

Transportation Facilities

ROADWAY CLASSIFICATION AND CHARACTERISTICS

Roadway classification and hierarchy are used to develop a transportation network that accommodates both mobility and access of vehicles. Mobility-oriented facilities allow motorists to travel long distances efficiently. Access-oriented facilities provide access to public streets and private developments. Mobility-oriented facilities tend to carry higher volumes of traffic traveling at faster speeds compared to access-oriented facilities. Preferred roadway hierarchy consists of local access-oriented streets feeding collector roadways, which in turn feed mobility-oriented arterials and freeways. Emerging concepts in roadway hierarchy are incorporating user priority in the functional classification system. While the more standard roadway classification approach is being applied to the US 1 corridor, the competing needs of heavy trucks and pedestrian oriented development suggest the consideration of a broader functional classification approach.

Howard County Roadway Classifications

Howard County has seven roadway classifications: Principal Arterial Highway (Freeway), Intermediate Arterial (multi-lane divided or undivided highway), Minor Arterial Highway, Major Collector, Minor Collector, Local Road, and Scenic Roadway. Each of these classifications is described in the “Howard County Design Manual Volume III – Roads and Bridges.” A brief description of each is provided below.

A **Principal Arterial Highway** provides efficient and uninterrupted travel across and between states or large metropolitan areas; this classification includes most interstate designated routes.

An **Intermediate Arterial Highway** provides access to principal arterial highways and provides inter-state, inter-county, and inter-regional travel through highly developed areas. They often provide routes for public transit systems.

Minor Arterial Highways provide connections between principal and intermediate arterials; there is a lower level of mobility and higher level of accessibility than with an intermediate arterial. These roadways provide primary access to, or through, high density residential, commercial, retail, or industrial land areas.

Major Collectors distribute trips to and from arterials and provide direct connections to local roads and minor collectors.

Minor Collectors provide direct access to local roads and direct driveway access to abutting properties. They have a limited amount of through traffic and connect local roads to major collectors.

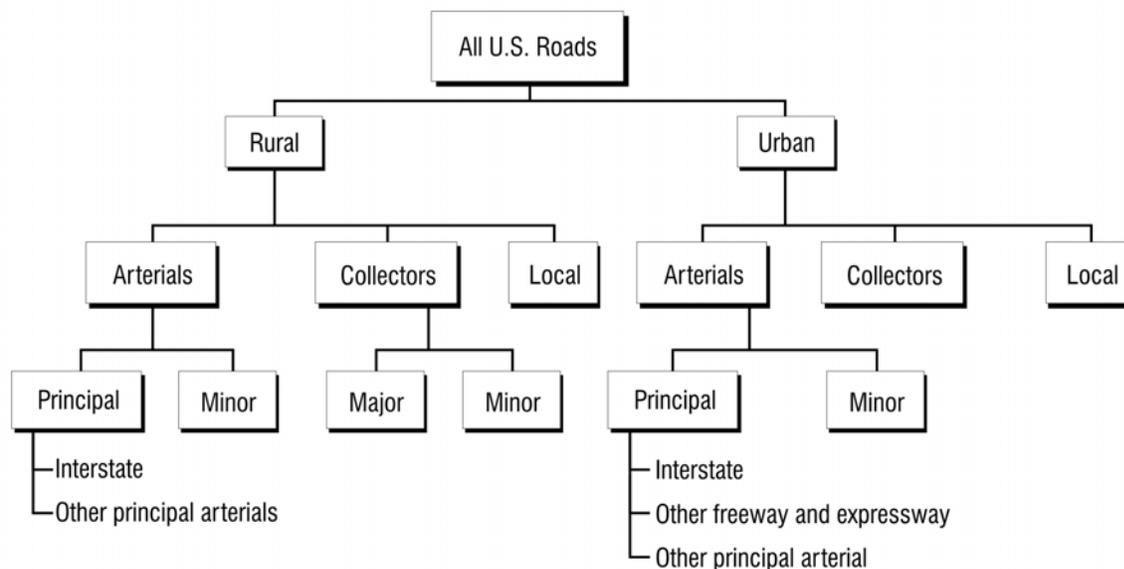
Local Roads provide direct access to abutting properties and distribute traffic generated from a neighborhood or non-residential areas to collector roadways.

A **Scenic Roadway** must be designated by the County Council Resolution and it may be a local, collector, or minor arterial road.

US 1 is classified by Howard County as an Intermediate Arterial Highway. The classifications of all roads in the study area are shown in Figure 4.

Maryland State Highway Administration (SHA) Roadway Classification

SHA classifies roads according to the Federal Highway Classification System shown in the figure below (Source: U.S. Department of Transportation, Federal Highway Administration and Federal Transit Administration, 1999 Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance, Washington, DC: 2000).



A description of each of the urban functional classifications is provided below, based on the descriptions provided by the American Association of State Highway and Transportation Officials (AASHTO) in *A Policy on Geometric Design of Highways and Streets*.

An **Urban Principal Arterial System** serves the major centers of activity of urbanized areas, the highest traffic volume corridors, and the longest trip desired. This system carries a high proportion of the total urban area travel even though it constitutes a relatively small percentage of the total roadway network. Although this system is not restricted to controlled-access routes, access is generally fully or partially controlled. Principal arterial systems are further divided into interstate systems, other freeways, and other principal arterials (with partial or no control of access). Only facilities with the subclass of other principal arterial provide direct access to land, and such service should be purely incidental to the primary functional responsibility of this class of roads.

An **Urban Minor Arterial System** interconnects with and augments the urban principal arterial system. This system accommodates trips of moderate length at a somewhat lower level of travel mobility than principal arterials and distributes travel to a smaller geographic area than the principal arterial system. The spacing of minor arterial streets is usually not greater than one mile in fully developed areas.

An **Urban Collector Street System** provides both land access and traffic circulation within residential neighborhoods and commercial/industrial areas.

An **Urban Local Street System** comprises all facilities not in one of the higher systems and offers the lowest level of mobility.

