

## APPENDIX A: CONCEPTUAL CORRIDOR PROFILES

This section of the Plan presents 20 preliminary studies, 13 bicycle corridor studies and 7 pedestrian improvement zones. These profiles are designed to be short term projects that can be implemented relatively easily and help illustrate different types of low cost solutions to improve bicycle and pedestrian conditions. Each bicycle corridor study includes a description of the corridor, existing roadway conditions and the proposed improvements. A table showing the before and after Bicycle Level of Service score for each corridor is also included for each. The majority of the proposed bicycle improvements can be implemented in the short term and primarily involve restriping and resurfacing of the roadways to provide more space for bicyclists. These improvements should include the appropriate signs and pavement markings as illustrated in the Engineering Solutions chapter of this report. The pedestrian improvement zone studies identify problem areas within each zone and present possible improvements to address the problems. While the data on the region's pedestrian environment was not comparable to the information available to evaluate on-road bicycling conditions, the recommended pedestrian improvements are examples of solutions to typical problems that exist throughout the region.

### LIST OF STUDY AREAS

Jurisdiction	Bicycle Corridors		Pedestrian Improvement Zones
Anne Arundel County	Bestgate Road from Generals Highway to Rowe Blvd.	Hammonds Ferry Road from County line to Andover Road	Jennifer Road from West Street (MD 450) to Medical Blvd.
City of Annapolis/Anne Arundel County	Spa Road		Forest Drive from Riva Road to Chinquapin Round Road
Baltimore County	Frederick Road (Rt. 144)	Shawan Road from I-83 to York Road	York Road between Padonia Road and Bosley Avenue
Baltimore City	St. Paul Street from Charles Street to North Avenue	Charles Street from Stratford Road to North Avenue	Boston Street (Canton Neighborhood)  Cold Spring Lane between Falls Road and Greenspring Avenue
Carroll County	Old Washington Road (MD 32) between Main Street and MD 97	New Windsor Road (MD 31) between Main Street and Old New Windsor Pike	Center Street: Downtown Westminster to Westminster Town Center
Harford County	Main Street and Bond Street in downtown Bel Air	MD 24 from Trimble Road to Edgewood Road (MD 755)	Intersection of Business US 1 and Memorial Highway
Howard County	Little Patuxent Parkway	Montgomery Road between US 1 and Marshalee Drive	Intersection of Waterloo Road/MD 108 and Old Montgomery Road

## BICYCLE LEVEL OF SERVICE FIELD DATA DEFINITIONS

The following list provides a definition for each of the data fields required for computation of the *Bicycle Level of Service* scores, as well as the associated guidelines for their collection and compilation into the programmed database.

**Average Daily Traffic (ADT)** - is the average daily traffic volume on the segment or link. The programmed database will convert these volumes to  $Vol_{15}$  using the Directional Factor (D), Peak to Daily Factor ( $K_d$ ) and Peak Hour Factor (PHF) for the road segment.

**Percent Heavy Vehicles (HV)** - is the percentage of heavy vehicles (*as defined by the 1994 Highway Capacity Manual or the Client*) on the segment or link.

**Number of lanes of traffic (L)** - is the total number of *through* traffic lanes of the road segment and its configuration. (e.g., D = Divided, U = Undivided, OW = One-Way, S = Center Turning Lane). The programmed database will convert these lanes into directional lanes. The presence of continuous right-turn lanes should be noted in the comments field. In the other direction it will be noted in the comments if there is a different number of through lanes.

**Posted Speed Limit ( $S_p$ )** - Recorded as posted.

**$W_t$  total width of pavement** - is measured from the center of the road, yellow stripe, or (in the case of a multilane configuration) the lane separation striping to the edge of pavement or to the gutter pan of the curb. When there is angled parking adjacent to the outside lane,  $W_t$  is measured to the traffic-side end of the parking stall stripes.

**$W_1$  width of paving between the outside lane stripe and the edge of pavement** - is measured from the outside lane stripe to the edge of pavement or to the gutter pan of the curb. When there is angled parking adjacent to the outside lane,  $W_1$  is measured to the traffic-side end of the parking stall stripes.

**$W_1$  width of pavement striped for on-street parking** - Record this factor only if there is parking to the right of a striped bike lane. If there is parking on two sides on a one-way, single lane street, report the combined width of the striped parking.

**Total Pavement Width (TPW)** - is measured from the center of the road or yellow stripe to the edge of pavement or to traffic side of the gutter pan of the curb. Record this dimension only when the roadway has four or more thru lanes and has no striped paved shoulder or bike lane.

**OSPA %** - estimated percentage (measured in increments of 25%) of the segment (excluding driveways) along which there is occupied on-street parking at the time of survey. Each side should be recorded separately. If parking is allowed only during off-peak periods and parking restrictions change widths and laneage, indicate the geometric changes in the comments field. Note: Indicate any "angled parking" in the comments field.

**Pavement Condition:**

**Travel Lane (PC<sub>t</sub>)** - Evaluate the pavement condition of the motor vehicle travel lane according to the FHWA's five-point pavement surface condition rating shown in Figure 3.

**Shoulder or Bike lane (PC<sub>s</sub>)** - Evaluate the pavement condition of the shoulder or bike lane according to the FHWA's five-point pavement surface condition rating shown in Figure 3.

<b>RATING</b>	<b>PAVEMENT CONDITION</b>
5.0 (Very Good)	Only new or nearly new pavements are likely to be smooth enough and free of cracks and patches to qualify for this category.
4.0 (Good)	Pavement, although not as smooth as described above, gives a first class ride and exhibits signs of surface deterioration.
3.0 (Fair)	Riding qualities are noticeably inferior to those above; may be barely tolerable for high-speed traffic. Defects may include rutting, map cracking, and extensive patching.
2.0 (Poor)	Pavements have deteriorated to such an extent that they affect the speed of free-flow traffic. Flexible pavement has distress over 50 percent or more of the surface. Rigid pavement distress includes joint spalling, patching, etc.
1.0 (Very Poor)	Pavements that are in an extremely deteriorated condition. Distress occurs over 75 percent or more of the surface.

