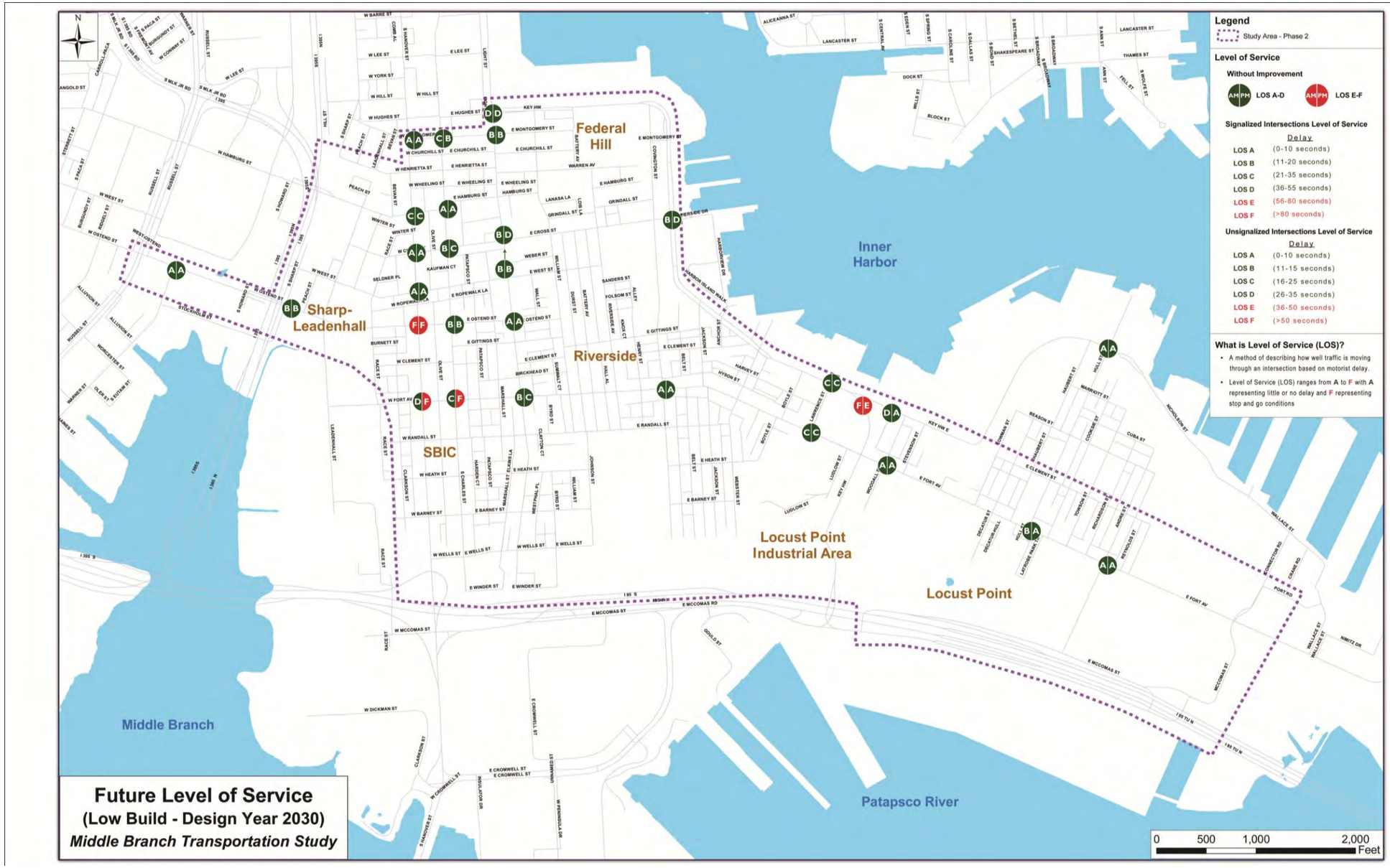


Figure 7b - Future Level of Service with No Geometric Improvements: Phase 2



Potential Improvements

A wide range of improvements were identified through the Transportation Plan's study efforts that could address area-wide capacity and accessibility concerns for all modes. These improvements cover the range of typical engineering solutions to common sense approaches to promote non-motorized transportation.

The following pages describe multi-modal improvements that should be considered in order to achieve the vision to connect to the waterfront and improve mobility for residents and visitors. Figure 42 contains an assessment of these potential improvements on all modes and on land use.

POTENTIAL IMPROVEMENTS

The Middle Branch Transportation Plan offers pedestrian-, bicycle-, and transit-friendly solutions as well as traditional traffic and roadway improvements. All are equally important to create sustainable Middle Branch neighborhoods. This summary document provides an overview of the improvements while detailed findings and the technical methodology outlining the approach can be found in the Technical Appendices.

I. Pedestrian and Bicycle Facility Improvements

Pedestrian and bicycle links are critical to the completion of a publicly accessible loop serving Middle Branch neighborhoods. Figure 8 displays general circulation patterns for the pedestrian/bicycle network.

Figure 8 - Bicycle and Multi-Use (Bike-Ped) Facilities

CSX Swing Bridge: The CSX Swing Bridge (Figure 9) crosses the Middle Branch between Swann Park and Westport. The bridge has not been maintained and is no longer in operation. The conversion of the bridge to a pedestrian/bicycle trail connecting to the Gwynns Falls Trail is a critical component of the proposed pedestrian/bicycle network around the Middle Branch.. The cost to convert the bridge to a hiking-biking trail has been estimated between $6.7 million and $9.9 million, depending upon requirements imposed by the U.S. Coast Guard for the movable portion of the bridge. There are several major technical issues involved in converting the bridge, including:

- The existing timber trestle approach spans are in severely deteriorated or failed condition and need to be replaced.
- The existing steel girder flanking spans are in fair condition and need to be repaired and rehabilitated.
- The existing steel swing span truss is in fair condition and needs to be repaired and rehabilitated.
- The U.S. Coast Guard may require the existing swing span truss to operate on a regular basis. If so, major repair and replacement of the mechanical and electrical systems will be necessary. The existing pier fender systems will also need to be replaced.
- If the U.S. Coast Guard allows the existing swing span truss to remain in closed position, extensive maintenance to the mechanical system will be required to close the swing span from its current open position.
- All existing steel surfaces need to be completely cleaned and repainted.
- Asbestos abatement is required on the swing span truss prior to beginning rehabilitation work.

To achieve the goal of a seamless pedestrian corridor for persons of all abilities, the Middle Branch Community will need to improve the local sidewalk network.

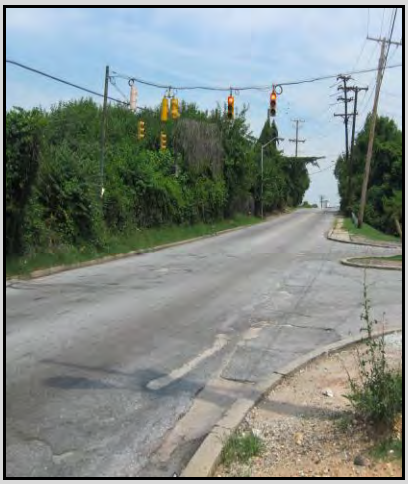


Figure 9 - CSX Swing Bridge

Hanover Street Bridge: Hanover Street Bridge is a critical link between South Baltimore and Middle Branch communities. An under-utilized reversible middle lane on the bridge should be removed and bike lanes added in both directions.

MD 295: The Baltimore-Washington Parkway (MD 295), while providing convenient access for automobiles to and from downtown, divides Middle Branch neighborhoods and makes east-west pedestrian access difficult between neighborhoods. The Neighborhood Design Center (NDC) suggests two pedestrian connections in the Westport area to provide improved pedestrian connectivity between both sides of MD 295. The first connection involves improvements to the existing pedestrian bridge over MD 295 near Maisel Street, where a new pedestrian path is proposed between Annapolis Road and the bridge. The second pedestrian connection is a pathway located under MD 295 at Manokin Street and Nevada Street (Figure 10). The proposed connection would begin at the Wenburn Street and Tacoma Street intersection and continue north to Manokin Street where it would cross under MD 295 and connect to Nevada Street and Kent Street.

Figure 10 - Proposed Pedestrian Underpath Crossing MD 295

SOURCE: "Westport Neighborhood/Annapolis Road Enhancement Study" by Neighborhood Design Center

Bike lanes along Hanover Street would help create a continuous loop around the harbor, provide additional access near the new Middle Branch waterfront aquarium site, and provide easy access to the potential trail across the CSX Swing Bridge. The bridge, the trail and proposed bike lanes would tie in with the planned residential and commercial development at Westport and provide an amenity for future waterfront development in the west Port Covington area. Figure 11 shows a concept plan of bike lanes along Hanover Street. Figure 12 shows an alternative with a separated bike path that would serve recreational bicyclists. This path would separate bicyclists from vehicular traffic.

Figure 11 - Proposed Hanover Street Bike Lanes in Port Covington – Alternative A

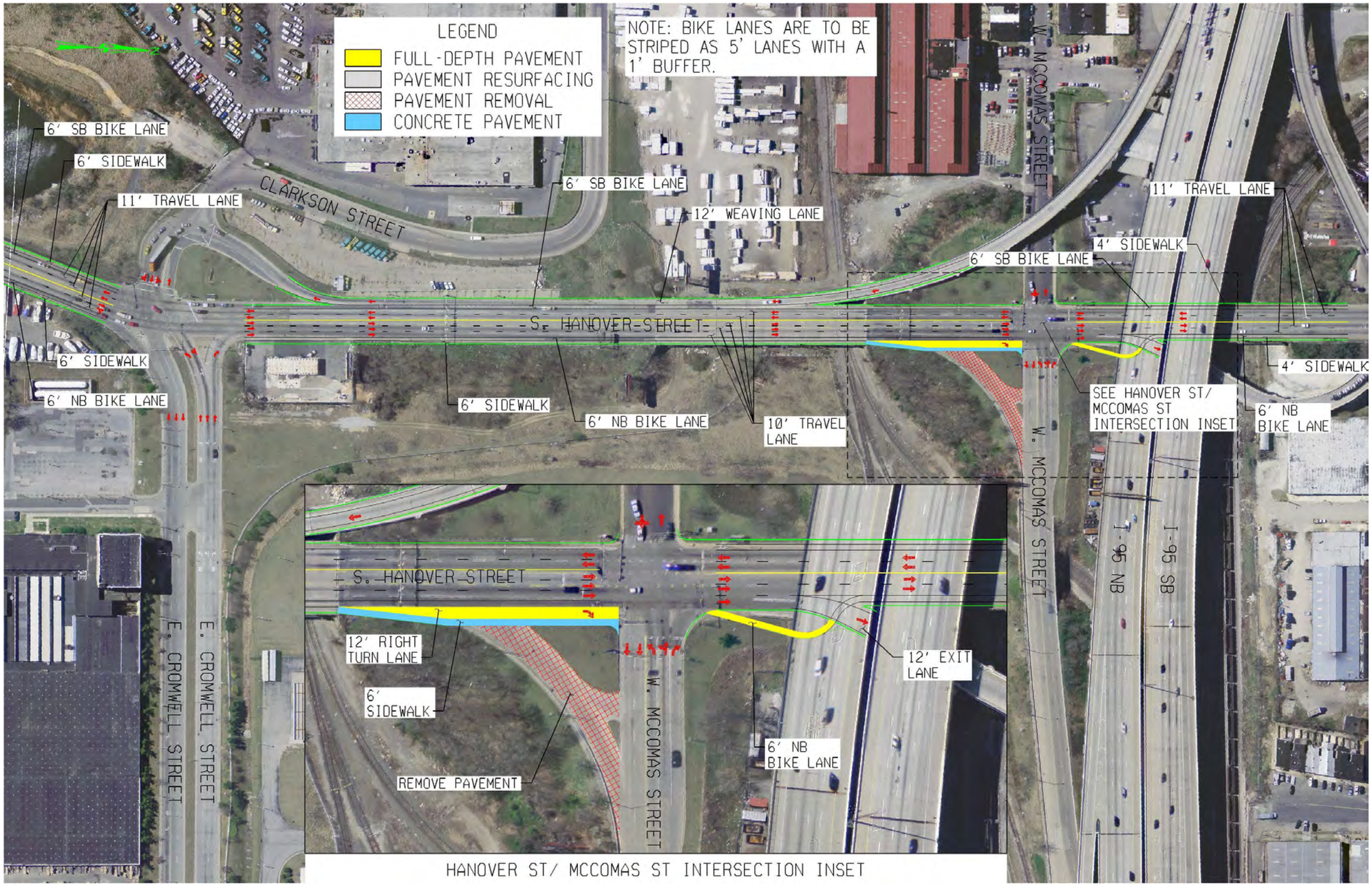
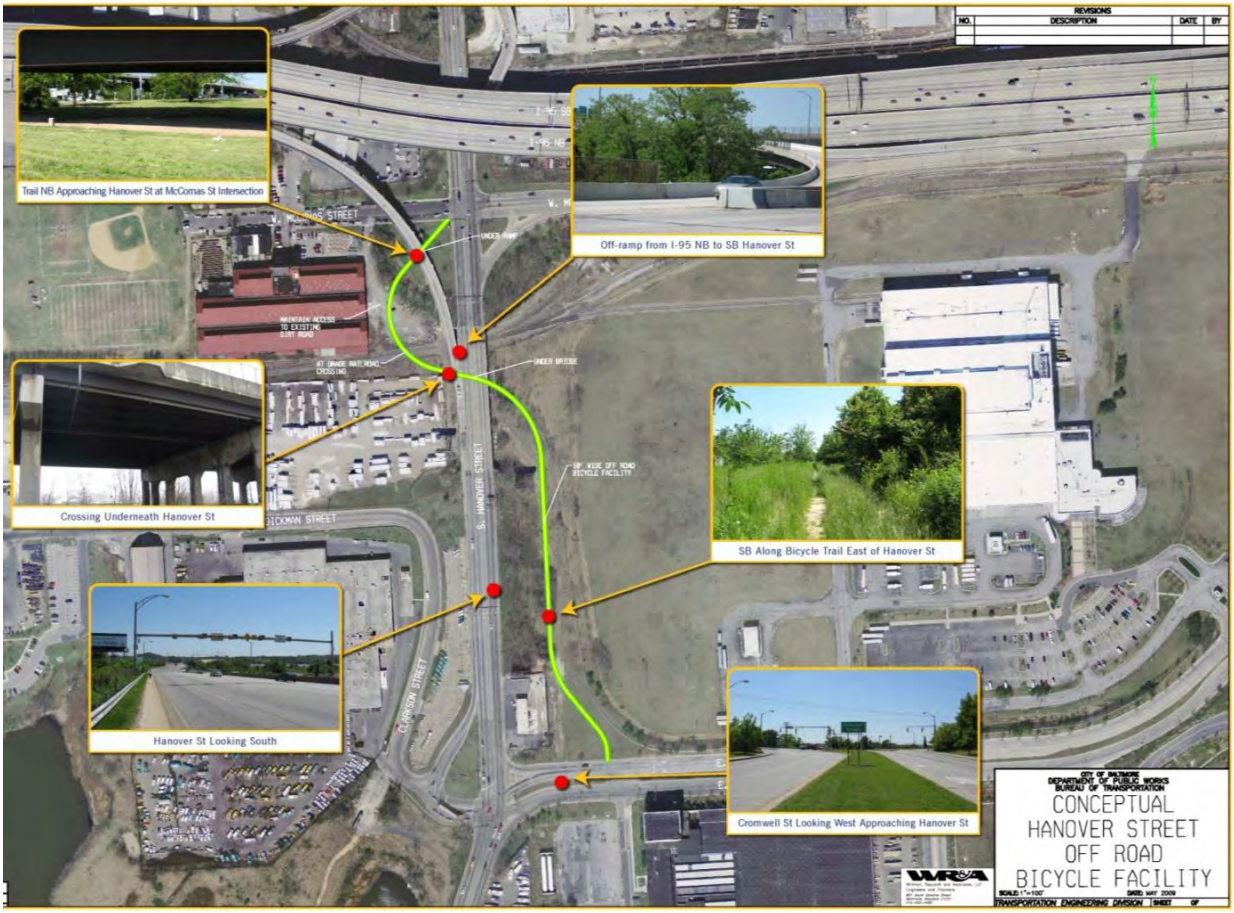