In Howard County, US 1 is classified by SHA as a Secondary Urban Other Principal Arterial Highway. The State Highway Access Manual provides spacing guidelines and design standards for approaches to state facilities. The Engineering Access Permits Division of SHA reviews requests for access to state facilities based on the guidance provided in the Access Manual. The Access Manual requires a minimum spacing of intersecting streets and median crossings of 750 feet on Secondary Urban Arterial Highways. Additionally, the Access Manual provides the following guidance for the evaluation of access proposals to Secondary Arterial Highways in Maryland:

- Access management techniques are applied to minimize the effect of development on safety and traffic operations.
- Where local road access is available by property rights, SHA may recommend that [Howard County] require all access, principal access, or certain turning movements to be directed to the local road instead of the Arterial Highway to minimize traffic and safety impacts of the access.
- The number of access points and permitted movements onto and across the Arterial Highway will be limited to the minimum required to provide reasonable access to the development, as determined by SHA. Unsafe access points or turning movements are unacceptable and will not be permitted.

Roadway Classification and Characteristics in US 1 Corridor Study

The Maryland State Highway Administration (SHA) is responsible for maintaining acceptable traffic operations and physical maintenance of US 1. Twenty-two roads that intersect US 1 in the study area were identified as key roadways that serve the local communities and land uses. Table 2 includes information regarding roadway classification, ownership, and cross section characteristics for each of these roadways. Figure 7 illustrates the classifications of roads in the study area.

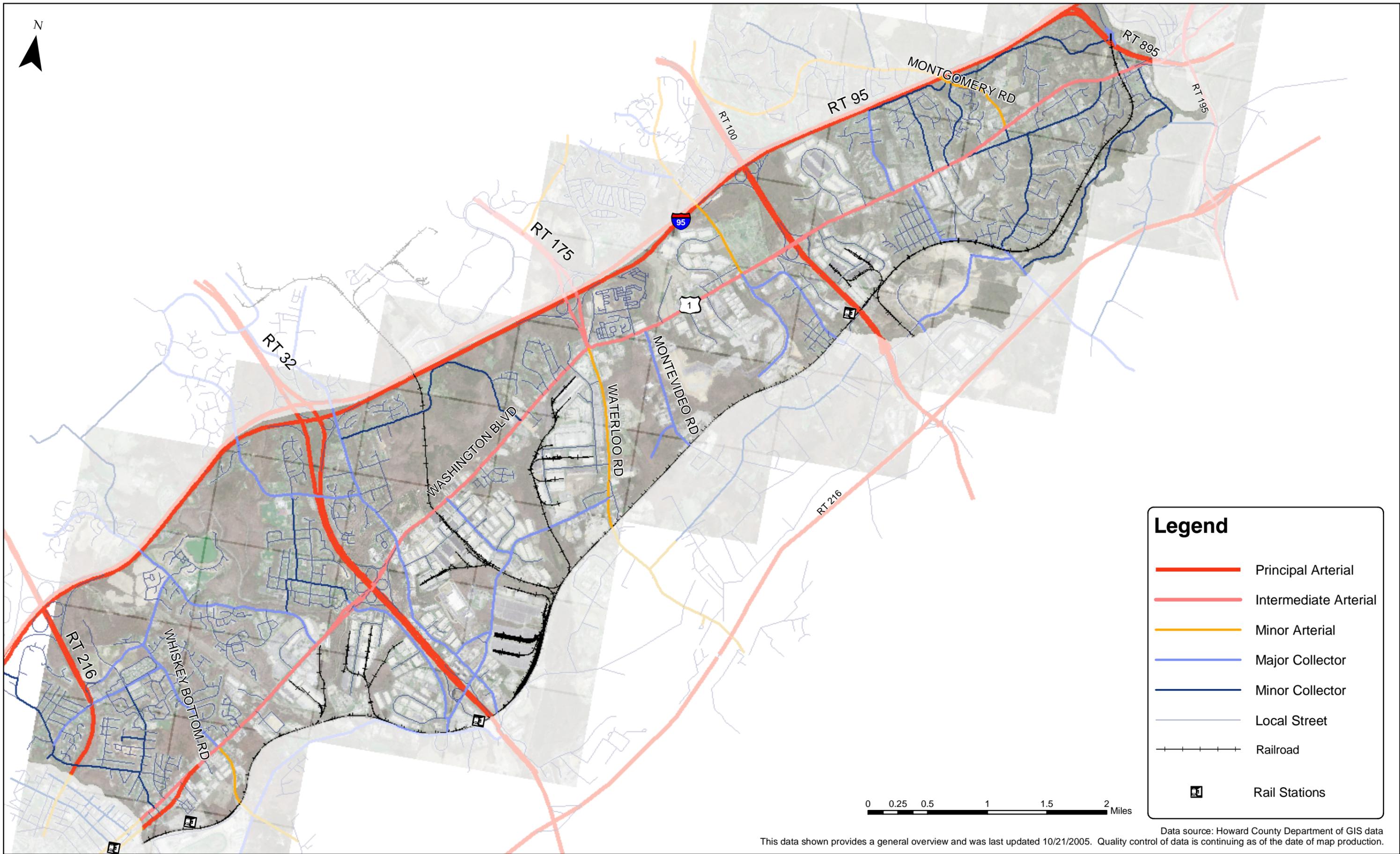
Table 2 Summary of Roadway Characteristics

Cross Street	Roadway Ownership	*County Roadway Classification (State Classification)	Roadway Cross Section		
			Total Number of Lanes	Sidewalk?	Bike Lanes?
Levering Avenue	County	Minor Collector/Major Collector	2	No	No
Montgomery Road	County	Minor Arterial	2	Partial	No
Rowanberry Drive	County	Minor Collector	2	Yes	No
Loudon Avenue	County	Major Collector	2	Southside of roadway	No
Troy Hill Drive North	County	Local Road	4	Partial	No
Troy Hill Drive South	County	Local Road	4	Partial	No
Amberton Road	County	Local Road	2	No	No
MD 100	State	Principal Arterial (Primary Freeway/ Expressway)	4 - Divided	No	No
MD 103 / Meadowridge Road	State	Minor Arterial (Collector east of US 1, Minor Arterial west of US 1)	3 west of intersection/4 east of intersection	No	No
Business Parkway	County	Local Road	4	No	No
Montevideo Road	County	Major Collector	2	No	No
MD 175 / Waterloo Road	State	Intermediate Arterial (Minor Arterial)	4 divided west of intersection/2 east of intersection	No	No
Assateague Drive	County	Local Road	4	No	No
Mission Road	County	Minor Collector	2	No	No
Patuxent Range Road	County	Major Collector	2	No	No
MD 732 / Guilford Road	County	Major Collector	2	Partial	No
MD 32	State	Principal Arterial (Primary Freeway/ Expressway)	4 - Divided	No	No
Corridor Road	County	Major Collector	2	No	No
Gorman Road	County	Major Collector	4	Yes	No
Freestate Drive	County	Local Road	2	North side of roadway	No
Whiskey Bottom Road	County	Major Collector/Minor Arterial	2 west of Intersection/ 4 east of intersection	Partial	No
North Laurel Road	County	Minor Collector	2	No	No

*Roadway Classifications were obtained from the Howard County Adequate Public Facilities Ordinance Map produced by Howard County GIS on February 18, 2004.