Source: U.S. Department of Transportation. Highway Performance Monitoring System- Field Manual. Federal Highway Administration. Washington, DC, 1987

# BICYCLE CORRIDOR PROFILES: ANNE ARUNDEL COUNTY

## BESTGATE ROAD: GENERALS HIGHWAY (MD 178) TO ROWE BOULEVARD

Bestgate Road is located in eastern Anne Arundel County, near the City of Annapolis. Land uses along this section are mixed; where Bestgate Road intersects with Generals Highway land uses are predominantly retail with Westfield Shoppingtown and Annapolis Plaza located on the south side of the road and Annapolis Business Park on the north side. East of this section, land uses are mixed with multi-family and single-family residences, a park, churches, a school and professional office buildings. This is an important



bicycle and pedestrian corridor due to the close proximity of the residential community to the shopping centers and commercial developments along this road.

### Existing Conditions and Recommended Improvements:

Currently, there are no bicycle facilities along Bestgate Road. Bicycle conditions are poor with a Bicycle LOS “E”. Bestgate Road is a 4-lane, divided arterial road with curb and gutter along the entire segment. The proposed improvement to Bestgate Road is the addition of a 4-foot bike lane. The resulting road cross-section would be four 10-foot travel lanes and two 4-foot bike lanes. Additional traffic calming measures should be considered to reduce the speed limit from 35 mph to 25 mph. These changes will greatly enhance the bicycling environment and achieve a Bicycle LOS “C”, a 30% improvement over existing roadway conditions.

Route Name	From	To	Lanes (L)		Traffic Data		Post Spd. (SPp) mph	Width of Pavement			Occu. OSP % (OSPA) (%)	Pvmt. Cond. (PR <sub>s</sub> ) (1..5)	Bicycle LOS	
			Th #	Con.	Vol. (ADT) (vpd)	Pct. (HV) (%)		(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score	Grade (A-F)
Bestgate Road	General s Highway	Rowe Blvd.	4	D	18,795	5	35	12.0	0.0	0.0	0	4.0	4.98	E
		Alternative	4	D	18,795	5	25	14.0	4.0	0.0	0	4.0	3.36	C

## HAMMONDS FERRY ROAD: COUNTY LINE TO ANDOVER ROAD

Hammonds Ferry Road, located in northern Anne Arundel County, is an important bicycle corridor, connecting with Baltimore County, Linthicum and the BWI Trail. Approximately 3.0 miles in length, the corridor not only links trail facilities, but also provides connections between neighborhoods and businesses in Anne Arundel and Baltimore counties and the Linthicum light rail station at the southern end of the corridor. Land uses along the corridor, are varied including residential, commercial and industrial.



### Existing Conditions and Recommended Improvements

Current bicycling conditions are poor along this corridor; the Bicycle Level of Service is rated a “D” as shown in the table below. The road cross-sections vary within the corridor from an open section with shoulders to sections with curb and gutter in residential areas. The recommended improvements are to repave the existing shoulders in areas where they have deteriorated, and strip the shoulders as bicycle lanes, at least 4 feet wide in areas with curb and gutter, leaving two 10-foot travel lanes for motor vehicles. These improvements should raise the Bicycle LOS to a “C”.

Route Name	From	To	Lanes (L)		Traffic Data		Post Spd. (SPp) mph	Width of Pavement			Occu. OSP % (OSPA) (%)	Pvmt. Cond. (PR <sub>s</sub> ) (1..5)	Bicycle LOS	
			Th #	Con.	Vol. (ADT) (vpd)	Pct. (HV) (%)		(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score	Grade (A-F)
Hammonds Ferry Road	County line	Andover Road	2	U	11,155	3	35	14.5	0.0	0.0	0	4.0	4.03	D
		Alternative	2	U	11,155	3	35	14.5	4.5	0.0	0	4.0	3.28	C

# BICYCLE CORRIDOR PROFILES: CITY OF ANNAPOLIS

## SPA ROAD: FOREST DRIVE TO WEST STREET

This segment of Spa Road is primarily residential with single-family homes and multi-family units located on both sides of the street. Additional land uses include stand alone businesses, the City’s Public Works Office and maintenance yard, churches, and access to Bates Middle School. This corridor is especially important to residents as it connects with West Street, a major route into downtown Annapolis, the Anne Arundel County Library, retail stores and bus service. Spa Road also intersects with Hilltop Lane, which has a dedicated bicycle lane.



### Existing Conditions and Recommended Improvements

Current bicycling conditions are poor along this corridor; the Bicycle Level of Service is rated a “D” as shown in the table below. The cross-section on this 2-lane undivided roadway is curb and gutter in residential areas and 15-foot travel lanes. The recommended improvement for Spa Road includes re-striping the existing pavement with 5-foot bicycle lanes, leaving 10-foot travel lanes for motor vehicles. These improvements will raise the Bicycle LOS to a “C”.

Route Name From To			Lanes (L)		Traffic Data		Post Spd. (SPP) mph	Width of Pavement			Occu. OSP % (OSPA) (%)	Pvmt. Cond. (PR <sub>5</sub> ) (1..5)	Bicycle LOS	
			Th #	Con.	Vol. (ADT) (vpd)	Pct. (HV) (%)		(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score	Grade (A-F)
Spa Road	Forest Drive	West Street	2	U	6,575	4	25	15	0.0	0.0	0	3.0	3.54	D
Alternative			2	U	6,575	4	25	15	5.0	0.0	0	3.0	2.52	C

# BICYCLE CORRIDOR PROFILES: BALTIMORE COUNTY

## FREDERICK ROAD: ROLLING ROAD TO BALTIMORE CITY LINE

Approximately 2 miles in length, Frederick Road in Baltimore County runs through Catonsville, extends into southwest Baltimore City, and is an important link between southern Baltimore County and Baltimore City. It also links to the No. 8 Trolley. Land uses along this corridor are mixed and include single and multi-family residences, retail establishments, restaurants and two schools, Hillcrest and Catonsville Elementary Schools. The density of land uses increases in the Catonsville area, becoming a small town center. Particularly surrounding the schools, Frederick Road is heavily traveled by students and residents.