Figure 12 - Proposed Off-Street Bike Path – Alternative B

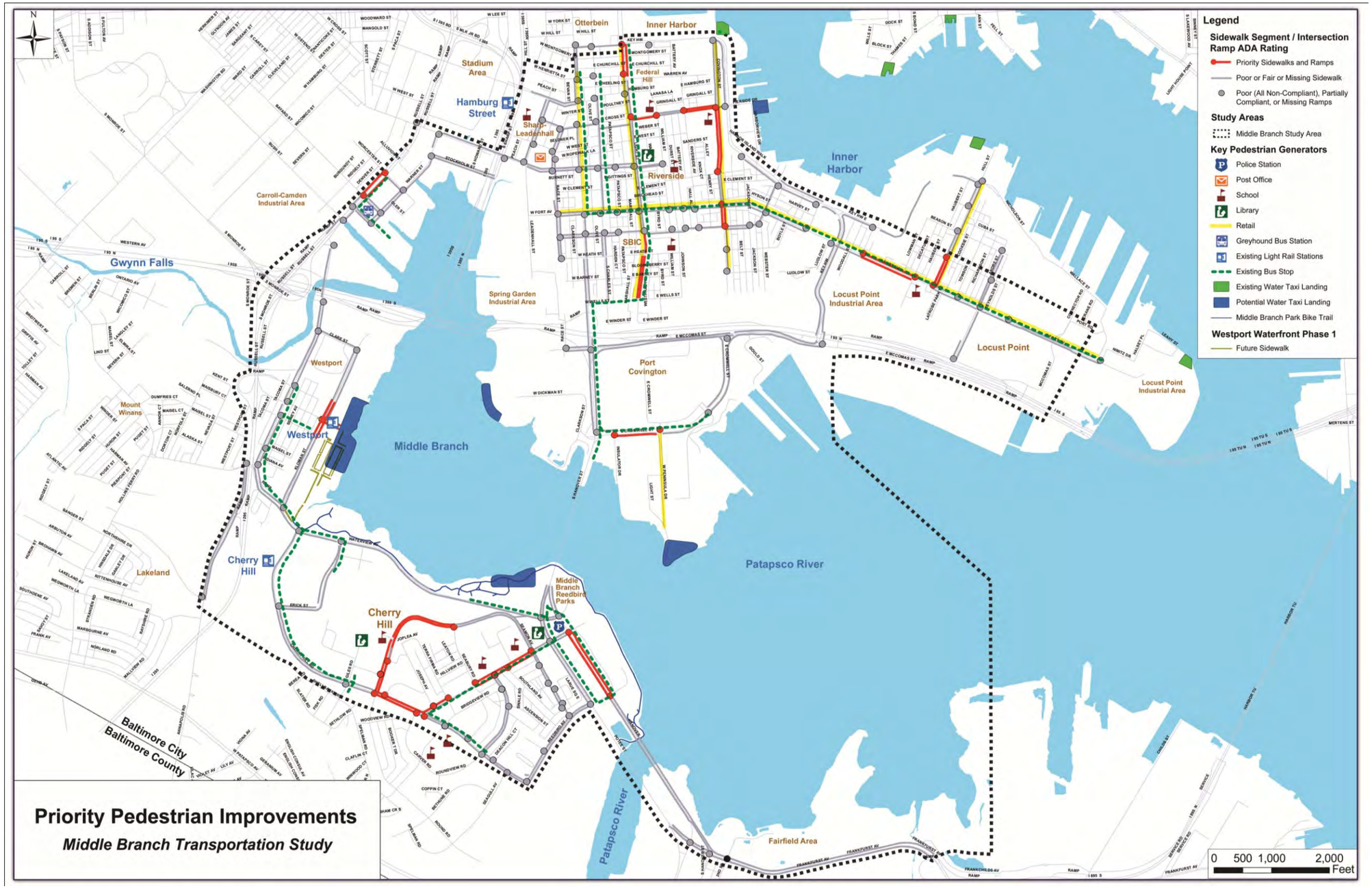


To improve pedestrian safety and access, substantial sidewalk repair is necessary and new sidewalks are needed in places where none currently exist. This finding was reached following a review of 45 miles of pedestrian corridors, comprised of 407 segments. Only 10 miles (94 segments) were rated as good while 14 miles were rated as fair (146 segments) and 12 miles (113 segments) were rated as poor. Sidewalks are not present in over nine miles (54 segments) of the 45 miles of pedestrian corridors studied.

Priority sidewalk connections (Figure 13) include the link between the South Baltimore and Port Covington neighborhoods along Key Highway, and between the Westport and Cherry Hill neighborhoods along Waterview Avenue. The Middle Branch Transportation Plan identifies priority locations for pedestrian improvements within individual neighborhoods based on the proximity to high pedestrian traffic generators.

Offering access to all people requires that the pedestrian network is compliant with the standards established in the Americans with Disabilities Act. Only two of the ramps in the entire study area were evaluated as ADA-compliant (both at the Cherryland Road at Bridgeview Road intersection); all other intersection ramps were rated "poor."

Figure 13 - Priority Pedestrian Improvements



II. Transit Improvements

Commuter Rail: MARC's Camden Station functions primarily as a walk-up station and transit transfer point and has no parking facilities. With unavailable parking and limited transit access, Camden Station neither serves the Middle Branch communities conveniently nor offers opportunities for transit oriented development (TOD) that would benefit them. The construction of additional MARC stations would improve regional access to commuter rail and create a neighborhood-accessible station for Middle Branch communities.

Four potential sites were for a park-and-ride commuter rail station along the MTA's MARC Camden Line to supplement the Camden Station. Based on the results of a comparative analysis (see Figure 15), Site B, near Ostend and Warner Streets, would be the most favorable for the construction of a new MARC station and a commuter park-and-ride lot for the following reasons:

- The surrounding area is being redeveloped and offers opportunities for TOD that would be attractive to MARC patrons as well as residents of Middle Branch
- Site has sufficient space for a platform that would accommodate the longest MARC trainset without blocking existing street crossings
- Site is located adjacent to the track currently used by all MARC Camden Line trains entering and leaving Camden Station
- Ample adjacent parking on Maryland Stadium Authority parking lots
- Convenient to I-95 via I-395 and Russell Street

BENEFITS OF REDUCING MOTOR VEHICLE TRAFFIC

Reducing the number of cars and trucks on local streets would not only lessen congestion but also offer additional positive benefits such as:

- Reduce pollution caused by vehicle emissions.
- Increase foot traffic around the neighborhood, which could increase patronage of local stores.
- Improve the well-being and health of residents through increased physical activity

Detailed discussions for each of the four potential sites (Figure 14) are included in Appendix G in the MARC Station Site Report. An evaluation matrix is included in Figure 15 to determine feasibility with ratings from '1' through '5', where '1' was the least favorable and '5' was the most favorable rating.

Figure 14 - Potential MARC Station Park-and-Ride Sites

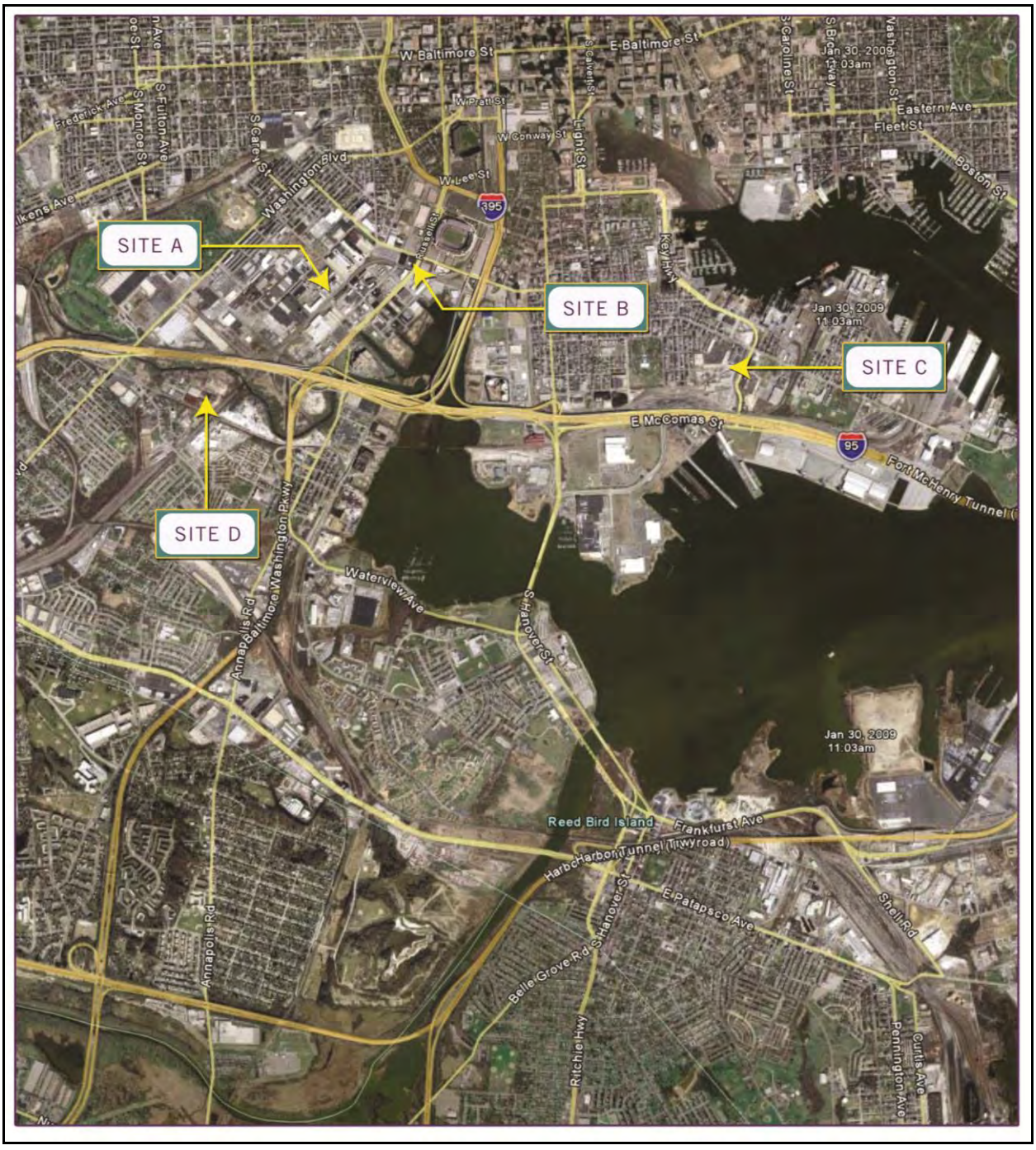


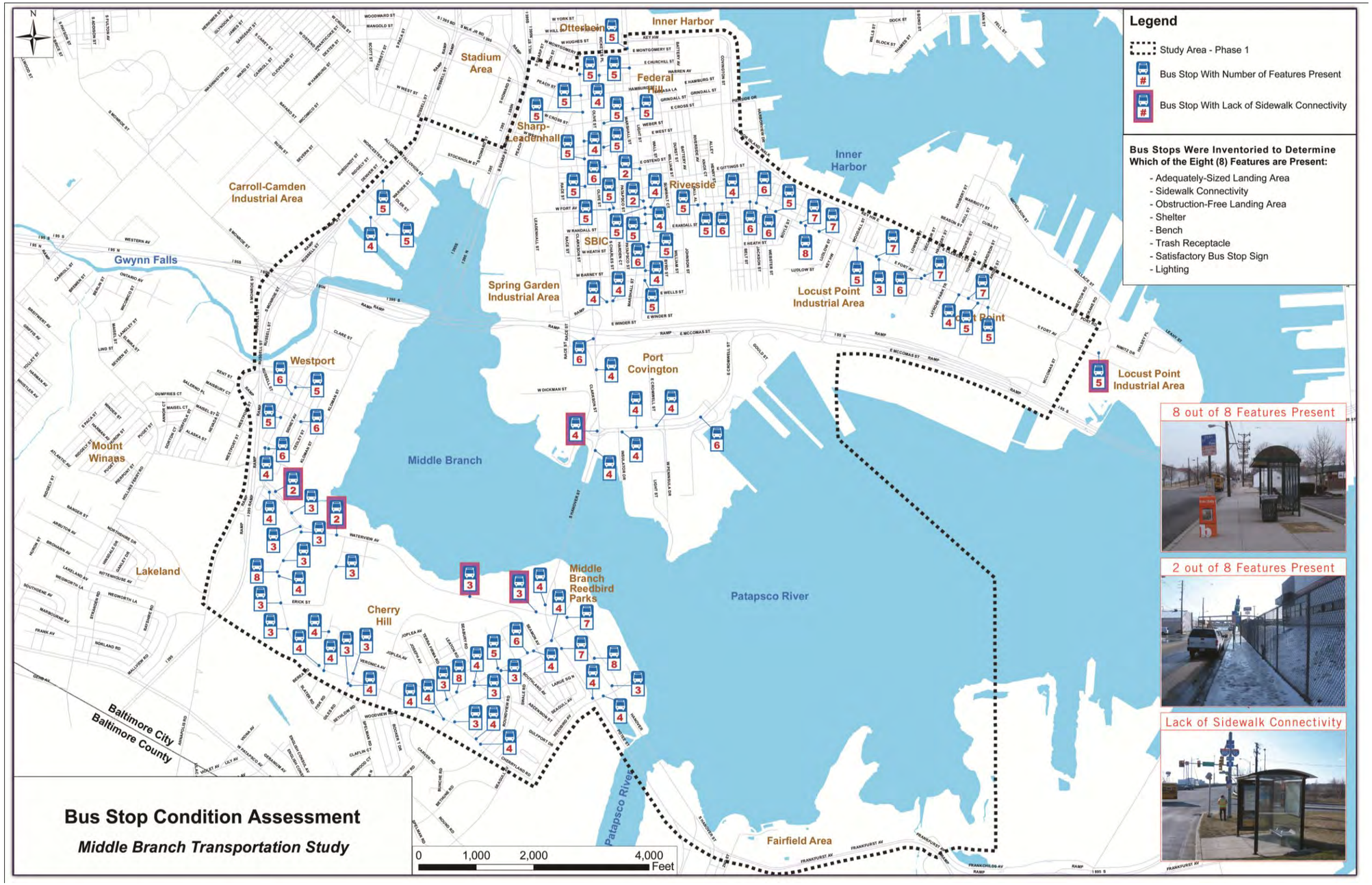
Figure 15 - MARC Station Evaluation Matrix (1 is Least Favorable, 5 is Most Favorable)

	Access To / From I-95	Compatibility with MARC Train Operations & Train Lengths	Distance From The Nearest MARC Station	Compatibility with CSX Operations	Park & Ride Opportunities / Constraints	Current Usage / Property Impacts / Redevelopment / TOD Potential	Traffic Impacts	Constructability	Average Rating
Bush Street / Bayard Street	3 Fair. Accessible via I-395 followed by other streets. Distance from/to I-95 up to 2 miles.	4 Requires single platform adjacent to the track. The distance between Bush & Bayard Streets will accommodate 4 out of 5 MARC trainsets.	2 1.3 miles from the Camden MARC station	2 CSX freight train blocks access to the station if parking is east of CSX tracks. Need to construct pedestrian bridge/tunnel between station and parking lot.	4 Two nearby sites, up to 16 acres. Both sites would require purchase of property and one would require relocation of existing businesses.	3 Adjacent to Gaslight Square development. Surrounding properties - light industrial	4 Both grade crossings are equipped with flashing light signals and gates.	5 No major concerns	**3.86**
Ostend Street	4 Good. Accessible via I-395 followed by other streets. Distance from/to I-95 up to 1.6 miles.	5 Requires single platform adjacent to the track. The distance between Ridgely & Warner will accommodate all MARC trainsets including train lengths up to 7 cars.	1 0.8 miles from the Camden MARC station	4 May require acquisition or agreement with CSX to construct the platform. No impact on CSX operations.	5 Stadium parking lots could be primary parking areas. Would require a usage agreement with the Stadium Authority.	4 Adjacent to the stadium; good potential for TOD. Surrounding properties - commercial, light industrial & warehousing.	4 Both grade crossings are equipped with with flashing light signals and gates.	3 Would require removal of turnout and diverging track, or the platform could be curved to follow the track	**4.29**
Riverside	4 Straightforward. Accessible via Key Highway followed by other streets. Distance from/to I-95 up to 1.5 miles. May require traffic study on Fort Avenue between Ludlow and Lawrence Streets.	2 Not located on the current Camden Rail Line. Would require rescheduling and rerouting of some MARC trains. 420-foot platform can accommodate two 4-car trains. May be an issue with MARC.	3 1.8 miles from the Camden MARC station	3 Rescheduling and rerouting would require negotiations with the CSX.	2 Parking is neither ample nor convenient. About 172 parking spaces may be provided. Structured parking with an exit on Key Hwy is a possibility.	4 Existing shopping center adjacent to the site and proposed (under construction) residential uses have the potential for TOD.	2 If commuter traffic is significant, several intersections on Fort Avenue may potentially fail during the peak hour.	3 Requires construction of parking - either surface or structured. Requires access to shopping center.	**3.29**
Morrell Park	2 Complicated. Accessible via Hollins Ferry Road followed by other streets. Distance from/to I-95 up to 3.3 miles.	5 Easy access to MARC. May require change to operating procedure. 750-foot platform would accommodate all MARC trainsets including train lengths up to 7 cars.	4 2.4 miles from the Camden MARC station	3 Changes in operating procedure would require negotiations with the CSX. May interfere with CSX operations.	4 Ample parking opportunities on the 8 acre site. Adjacent 6 acre property may be available for future parking.	2 Site of a former glass manufacturing plant. Abandoned industrial buildings. Isolated from neighborhoods - unlikely candidate for TOD.	4 No major impacts, barring those during construction.	2 Would require the construction of a 700-foot-long high level platform, on and off ramps to I-95 and connecting road to Westport development.	**3.71**