Table 2 and Figure 7 both illustrate that the transportation network in the area does not follow a strict hierarchy. A number of local roads have direct access onto US 1. A more efficient system is generally achieved when local roads connect to collector roadways rather than directly to arterials. Few other arterial roads are found in the study area. The lack of a connected network of arterials increases the demand on US 1 and limits the travel capacity of the area. A comprehensive structure of collector and minor arterial roadways in the area would improve connectivity and increase redundancy by providing alternate routes for motorists traveling in the area.

Figure 8 shows US 1's roadway characteristics as it moves through the corridor. It varies from 4-5 lanes, with and without shoulder and acceleration/deceleration lanes. Driveway openings are particularly dense and concentrated in some areas, and sidewalk availability is minimal.





SB Driveways per Mile	51	63	21	8	4	10	5	0	5	18	13	5	20	11	3	6	4	0	3	8	2	21	38	12	17	
SB Sidewalk					None											None									None	
SB Section Type			Closed		Open				Closed		Open				Closed		Open		Open					Closed		
SB Lanes	3														2											
Median Type	Cuplet			None		Grass		TWLTL		None				TWLTL			None	Paved	TWLTL	None	TWLTL		None	TWLTL	None	TWLTL
NB Lanes															2											
NB Section Type		Open		Closed		Open			Closed		Open				Closed		Open		Open					Closed		
NB Sidewalk							None									None									None	
NB Driveways per Mile	30	9	20	20	4	10	0	5	9	17	29	4	13	13	35	17	9	0	9	13	7	21	32	7	17	
Speed Limit						50						45					50						45		40	
ADT					34000				36500				30000				28000			33000			28000		26000	
% Truck Traffic						12%	15%				9%						10%			11%			8%			



Data sources: Howard County GIS data and site visit 10/2005. This data shown provides a general overview and was last updated 10/30/2005. Quality control of data is continuing as of the date of map production.

Figure 8: US 1 Roadway Characteristics
US 1 Reconnaissance Survey

PEDESTRIAN AND BICYCLE CONDITIONS

The pedestrian and bicycle facilities are inconsistent throughout the corridor. There are no designated bike lanes or parallel paths along US 1 in the study area. As shown schematically on Figure 8, sidewalks are intermittent, disconnected, and inconsistent in their appearance. Some sidewalks are adjacent to US 1 and others are set back 10 to 15 feet. Sidewalks are provided on some of the cross streets, which have similar inconsistencies, especially where newer and older developments are adjacent to one another. Figure 9 illustrates the existing sidewalk connections and locations in the study area.

Transit Service

Transit service within the US 1 corridor consists of three bus routes with two operators and one heavy rail line with commuter service. The Maryland Transit Administration (MTA) runs a commuter bus line on US 1 within the study area and a commuter rail service on the CSX-owned rail line at the eastern edge of the corridor. Howard Transit operates two bus routes in the study area. Each of these services is described in further detail below. The *Phase I* and *Phase II Report* from the *Route 1 Corridor Revitalization Study* recommended increased transit service within the corridor; however, the study area has since lost service with the elimination of the BWI Business Partnership's Spirit Shuttle service in MARCH 2004 and the likely discontinuation of service to the Jessup MARC Station. Figure 6 illustrates the transit stops within the study area.

MTA ROUTE #320

The Maryland Transit Administration's #320 commuter bus provides weekday service, with over a dozen stops along US 1 from Laurel to Elkridge, deviating from US 1 in the study area only to serve the Maryland Food Center. The route runs express on Interstate 95 from Levering Avenue to Baltimore City where it makes over twenty stops as it circulates around the downtown. The majority of the weekday a.m. service is southbound, with four southbound buses leaving Baltimore City between 5:45 a.m. and 7:45 a.m. to serve the US 1 corridor. Two northbound buses operate during the same time period. The service reductions proposed for this route were not implemented in Phase I of the recent Greater Baltimore Bus Initiative (GBBI), although reductions were made on commuter services to other portions of Howard County.

MARC CAMDEN LINE

The MARC Camden Line is a commuter rail service between Baltimore's Camden Station and Washington's Union Station. The Camden Line runs on a track owned by CSX and is sometimes delayed by freight trains, which receive priority. The Savage and Dorsey stops are served by all Camden Line trains while the Jessup and Laurel Racetrack stops, have less service. The Jessup stop, which is not handicap accessible, is only served by one train in each direction daily, with a second train on some holidays. The Laurel Racetrack stop is only served by three southbound trains during the afternoon. Daily ridership at the Jessup stop was reported by the MTA to be one rider in November 2005 and a proposal to eliminate service at the stop has been evaluated and continues to be considered. The Savage station is served by Howard Transit's Purple bus route. The Dorsey MARC station is also served by Howard Transit's Purple and Red Express bus routes. As with the MTA #320 commuter bus, there is no weekend service provided along the Camden Line.

HOWARD TRANSIT PURPLE ROUTE

Howard Transit runs two bus routes in the corridor, the Purple Route and the Red Express Route. Real-time bus location and expected arrival times for all Howard Transit routes are available at <http://www.nextbus.com/>. The Purple Route travels the US 1 corridor between Montgomery Road in the north and Laurel in the south with several deviations off US 1 to serve stops off the main corridor. Service is provided Monday through Friday with eleven buses between 6:00 a.m. and 9:00 p.m.

HOWARD TRANSIT RED EXPRESS

The Red Express Bus connects Columbia Mall and BWI Thurgood Marshall Airport with six stops in the study area (four along US 1, one at the Maryland Food Center, and one at the Dorsey MARC station). This service runs hourly from 6:00 a.m. to 9:00 p.m. on weekdays, from 9:00 a.m. to 9:00 p.m. on Saturday, and between 10:00 a.m. and 7:00 p.m. on Sunday.