### Existing Conditions and Recommended Improvements:

The bicycling conditions along this corridor are poor with a Bicycle Level of Service of “E”. Frederick Road is currently a four-lane undivided arterial road with curb and gutter and on street parking on both sides. The total width of Frederick Road is 44 feet; each travel lane is 12 feet wide and the parking lanes have a width of 10 feet. Based upon the potential for increased bicycle activity along this segment, improvements are recommended. Changes along this section of Frederick Road include resurfacing and restriping the road to include two 10-foot travel lanes, two, 7-foot parking lanes and the creation of two 5-foot wide bicycle lanes. These improvements will enhance conditions considerably for bicycling, from a Bicycle LOS “E” to “D”.

Route Name	From	To	Lanes (L)		Traffic Data		Post Spd. (SPP) mph	Width of Pavement			Occu. OSP % (OSPA) (%)	Pvmt. Cond. (PR <sub>s</sub> ) (1..5)	Bicycle LOS	
			Th #	Con.	Vol. (ADT) (vpd)	Pct. (HV) (%)		(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score	Grade (A-F)
Frederick Road	Rolling Road	Baltimore City Line	2	U	17,925	5	35	22.0	10.5	0.0	L70/R80	3.5	4.65	E
		Alternative	2	U	17,925	5	35	22.0	12.0	5	L70/R80	5.0	3.81	D

## SHAWAN ROAD: I-83 TO YORK ROAD (MD 45)

Shawan Road provides a link between I-83 and MD 45 (York Road). This corridor is an important link for bicycle and pedestrian traffic particularly because of its proximity to Northern Central Rail Trail and the proposed extension of Paper Mill Road. Land uses along this corridor include Hunt Valley Mall, Light Rail Station on the north side of the road, the Hunt Valley Business Community on the south side, and Shawan Plaza on the east side of the York Road intersection. Currently there is some pedestrian activity along the corridor, particularly near the mall and the Light Rail Station.



### **Existing Conditions and Recommended Improvements:**

Shawan Road is a six lane arterial road with right and left turn lanes at most intersections. Traffic volumes, 14,900 VPD, are high, particularly during peak hours. Current conditions for bicycling and walking are poor, with a Bicycle LOS “F”, and limited accommodation of pedestrians. Sidewalks are missing on the south side of the road and the few existing crosswalks require pedestrians to cross multiple lanes of high-speed traffic without refuge areas. There is currently a fair amount of pedestrian activity between the offices located on the south side of the road and the retail and restaurants in and around the Hunt Valley Mall on the north.

Recommended pedestrian improvements are to complete the sidewalk network on the south side of the road, from York Road to International Drive. The sidewalk should be at least five feet wide and **preferably** ten feet wide to also accommodate bicycle travel. Pedestrian signal heads should be added at all signalized intersections where none are in place today. Additionally, a pedestrian phase activated by a push button should be included at all signals. Pedestrian refuge islands should be installed in Shawan Road at the intersections of with McCormick Road and the Entrance to the Light Rail Station. Installation of a traffic signal should be considered at the Hyland Road intersection. The signal should include pedestrian signal heads and phases, and refuge islands should be installed in Shawan Road.

The existing conditions on Shawan Road are not conducive to bicycling, with a Bicycle LOS rating of “F”. Multiple lanes, and high speeds and volumes or traffic combine to create an uncomfortable environment for cycling. It would be very difficult to make changes to the roadway cross-section that would result in significant improvements to the Bicycle LOS. However, the land use and access patterns along this section of Shawan Road are conducive to the installation of a shared use path adjacent to the road.

Construction of a path on the north side of the road would provide bike access to the Hunt Valley Mall and Light Rail Station and could connect these places with the Northern Central Rail Trail in conjunction with the Paper Mill Road extension project. As discussed under the pedestrian improvements construction of a ten foot sidewalk would accommodate bicycle travel on the south side of the road, making bicycle commuting a more viable option for people working in businesses located in the business park. Bicycle parking facilities should be installed throughout the area.

## **BICYCLE CORRIDOR PROFILES: BALTIMORE CITY**

### **ST. PAUL STREET: CHARLES STREET TO NORTH AVENUE**

St. Paul Street is an important north/south arterial road that connects businesses, residences and colleges/universities in the north of the City with downtown Baltimore. From its intersection with Charles Street, St. Paul Street travels through a residential area and carries two-way traffic. At University Parkway, the street changes to one-way southbound and becomes part of a one-way pair system with Charles Street. At this point surrounding land uses become more urban, with a higher densities and a mix of residential, commercial and retail uses.



### **Existing Conditions and Recommended Improvements**

Current bicycling conditions in the corridor are poor with Bicycle LOS scores of “E” between University Parkway and North Avenue and “D” from University Parkway to Charles Street. The road cross-section varies throughout the corridor, from a 54-foot wide street with two-way traffic from Charles Street to University Parkway to a one-way street southbound from University Parkway to North Avenue, with parking on both sides of the street and widths of 40 or 44 feet. St. Paul Street is the southbound segment of a one-way pair system, with Charles Street, that serves north-south traffic through north central Baltimore. Parking is prohibited during the morning peak hours, 7:00-9:30 AM, to allow an additional travel lane. Because of the different traffic patterns during the day two alternatives are proposed for St. Paul Street. The first is to stripe a parking lane and bike lane adjacent to the left side curb to accommodate bicycles at all hours. The resulting cross-section would be a 7-foot parking lane, a 5-foot bike lane, and three 10 foot travel lanes, raising the Bicycle LOS to “C”. A second alternative is to stripe a wide curb lane on the right side of the road. The resulting cross-section would be a 13-14 foot lane adjacent to the right curb, two 10-11 foot travel lanes and a 7-foot parking lane on the left side. The wide curb lane would improve conditions during the morning peak hours and also allow for parking during the rest of the day. This cross-section would improve the Bicycle LOS to a “D”. In some segments the configuration of bike lanes will need to be carefully studied, to reduce potential conflicts between bicycles and parked cars. However, accommodating bicycle travel along St. Paul Street is an important step in meeting the high demand for bicycling in the corridor.