Bus: Bus service is readily available in Middle Branch neighborhoods, with 106 bus stops located within the study area. Part of the Transportation Plan study efforts involved a condition assessment of each stop. This information was presented to residents who ranked each aspect based upon what was most important to them. Personal safety was rated as the highest priority. Offering locations with adequate lighting is one measure that would address this concern. Extending sidewalks near bus stops that are not well connected will improve convenience and safety as well. These improvements should be made first, with upgrades to bus shelters that lack trash receptacles and other such amenities to be undertaken once safety and convenience are addressed. Figure 16 provides a summary of bus stop conditions throughout the study area. Bus stops were rated based on the presence of the following 8 features:

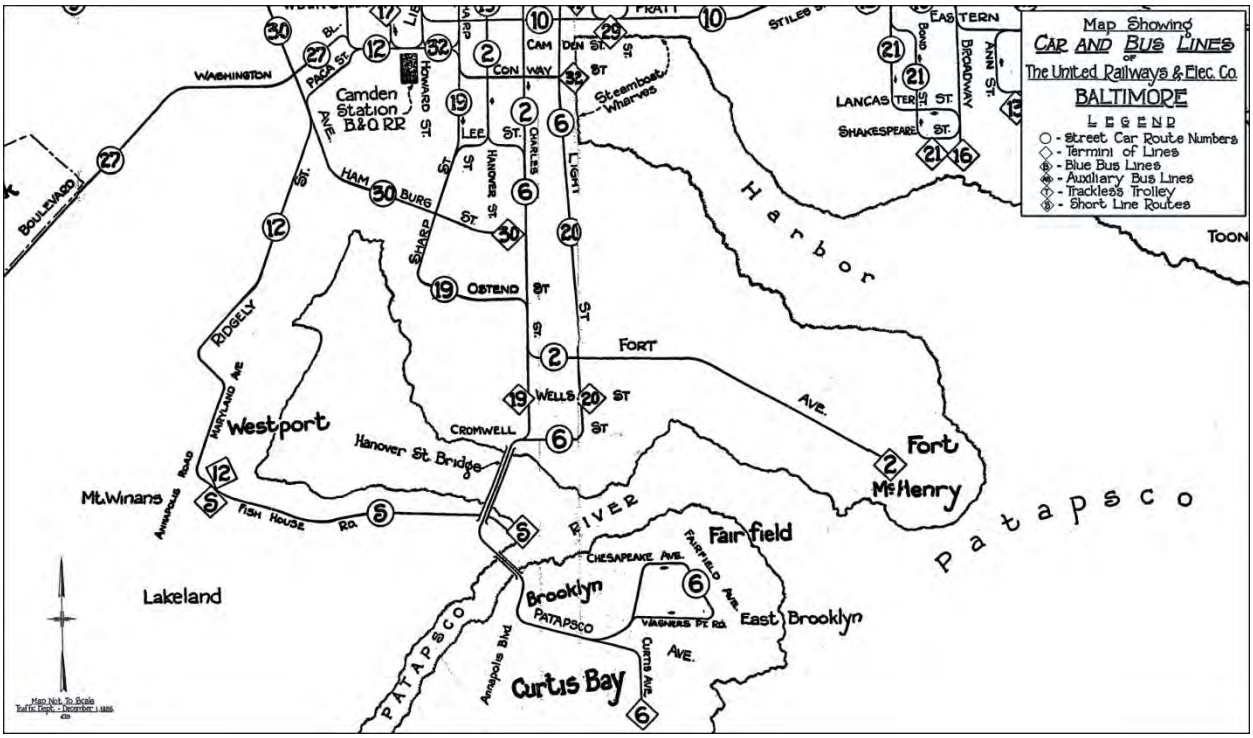
- Adequately-sized landing area
- Sidewalk connectivity
- Obstruction-free landing area
- Shelter
- Bench
- Trash receptacle
- Satisfactory bus stop sign
- Lighting

Figure 16 - Bus Stop Condition Assessment



Streetcar: A fixed–track streetcar line provides a highly visible and easy-to-understand routing that can attract both visitors and local users to transit and generate new development opportunities due to the perceived ease of use and the permanence of rail transit. Costs for streetcar are significantly less than light rail and often attract private financing, and they can contribute significantly to the economic development of surrounding neighborhoods. A streetcar system previously existed in Baltimore City, with service provided throughout the Middle Branch area. For historical reference, Figure 17, a map of transit routes, including street cars, is shown below. This map is dated December 1, 1926.

Figure 17 - Historic Transit Routes



South Charles Street, South Light Street, Key Highway, and East Fort Avenue have sufficient width to support a streetcar, and two of these (East Fort Avenue and South Light Street) have a concentration of businesses flanked by residential uses, which indicates a potential for high streetcar ridership. See Figure 18 for the potential streetcar route.

Offering an expanded Charm City Circulator route from Fort Avenue through Locust Point would improve access to downtown employment and entertainment centers for Middle Branch neighborhoods. It would also be possible to extend the proposed Charles Street Corridor Trolley to connect the Middle Branch Area to Inner Harbor Visitor's Center.

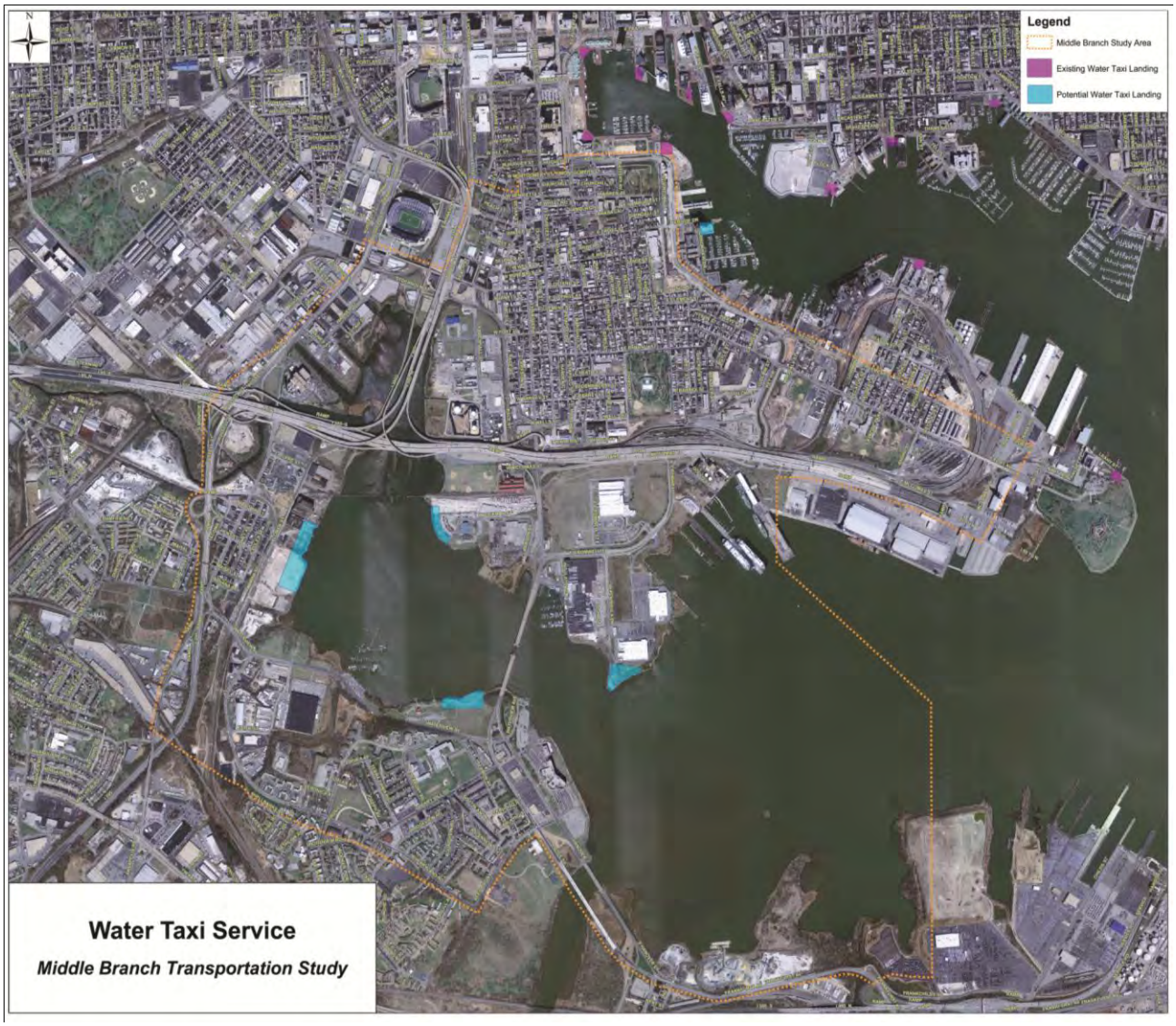
Figure 18 - Streetcar Routing Proposal

Water Taxi: A natural complement with the waterfront is the option to use a Water Taxi. An existing water taxi company runs year-round and offers passenger service within the Inner Harbor area. In the future, additional water taxi locations should be considered with stops at Harbor View directly south of the condominiums tower, at West Covington south of the CSX Bridge, at Westport to serve the upcoming Westport Waterfront development, and at Middle Branch Park near Hanover Bridge.

A comprehensive water taxi system could be connected to MTA's transit service as well as the proposed bicycle network around the Middle Branch. Real time departure time displays, GPS tracking, and mobile phone/web information could make water taxis a viable alternative to driving. Improved marine commuting services can make Baltimore's waterways a viable commuting option instead of just a tourist amenity.

If proposed projects are built out in the future, sufficient density around the Middle Branch may allow for a more comprehensive commuter water taxi. Possible new Middle Branch water taxi stops are highlighted in blue in Figure 19.

Figure 19 - Existing and Proposed Water Taxi Service



Light Rail: The existing Cherry Hill Light Rail Station has no parking lot and limited on-street parking available along Cherry Hill Road. The Patapsco Light Rail Station, located approximately one mile to the south, has a parking lot but is difficult to access from the Cherry Hill community. An off-street parking lot could potentially be located just south of the station on public property owned by Baltimore City and MTA. A conceptual plan of the parking lot is shown in Figure 20. It would have capacity for approximately 122 vehicles, including 5 handicap-accessible spaces. A parking lot at this location could compliment future transit-oriented development at the adjacent Waterview TOD site east of Cherry Hill Road. A parking lot at this site would involve extensive earthwork, and would possibly need a retaining wall.

Figure 20 - Proposed Cherry Hill Light Rail Parking Lot

III. Intersection and Street Improvements

Every arterial and collector street in Middle Branch with one or more intersections having less-than-acceptable level of service was evaluated for potential improvements. Five sub-areas were established to coordinate improvement recommendations geographically.

- Russell Street
- Westport
- South Baltimore
- Brooklyn
- Port Covington

A. Russell Street Area

RUSSELL STREET

- The Baltimore Casino will have an impact on traffic
- Proposed Improvements:
  - Turnaround lanes
  - Weaving lanes

Street/Intersection Improvements: The intersection of Russell Street at Bayard Street is projected to operate under failing conditions during both peak hours under both the Low Build and High Build scenarios, primarily due to traffic generated by the Baltimore casino. The following improvements, shown in Figure 21, would help to address these capacity concerns:

- ***Turnaround lane from southbound Russell Street to northbound Russell Street:*** This turnaround lane would be located under MD 295 north of Monroe Street. The turnaround lane would merge with traffic from the ramp from northbound I-95 to northbound Russell Street.
- ***Remove two traffic signals along Russell Street and restrict left turns:*** If the signals along Russell Street at Bush Street and Russell Street at Bayard Street remain, northbound queues will extend onto the freeway section of MD 295, blocking the off-ramp from northbound MD 295 to westbound Monroe Street, and southbound queues will extend to the bridge over Ostend Street. Removing the signals and converting the intersections to right-in, right-out will significantly reduce delays and queuing. If these improvements are carried out, the median openings along Russell Street at these two intersections would need to be closed to prevent unsafe left turns and cross street movements. Vehicles wishing to make these movements would then use the turnaround lane to the south as well as the existing turnaround lane to the north (along Alluvion Street).
- ***Weaving lanes along Russell Street:*** Constructing an additional lane along both directions of Russell Street between Bayard Street and Alluvion Street would better serve traffic using the existing turnaround lane to the north. The northbound weave lane would be an added lane from Bayard Street, and the southbound weave lane would be a drop lane onto Bayard Street. The northbound weave lane would begin immediately north of Bayard Street, allowing traffic exiting Bayard Street to turn right without stopping. This traffic would then merge with Russell Street traffic. The lane would transition into the turnaround lane, which

would serve many vehicles (about 80% during the PM peak hour) turning out of Bayard Street (the potential casino location). They will use the turnaround lane to head south on I-95, MD 295, or Monroe Street, so these vehicles would remain in the weave lane throughout the entire length of this lane. The southbound weave lane would begin at the turnaround lane and end at Bayard Street. This would give vehicles from the turnaround lane space in which to merge with southbound Russell Street traffic, and would provide a separate right-turn lane onto Bayard Street.

Although traffic analyses support the installation of weave lanes and traffic signal removals at Bush Street and Bayard Street, these roadway and traffic signal modifications are not complete multimodal urban design solutions for the Russell Street corridor. They may impede circulation for side-street traffic and left turns from Russell Street, encourage higher vehicular speeds, and eliminate pedestrian connectivity between the neighborhoods on either side of Russell Street, and. Pedestrian crossings of Russell Street are particularly heavy before and after stadium events and could increase significantly if and when the Baltimore casino is built. Although the weaving lanes would also present challenges for bicyclists, it should be noted that Russell Street is not part of the City's on-street bicycle network.

For these reasons, it is recommended that multimodal transportation conditions along this portion of Russell Street be monitored over time, with the cooperation of community stakeholders, as re-development takes place. If traffic congestion and queues become unacceptable, the recommended improvements could be phased in over time to retain good multimodal connectivity. If congestion is not as severe as projected by the traffic forecasts, alternative treatments could be considered, including providing pedestrian-only signals, and/or retiming the signals at Bush and Bayard Streets to maximize green time on Russell Street.

Parking Access Improvement: Under the 2009 plans for the Baltimore Entertainment Facility, the parking garage would be located between Bayard Street and Worchester Street. Warner Street would be cut off between Bayard Street and Worchester Street, and the garage's sole access point for visitors would be along Bayard Street. If a second access point were provided along the north end of the garage, with access from Worchester Street and/or Warner Street, vehicles would be able to access the garage without entering Russell Street, thus reducing traffic along Russell Street and providing improved operations at the intersections along the Russell Street corridor.

Figure 21 - Potential Improvements to the Russell Street Corridor

B. Westport Area

The Westport Waterfront development (see Figure 22) will affect traffic patterns significantly in the following areas:

Annapolis Road Intersections: In order to achieve acceptable vehicular levels of service during the AM and PM peak hours, the following improvements should be considered:

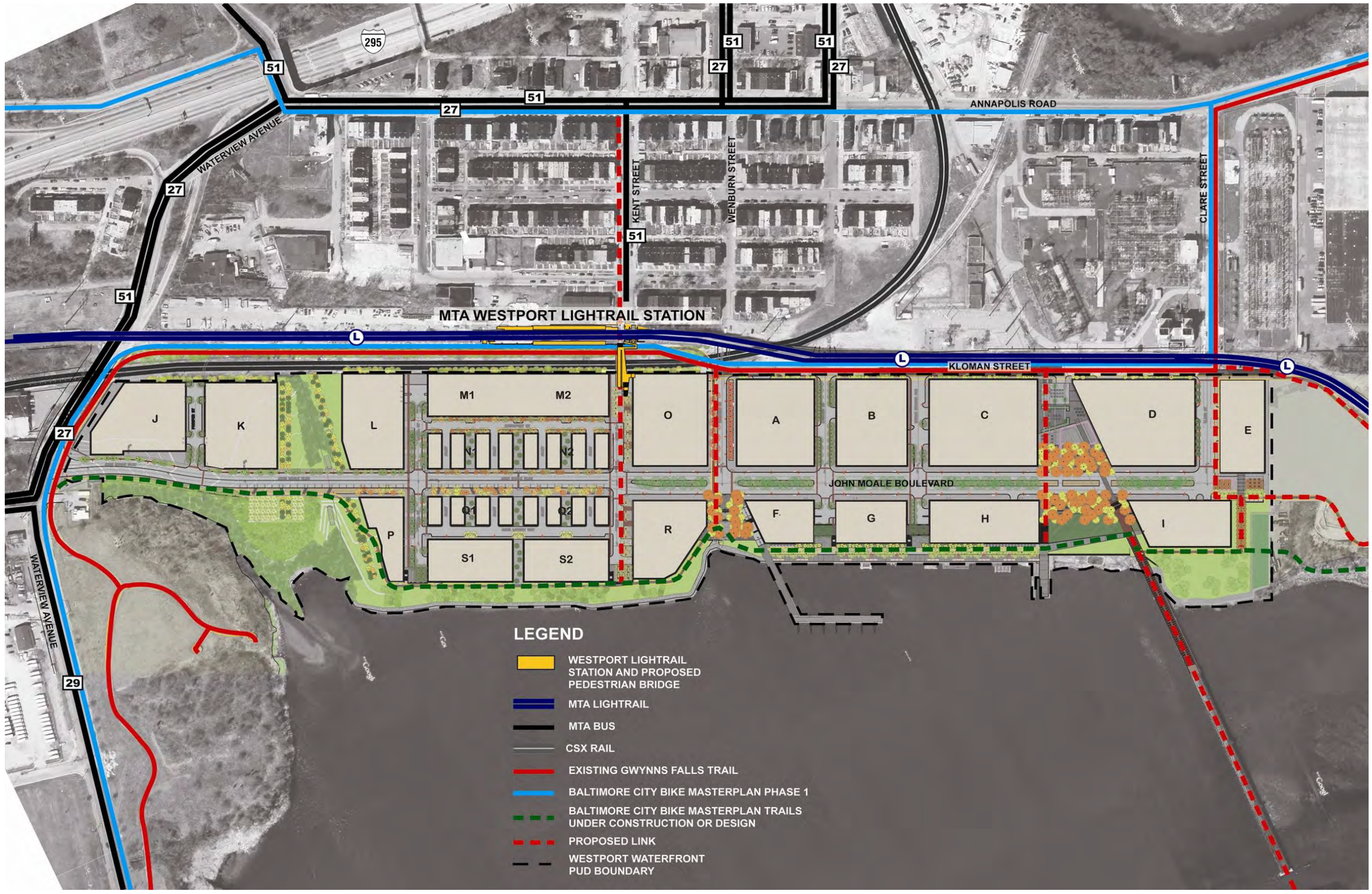
WESTPORT

Proposed Improvements:

- New Lanes
- New Traffic Signals
- Lane Conversions

- Annapolis Road at Monroe Street: install a separate northbound left-turn lane with protected/permissive phasing.
- Annapolis Road at Clare Street: install a traffic signal. For further improved operations, install a separate westbound right-turn lane, which would require repainting only and no geometric improvements. This right-turn lane enhances a City-designated bike route.