CORRIDOR TRANSIT (CTC) CONNECT-A-RIDE ROUTE C

Corridor Transit Corporation's Connect-A-Ride Route C is a circular route that provides service between the Laurel Mall Transit Center at its south end and Whiskey Bottom Road in the north. Northbound service is provided on Route 1 and southbound service is on a combination of All Saints Road, 8th Street, and 4th Street, with a branch down Old Scaggsville Road on Saturdays. The route runs every half hour from 6:00 a.m. to 6:00 p.m. on weekdays and every 45 minutes between 9:00 a.m. and 6:00 p.m. on Saturdays.

CORRIDOR TRANSIT (CTC) CONNECT-A-RIDE ROUTE E

Corridor Transit Corporation's Connect-A-Ride Route E is a circular route that provides service between the Laurel Mall Transit Center and Columbia. From the Laurel Mall the route travels northeast on 4th Street, southeast on Main Street, northeast on US 1, northwest on Gorman Road making a loop on Knights Bridge Road, north on Savage Guilford Road, east on Volmerhausen Road, and finally northeast on Guilford Road towards Columbia. The route runs hourly from 6:00 a.m. to 7:00 p.m. on weekdays and every 2 hours between 9:00 a.m. and 5:00 p.m. on Saturdays.

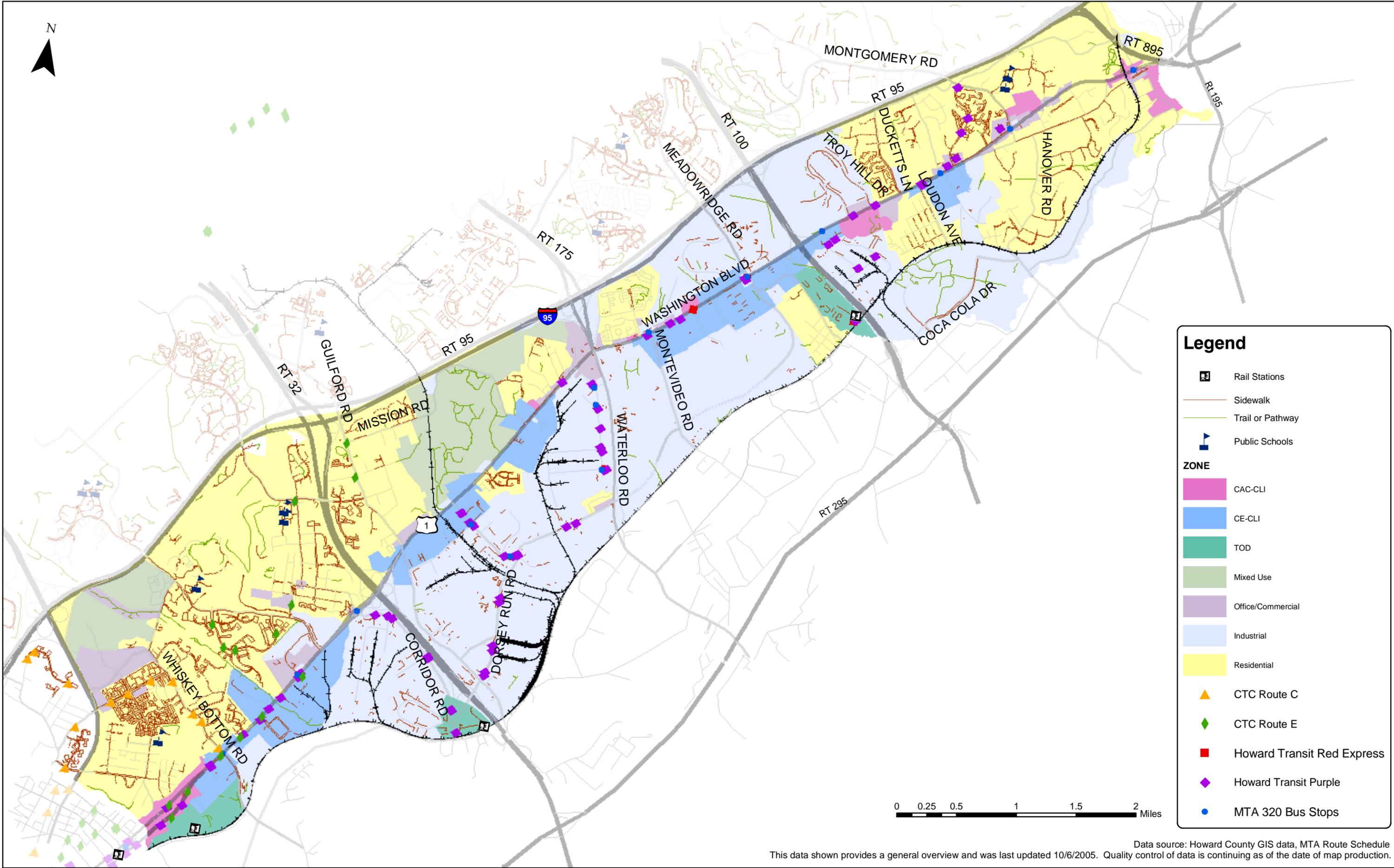
BUS USE & STOP ACTIVITY

According to the MTA, its #320 line has an average of 194 total boardings, with 108 of those on southbound a.m. routes, 54 on northbound a.m. routes, and the remainder equally divided between northbound a.m. and southbound p.m. routes. Weekday ridership on Howard County Transit's Purple Line is roughly 150 riders per day and the Red Express route has roughly 375 riders per weekday, 300 riders on Saturdays, and 130 riders on Sundays. While stop by stop ridership is unavailable for the Howard Transit routes, demand for service is significant along



Assateague Drive and Patuxent Range Road at the Maryland Food Center where the #320 and the two Howard Transit routes are concentrated and internal to the industrial center. Twice as many riders alight at those stops than at the nine stops along US 1 during the a.m.

peak hour. Disparity in ridership levels between a.m. and p.m. service should be further investigated. Howard County is planning an on-time performance evaluation this spring that should be designed to provide stop by stop ridership information.



TRANSPORTATION PROJECTS

Roadway Projects

Several capital improvement projects are anticipated in the study area. These projects are discussed below and summarized in Table 3 and Figure 10.