**ST. PAUL STREET: CHARLES STREET TO NORTH AVENUE**

Bike Lane			Lanes (L)		Traffic Data		Post Spd. (SPp) mph	Width of Pavement			Occu. OSP % (OSPA) (%)	Pvmt. Cond. (PR <sub>5</sub> ) (1..5)	Bicycle LOS	
			Th #	Con.	Vol. (ADT) (vpd)	Pct. (HV) (%)		(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score	Grade (A-F)
Route Name	From	To												
St. Paul Street	Charles Street	North Avenue	3	OW	17,885	3	30	20	0	10	L70/R70	3.5	4.59	E
	Alternative		3	OW	17,885	3	30	22	12	7	L70/R70	3.5	3.22	C

**Wide Curb Lane**

Route Name	From	To												
St. Paul Street	Charles Street	North Avenue	3	OW	17,885	3	30	10	0	0	L70/R0	3.5	4.72	E
	Alternative		3	OW	17,885	3	30	14	0	0	L70/R0	3.5	4.24	D

## CHARLES STREET: STRATFORD ROAD TO NORTH AVENUE

Charles Street is an important north/south arterial road that connects downtown Baltimore with businesses, residences and colleges in the north of the City. The street is part of a one-way pair system with St. Paul Street from 29th to Stratford it is two-way. As it enters the more urban areas of the City the street travels through areas with a mix of residential commercial and retail uses.



### Existing Conditions and Recommended Improvements

Current bicycling conditions in the corridor are poor with Bicycle LOS scores of “D” and “E” for segments in the corridor. The road cross-section varies throughout the corridor, but is generally a one-way street north bound, with parking on one or both sides of the street and has a contra-flow vehicle lane for southbound traffic during the morning peak hour adjacent to Johns Hopkins University. Charles Street is the northbound segment of a one-way pair system, with St. Paul Street, that serves north-south traffic through north central Baltimore. The street width varies from 40 to 60 feet. Parking is prohibited during the afternoon peak hours, 4:00-6:30 PM, to allow an additional travel lane. Because of the different traffic patterns during the day two alternatives are proposed for Charles Street. The first is to stripe a parking lane and bike lane adjacent to the left side curb to accommodate bicycles during all hours. The resulting cross-section would be a 7-foot parking lane, a 5-foot bike lane and three 10 foot travel lanes, raising the Bicycle LOS to “C”. A second alternative is to stripe a wide curb lane on the right side of the road. The resulting cross-section would be a 13-14 foot lane adjacent to the right curb, two 10-11 foot travel lanes and a 7-foot parking lane on the left side. The wide curb lane would improve conditions during the morning peak hours and also allow for parking during the rest of the day. This cross-section would improve the Bicycle LOS to a “D”. In some segments the configuration of bike lanes will need to be carefully studied, particularly in front of Johns Hopkins University, between 29<sup>th</sup> street and University Parkway where a contra-flow vehicular lane is in place during the AM peak hour. However, accommodating bicycle travel along Charles Street is an important step in meeting the high demand for bicycling in the corridor.

**CHARLES STREET: STRATFORD ROAD TO NORTH AVENUE**

Bike Lane			Lanes (L)		Traffic Data		Post Spd. (SPP) mph	Width of Pavement			Occu. OSP % (OSPA) (%)	Pvmt. Cond. (PR <sub>s</sub> ) (1..5)	Bicycle LOS	
			Th #	Con.	Vol. (ADT) (vpd)	Pct. (HV) (%)		(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score	Grade (A-F)
Route Name	From	To												
Charles Street	28 <sup>th</sup> Street	North Avenue	<b>3</b>	OW	12,701	3	25	20.0		10.0	L70/R70	3.5	3.97	D
	Alternative		<b>3</b>	OW	12,701	3	25	22.0	12.0	7.0	L70/R70	3.5	2.61	C

**Wide Curb Lane**

Route Name	From	To												
Charles Street	28 <sup>th</sup> Street	North Avenue	<b>3</b>	OW	12,701	3	25	10.0	0	0	L70/R0	3.5	4.40	D
	Alternative		<b>3</b>	OW	12,701	3	25	14.0	0	0	L70/R0	3.5	4.06	D

# BICYCLE CORRIDOR PROFILES: CARROLL COUNTY

## MD 32 (WASHINGTON ROAD/OLD WASHINGTON ROAD): E. MAIN STREET TO MD 97

MD 32 is an important north/south route into the City of Westminster. This segment of MD 32 is approximately 3 miles in length and links a variety of land uses, making it a key travel corridor to and from the City. Single family residences, stand alone businesses, automobile service and sales, and key destinations such as Westminster High School, Carroll County Career and Tech Center, Carroll County Community College, and the YMCA among others, exist along this corridor. This is an important segment of MD 32 as it provides a direct route for students traveling north to the high school, community college and tech center, or for area residents going to the YMCA. Traveling south, this corridor provides a link for residents to Main Street in Downtown Westminster, residential communities, as well as the City’s main commercial area on MD 140.



### Existing Conditions and Recommended Improvements:

MD 32 is a 2-lane undivided roadway with no bicycle or pedestrian facilities. Current bicycling conditions are poor with a Bicycle LOS “F”. Considering the potential for bicycling activity, improvements on this road are recommended. Based on the existing pavement width, the road would be restriped with two 10-foot travel lanes and two 4-foot bicycle lanes. In addition, construction of five-foot wide sidewalk on both sides of the roadway is recommended. The recommended changes, coupled with a reduction of the posted speed limit to 35 mph will greatly improve the Bicycle LOS to a “D”. During the next resurfacing project a few feet of pavement should be added to enable the installation of curb and gutter where it does not exist closer to Main Street and allow for an additional foot to be added to the bicycle travel lanes. These additional steps would achieve a Bicycle LOS “C” for this section of MD 32.