Figure 22 - Westport Waterfront Project



Washington Boulevard at Monroe Street: The Westport development will have significant impacts to Washington Boulevard at Monroe Street and the following improvements should be considered (see Figure 23):

- Conversion of northbound Monroe Street lanes to one left-turn lane and one shared thru/right-turn lane
- Addition of southbound Monroe Street right-turn lane
- Addition of eastbound Washington Boulevard left-turn lane
- Left-turn exclusive/permissive phasing for eastbound approach

The additional lanes on southbound Monroe Street and eastbound Washington Boulevard will increase pedestrian crossing distances and may increase vehicle speeds.

Kent Street: A transit boulevard and streetscape treatment is recommended for Kent Street between Annapolis Road and the Westport Light Rail Station. In addition to improving the look and function of the street, consolidation of bus stops and a more convenient light rail station pick up/drop off area would help link the Westport community to new waterfront development.

Figure 23 - Washington Boulevard at Monroe Street Improvements

The proposed Westport Waterfront development will increase traffic along Manokin Street and Wenburn Street and the following improvements should be considered:

- Construct a one-way pair, with Wenburn Street one-way eastbound and Manokin Street one-way westbound east of Annapolis Road. The one-way pair will provide improved vehicular operations, preventing long queues and heavy delay times. Without installation of a one-way pair, queues along Wenburn Street are projected to extend from Annapolis Road onto the off-ramp from northbound MD 295 during the AM peak hour. This would create a potential safety issue, as drivers along MD 295 would not have adequate space to decelerate. Additionally, vehicles would experience increased delay times of several minutes. However, unless carefully designed, one-way pairs may increase vehicle speeds and reduce travel options and visibility within neighborhoods. The increased speeds may make pedestrians and bicyclists feel less safe. Other options were explored, including maintaining two-way traffic while improving vehicular operations. These options are anticipated to provide better vehicular operation than the existing layout, but worse operation than the one-way pair scenario. These options would require removal of a parking lane along Manokin Street to provide an additional travel lane, requiring pedestrians to travel longer distances to cross this roadway while reducing available parking.

  The Westport Neighborhood/Annapolis Road Enhancement Study (prepared by Neighborhood Design Center) recommends maintaining two-way traffic along Manokin Street and Wenburn Street until an increase of traffic justifies changing to one-way streets. This report concurs with that approach. To ensure that the eventual implementation of a one-way pair on Wenburn and Manokin Streets provides the best possible environment for pedestrians and bicyclists, it is recommended that some of the design treatments proposed for Annapolis Road be extended along Wenburn and Manokin. The combination of minimum acceptable lane widths and curb bump-outs will reduce pedestrian crossing distances and may marginally reduce vehicle speeds. Shared-use markings should be provided in the right lane of both streets to designate those lanes for bicycle travel.

Manokin Street:

- Annapolis Road at Manokin Street intersection – install new traffic signal with eastbound/westbound protected/permitted left-turn phasing
- Restripe to convert Manokin Street to two-lane westbound east of Annapolis Road and remove parking from one side of Manokin Street west of Annapolis Road
- Add an eastbound right-turn lane from Manokin Street onto Annapolis Road; lane would extend to Tacoma Street
- Extend Manokin Street east to John Moale Boulevard

Wenburn Street:

- Annapolis Road at Wenburn Street intersection – install new traffic signal with northbound/southbound protected/permitted left-turn phasing and southbound permitted/overlap right-turn phasing. The southbound right-turn lane must extend to the

intersection of Annapolis Road at Manokin Street, which would require the elimination of 6 parking spaces (150', assumed 25' per space). Use of the entire street segment between Manokin Street and Wenburn Street for a right-turn lane is necessary to accommodate the heavy volume of over 900 vehicles making this movement during the PM peak hour. Parking may be permitted during all other hours. Because these peak hour parking restrictions may pose a challenge to the neighborhood, including a reduction in pedestrian and bicycle accessibility, they should implemented only over time as conditions dictate.

- Restripe to convert to two-lane eastbound only east of Annapolis Road.
- Realign the northbound exit ramp from MD 295, realign the entire street from MD 295 ramps to Annapolis Road, and restrict parking on both sides of entire length of street (see Figure 24).

Figure 24 - Wenburn Street Ramp Reconstruction

The Westport Neighborhood/Annapolis Road Enhancement Study referenced above also recommends landscaped medians, curb bump-outs, and streetscape improvements (see Figure 25). This would require the elimination of one of the two northbound lanes just north of the intersection with Waterview Avenue. As a result, signing and marking changes would be required at both the west and east intersections of Annapolis Road at Waterview Avenue as follows:

- West Intersection
  - Convert northbound Annapolis Road from a shared left- and right-turn lane and a dedicated right-turn lane to a dedicated left-turn lane and a dedicated right-turn lane.

- East Intersection
    - Convert eastbound Waterview Avenue from a dedicated left-turn lane and a shared left- and right-turn lane to a dedicated left-turn lane and a dedicated right-turn lane.
    - Convert southbound Annapolis Road from a dedicated left-turn lane and a shared left- and right-turn lane to a dedicated left-turn lane and a dedicated right-turn lane.
    - Convert northbound Waterview Avenue from a shared left- and right-turn lane and a dedicated right-turn lane to a dedicated left-turn lane and a dedicated right-turn lane.

The proposed median and bump-outs would extend from Waterview Avenue to Clare Street. In much of this area, an acceptable level of service would be maintained. Additionally, a median could serve as a pedestrian refuge for pedestrians crossing at unsignalized intersections. The proposed median may create traffic issues in the following areas, as left-turn bays are needed along the full length of these two blocks to accommodate the heavy projected left-turn volumes, and is therefore not recommended:

- Between Kent Street and Wenburn Street (over 150 peak-hour northbound left turns from Annapolis Road onto Wenburn Street)
- Between Wenburn Street and Manokin Street (over 350 peak hour southbound left turns from Annapolis Road onto Wenburn Street)

In lieu of a median, a combination of bump-outs, bike lanes, and an expanded tree canopy could serve as effective traffic calming for Annapolis Road and would help beautify the corridor to encourage new investment. Note, however, that the median proposed in the NDC report may remove the pavement width necessary to provide bike lanes on the blocks where the median is present.

Figure 25 - Proposed Median, Curb Bump-outs, and Streetscape along Annapolis Road

SOURCE: "Westport Neighborhood/Annapolis Road Enhancement Study" by Neighborhood Design Center

C. South Baltimore Area

SOUTH BALTIMORE

- Impacts to operations will be seen under both the low build and high build scenarios.
- Proposed Improvements:
  - New Traffic Lanes

The intersections of Hanover Street at Ostend Street, Hanover Street at Fort Avenue, Charles Street at Fort Avenue, and Key Highway at Key Highway East are projected to operate under less-than-acceptable levels of service under Low Build and High Build conditions. With minor improvements; however, they would operate under acceptable levels of service. Potential improvements for both the build scenarios using the conservative assumption of vehicular trips only to the Port Covington developments are as follows:

- ***Hanover Street at Ostend Street (Figure 26):***
  - Add northbound left-turn lane (125' for Low Build scenario, 175' for High Build).
  - Add eastbound right-turn lane (150' for Low Build, 250' for High Build)
  - Add 225' westbound left-turn lane (High Build only)
- ***Hanover Street at Fort Avenue:***
  - Add southbound left-turn lane (175' for Low Build, 225' for High Build)
  - Add 75' northbound left-turn lane (Low Build only)
  - Add 75' northbound right-turn lane (High Build only)
  - Add westbound left-turn lane that extends to Charles Street (High Build only)

While the turn lanes on Hanover Street require the removal of parking spaces along Hanover Street near the intersections, they would designate distinct travel paths and enhance a City-designated bike route. As a potential drawback, they would shift traffic closer to the sidewalk where pedestrians may be waiting to cross.

Figure 26 - Hanover Street at Ostend Street Improvements

The improvements at the intersection of Hanover Street at Fort Avenue would result in improved operations at the nearby intersection of Charles Street at Fort Avenue; therefore, no improvements would be necessary at Charles Street at Fort Avenue.

- ***Key Highway at Key Highway East:***
  - Install pedestrian improvements for crossing Key Highway, including an increased-visibility crosswalk and a dedicated pedestrian phase. The pedestrian phase would be implemented on a trial basis to determine if it will have a significant detrimental impact on vehicular operations.

Figure 27 - Key Highway at Key Highway East Improvements

Currently, the Department of Transportation is examining the installation of a roundabout to enhance safety and operations at the intersection of Key Highway and Light Street, which serves as a gateway to the South Baltimore area. Between 2005 and 2007, 18 crashes occurred at this intersection; six of these crashes were rear-end collisions while four crashes resulted in personal injury. A concept plan of this roundabout is shown in Figure 28.

Figure 28 - Proposed Roundabout – Key Highway at Light Street

The Key Highway Waterfront Master Plan recommends several improvements along Key Highway. These improvements would enhance pedestrian and bicycle facilities and improve safety and aesthetics. Proposed improvements include:

- Curb bump-outs
- Median widening
- Streetscape
- Enhanced pedestrian facilities, including the extension of the waterfront promenade to Tide Point

In addition to these improvements, Baltimore DOT streetscape plans for Key Highway between I-95 and Fort Ave include an off-street bike/pedestrian path. This path should connect to the future Port Covington waterfront promenade and the future multi-use trail from the CSX bridge running parallel to McComas Street at the intersection of McComas and Key Highway underneath the I-95 viaduct.

D. Brooklyn Area

BROOKLYN

- Proposed Improvements
  - New Traffic Patterns

Based on conversations with the community and with Department of Transportation staff, two improvements were proposed to improve connectivity and divert trucks away from Hanover Street, which is Brooklyn's Main Street. Reducing through truck traffic on Hanover Street supports Baltimore DOT livability goals and will create a safer pedestrian environment for Brooklyn's "Main Street". The improvements, as shown in Figure 29, are as follows:

- Install a left-turn stub connection from southbound I-895 to Potee Street along its exit ramp, allowing left turns onto northbound Potee Street.
- Add a westbound Frankfurst Avenue to southbound Potee Street movement. This would involve widening a section of northbound Potee Street south of Frankfurst Avenue to provide a continuous two-way roadway from Frankfurst Avenue to the south, connecting from the Hanover Street at Frankfurst Avenue intersection to southbound Potee Street. This would divert large trucks from Hanover Street to Potee Street.

Neither improvement is expected to have an effect on pedestrians/bicyclists, since this intersection is primarily a through traffic/truck route.

Figure 29 - Brooklyn Area Improvements

E. Port Covington Area

The Port Covington area presents several challenges to a well functioning Middle Branch transportation system. For instance, the area is poorly accessible for pedestrians and offers limited transit service with only one bus stop in the area. Additionally, the presence of I-95 limits the ability to redesign specific areas such as the intersection of Key Highway at McComas Street, which is located directly under the interstate.

PORT COVINGTON

- Proposed Improvements
  - New Intersections
  - New Traffic Lanes
  - New Traffic Patterns

It is important to understand the obstacles that will face the Middle Branch area and plan accordingly. For instance, the Port Covington area will be impacted by several major developments including Ruppert Homes, Aquarium Center for Aquatic Life, and the GE Site. Other development projects may also be proposed in the coming years. All new Port Covington development should incorporate pedestrian, bicycle and transit infrastructure to reduce single occupant vehicle trips. It is also imperative that a publicly accessible waterfront promenade be maintained around the entirety of the Middle Branch, including Port Covington and West Covington.

It is important that additional roadway connections be created between Port Covington and South Baltimore neighborhoods north of I-95 when new developments are built. Creating additional connections will take local traffic off of Hanover Street and reduce congestion on arterial roads while providing new walking/biking opportunities between South Baltimore and new development in Port Covington. Also, while not shown as an illustration, it is recommended that future Port Covington development use a grid style street network rather than a curvilinear, suburban style network in order to increase trip route options for local traffic, and also to continue the urban character of South Baltimore to the south side of I-95.

Several intersections in the Port Covington area are projected to operate at less-than-acceptable levels of service under Low-Build volumes. These intersections include:

- Hanover Street at McComas Street
- Key Highway at McComas Street
- Cromwell Street at McComas Street
- Hanover Street at Cromwell Street

The following improvements were examined for the Port Covington area (see Figure 30):

- ***Changing of phasing at Hanover Street at McComas Street intersection:*** This improvement involves "splitting" the signal phase for the McComas Street approaches. Eastbound traffic would precede westbound traffic.
- ***Construction of a new intersection along McComas Street east of Hanover Street:*** A new intersection is proposed at McComas Street between Hanover Street and the ramp from southbound I-95 to westbound McComas Street. This T-intersection would include a shared eastbound thru/right-turn lane, a westbound left-turn lane, a westbound thru lane, a northbound left-turn lane, and a northbound right-turn lane (see Figure 31).

Construction of this new intersection would divert traffic from adjacent heavily-travelled movements. Per guidance in the *Highway Capacity Manual*, it was assumed that during the peak hours at this intersection there would be 300 northbound left turns (diverted from westbound right turns from Cromwell Street onto Hanover Street), 300 northbound right turns (diverted from northbound right turns from Cromwell Street onto McComas Street), and 300 westbound left turns (diverted from westbound left turns from McComas Street onto Hanover Street followed by southbound left turns from Hanover Street onto Cromwell Street). Rebuilding this intersection will significantly reduce delay at Hanover Street at McComas Street, Hanover Street at Cromwell Street, and Cromwell Street at McComas Street.

- ***Construction of a new connection between South Baltimore and Port Covington:*** Extending Marshall Street underneath I-95 and over the railroad tracks to intersect with McComas Street would improve pedestrian, bicycle, and vehicular connectivity between the South Baltimore and Port Covington areas, provide an alternate route to Hanover Street and Key Highway, and extend the character of South Baltimore to south of I-95. Such a connection would tie into the potential Port Covington grid street network (see Figure 31). The new road would be 23' above the freight tracks which run parallel to and under I-95, leaving 14' of clearance between the new connector road and the I-95 viaduct (see Figure 32). The new road would also run above the abandoned tracks south of I-95.

  In addition to the Marshall Street connection, other locations were considered for connections from north of I-95 to south of I-95. In each of these locations, constraints included the profile (elevation) and structure depth of I-95, the locations of existing I-95 piers; the elevation, alignment, and number of existing railroad tracks which the alignment would pass over; the profile and location of McComas Street on the south side of I-95; the location of off and on ramps to I-95; and the ability, if desired, to cross the railroad tracks south of McComas Street to connect to any future development in the Port Covington area. For areas to the east of Marshall Street, such as Light Street, insufficient clearance was available between I-95 and the ground elevations to create a roadway alignment passing under I-95 and over the railroad tracks. An option was also considered at Charles Street, but several issues precluded an alignment option at that location, including:

  - The existing I-95 bridge pier layout would conflict with the connection;
  - The layout of the railroad tracks south of McComas Street would make a connection to the south difficult or impossible;
  - The proximity of a Charles Street / McComas Street intersection to the existing Hanover Street/McComas Street intersection would create queuing through the adjacent signal;
  - An alignment under I-95 would displace the existing use under I-95 (a recycling center/truck yard); and
  - The location of the McComas Street bridge over the railroad would make alignment layout difficult.

  A new roadway between South Baltimore and Port Covington should only be constructed if and when new development occurs in Port Covington to prevent building a "road to nowhere".