Table 3 Capital Improvement Projects

Project Number	Project Description	Status	Scheduled Completion Date
J-4110	Dorsey Run Road Extension - South Link	Design	2007
---	Dorsey Run Road Extension - North Link	Environmental Review	2008
J-4147	Montevideo Road Improvements	Design	2009
B-3855	Guilford Road CSX Bridge	Design	2007
J-4175	Guilford Road Improvements (Dorsey Run Road to Anne Arundel County Line)	Design	2007
J-4181	Guilford Road Improvements (US1 to Dorsey Run Road)	Design	2009
J-4176	North Laurel Road Geometric Improvements	Design and Land Acquisition	2009
J-4183-06	Norfolk Ave. sidewalks and traffic study	Land Acquisition	2008
J-4201	Mary Lane Improvements	Design and Land Acquisition	2009
N-3940	High Ridge Community Park	Construction	2006
N-3957	Troy Park Historic Rehabilitation	Construction	2012

Source: Howard County FY2005 Capital Budget

DORSEY RUN ROAD

Dorsey Run Road is currently a two-lane road that runs parallel to US 1 between Guilford Road and MD 175. The road will be extended north to Old Dorsey Road, which connects to Meadowridge Road. The existing segments of Old Dorsey Road will be widened and the new segments will be constructed with a three-lane cross section that may ultimately be restriped as a four-lane road. The improved Dorsey Run Road will function as a major collector.

Design of the south link of Dorsey Run Road, which runs from MD 175 to Montevideo Road, is nearly complete and construction is expected to begin in the Fall of 2006. The south link project also includes improvements to the existing Old Dorsey Road, near the intersection with Dorsey Road and to the existing Dorsey Run Road south of the Patuxent Range Road. Improvements will include widening, improvements to all of the driveways on Dorsey Run Road, sight distance, and truck access to MD 32. These improvements are expected to be constructed late in 2006. Similar improvements to Dorsey Run Road between Patuxent Range Road and MD 175 will follow in 2007 as part of the South Link project.

The last phase of the project is the north link, which will provide a new connection between Montevideo Road and Old Dorsey Road. The Environmental Impact Study for this phase of Dorsey Run Road has not been approved, thus the design for this portion of the road has not yet begun. Construction of this phase is expected in 2008. The typical section of the road is expected to be the same as for the other phases. While funding has not been secured for the entire project, it is expected to be granted on a yearly basis as needed.

GUILFORD ROAD

Guilford Road is an existing two-lane major collector that runs east-west throughout the study area north of MD 32. Guilford Road is planned to be widened from two to four lanes east of US 1 to Dorsey Run Road, and from two to five lanes from Dorsey Run Road to the Anne Arundel County Line. In addition, the Guilford Road CSX Bridge at the Anne Arundel County Line will be widened from two to five lanes. Widening east of Dorsey Run Road, including the CSX bridge is expected to be completed in December 2007. Widening from US 1 to Dorsey Run Road is expected to be constructed in 2009.

MONTEVIDEO ROAD

Safety improvements are planned to Montevideo Road, which runs east from US 1 providing access to several industrial and residential parcels. Improvements will include improved sight distance and separate lanes for westbound left- and right-turning vehicles. The additional westbound lane will be funded through developer agreements. This project is in design, but will not be constructed until Dorsey Run Road is extended to Montevideo Road. A construction schedule has not been set for this project, but is likely to occur in 2009.

NORTH LAUREL ROAD

Geometric improvements along North Laurel Road between Washington Avenue and Park Road are proposed to allow safe passage of vehicles. Modifications in roadway geometry will improve sight distance; however, no significant widening will occur. Design and land acquisition will be performed in 2007 and construction will occur in 2008. The project should be complete in 2009.

NORFOLK AVENUE

Norfolk Avenue runs parallel to Baltimore Avenue north of MD 216. Planned improvements include emergency service access, parking, and improved drainage. The project entails design, land acquisition, and construction along Norfolk Avenue. Land acquisition and construction will begin in 2007 and be completed throughout 2008.

MARY LANE

Mary Lane will be reconstructed between Guilford Road and Jones Road. This may include channelization of the Guilford Road intersection, and new curbing, gutters, and a sidewalk on the west side.

HIGH RIDGE COMMUNITY PARK

This 88-acre park opened in July 2006. This park, located at the end of Superior Avenue, on the Howard side of the Patuxent River, includes a playground, tennis court, basketball court, picnic area, rest rooms and a half-mile trail.

Pedestrian Projects

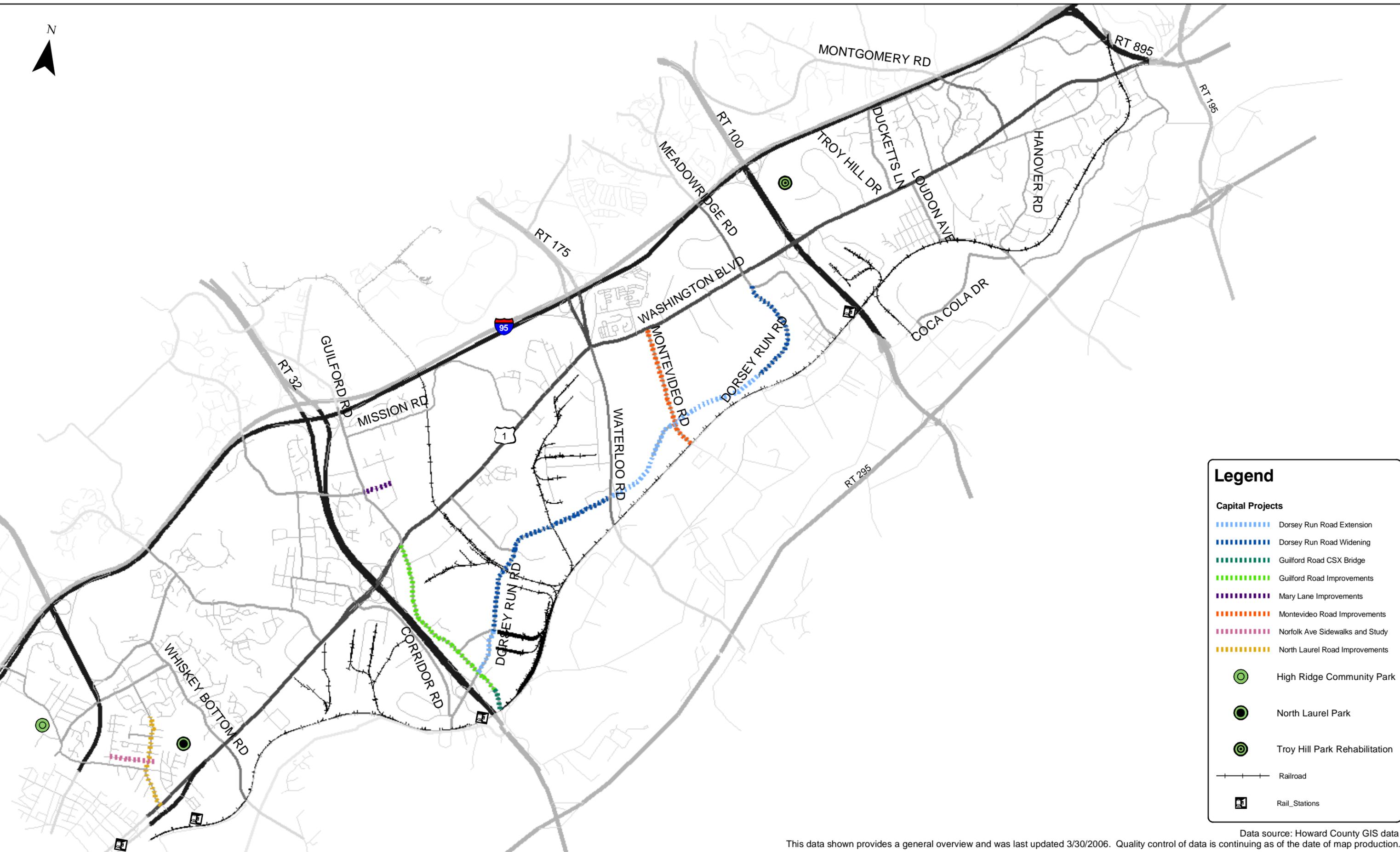
Table 4 lists the County identified and funded pedestrian improvement projects in the study area. These projects were identified as the highest priority locations based on a