Route Name	From	To	Lanes (L)		Traffic Data		Post Spd. (SPp) mph	Width of Pavement			Occu. OSP % (OSPA) (%)	Pvmt. Cond. (PR <sub>s</sub> ) (1..5)	Bicycle LOS	
			Th #	Con.	Vol. (ADT) (vpd)	Pct. (HV) (%)		(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score	Grade (A-F)
MD 32/Old Washington Rd.	E. Main St.	Washington Rd. (Route 97)	2	U	14,000	8	40	13.0	0.0	0.0	0	3.0	6.15	F
	Alternative		2	U	14,000	5	35	14.0	4.0	0.0	0	5.0	3.87	D

**MD 31 (NEW WINDSOR ROAD): MAIN STREET TO OLD NEW WINDSOR PIKE**

MD 31 from Main Street to Old New Windsor Road is an important travel corridor for students and families traveling into Westminster. Specifically, this state road provides direct access to West Main Street, which borders Western Maryland College campus and leads into downtown Westminster. Land uses along this state road consist of single-family homes and multi-family residences.



**Existing Conditions and Recommended Improvements:**

This 2-lane undivided road has 10-foot shoulders, 12-foot travel lanes and no curb and gutter. Conditions for bicycling along this section of MD 31 are average but could be enhanced from a Bicycle LOS “C” to “A” by restriping the existing shoulders as bicycle lanes and installing proper bicycle lane signage to raise motorist awareness. These changes are a good example of how inexpensive improvements to the bicycling environment can encourage bicycling.

Route Name From To			Lanes (L)		Traffic Data		Post Spd. (SPP) mph	Width of Pavement			Occu. OSP % (OSPA) (%)	Pvmt. Cond. (PR <sub>s</sub> ) (1..5)	Bicycle LOS	
			Th #	Con.	Vol. (ADT) (vpd)	Pct. (HV) (%)		(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score	Grade (A-F)
MD 31/New Windsor Road	W. Main St.	Old New Windsor Pike	2	U	3,675	4	45	15.0	4.0	0.0	0	4.0	2.93	C
Alternative			2	U	3,675	4	45	22.0	10.0	0.0	0	4.0	0.00	A

## BICYCLE CORRIDOR PROFILES: HARFORD COUNTY

### MAIN STREET AND BOND STREET: FULFORD AVENUE TO GORDON STREET

Main and Bond Streets form a one-way pair system serving downtown Bel Air. Main Street travels northbound through the heart of downtown, with offices, shops and restaurants on both sides of the road. Bond Street, traveling southbound has commercial, a few retail uses of the east side, and a mix of lower density commercial, retail and residential uses on the west. Bond Street was reconstructed in 1999-2000.



#### **Existing Conditions and Recommended Improvements:**

Conditions for bicycling on Bond and Main Streets are currently poor with Bicycle LOS grades of “D” for both Streets. Main Street is currently configured with two 11-foot travel lanes and a 9-foot parking lane on both sides of the street. Tree islands, extending 7 feet beyond the face of curb are installed intermittently on both sides of the street. Bond Street has two lanes with parking on the west side from Main Street to Lee Street, and then three lanes with no parking to Fulford Avenue. All travel lanes on Bond Street are 12-feet wide. The recommended improvement for Main and Bond Streets is to add bike lanes to both streets. On both streets bike lanes could be created by restriping the road. The resulting cross-section for Main Street would be two 10-foot travel lanes, two 7-foot parking lanes and a 6-foot bike lane. The cross-section on Bond Street would be three 10-foot travel lanes and a 5-foot bike lane. Consideration should be given to striping the bike lane on the left side of Bond Street, because most of the large number of retail and restaurant uses on the east side of the street and on Main Street.



**MAIN STREET AND BOND STREET: FULFORD AVENUE TO GORDON STREET**

Route Name From To			Lanes (L)		Traffic Data		Post Spd. (SPp) mph	Width of Pavement			Occu. OSP % (OSPA) (%)	Pvmt. Cond. (PR <sub>5</sub> ) (1..5)	Bicycle LOS	
			Th #	Con.	Vol. (ADT) (vpd)	Pct. (HV) (%)		(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score	Grade (A-F)
Bond Street	Churchville Road	Gordon Street	3	ow	10,000	4	25	12	0.0	0.0	0	4.0	4.03	D
		Alternative	3	ow	10,000	4	25	15	5	0.0	0	4.0	2.66	C

Route Name From To			Lanes (L)		Traffic Data		Post Spd. (SPp) mph	Width of Pavement			Occu. OSP % (OSPA) (%)	Pvmt. Cond. (PR <sub>5</sub> ) (1..5)	Bicycle LOS	
			Th #	Con.	Vol. (ADT) (vpd)	Pct. (HV) (%)		(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score	Grade (A-F)
Main Street	Churchville Road	Gordon Street	2	ow	15,925	5	30	22	9.0	9.0	L/R 70/70	4.0	4.03	D
		Alternative	2	ow	15,925	5	25	25.0	13.0	7.0	L/R 70/70	4.0	2.64	C

## MD 24: TRIMBLE ROAD TO EDGEWOOD ROAD (MD 755)

Located in the southern Harford County, MD 24 provides direct access to Aberdeen Proving Ground. The Edgewood MARC Station can be accessed from MD 24 via Trimble Road, providing an alternative to Edgewood Road. This corridor is an important link for surrounding residential communities to the Edgewood MARC Station, as well as commuters traveling to Aberdeen Proving Ground.



### Existing Conditions and Recommended Improvements:

Current conditions along this two-lane undivided roadway are average, Bicycle LOS “C”. Considering the potential for increased activity along this corridor, improvements are recommended. The shoulders along this road are in disrepair. Resurfacing the shoulders, marking them as bicycle lanes and installing bicycle route signs on Trimble Road directing cyclists to the MARC Station and Aberdeen Proving Ground, will provide an improved bicycling environment along this segment. As shown on the second row of the table below, a Bicycle LOS “B” would be achieved with these improvements.