- ***Removal of westbound U-turn movement from Key Highway at McComas Street:*** Installing a turnaround lane for westbound traffic prior to this intersection and prohibiting U-turns at the intersection would allow eastbound and westbound traffic to operate concurrently, providing more green time for eastbound through traffic (see Figure 33).
- ***Installation of a half-signal at Cromwell Street at McComas Street:*** This signal would serve the eastbound McComas Street and northbound Cromwell Street approaches. The westbound McComas Street approach, which is separated from the other two approaches, would continue to operate as a free movement. The eastbound right-turn movement would continue to operate as a free movement.
- ***Reconstruction of Hanover Street at Cromwell Street Intersection:***
    - ***Option 1:*** **Traditional 4-way Intersection (preferred option):** A second possible alternative to improve access at the intersection of Hanover and Cromwell Streets is to convert the existing "jug handle" to a traditional four-way signalized intersection, as shown in Figure 35. This would include the following lane configurations:
        - NB: 75' left-turn lane, two thru lanes, 200' channelized right-turn lane
        - SB: Two 675' left-turn lanes, two thru lanes, channelized right-turn lane (added on from I-95 off-ramp)
        - EB: Two left-turn lanes, shared thru/right-turn lane
        - WB: Left-turn lane, thru lane, channelized right-turn lane
    - ***Option 2:*** **Roundabout**: A third possible alternative at the Hanover Street at Cromwell Street intersection is the construction of a two-lane roundabout. Roundabouts have been shown to reduce the severity of automobile accidents, improve pedestrian safety, and create visually appealing neighborhood gateways when operating at an acceptable level of service. Though a roundabout would accommodate existing traffic, models predict it would operate at LOS F and cause significant delays by the year 2030 given projected traffic volumes. This alternative is shown in Figure 36.

Figure 30 - Port Covington Area Improvements

Figure 31 - New Connections along McComas Street (To Connect to Future Development)

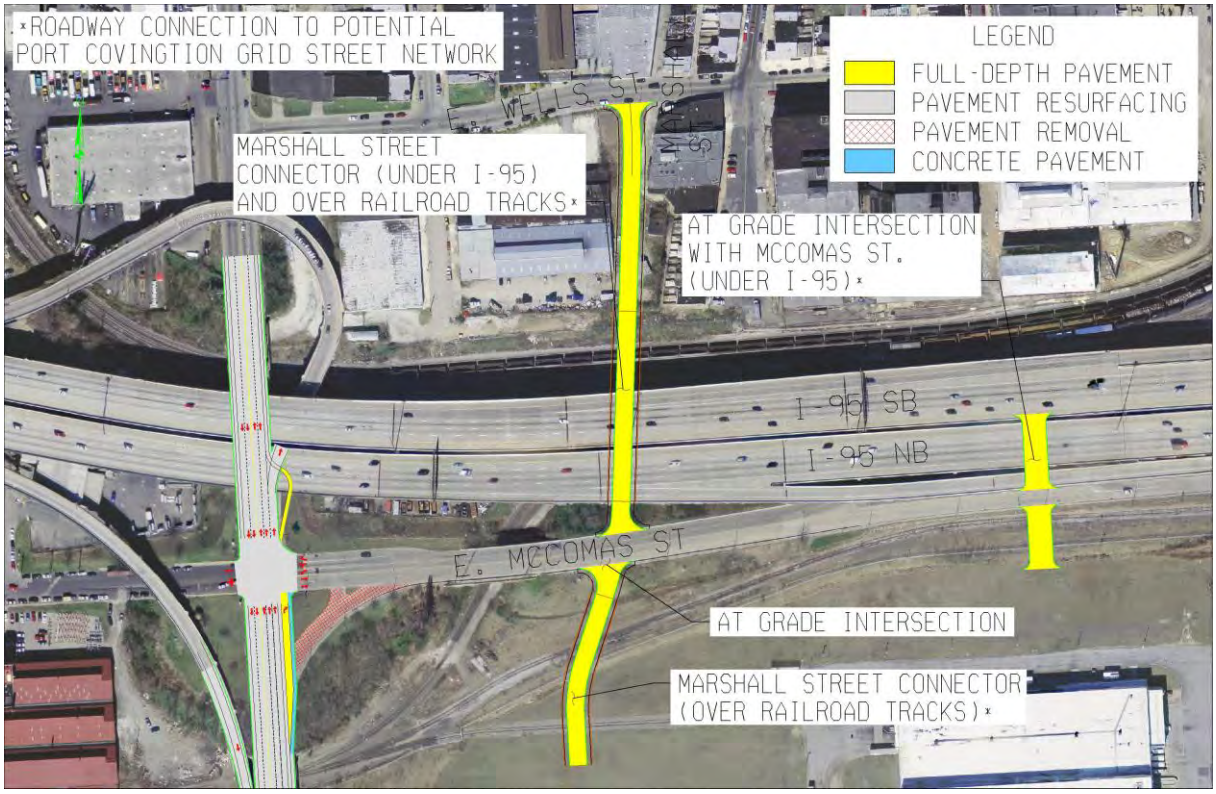


Figure 32 - Marshall Street Connector Profile

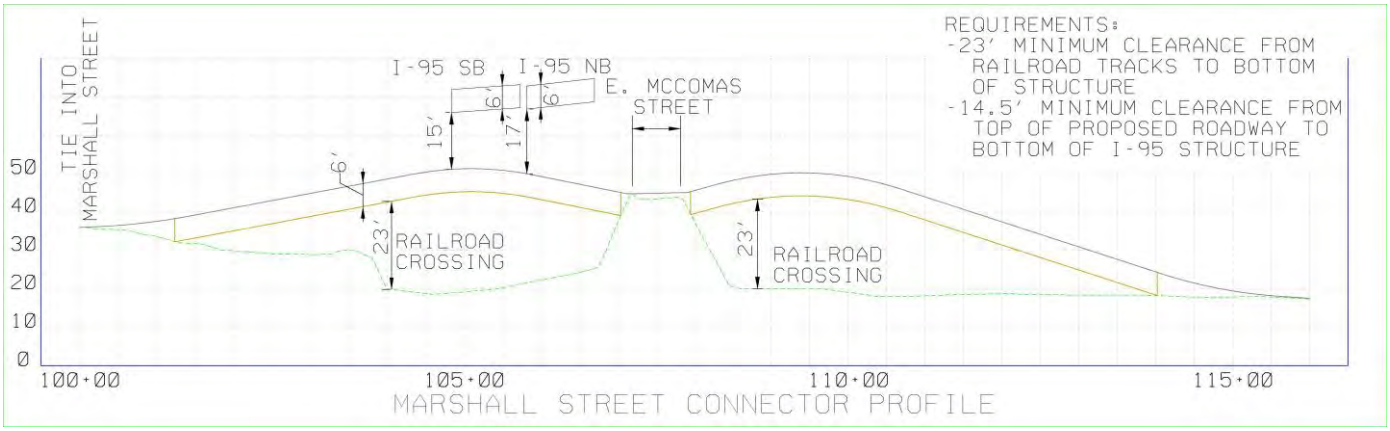


Figure 33 - Key Highway at McComas Street Improvements – Turnaround Lanes

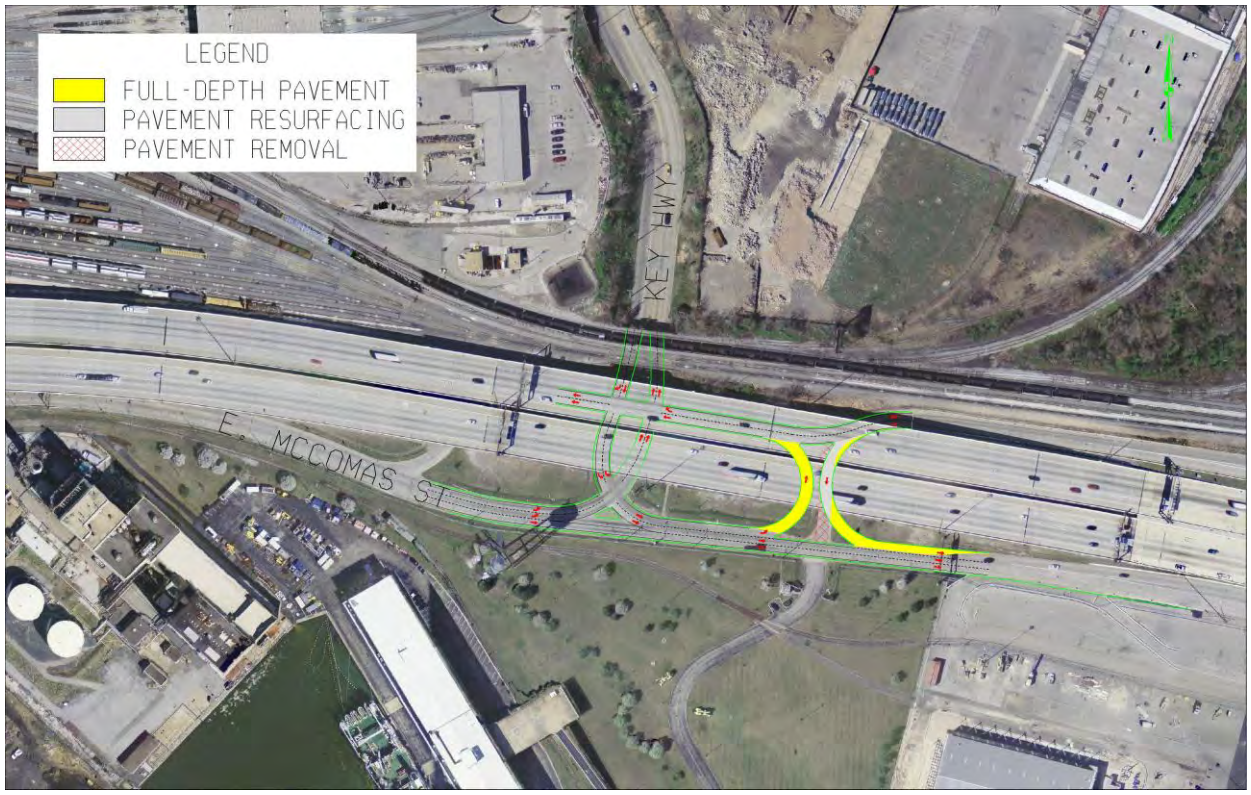


Figure 34 - Hanover Street at Cromwell Street Improvements (Right-In, Right-Out) and New Roadway Between West Covington and Port Covington Underneath Hanover Street (To Connect To Future Development)

Figure 35 - Hanover Street at Cromwell Street Improvements (Traditional Four-Way)

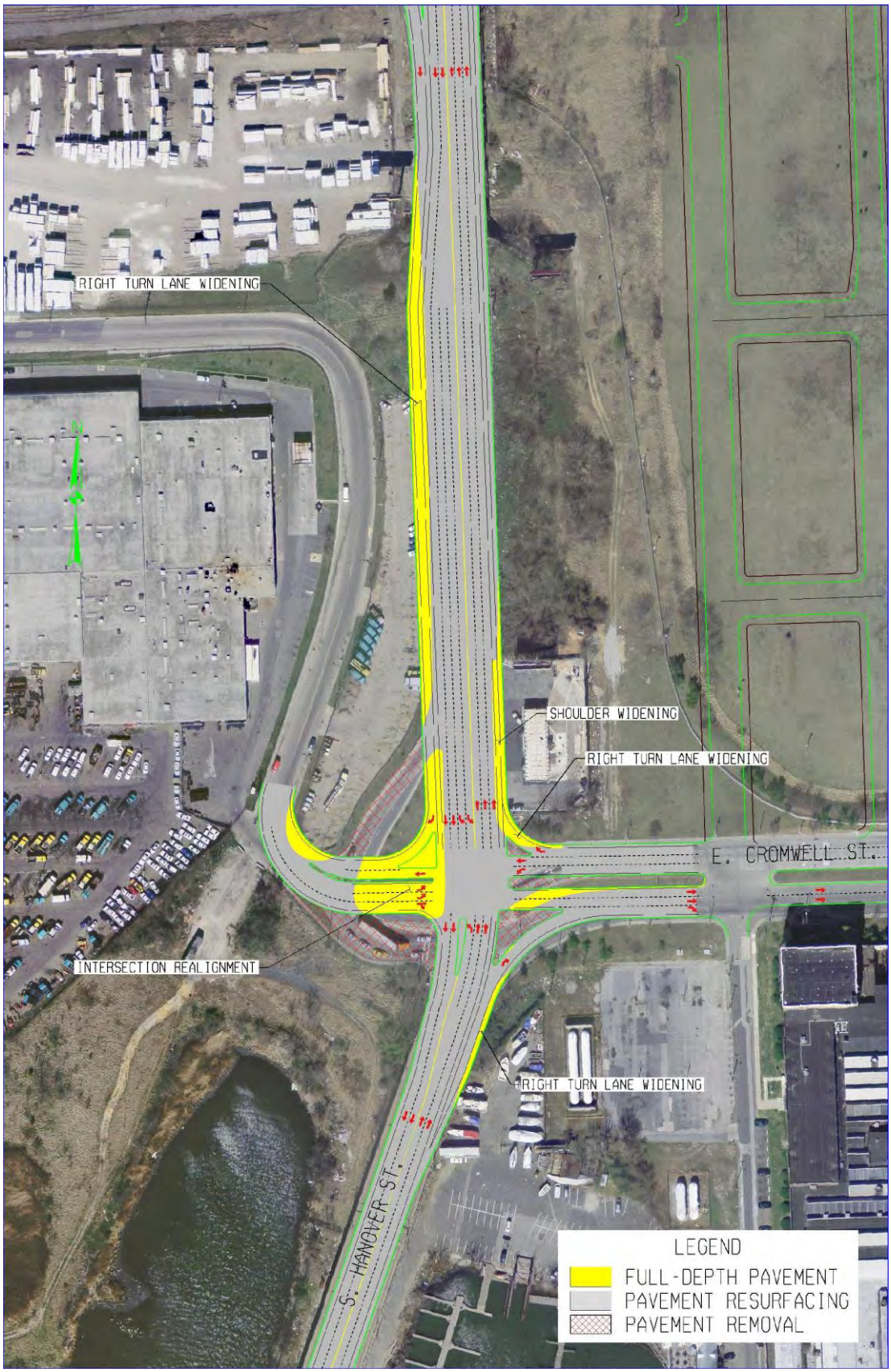
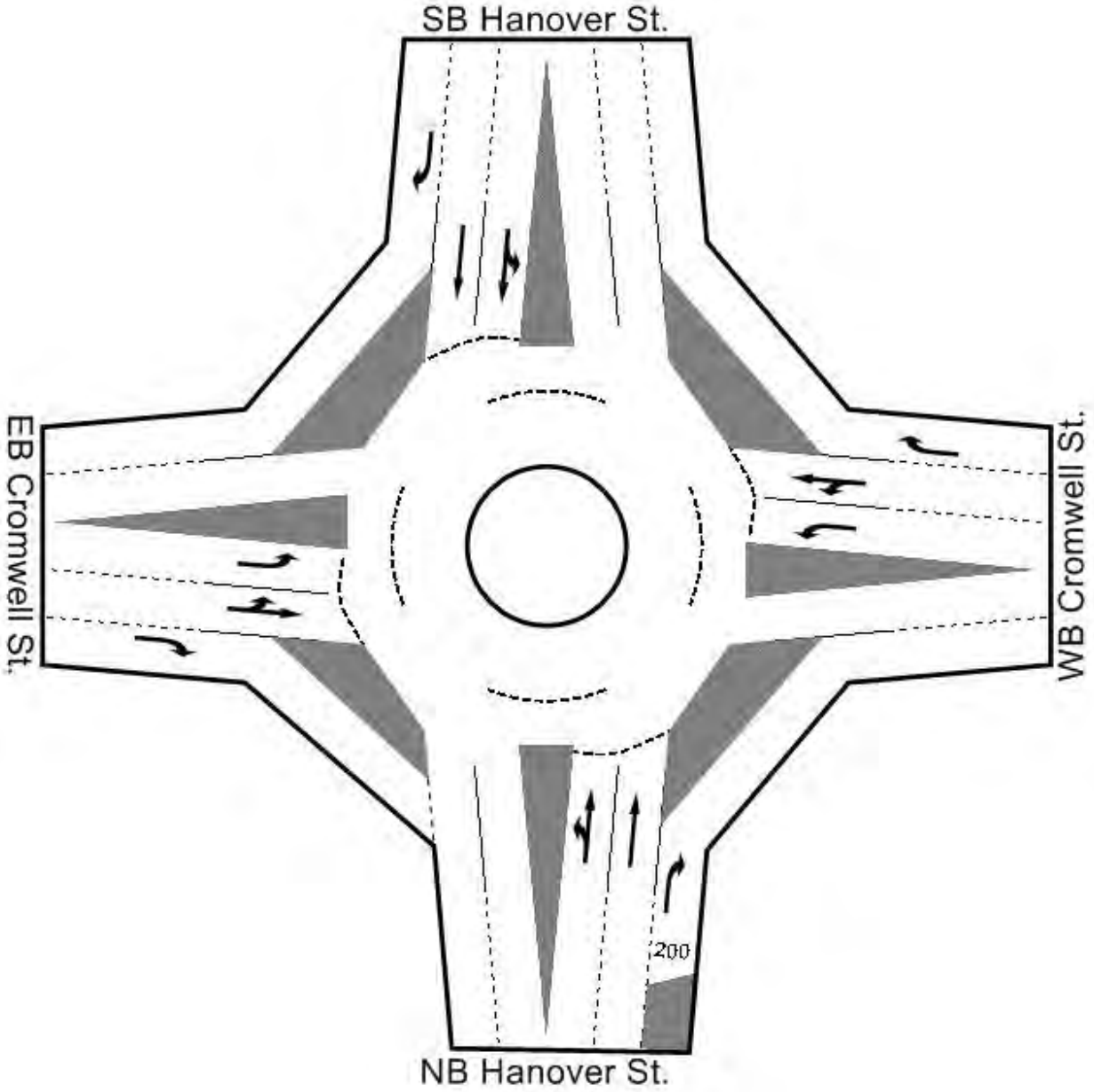


Figure 36 - Hanover Street at Cromwell Street Improvements (Roundabout)



1. Port Covington Modal Analysis

PORT COVINGTON

- Alternate modes of Traffic Analysis
- Trip Diversions

As previously mentioned, all new Port Covington development should incorporate pedestrian, bicycle, and transit infrastructure to reduce single occupant vehicles. The impact of proposed developments was factored to determine how alternative modes of transportation could reduce the level of single occupant vehicle trips. After assuming 20% non-auto trips to the Port Covington development, Ruppert Homes, Aquarium Center for Aquatic Life, and the GE Site, the following benefits of reducing motor vehicle trips were identified:

- Cromwell Street at McComas Street and Hanover Street at Cromwell Street will continue to operate at acceptable levels of service.
- The intersection of Hanover Street at McComas Street, which operates under a less-than-acceptable level of service during the PM peak hour under 0% non-motorized trips, will improve to an acceptable level of service during the PM peak hour.
- The intersection of Key Highway at McComas Street will continue to operate at less-than-acceptable levels of service.
- Other intersections throughout the study area will experience decreases in delay as compared to a scenario where all trips were made by motor vehicle; however, as these intersections are further from the Port Covington developments, such decreases would be relatively minor.