weighted criteria point system considering: safety (4), cost effectiveness (3), demand (3), community response (2) and connectivity (2). Those projects identified and prioritized within the study area that have not yet received funding are included in a summary table in Appendix C.

Table 4 Funded Pedestrian Projects

Location	Improvements	Comments
US 1/Levering Ave.	Pedestrian crossing Public financing	Project implementation in 2005 Retrofit
Guilford Rd - US 1 to Anne Arundel County	Sidewalk Pedestrian crossing, as needed	Include in design and reconstruction of Guilford Rd. Capital Projects J-4175 and J-4181 Mew development / retrofit
Stephens Road	Roundabout with Whiskey Bottom Sidewalk/pathway	Emerson developing out creating new pedestrian demand Developer should assume major responsibility Capital Project J-4202 funded for FY 06 - FY 08 New development
Dorsey Run Rd, MD 175 to MD 103	Sidewalk Pedestrian crossings at MD 175, Montevideo Rd and MD 103 should be included	Capital Project J-4148; cost effective as part of roadway design/construction Few residential impacts

Source: Howard County Department of Planning and Zoning, Draft Pedestrian Study. Updated February 2006.



Legend

Capital Projects

- Dorsey Run Road Extension
- Dorsey Run Road Widening
- Guilford Road CSX Bridge
- Guilford Road Improvements
- Mary Lane Improvements
- Montevideo Road Improvements
- Norfolk Ave Sidewalks and Study
- North Laurel Road Improvements

- High Ridge Community Park
- North Laurel Park
- Troy Hill Park Rehabilitation

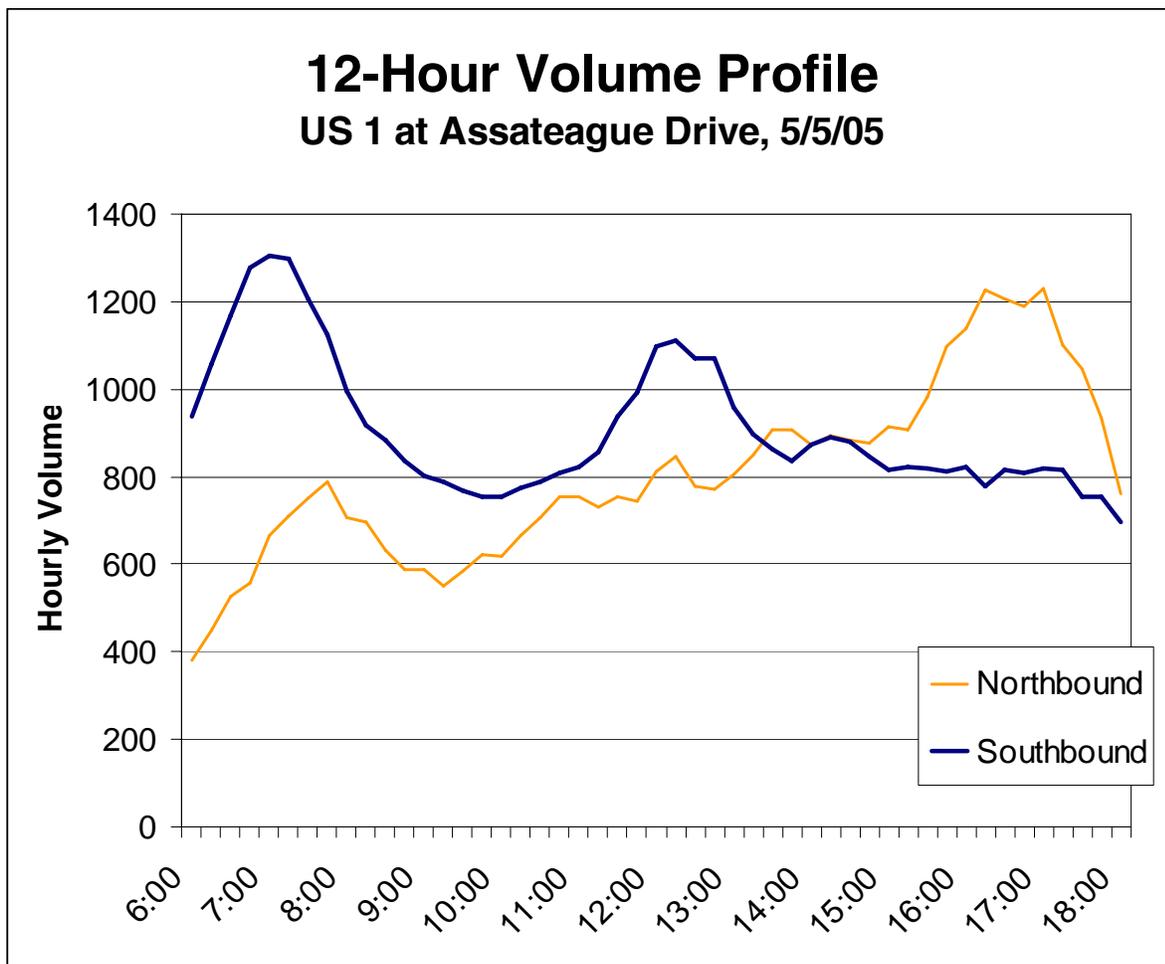
- Railroad
- Rail_Stations

Data source: Howard County GIS data
This data shown provides a general overview and was last updated 3/30/2006. Quality control of data is continuing as of the date of map production.