Route Name From To			Lanes (L)		Traffic Data		Post Spd. (SPp) mph	Width of Pavement			Occu. OSP % (OSPA) (%)	Pvmt. Cond. (PR <sub>5</sub> ) (1..5)	Bicycle LOS	
			Th #	Con.	Vol. (ADT) (vpd)	Pct. (HV) (%)		(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score	Grade (A-F)
MD 24	Willoughby Beach Road	Edgewood Road (MD 755)	2	S	12,950	8	50	20.0	10.0	0	0	3.0	2.86	C
Alternative			2	S	12,950	8	50	20.0	10.0	0	0	5.0	2.12	B

## **BICYCLE CORRIDOR PROFILES: HOWARD COUNTY**

### **LITTLE PATUXENT PARKWAY: CEDAR LANE TO GOVERNOR WARFIELD PARKWAY**

As a central artery through Columbia, Little Patuxent Parkway is a key transportation corridor that extends through one of the most populated areas of Howard County. The Parkway connects a number of densely populated residential villages such as Hickory Ridge, Harpers Choice, Town Center and Wilde Lake. Specific destinations that lie along this road include Howard County Hospital, Howard County Community College, Swansfield Elementary School, Symphony Woods, Merriweather Post Pavilion, Howard County’s Central Library, numerous office buildings (including several high-rise offices), the Columbia Mall, the Columbia Waterfront (and home of Rouse Corporation), the



Sheraton Hotel and a number of restaurants and retail businesses. Although there are sidewalks/bicycle sidepaths along the entire length of the corridor, these existing pathways are insufficient to safely accommodate bicycle transportation and do not meet national design standards.

#### **Existing Conditions and Recommended Improvements**

Current bicycling conditions on Little Patuxent Parkway are poor with Bicycle LOS scores of “E” and “F” between Cedar Lane and Governor Warfield Parkway. The roadway cross section varies considerably along the corridor: from a 4-lane two-way street with no center turn lane around the “loop”, to a 4-lane two-way street with a wide grassed center median between end of the loop and Broken Land Parkway, to a 6-lane two way street with a center parkway through Town Center. Along each cross section, however, there are opportunities to accommodate bicycles relatively easily, in some cases without adding additional pavement.

The proposed improvement for Little Patuxent Parkway is to install bike lanes for the entire length of the corridor. It is recommended that the 6-lane section of Little Patuxent Parkway between Broken Land Parkway and Governor Warfield Parkway (north of mall) be reduced to a 4-lane roadway. This section exceeds the amount of roadway width normally needed to carry current traffic volumes. It carries 23,000 vehicles per day and operates at a motor vehicle LOS of “A” – the reduction to a 4-lane road will not degrade motor vehicle LOS below an “A.” The additional space may be used for bike lanes on each side (as well as additional sidewalk space). The resulting improvement in bicycling conditions would be dramatic – going from an “F” to a “B” (see below).

Along the 4-lane section between Cedar Lane and Broken Land Parkway, the existing 12’ lanes could be narrowed to 10’ wide (which may also have the benefit of reducing excessive motor vehicle speed on this road), leaving 4’ of space on the sides for bike lanes. Another option would be to add a few feet of pavement on the inside, non-curbed portion of the road (alongside the center median) and shift the travel lanes over in order to have room for bike lanes on the outside edge.

Finally, the existing 4-lane, undivided section of Little Patuxent Parkway that extends around the loop would also be an excellent candidate for restriping to a 3-lane road with a center scramble lane. There is a considerable number of left turns on this road – the new configuration would reduce the likelihood of rear-end motor vehicle collisions, while also providing an opportunity to install bike lanes on the sides without adding more pavement.

Route Name From To			Lanes (L)		Traffic Data		Post Spd. (SPp) mph	Width of Pavement			Occu. OSP % (OSPA) (%)	Pvmt. Cond. (PR <sub>s</sub> ) (1..5)	Bicycle LOS	
			Th #	Con.	Vol. (ADT) (vpd)	Pct. (HV) (%)		(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score	Grade (A-F)
Little Patuxent Pkwy.	Broken Land Pkwy.	Gov. Warfield Pkwy.	<b>6</b>	D	23,000	8	35	12				4	5.74	F
Alternative			<b>4</b>	D	23,000	8	35	20	8			4	2.42	B

## **MONTGOMERY ROAD: US 1 TO ROCKBURN**

Montgomery Road, located in the Greater ElkrIDGE area of Howard County, currently accommodates bicycle commuters as well as many walkers and cyclists to/from Howard County Rockburn Park, Patapsco State Park and several elementary and middle schools. Montgomery Road bridges I-95 east of Landing Road. Land uses are predominantly non-subdivision residential west of I-95 with a variety of uses east of I-95 (churches, schools, apartments, shopping centers, etc.)



### **Existing Conditions and Recommended Improvements**

Current bicycling and walking conditions are poor to barely adequate. West of Landing Road, the Bicycle Level of Service is rated as “E”; east of Landing Road it is “D”. Sidewalks are almost non-existent. Cross section west of Landing road narrows and shoulders are often one foot to two feet wide (reflecting limited right-of-way). East of Landing Road (I-95) to US 1, shoulders vary but are adequate in some segments. However, motor vehicle traffic volumes are higher in this segment as well. The impending second connection of Marshalee Drive to Montgomery Road near I-95 will divert traffic from part of Montgomery Road improving the “E” Bicycle Level of service road segment. The recommended direction of improvements is to widen and demarcate shoulders especially on uphill grades in the direction of traffic and to provide protected pedestrian crossings at key intersections. Constrained right-of-way may require that centerline striping be shifted to maximize lateral clearance on the side where needed more critically. Shoulder design, signing and construction should accommodate both pedestrians and cyclists where possible.

# Pedestrian Improvement Zone: Anne Arundel County

## Jennifer Road from West Street (MD 450) to Medical Boulevard

**Roadway:** 4-lanes, undivided roadway, urban, sidewalks

**Walking Conditions:** This is an important pedestrian corridor with adjacent land use being primarily commercial in nature. The Annapolis Mall, Annapolis Plaza, Restaurant Park and Jennifer Square Shopping Center make up the western end of the corridor, while Anne Arundel Medical Center is located on the eastern end. Sidewalk gaps exist on both sides of Jennifer Road from MD 450 to the first shopping center entrance. Segments along the south side of the roadway lack sidewalk buffers such as nature strips or street trees.