Overall, increasing non-auto trips can reduce the need for expensive capacity expansion improvements and support the vision for a more livable and accessible Middle Branch.

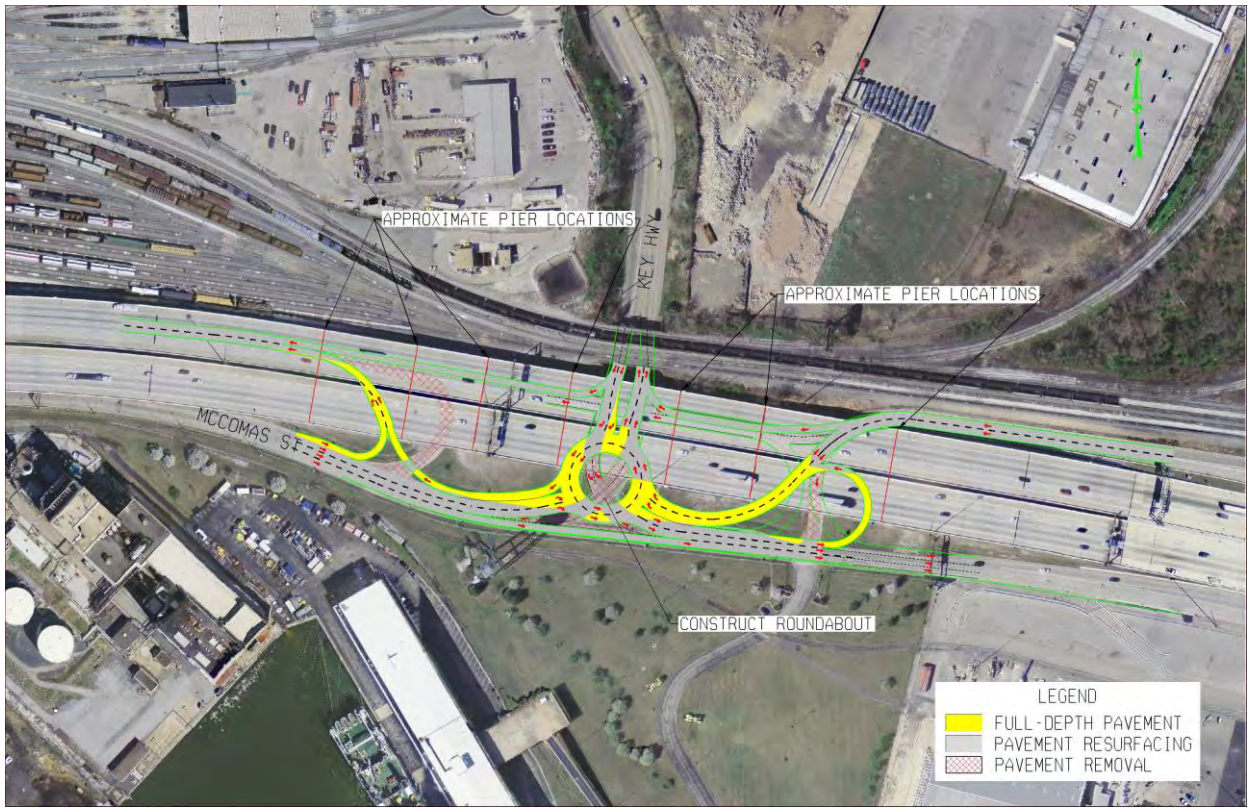
2. Port Covington No-Growth and Trip Diversion Analyses

The intersection of Key Highway at McComas Street, which is located under I-95, presented particular concerns since most improvements at this location are not feasible as the I-95 support columns are located too close to the intersection to allow for widening to provide additional lanes. (The one exception would be the construction of a westbound turnaround lane.) A two-lane roundabout at this intersection was examined, but is not recommended as it would operate at level of service F under projected future volumes, and the volume of vehicles wishing to travel through this roundabout would be over double its capacity. Moreover, a two-lane roundabout with such high volumes would constitute a significant barrier to safe pedestrian and bicycle travel, particularly for less experienced cyclists. Construction of a roundabout would be mutually exclusive from the westbound turnaround lane option presented in Figure 33. Figure 37 shows the largest roundabout that could be constructed within the existing support columns. Three scenarios were examined to offset the likely failure of this intersection due to the projected traffic growth. Each scenario assumed Low Build volumes and 20% non-auto trips to the Port Covington area developments.

- ***Baseline:*** This is the Low Build scenario with 20% non-auto trips with the removal of the westbound U-turn movement.
- ***No Background Growth:*** A 1% growth rate was assumed for traffic in the Middle Branch study area, which is in addition to the traffic generated by the proposed developments. As this was a high-end assumption and might not necessarily apply to all intersections, the Key Highway at McComas Street intersection was analyzed without background growth.
- ***Diverted Trips:*** Many drivers will avoid this intersection due to the lengthy delay times (especially the eastbound left-turn and southbound right-turn movements). Due to the failing conditions of Key Highway at McComas Street, it was assumed that drivers who use Key Highway to access the Port Covington developments to/from locations to the north might instead use I-95 to/from the north. Different percentages were examined to determine the rate that would provide the least overall delay at this intersection. This rate of diverted trips is 75%.
- ***No Background Growth and Diverted Trips:*** This scenario is the combination of no background growth scenario and the diverted trips scenario.

All three scenarios provide improved operations, but none of these scenarios provides acceptable level of service during the PM peak. The combination of no background growth and diverted trips provides level of service "E" during the PM peak, which is a significant improvement over the baseline scenario. The redistribution of trips would also provide improved operations at the other intersections along Key Highway, including Key Highway at Key Highway East, Lawrence Street at Key Highway, Key Highway at Cross Street, and Light Street at Key Highway/Hughes Street, which already are projected to operate at acceptable levels of service with the proposed improvement at Key Highway at Key Highway East.

Figure 37 - Roundabout at Key Highway at McComas Street



F. MD 295 Freeway Improvements

MD 295

- Freeway Improvements

MD 295 was analyzed under existing and future conditions using Highway Capacity Software (HCS) along the freeway section between the I-95/Monroe Street ramps to the north and the Annapolis Road/Waterview Avenue ramps to the south. Freeway sections were analyzed based on lane configurations, traffic volumes along freeway segments, and traffic volumes entering and exiting the freeway segments. This data was used to determine the Level of Service at freeway merge points, diverge points, and weaving segments. The following segments of MD 295 were analyzed:

- Northbound MD 295
  - From Waterview Avenue to Wenburn Street – weaving segment
  - From Wenburn Street to northbound I-95 – weaving segment
  - To Monroe Street – diverge point
- Southbound MD 295
  - From southbound I-95 and Monroe Street to Manokin Street – weaving segment
  - From Manokin Street – merge point
  - To Annapolis Road – diverge point

The results of the HCS analysis determined that the weaving segment along southbound MD 295 from southbound I-95 and Monroe Street to Manokin Street would operate at failing conditions under future volumes. To determine how to best accommodate future volumes, three alternatives for geometric improvements were developed. Alternative B, shown in Figure 38, is recommended as it is the lowest-cost option and major impacts to post-event departing traffic are not anticipated. This Alternative takes two lanes from southbound Russell Street and two lanes from southbound I-95/Monroe Street on-ramps. The lane added from Monroe Street would exit at Manokin Street. The lane added from southbound I-95 would remain as the third southbound MD 295 lane, with a choice lane to exit at Manokin Street.

Figure 38 - Southbound MD 295 Preferred Alternative

Future Implementation and Stakeholder Involvement

The Middle Branch Master Plan projects significant development activity in Middle Branch and recommends specific steps in numerous areas including urban design, recreation and transportation. The Plan calls for the creation of a Middle Branch Advisory Committee that, among other tasks, could help develop guidelines for a maintenance and management entity for the Middle Branch project area and lead the effort to create a Transportation Management Association. The creation of a Middle Branch Transportation Management Association (TMA), comprised of area property owners and other stakeholders, could become an important vehicle to engage local interests in efforts to mitigate projected traffic congestion, reduce single occupancy vehicle trips, and recommend strategies to reduce the overall demand on Baltimore's road network. A TMA could help guide and advocate for the provision of multi-modal transportation improvements that would protect the quality of life in the face of proposed development activity that could result in a densely populated and potentially congested area. Specifically, a Middle Branch TMA would advocate for non-auto modes of transportation, pedestrian friendly neighborhoods, and bike trails. Such an entity would advance the goals of the Middle Branch Master Plan and help accomplish the goal of the Westport Waterfront Plan to become "Baltimore's Green Waterfront".

Summary of Improvements

The Middle Branch Transportation Plan offers a balance of pedestrian, bicycle, transit, and motor vehicle improvements. All are important to create sustainable Middle Branch neighborhoods.

Implementation of the recommendations will be the responsibility of City and State agencies, businesses, residents, and other stakeholders in the Middle Branch neighborhood. Due to the extent and complexity of the project area and corresponding recommendations, it will take the cooperation of all involved to move these projects forward. Through cooperation and collaboration, better infrastructure can connect and enhance new development projects and improve the quality of life for existing and new residents. The Middle Branch Transportation Plan provides the roadmap by which to direct future investments in the transportation system.

Figures 39a and 39b provide a summary of future level of service at each intersection under Low Build conditions, both with and without the proposed improvements.

Figures 40 and 41 provide a summary of all potential improvements throughout the Middle Branch study area.

In addition to summarizing all of the potential improvements, Figure 42 provides an implementation plan (short-term, mid-term, and long-term) for the improvements and describes their impacts to pedestrians, bicyclists, motorized vehicles, transit, and land use.