Traffic Volumes and Peak Hour Operations

The Howard County Design Manual requires that state controlled intersections must maintain, at a minimum, a level of service (LOS) E. Using the Critical Lane Volume methodology described in the Design Manual, operating standards are met at state controlled intersections when the critical lane volume does not exceed 1,600 vehicles during the peak hour of operation. The Critical Lane Volume methodology evaluates intersection operations based on the maximum conflicting volume that must be accommodated at the intersection. Critical lane volume evaluation does not consider the traffic control used at the intersection – the procedure is the same for all signalized and unsignalized intersections.

The weekday a.m. and p.m. peak hours were found to occur between 7:30 and 8:30 a.m. and 4:00 and 5:00 p.m., respectively. Figure 8 shows the twelve-hour directional volume profile on US 1 at Assateague Drive based on a 12-hour count collected on May 5, 2005. While the traffic volumes vary along US 1, the peaking pattern is representative of traffic throughout the corridor. Southbound is the peak direction during the a.m. peak hour, and northbound is the peak direction during the p.m. peak hour.



Operational analyses were conducted for the weekday a.m. and p.m. peak hours at all signalized intersections on US 1 between the south county line and Levering Avenue. Operational analyses were also conducted at three unsignalized intersections on US 1. These in-

tersections were selected for analysis because of the relatively high volumes on the minor streets and the potential for development to contribute additional traffic to these intersections. Operational analyses were performed according to the critical lane analysis procedure outlined in the “Howard County Design Manual, Volume III – Roads and Bridges” and according to the *Highway Capacity Manual* (HCM) methodology. Figure 11 summarizes the intersection operations.

The traffic volumes and signal timing at all of the intersections were obtained from the Maryland State Highway Administration (SHA). SHA also reviewed the final existing traffic volumes used in the analysis. Appendix D contains figures illustrating the existing lane configurations, traffic control devices, turning movement volumes, and additional traffic operations data. Table 5 summarizes the results of the traffic operations analysis.

Table 5 Summary of Weekday Intersection Operational Analysis

Cross Street	Intersection Type	Weekday A.M. Peak Hour Existing Traffic Year 2005			Weekday P.M. Peak Hour Existing Traffic Year 2005		
		CLV	CLV LOS	HCM LOS	CLV	CLV LOS	HCM LOS
Levering Avenue	Signalized	705	A	B	1020	B	B
Montgomery Road	Signalized	1490	E	D	1450	E	E
Rowanberry Drive	Signalized	880	A	A	1095	B	B
Loudon Avenue	Signalized	1060	B	B	1280	C	B
Troy Hill Drive North	*Signalized	1065	B	B	1185	C	A
Troy Hill Drive South	Unsignalized	1045	B	F	1140	B	F
Amberton Road	Signalized	845	A	B	1440	D	D
MD 100 WB	Signalized	1005	B	B	1380	D	B
MD 100 EB	Signalized	645	A	A	1095	B	A
MD 103	Signalized	1190	C	D	1375	D	D
Business Parkway	Signalized	775	A	B	915	A	C
Montevideo Road	Signalized	575	A	B	955	A	C
MD 175	Signalized	1105	B	D	1295	C	E
Assateague Drive	Signalized	810	A	B	920	A	B
Mission Road	Unsignalized	810	A	B	810	A	F
Patuxent Range Road	Signalized	880	A	B	801080	B	C
Guilford Road	Signalized	1080	B	D	1250	C	E
MD 32 EB off ramp	Signalized	525	A	D	635	A	D
Corridor Road West	Signalized	1000	A	C	1195	C	C
Corridor Road East	Signalized	960	A	D	930	A	D
Gorman Road	Signalized	1085	B	B	1155	C	C
Freestate Drive	Signalized	985	A	A	1095	B	B
Whiskey Bottom Road	Signalized	1235	C	C	1435	D	D
North laurel Road Southbound	Signalized	930	A	B	880	A	A
North Laurel Road Northbound	Unsignalized	530	A	C	1035	B	F