*(Below) Crosswalks, signalheads and some sidewalks are missing from this intersection. These omissions are characteristic of many intersections studied throughout the Baltimore region. The lower two illustrations demonstrate a retrofit suggestion for the intersection at Jennifer Road. The turning radius is reduced approaching the intersection to enhance pedestrian visibility and reduce motor vehicle speed.*

**Concern:** Traffic volumes are high with moderate speeds. Crossing distances are too far apart and many destinations lack pedestrian crossings.

### Recommendations:

**Short Term:** Install pedestrian crossing signal at intersections of Jennifer Road with West Street and Medical Boulevard. Provide a refuge and push button at this intersection. Re-stripe pedestrian crossings at all signalized intersections. Add pedestrian crossing signage at intersection crosswalks.



Before

**Long Term:** Complete sidewalk gaps on north and south side of the Jennifer Road with nature strip as a buffer to the pedestrian.



After

# Pedestrian Improvement Zone: Anne Arundel County and City of Annapolis Forest Drive from Riva Road to Chinquapin Round Road

**Roadway:** 2-lane, undivided, urban, some sections of curb and gutter, sidewalks

**Walking Conditions:** The adjacent land use along this segment includes commercial areas between Riva Road and Solomons Island Road such as Parole Plaza, Forest Plaza, and Festival at Riva, as well as a residential zone between Solomons Island Road and Chinquapin Round Road. This is an important travel corridor for pedestrians as it leads into and travels through the City of Annapolis and transit service is provided on Forest Drive.



**Concern:** A continuous system of sidewalks is not provided at this location between commercial and residential areas. In addition, in the residential area, there are horizontal and vertical curves that create limited sight distance for pedestrians.



## Recommendations:

**Short Term:** Provide visible crosswalks and pedestrian signage at the intersections of Forest Drive with Riva Road, Solomons Island Road and Chinquapin Round Road, as well as the entrances to the shopping areas. Investigate sight distances in the proximity of vertical and horizontal curvatures throughout residential areas with specific attention to transit stops generating midblock crossings.



**Long Term:** Complete the missing sidewalks on the north side of Forest Drive between Riva Road and Solomons Island, as well as the south side of Forest Drive from Riva Town Center Road to Solomons Island Road, as well as the entrances to the shopping areas with some physical separation from the motor vehicle traffic where permitted. Investigate the feasibility of a system of sidewalks through the residential area. Install pedestrian crossing signals at all major intersections including Riva Road, Solomons Island Road, and Chinquapin Round Road, as well as at the shopping mall entrances.

# Pedestrian Improvement Zone: Baltimore County

## York Road from Padonia Road and Warren Road

**Roadway:** 4-lane undivided, urban, sidewalks

**Walking Conditions:** The existing land use is dense commercial on both sides of York Road including major shopping centers such as Padonia Village, Yorktowne Plaza, Trays Corner Shopping Center, and Scotts Corner Shopping Center. Secondary land use includes automobile dealers and office buildings. Bus stops are located on both sides of the street.

**Concern:** Pedestrian accessibility is a major concern for this dense commercial corridor. Impediments include numerous access driveways, a center turning lane, missing curb cuts and accessible ramps, long distances between signalized intersections, and midblock crossings generated by transit stops. In addition, the vast parking lots adjacent to the commercial developments include little treatment for pedestrian circulation within the parking facilities.

**Recommendations:**

**Short Term:** Provide crosswalks and pedestrian signage at the intersections of York Road with Padonia Road, Galloway Avenue, and Scott Adam Road, Church Lane and Warren Road. Design midblock treatments between heavily used bus stops to provide shorter distances between crossing areas. Investigate access consolidation to minimize the required number of curb cuts and accessible ramps.

**Long Term:** Complete the missing sidewalks in front of Crestridge Offic Park (south of Scott Adam Avenue) and north of Industry Lane, as well as both sides of YOurk Road north of Warren Road with buffering where permitted. Provide median pockets to separate pedestrians from vehicular traffic on the center turning lane. Install pedestrian crossing signals and push buttons at the intersections of York Road with Padonia Road, Galloway Avenue, and Scott Adam Road.



# Pedestrian Improvement Zone: Baltimore City

## Boston Street, Canton Neighborhood

**Roadway:** 4-lanes, urban, with sidewalks, median and turning pockets, other streets have 2 lanes

**Walking Conditions:** The City reconstructed Boston St. 2-3 years ago, and installed wide sidewalks which are often separated from the roadway section. The reconstruction also provided crosswalks - both at intersections controlled by traffic signals and at other key intersections - and included elevated medians to prevent pedestrians from crossing between these points. However, since the project was completed, new development in the area has generated additional pedestrian traffic along both sides of the street, not always at the signalized intersections. Crossings at several intersections have poor sight distances.

**Concern:** The reconstruction included the community input on pedestrian access issues - in particular, jaywalking and the need to channelize pedestrian traffic across the street. However, the medians do not extend to the crosswalks, leaving pedestrians unprotected from through and turning traffic. Patterns of pedestrian travel suggest that crossing distances are too far apart and many pedestrians cross in places motorists do not anticipate. In addition, motorists do not yield to pedestrians at unsignalized intersections, pedestrian signal delays discourage pedestrians from using signalized crossings, and motor vehicle speeds are significantly higher than the posted speed limit of 30 mph.



*(Above) Motorists are failing to yield to pedestrians in marked crosswalks. Pedestrian signals and systems fail to reward pedestrians who come to these crossings. There are insufficient marked crossings for pedestrians in this compact village area.*



## **Recommendations:**

### **Short Term:**

Provide hot response for pedestrians at existing signals during all off-peak hours. Improve crosswalk markings and test innovative treatments, such as embedded pavement signals and signs.



### **Long Term:**

Create appropriate gaps in medians, as well as extend the medians to provide a refuge area to protect pedestrians and enable them to cross each direction of traffic safely. The City has already implemented an example of such a treatment on President Street. Create pedestrian-activated signal crossings at all logical points, including all intersections. Provide half-signal systems, and slow motorist speeds using progression on signals at appropriate speeds. Install curb extensions for mid-block crossings with trees and plantings to narrow the perception of the street.