Figure 39a - Future Level of Service: Phase 1 Study Area

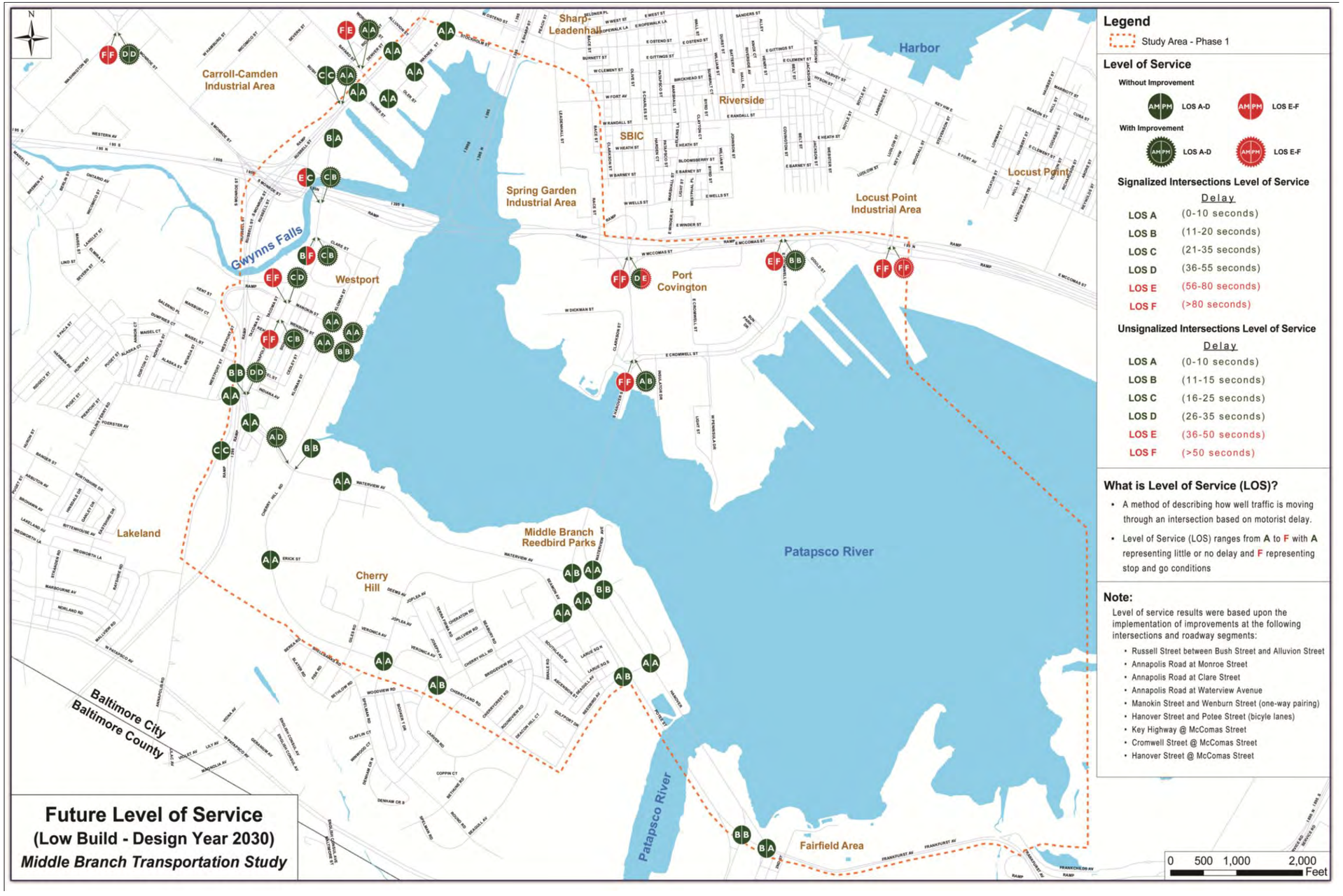


Figure 39b - Future Level of Service: Phase 2 Study Area

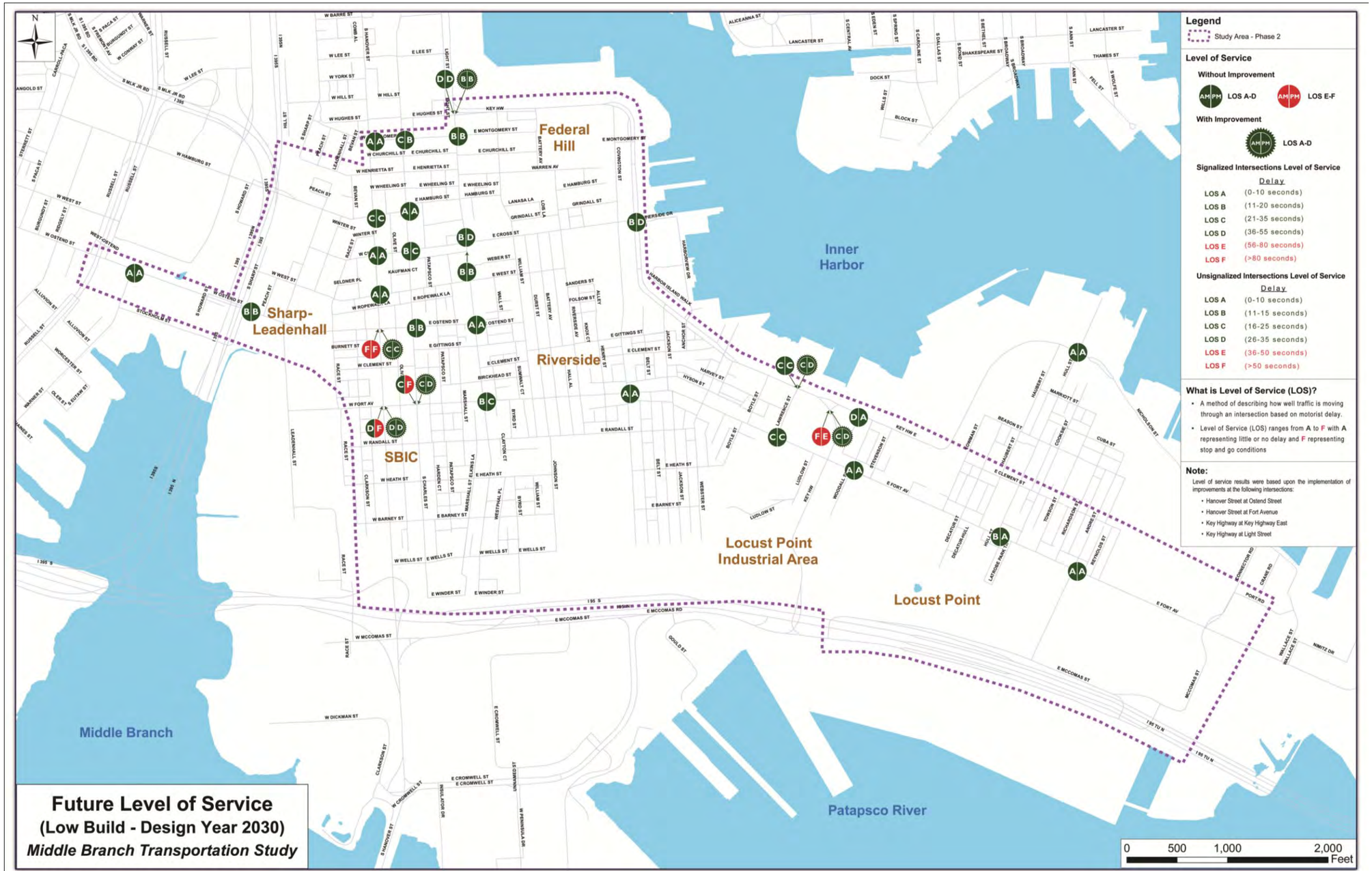
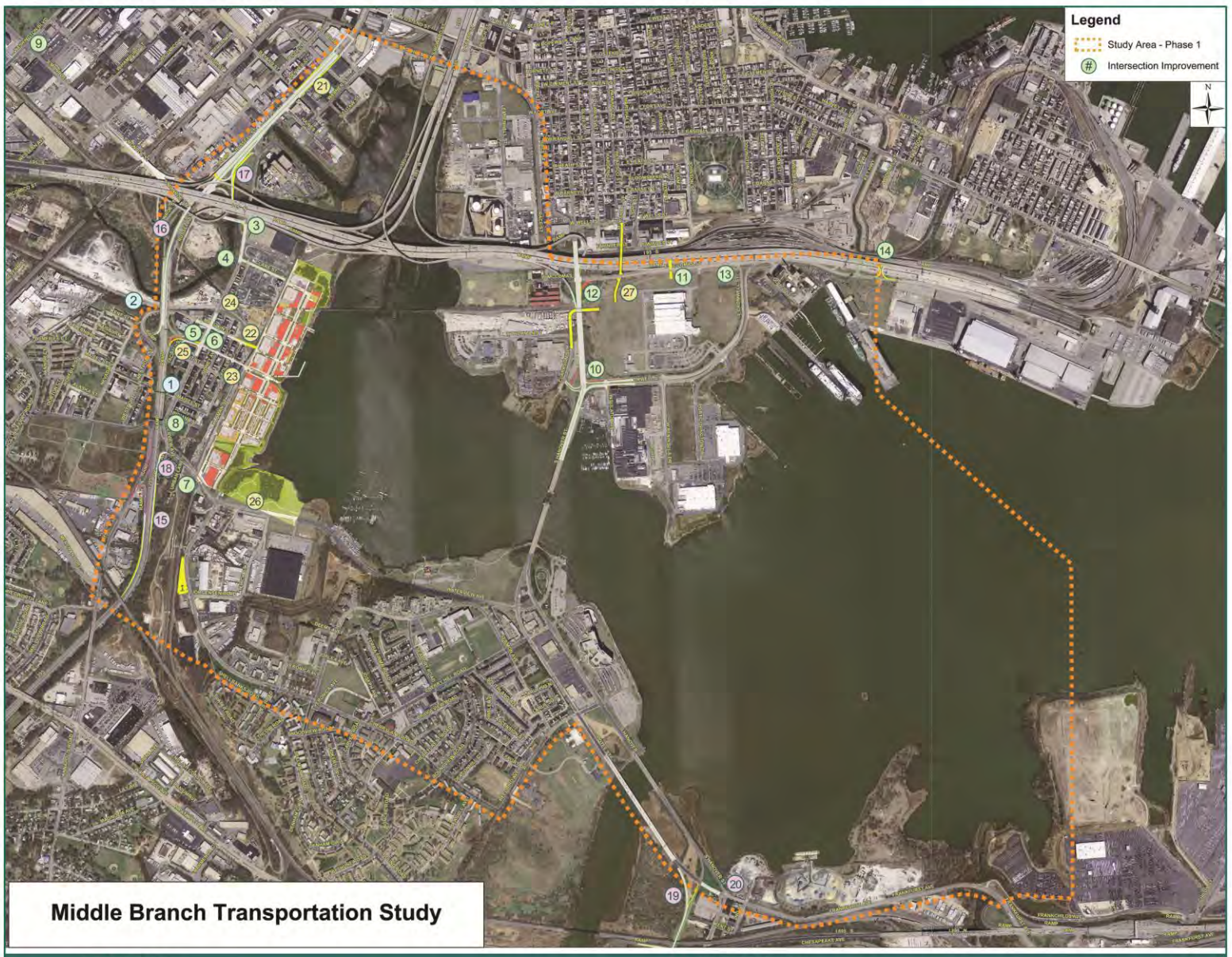


Figure 40 - Phase 1 Study Area Recommendations

SUMMARY OF POTENTIAL PLAN RECOMMENDATIONS



	PROJECT	DESCRIPTION
	SIDEWALKS	
	Sidewalk / Ramp Reconstruction	Reconstruct sidewalk segments rated as "poor" and non-compliant ramps to comply with ADA standards; refer to Pedestrian Accessibility Overview Map
1	Rehabilitate Pedestrian Bridge over MD 295 along Maisel Street	Improve existing pedestrian bridge along Maisel Street crossing over MD 295; provide a new pedestrian path between Annapolis Road and the bridge
2	Install Pedestrian Underpath under MD 295	Intsall a pedestrian underpath starting along Wenburn Street at Tacoma Street that would continue north to Manokin Street, cross under MD 295, and connect to Nevada Street and Kent Street on the west side of MD 295
	BIKE LANES	
	Bicycle Master Plan	Install proposed bike lanes (on-street and off-street) and pedestrian/bicycle path between Westport and Key Highway across CSX Swing Bridge; refer to Bicycle and Multi-Use (Bike / Pedestrian) Facilities Map
	TRANSIT IMPROVEMENTS	
	Bus Stop Conditions	Improve bus stop conditions to provide increased accessibility, safety, and comfort; refer to Bus Stop Condition Assessment Map
	MARC Station and Commuter Park-and-Ride	Construct new MARC station and park-and-ride facility; four potential locations were selected, with the most favorable location being along Ostend Street between Ridgely Street and Warner Street
	Water Taxi	Expand existing water taxi service to the Middle Branch
	Shuttle Bus	Expand Charm City Circulator into the Middle Branch
	Cherry Hill Light Rail Station	Construct parking lot
	INTERSECTION IMPROVEMENTS	
3	Annapolis Road / Monroe Street	Restripe to provide northbound left-turn lane; add northbound left-turn phase
4	Annapolis Road / Clare Street	Install new signal and restripe Clare Street to add westbound right-turn lane
5	Annapolis Road / Manokin Street	Install split signal phasing on Manokin Street approaches (eastbound and westbound traffic operate on separate signal phases); restripe between Annapolis Road and Tacoma Street to provide eastbound right-turn lane to Annapolis Road
6	Annapolis Road / Wenburn Street	Install new signal with left-turn phasing on Annapolis Road approaches and right-turn permitted/overlap phasing on southbound Annapolis Road approach
7	Waterview Avenue / John Moale Boulevard	Install new traffic signal
8	Annapolis Road / Waterview Avenue	Install signing/marking to alter lane configurations to have northbound left-turn lane and right-turn lane at west signal; eastbound left-turn lane and right-turn lane , southbound left-turn lane and right-turn lane, and northbound left-turn lane and right-turn lane at east signal
9	Washington Boulevard / Monroe Street	Restripe northbound Monroe Street to include a left-turn lane and a shared thru/right-turn lane; add southbound right-turn lane; add eastbound left-turn lane with exclusive/permissive phasing (addition of eastbound left-turn lane is currently under construction)
10	Hanover Street / Cromwell Street	Remove signal, convert intersection to right-in/right-out (RIRO) and construct connector road crossing under Hanover Street; other options include installing northbound/southbound left-turn lanes to create a "traditional" intersection and constructing a two-lane roundabout
11	Port Covington Site / McComas Street	Build connection on north side of Port Covington site with an at-grade intersection with McComas Street
12	Hanover Street / McComas Street	Install EB/WB split phasing
13	Cromwell Street / McComas Street	Install half-signal serving eastbound and northbound traffic
14	Key Highway / McComas Street	Install signing/marking to alter lane configuration to have two eastbound left-turn lanes and one eastbound thru lane; westbound thru lane and right-turn lane, southbound left-turn lane and right-turn lane; install turnaround lane for westbound U-turns separate from the intersection; other option includes installing a two-lane roundabout
	INTERCHANGE IMPROVEMENTS	
15	Northbound MD 295	Extend exit ramp deceleration lane from MD 295 northbound to Waterview Avenue
16	Southbound MD 295	Reduce Russell Street southbound to two lanes at I-95; restripe southbound I-95 exit ramp as right-most lane on southbound MD 295; extend on-ramp acceleration lane from Annapolis Road
17	Annapolis Road / Russell Street Exit Ramp from Northbound I-95	Widen/restripe to provide right-turn lane for northbound I-95 exiting traffic onto Annapolis Road
18	MD 295 / Waterview Avenue	Restrict left-turn movement from MD 295 NB exit ramp to Waterview Avenue
19	I-895 / Potee Street	Install left-turn ramp connection from southbound I-895 exit ramp to northbound Potee Street
20	Frankfurst Avenue / Potee Street	Add westbound Frankfurst Avenue to southbound Potee Street movement; divert large trucks from Hanover Street to Potee Street
	ARTERIAL, COLLECTOR, AND LOCAL ROAD IMPROVEMENTS	
21	Russell Street	Install turnaround lanes on both ends of Russell Street; construct weave lanes between Bayard Street and Alluvion Street; remove signals from Bush Street and Bayard Street and convert these intersections to right-in/right-out
22	Manokin Street	Restripe east of Annapolis Road to convert to two lanes westbound; extend street east across railroad tracks to John Moale Boulevard
23	Wenburn Street	Restripe east of Annapolis Road to convert to two lanes eastbound; realign the entire street from MD 295 ramps to Annapolis Road and install a median; restrict parking on both sides of entire length of street; extend street east to John Moale Boulevard
24	Annapolis Road Medians and Streetscape	Install medians, streetscaping, and curb bump-outs between Clare Street and Waterview Avenue as a method of traffic calming and to facilitate pedestrian crossings
25	Annapolis Road	Restrict parking in peak traffic hours for up to 150' north of Wenburn Street on the west side to provide southbound right-turn lane at Wenburn Street
26	Waterview Avenue	Resurface to temporarily improve street condition prior to future reconstruction project
27	Marshall Street	Extend from South Baltimore to Port Covington under I-95, intersecting with McComas Street and over railroad tracks

Figure 41 - Phase 2 Study Area Recommendations

SUMMARY OF POTENTIAL PLAN RECOMMENDATIONS

	PROJECT	DESCRIPTION
		SIDEWALKS
	Sidewalk / Ramp Reconstruction	Reconstruct sidewalk segments rated as "poor" and non-compliant ramps to comply with ADA standards; refer to Pedestrian Accessibility Overview Map
		BIKE LANES
	Bicycle Master Plan	Install proposed bike lanes (on-street and off-street) and pedestrian / bicycle path between Westport and Key Highway across CSX Swing Bridge; refer to Bicycle and Mult-Use (Bike /Pedestrian) Facilities Map
		TRANSIT IMPROVEMENTS
	Streetcar System	Extend streetcar system from proposed Charles Street Corridor trolley into Middle Branch, with base alignment on Charles Street, Light Street, and Fort Avenue; refer to Streetcar Routing Proposal Map
	Bus Stop Conditions	Improve bus stop conditions to provide increased accessibility, safety and comfort; refer to Bus Stop Condition Assessment Map
		INTERSECTION IMPROVEMENTS
1	Hanover Street / Ostend Street	Install 125' northbound left-turn lane and 150' eastbound left-turn lane
2	Hanover Street / Fort Avenue	Install 75' northbound left-turn lane and 175' southbound left-turn lane
3	Key Highway / Key Highway East	Install 200' westbound right-turn lane
4	Key Highway / Light Street	Install roundabout
		ARTERIAL, COLLECTOR, AND LOCAL ROAD IMPROVEMENTS
5	Key Highway	Install curb bump-outs, median widening, streetscaping, and enhanced pedestrian facilities

MIDDLE BRANCH
TRANSPORTATION PLAN

Figure 42 - Implementation Matrix

Project	Range	Description	Assessment									
			Pedestrians		Bicyclists		Motorized Vehicles		Transit		Land Use	
Pedestrian and Bicycle Facilities												
Sidewalk/Ramp Reconstruction	Short-term	Reconstruct sidewalk segments rated as "poor" and non-compliant ramps to comply with ADA standards; refer to Pedestrian Accessibility Overview Map	●	Improves overall pedestrian operations	◑	N/A	◑	N/A	◑	N/A	◑	N/A
Bicycle Master Plan	Mid-term	Install proposed bike lanes (on-street and off-street) and pedestrian/bicycle path between Westport and Key Highway across CSX Swing Bridge; refer to Bicycle and Multi-Use (Bike/Pedestrian) Facilities Map	●	Pedestrian/bicycle path across CSX swing bridge improves pedestrian operations	●	Improves overall bicycle operations	◕	Provision of non-motorized options may slightly reduce auto travel demand	◑	N/A	●	Pedestrian/bicycle path across CSX swing bridge provides neighborhood connection between Westport and Port Covington
Rehabilitate Pedestrian Bridge over MD 295 along Maisel Street		Improve existing pedestrian bridge along Maisel Street crossing over MD 295; provide a new pedestrian path between Annapolis Road and the bridge	●	Improves pedestrian operations in the Westport area	◕	Potentially improves bicycle operations in the Westport area if bicyclists are able to use the facility	◑	N/A	◑	N/A	●	Improves neighborhood connectivity in Westport across MD 295
Install Pedestrian Underpath Under MD 295		Install a pedestrian underpath starting along Wenburn Street at Tacoma Street that would continue north to Manokin Street, cross under MD 295, and connect to Nevada Street and Kent Street on the west side of MD 295	●	Improves pedestrian operations in the Westport area	◕	Potentially improves bicycle operations in the Westport area if bicyclists are able to use the facility	◑	N/A	◑	N/A	●	Improves neighborhood connectivity in Westport across MD 295
Transit Improvements												
Streetcar System	Long-term	Extend streetcar system from proposed Charles Street Corridor trolley into Middle Branch, with base alignment on Charles Street, Light Street, and Fort Avenue; refer to Streetcar Routing Proposal Map	●	Creates an alternative to vehicular travel by providing the option to make combined walking/streetcar trips	◕	Potentially creates an alternative to vehicular travel by providing the option to make combined bicycle/streetcar trips if streetcars allow riders to mount bicycles	◔	Causes more delay for drivers along streets where streetcar is installed; potentially reduces parking	●	Provides new transit option	◕	Provides increased connectivity between neighborhoods
Bus Stop Conditions	Short-term	Improve bus stop conditions to provide increased accessibility, safety, and comfort; refer to Bus Stop Condition Assessment Map	●	Improves conditions and accessibility for bus users, including sidewalk connectivity and lighting	◕	Facilitates bus travel for users who take combined bicycle/bus trips	◑	N/A	●	Improves conditions and accessibility for bus users	◑	N/A
MARC Station and Commuter Park-and-Ride		Construct new MARC station and park-and-ride facility; four potential locations were selected, with the most favorable location being along Ostend Street between Ridgely Street and Warner Street	●	Creates an alternative to vehicular travel by providing the option to make combined walking/MARC trips	◕	Potentially creates an alternative to vehicular travel by providing the option to make combined bicycle/MARC trips if MARC train allows riders to mount bicycles, or if station includes storage for bicycles	●	Provides new park-and-ride facility; creates option to make combined driving/MARC trips	●	Provides new transit option	◕	Provides increased connectivity between neighborhoods

LEGEND:

● Very Favorable | ◕ Favorable | ◑ Neutral | ◔ Unfavorable | ○ Very Unfavorable

Project	Range	Description	Assessment									
			Pedestrians		Bicyclists		Motorized Vehicles		Transit		Land Use	
Water Taxi	Long-term	Expand existing water taxi service to the Middle Branch	●	Creates an alternative to vehicular travel by providing the option to make combined walking/water taxi trips	◕	Potentially creates an alternative to vehicular travel by providing the option to make combined bicycle/water taxi trips if water taxi allows riders to take bicycles onboard, or if landings include storage for bicycles	◑	N/A	●	Provides new transit option	◕	Provides increased connectivity between neighborhoods
Shuttle Bus	Short-term	Expand Charm City Circulator into the Middle Branch	●	Creates an alternative to vehicular travel by providing the option to make combined walking/bus trips	◕	Provides new bus option and facilitates bus travel for users who take combined bicycle/bus trips	◑	N/A	●	Provides new bus route; provides connection to existing Charm City Circulator routes	◕	Provides increased connectivity between neighborhoods
Cherry Hill Light Rail Station	Mid-term	Construct parking lot	◔	Increased in auto demand to access parking lot may create more conflicts with pedestrians	◔	Increased in auto demand to access parking lot may create more conflicts with bicyclists	◕	Provides alternative to short-term street parking, freeing up parking for other drivers	●	Provides light rail riders with the option to drive to the station	◑	N/A
Intersection Improvements												
Annapolis Road/Monroe Street	Mid-term	Restripe to provide northbound left-turn lane; add northbound left-turn phase	◔	Worsens pedestrian operations, as additional lanes typically increase vehicular travel speeds	◔	Worsens bicycle operations, as additional lanes typically increase vehicular travel speeds	●	Improves traffic to acceptable operating conditions	◑	N/A	◑	N/A
Annapolis Road/Clare Street	Mid-term	Install new signal and restripe Clare Street to add westbound right-turn lane	◕	New signal allows for safe pedestrian crossing across Annapolis Road	◔	New signal would require more stops for bicyclists along Annapolis Road	●	Improves traffic to acceptable operating conditions	◑	N/A	●	Improves access to/from Westport Waterfront
Annapolis Road/ Manokin Street	Mid-term	Install split signal phasing on Manokin Street approaches (eastbound and westbound traffic operate on separate signal phases); restripe between Annapolis Road and Tacoma Street to provide eastbound right-turn lane to Annapolis Road	◑	N/A	◑	N/A	●	Improves traffic to acceptable operating conditions	◕	Decreased delay at this intersection reduces bus travel time, improves reliability of bus schedule	●	Improves access to/from Westport Waterfront
Annapolis Road/ Wenburn Street	Mid-term	Install new signal with left-turn phasing on Annapolis Road approaches and right-turn permitted/overlap phasing on southbound Annapolis Road approach	◕	New signal allows for safe pedestrian crossing across Annapolis Road	◔	New signal would require more stops for bicyclists along Annapolis Road	●	Improves traffic to acceptable operating conditions	◕	Decreased delay at this intersection reduces bus travel time, improves reliability of bus schedule	●	Improves access to/from Westport Waterfront
Waterview Avenue/John Moale Boulevard	Mid-term	Install new traffic signal	◕	New signal allows for safe pedestrian crossing across Waterview Avenue	◔	New signal would require more stops for bicyclists along Waterview Avenue	●	Improves traffic to acceptable operating conditions	◕	Decreased delay at this intersection reduces bus travel time, improves reliability of bus schedule	●	Improves access to/from Westport Waterfront
Annapolis Road/ Waterview Avenue	Mid-term	Install signing/marking to alter lane configurations to have northbound left-turn lane and right-turn lane at west signal; eastbound left-turn lane and right-turn lane, southbound left-turn lane and right-turn lane, and northbound left-turn lane and right-turn lane at east signal	◕	Allows for Annapolis Road Streetscape improvement, improving pedestrian operations crossing Annapolis Road	◕	Allows for Annapolis Road Streetscape improvement, which would slow vehicle speeds, thus improving bicycle operations	●	Improves traffic to acceptable operating conditions	◕	Decreased delay at this intersection reduces bus travel time, improves reliability of bus schedule	◑	N/A
Washington Boulevard/ Monroe Street	Mid-term	Restripe northbound Monroe Street to include a left-turn lane and a shared thru/right-turn lane; add southbound right-turn lane; add eastbound left-turn lane with exclusive/permissive phasing (addition of eastbound left-turn lane is currently under construction)	◔	Widening of roadway increases vehicles speeds and requires longer pedestrian crossings, worsening pedestrian operations	◔	Widening of roadway increases vehicular speeds, worsening bicycle operations	●	Improves traffic to acceptable operating conditions	◕	Decreased delay at this intersection reduces bus travel time, improves reliability of bus schedule	◑	N/A

Project	Range	Description	Assessment									
			Pedestrians		Bicyclists		Motorized Vehicles		Transit		Land Use	
Hanover Street/ Cromwell Street	Long-term	Convert to traditional 4-way intersection or roundabout	○	RIRO: worsens pedestrian operations by eliminating pedestrian connectivity across Hanover Street; increased vehicular speeds worsen pedestrian operations	◔	RIRO: worsens bicycle operations by eliminating bicycle connectivity across Hanover Street and increasing vehicular speeds, but signal removal allows bicycles along Hanover Street to cross Cromwell Street without stopping	●	RIRO: Improves traffic to acceptable operating conditions	◕	RIRO: Decreased delay at this intersection reduces bus travel time, improves reliability of bus schedule	●	RIRO: Improves access to/from sites in Port Covington
			◔	Left-turn lanes: Widening of roadway to provide turn lanes increases length of pedestrian crossings, worsening pedestrian operations	◔	Left-turn lanes: Addition of SB left-turn lane removes need for existing jug handle, reducing conflicts between SB bicyclists and SB left-turning vehicles; NB/SB bicyclists would be required to stop during left-turn phase	◕	Left-turn lanes: Improves traffic to near-acceptable operating conditions	◕	Left-turn lanes: Decreased delay at this intersection reduces bus travel time, improves reliability of bus schedule	●	Left-turn lanes: Improves access to/from sites in Port Covington
			◔	Roundabout: Two-lane roundabouts create challenges for pedestrians, especially those with disabilities, because interruptions to traffic flow are infrequent	◑	Roundabout: Although the roundabout would reduce motor vehicle speeds to near bicycle speeds, many bicyclists are uncomfortable negotiating the weaving movements in a two-lane roundabout; many would prefer to dismount and cross as pedestrians	○	Roundabout: Would result in very poor traffic operations, including extensive queues and delay	○	Roundabout: Heavy delay at this intersection would cause increased delays to buses, worsens reliability of bus schedule	●	Roundabout: Improves access to/from sites in Port Covington, creates visually appealing gateway
Port Covington Site/McComas Street	Long-term	Build connection on north side of Port Covington site with an at-grade intersection with McComas Street	◑	N/A	◑	N/A	●	Diverts traffic from nearby intersections	◕	Decreased delay at nearby intersections reduces bus travel time, improves reliability of bus schedule	●	Improves access to/from sites in Port Covington
Hanover Street/ McComas Street	Mid-term	Install EB/WB split phasing	◑	N/A	◑	N/A	●	Improves traffic to acceptable operating conditions	◕	Decreased delay at this intersection reduces bus travel time, improves reliability of bus schedule	◑	N/A
Cromwell Street/ McComas Street	Mid-term	Install half-signal serving eastbound and northbound traffic	◕	New signal allows for safe pedestrian crossing across Cromwell Street; pedestrian crossing across Cromwell Street would remain prohibited as it is adjacent to an I-95 off-ramp	◕	New signal removes direct conflict between EB bicyclists and NB right-turning vehicles by establishing a clear right-of-way	●	Improves traffic to acceptable operating conditions	◑	N/A	◑	N/A

Project	Range	Description	Assessment									
			Pedestrians		Bicyclists		Motorized Vehicles		Transit		Land Use	
Key Highway/ McComas Street	Mid-term	Install signing/marking to alter lane configuration to have two eastbound left-turn lanes and one eastbound thru lane; westbound thru lane and right-turn lane, southbound left-turn lane and right-turn lane; install turnaround lane for westbound U-turns separate from the intersection; other option includes installing a two-lane roundabout	◔	Signing/marking changes: increased vehicular speeds worsen pedestrian operations	◔	Signing/marking changes: increased vehicular speeds worsen bicycle operations	●	Signing/marking changes: Improves traffic to acceptable operating conditions	◑	N/A	◑	N/A
			◔	Roundabout: Two-lane roundabouts create challenges for pedestrians, especially those with disabilities, because interruptions to traffic flow are infrequent	◑	Roundabout: Although the roundabout would reduce motor vehicle speeds to near bicycle speeds, many bicyclists are uncomfortable negotiating the weaving movements in a two-lane roundabout; many would prefer to dismount and cross as pedestrians	○	Roundabout: Would result in very poor traffic operations, including extensive queues and delay	◑	N/A	◕	Roundabout: Creates visually appealing gateway
Hanover Street/ Ostend Street	Mid-term	Install 125' northbound left-turn lane and 150' eastbound left-turn lane	◔	Elimination of parking to install new lanes increases vehicles speeds and requires longer pedestrian crossings, worsening pedestrian operations	◔	Elimination of parking to install new lanes increases vehicular speeds, worsening bicycle operations	●	Improves traffic to acceptable operating conditions	◕	Decreased delay at this intersection reduces bus travel time, improves reliability of bus schedule	◑	N/A
Hanover Street/ Fort Avenue	Mid-term	Install 75' northbound left-turn lane and 175' southbound left-turn lane	◔	Elimination of parking to install new lanes increases vehicles speeds and requires longer pedestrian crossings, worsening pedestrian operations	◔	Elimination of parking to install new lanes increases vehicular speeds, worsening bicycle operations	●	Improves traffic to acceptable operating conditions	◕	Decreased delay at this intersection reduces bus travel time, improves reliability of bus schedule	◑	N/A
Key Highway/ Key Highway East	Mid-term	Install 200' westbound right-turn lane; add exclusive pedestrian phase on a trial basis	◔	Turn lane: Widening of roadway increases vehicle speeds and requires longer pedestrian crossings, worsening pedestrian operations	◔	Turn lane: Widening of roadway increases vehicular speeds, worsening bicycle operations	●	Turn lane: Improves traffic to acceptable operating conditions	◑	N/A	◑	N/A
			●	Pedestrian phase: improves safety for pedestrians crossing the intersection	◑	Pedestrian phase: N/A	◔	Pedestrian phase: Would result in poor traffic operations, including extensive queues and delay	◑	N/A	◑	N/A

Project	Range	Description	Assessment									
			Pedestrians		Bicyclists		Motorized Vehicles		Transit		Land Use	
Key Highway/ Light Street	Mid-term	Install roundabout	◔	Two-lane roundabouts create challenges for pedestrians, especially those with disabilities, because interruptions to traffic flow are infrequent	◑	Although the roundabout would reduce motor vehicle speeds to near bicycle speeds, many bicyclists are uncomfortable negotiating the weaving movements in a two-lane roundabout; many would prefer to dismount and cross as pedestrians, or bicyclists may prefer alternate routes (see Existing Multi-Use Trail in Figure 6)	●	Improves traffic to acceptable operating conditions	◕	Decreased delay at this intersection reduces bus travel time, improves reliability of bus schedule	◕	Creates visually appealing gateway between the Inner Harbor and South Baltimore
Interchange Improvements												
Northbound MD 295	Mid-term	Extend exit ramp deceleration lane from MD 295 northbound to Waterview Avenue	◑	N/A	◑	N/A	●	Improves traffic to acceptable operating conditions	◕	Decreased delay reduces bus travel time, improves reliability of bus schedule	◑	N/A
Southbound MD 295	Mid-term	Reduce Russell Street southbound to two lanes at I-95; restripe southbound I-95 exit ramp as right-most lane on southbound MD 295; extend on-ramp acceleration lane from Annapolis Road	◑	N/A	◑	N/A	●	Improves traffic to acceptable operating conditions	◕	Decreased delay reduces bus travel time, improves reliability of bus schedule	◑	N/A
Annapolis Road/Russell Street Exit Ramp from Northbound I-95	Mid-term	Widen/restripe to provide right-turn lane for northbound I-95 exiting traffic onto Annapolis Road	◑	N/A	◑	N/A	●	Improves traffic to acceptable operating conditions	◑	N/A	◑	N/A
MD 295/ Waterview Avenue	Mid-term	Restrict left-turn movement from MD 295 NB exit ramp to Waterview Avenue	◑	N/A	◑	N/A	●	Reduces queues along exit ramp	◑	N/A	◑	N/A
I-895/Potee Street	Mid-term	Install left-turn ramp connection from southbound I-895 exit ramp to northbound Potee Street	◑	N/A	◑	N/A	●	Provides improved vehicular connectivity	◑	N/A	◑	N/A
Frankfurst Avenue/ Potee Street	Mid-term	Add westbound Frankfurst Avenue to southbound Potee Street movement; divert large trucks from Hanover Street to Potee Street	◑	N/A	◑	N/A	●	Provides improved vehicular connectivity, diverts trucks from Hanover Street	◑	N/A	◑	N/A
Arterial, Collector, and Local Road Improvements												
Russell Street	Long-term	Install turnaround lanes on both ends of Russell Street; construct weave lanes between Bayard Street and Alluvion Street; remove signals from Bush Street and Bayard Street and convert these intersections to right-in/right-out	○	Decreases connectivity between neighborhoods on either side of Russell Street by eliminating two traffic signals; increased vehicle speeds worsen pedestrian operations	○	Decreases connectivity between neighborhoods on either side of Russell Street by eliminating two traffic signals; increased vehicle speeds worsen bicycle operations	●	Improves traffic to acceptable operating conditions	◕	Decreased delay along this roadway reduces bus travel time, improves reliability of bus schedule	◑	N/A
Manokin Street	Mid-term	Restripe east of Annapolis Road to convert to two lanes westbound; extend street east across railroad tracks to John Moale Boulevard	◑	To ensure speeds do not increase as a result of one-way traffic implementation, provide bulbouts to enhance pedestrian crossings; one-way traffic allows pedestrians to look one way when crossing the street	◑	Although one-way couplets typically increase motor vehicle travel speeds, providing two lanes in one direction may allow for narrower motor vehicle lanes and installation of a bike lane	●	Improves traffic to acceptable operating conditions	◑	N/A	●	Improves access to/from Westport Waterfront, reduces neighborhood livability

Project	Range	Description	Assessment									
			Pedestrians		Bicyclists		Motorized Vehicles		Transit		Land Use	
Wenburn Street	Mid-term	Restripe east of Annapolis Road to convert to two lanes eastbound; realign the entire street from MD 295 ramps to Annapolis Road and install a median; restrict parking on both sides of entire length of street; extend street east to John Moale Boulevard	◑	To ensure speeds do not increase as a result of one-way traffic implementation, provide bulbouts to enhance pedestrian crossings; one-way traffic allows pedestrians to look one way when crossing the street	◑	Although one-way couplets typically increase motor vehicle travel speeds, providing two lanes in one direction may allow for narrower motor vehicle lanes and installation of a bike lane	●	Improves traffic to acceptable operating conditions	◑	N/A	●	Improves access to/from Westport Waterfront, reduces neighborhood livability
Annapolis Road Streetscaping	Mid-term	Install streetscaping, medians, and curb bump-outs between Clare Street and Waterview Avenue as a method of traffic calming and to facilitate pedestrian crossings	●	Improves pedestrian operations crossing Annapolis Road	◕	Slower vehicle speeds will improve bicycle operations	◔	Causes small decrease in operating conditions	◔	Small decrease in operating conditions increases bus travel time, worsens reliability of bus schedule	◑	N/A

Project	Range	Description	Assessment									
			Pedestrians		Bicyclists		Motorized Vehicles		Transit		Land Use	
Annapolis Road	Mid-term	Restrict parking in peak traffic hours for up to 150' north of Wenburn Street on the west side to provide southbound right-turn lane at Wenburn Street	◔	Worsens pedestrian operations, as additional lanes typically increase vehicular travel speeds	◔	Worsens bicycle operations, as additional lanes typically increase vehicular travel speeds	●	Improves traffic to acceptable operating conditions	◔	Right-turn lane is located next to a bus stop, may negatively impact bus operations	●	Improves access to/from Westport Waterfront, reduces neighborhood livability
Waterview Avenue	Short-term	Resurface to temporarily improve street condition prior to future reconstruction project	◑	N/A	◑	N/A	●	Improves street conditions for vehicles	●	Improves street conditions for buses	◑	N/A
Marshall Street	Long-term	Extend from South Baltimore to Port Covington under I-95, intersecting with McComas Street and over railroad tracks	◕	Improves pedestrian connectivity between Port Covington and South Baltimore	◕	Improves bicycle connectivity between Port Covington and South Baltimore	◕	Improves vehicular connectivity between Port Covington and South Baltimore	◑	N/A	●	Improves neighborhood connectivity between South Baltimore and Port Covington
Key Highway Streetscaping	Mid-term	Install curb bump-outs, median widening, streetscaping and enhanced pedestrian facilities	●	Improves pedestrian operations along Key Highway	◕	Slower vehicle speeds will improve bicycle operations	◔	Causes small decrease in operating conditions	◔	Small decrease in operating conditions increases bus travel time, worsens reliability of bus schedule	◑	N/A