# Pedestrian Improvement Zone: Baltimore City Cold Spring Lane from Falls Road and Greenspring Avenue

## Roadway:

4-lane, partially undivided and divided, urban, sidewalks



## Walking Conditions:

There are three distinct pedestrian environments in this street segment: 1) between Falls Road and I-83, which includes a high amount of attention to pedestrian facilities in the vicinity of Western High School; 2) the I-83 interchange, which includes the MTA station and difficult on- and off-ramp junctions; and 3) between Tamarind Road and Greenspring Avenue, with adjacent open areas such as Cylburn Park and adjoining residential developments.



The roadway provides connectivity between residential developments east of Falls Road and west of Greenspring Avenue. Transit service is provided by light rail station, as well as numerous bus routes.

## Concern:

High vehicular speeds, no physical buffer between pedestrian and motor vehicle traffic, lack of accessible ramps and curb cuts, multiple high speed ramps, without pedestrian crossing advisory signage, and physical gaps in sidewalk system.



## Recommendations:

### Short Term

Re-paint crosswalks and upgrade signage in the vicinity of Western High School between I-83 and Falls Road. Repair sidewalks in the vicinity of the I-83 interchange and MTA transit stop including upgrading accessible ramps. Provide pedestrian crossing advisory signage and crosswalks delineating the I-83 on- and off-ramps.

### Long Term:

Construction of a 5 foot sidewalk with buffering where possible on the segment between Tamarind Road and Greenspring Avenue. Install pedestrian crossing signals at the intersection of Cold Spring Lane and Falls Road. Investigate geometric reconfiguration of I-83 ramps to reduce vehicular speeds in the vicinity of crosswalks.

# Pedestrian Improvement Zone: Carroll County

## Center Street from Downtown Westminster to Westminster Town Center

**Roadway:** 2-lanes, urban, sidewalks

**Walking Conditions:** Existing pedestrian conditions include sidewalk gaps on the west side of Center Street in the vicinity of the Carroll County Offices. Generally, sidewalk conditions are poor.



**Concern:** This is a key travel corridor for residents, downtown employees and visitors to access the commercial zone located on MD 140. Crossings are poorly marked and traffic volumes are low to moderate along Center Street. In addition, the crossing at MD 140 is difficult due to the multiple lane configuration of the roadway, which results in long crossing distances.



**Recommendations:**

**Short Term** Provide crosswalks and pedestrian signage at the intersections of Center Street with Main Street, and MD 140, as well as in front of the Carroll County Offices. Investigate signal timing at MD 140 to provide adequate crossing time. Provide crosswalks on north and west sides of the MD 140 intersection.



**Long Term:** Complete sidewalk on west side of Center Street in front of Carroll County Offices. Investigate geometric layout of MD 140 intersection to reduce vehicle turning speeds at pedestrian crossing areas. Install pedestrian signals at all approaches to MD 140 intersection. Provide curb cuts and pedestrian signal heads in new design. Signals and recall buttons are needed in median islands. Provide median noses to protect pedestrians in the center of their crossing.

# Pedestrian Improvement Zone: Harford County

## Intersection: Business US 1 and Memorial Highway (MD 24)

**Roadway:** 4-lane undivided, urban, turn lanes

**Walking Conditions:** Land use at this intersection is predominantly commercial including Harford Mall, Tollgate Plaza, Bel Air Plaza, and Bel Air Town Center. From a land use perspective, high numbers of pedestrians can be expected at this intersection.



**Concern:** There are a number of impediments at this intersection including: high traffic volumes, excessive speed, the absence of sidewalks on the MD 24 approaches, push button actuation systems missing to cross MD 24, large crossing distances, and free flowing right turns. In addition, the parking lots for these commercial sites include little treatment for pedestrian circulation. Pedestrian accessibility is a major concern for this corridor that is so densely populated by retail destinations.



### Recommendations:

#### Short Term

Provide crossing treatments, including pedestrian crossing signage, at the four free flowing right turn ramps. Investigate appropriate time required on pedestrian crossing signals to allow five lanes of traffic to be crossed on Business US 1 and six lanes to be crossed on MD 24. During the field visit, actuation of the push button resulted in approximately 2 seconds of walk time, and approximately 5 seconds blink-do not walk time.



#### Long Term:

Provide a complete system of sidewalks, with additional buffering where possible, at the MD 24 approaches to the intersection. Investigate a safe alternative to managing pedestrians crossing Business US 1 with opposing dual lefts on MD 24.

# Pedestrian Improvement Zone: Howard County Intersection of Waterloo Road/MD 108 and Old Montgomery Road (Waterloo Elementary School)

**Roadway:** 2-lanes, rural, no curb & gutter

**Walking Conditions:** The existing conditions at the Intersection of Waterloo Road/MD 108 and Old Montgomery Road include: no sidewalks, poorly defined crossing, and no pedestrian signal heads. A pedestrian and bike trail connection is provided to the Columbia area homes.



**Concern:** There is a need to provide a safe pedestrian environment with the limit of the elementary school. Speeds are excessive, and sight distances on Old Montgomery Road approaches are questionable.

**Recommendations:**

**Short Term** Delineate a school zone in the vicinity of the elementary school. Provide full school zone operations support such as crossing guards before and after school. Provide traffic safety education to school children.



*(Above) Sidewalks are missing on all approaches to the school. Traffic speeds are high, and turning movements are complex. Children cannot see the signals, and pedestrian signals are missing. This intersection may model well for a roundabout. Sidewalks are needed to area housing and other destinations.*

**Long Term:** Provide added support for walking and bicycling through long term improvements to this intersection and area roadways. Within 1200 feet of the school sidewalks should be 8 foot width. At greater distances sidewalks can be 5 foot width. Study this intersection for a roundabout, which would reduce speeds at the school to the 15-20 mph range 24 hours daily.



**Other:** Busing 75 school children to Waterloo Elementary costs between \$600-\$1,000 per child (national averages). These funds could be better spent providing a needed walking/ bicycling system, providing added health, fitness and other benefits to area children, as well as other residents.