LOS: Level of Service

CLV: Critical Lane Volume

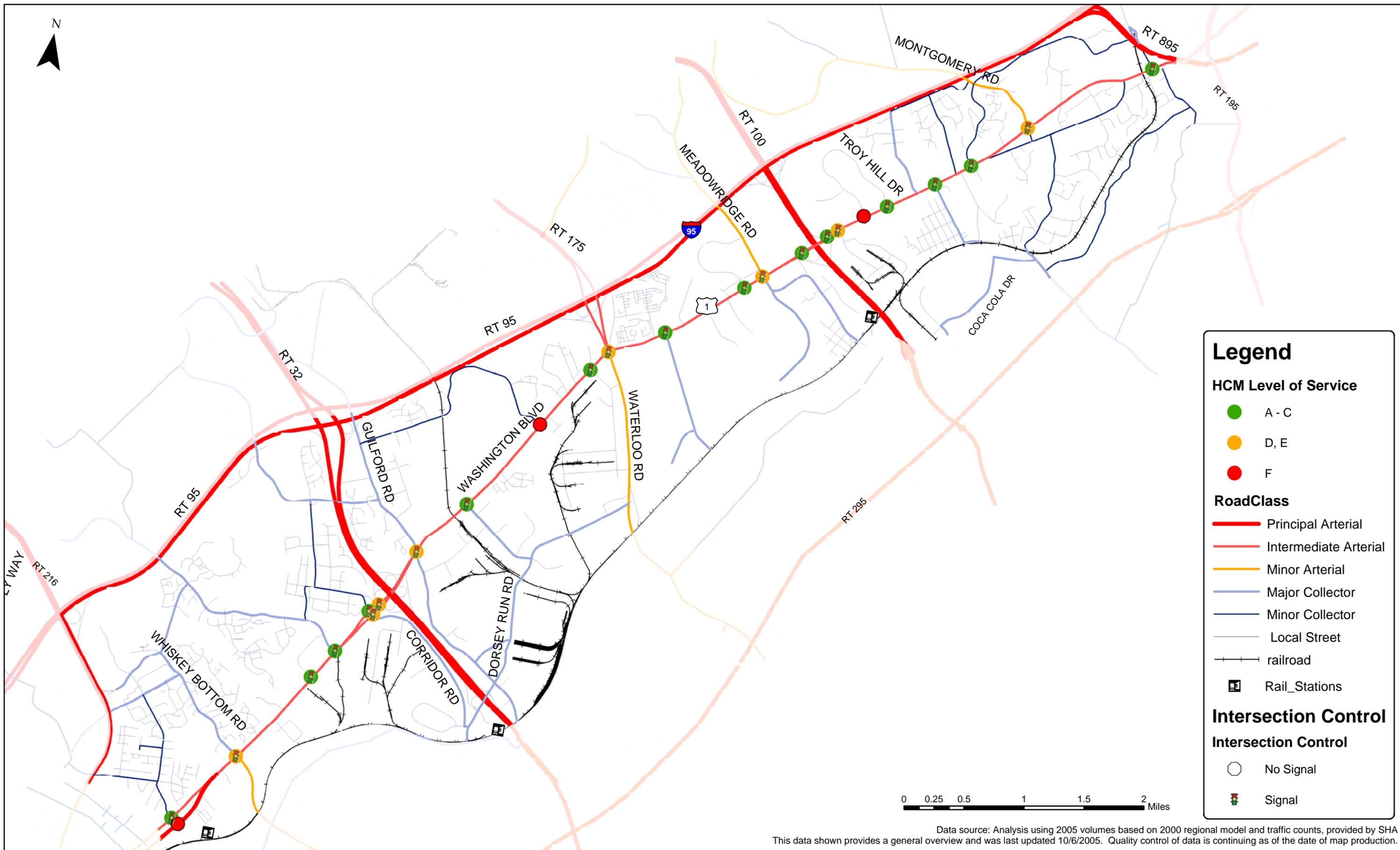
HCM: Highway Capacity Manual

*A traffic signal will be installed at the US 1/Troy Hill Drive North intersection in the summer of 2006.

** Analysis based on traffic volumes provided by SHA.

The Critical Lane Analysis and the HCM analysis produced similar results at most of the intersections. The results were quite different at the three unsignalized intersections because the HCM level-of-service (LOS) is based on the critical (stop-controlled) approach only; whereas the critical lane analysis LOS is based on all conflicting movements at the intersection regardless of control type. Because the HCM methodology accounts for truck traffic and the critical lane analysis does not, it is not surprising that the HCM analysis produced slightly lower LOS at many intersections.

At most intersections the weekday p.m. peak hour is the critical time of day. All of the signalized intersections operate with a LOS E or better during the weekday a.m. and p.m. peak periods. Although the unsignalized intersections operate at LOS F during the p.m. peak hour analysis based on the HCM, the delay experienced on US 1 at these intersections is minor. The most significant capacity constrained intersections on US 1 in the study area at Montgomery Road, MD 175, and Guilford Road.



Data source: Analysis using 2005 volumes based on 2000 regional model and traffic counts, provided by SHA. This data shown provides a general overview and was last updated 10/6/2005. Quality control of data is continuing as of the date of map production.

Intersection Safety and Crash History

Historical crash data along the corridor was studied to identify areas in the corridor where safety issues may exist and where land use and transportation decisions should be particularly sensitive to safety issues, based on a history of relatively high crash rates. SHA provided the intersection crash data for US 1 in the study area.

CRASH FREQUENCY

Figure 12 illustrates the reported crashes along US 1 that occurred between January 1, 2002, and December 31, 2004. Most reported crashes occurred at the intersection of US 1 and other arterials or major collectors. Fewer crashes were reported at smaller intersections or between intersections. This pattern is expected because there are more potential conflict points and longer exposure time at larger intersections. Thus, a high number of crashes at a large intersection does not necessarily indicate a safety deficiency.

Figure 12 identifies areas along the corridor where many crashes were experienced and where fatalities occurred and/or pedestrians or bicyclists were involved in collisions. Three fatalities and one pedestrian crash occurred between Mission Road and Montevideo Road along US 1. There was also a high occurrence of crashes between major intersections in this region. The high driveway density and the proximity to the high volume, high speed intersection with MD 175 may be contributing to the high occurrence of crashes in this area. Queuing from the MD 175 intersection should be monitored to ensure that adequate sight distance is maintained for vehicles approaching the intersection on US 1.

The frequency and location of crashes north of Loudon Avenue also stands out in Figure 12. Six pedestrian crashes and one bicycle crash occurred in this area, one of which was fatal. High driveway density, steep slopes, and residential land uses in this area are likely contributing factors to this crash pattern.

Two pedestrian crashes and one fatal vehicular accident occurred south of Whiskey Bottom Road. Most crashes in this area occurred at the US 1 intersections with Whiskey Bottom Road and North Laurel Road.

CRASH RATES

Crash rates were calculated for all signalized intersections using the most recent three years of historical crash data available as shown in Table 6. Crashes that occurred within 100 feet of an intersection were attributed to that intersection. Crash rates, particularly at low volume intersections, may vary significantly due to random variations in yearly crash occurrence and daily traffic volumes.

Table 6 Intersection Crash Rates, 2002 to 2004

Intersection	Number of Crashes	Crashes per year	Annual MEV	Crash Rate (per MEV)
North Laurel Road Southbound / US 1	11	3	5.8	0.52
North Laurel Road Northbound / US 1	16	4	6.7	0.60
Davis Road / US 1	11	3	6.6	0.46
Whiskey Bottom Road / US 1	51	17	14.7	1.16
Maier Road / US 1	19	6	12.4	0.48
Lynn Buff Court / US 1	33	11	12.4	0.89
Freestate Road / US 1	16	5	12.8	0.39
Gorman Road / US 1	26	9	15.7	0.57
Corridor Road / Howard Street / US 1	41	14	16.2	0.86
MD 32 Ramps / US 1	7	2	32.5	0.06
Guilford / US 1	51	17	13.2	1.28
Patuxent Range Road / US 1	15	5	9.7	0.52
Mission Road / US 1	6	2	8.6	0.23
Assateague Drive / US 1	27	9	9.2	0.98
Waterloo Road / US 1	39	13	19.7	0.66
Montevideo Road / US 1	23	8	8.9	0.90
Kit Kat Road / US 1	37	12	8.0	1.49
Business Parkway / US 1	14	5	9.3	0.54
Meadowridge Road / Dorsey Road / US 1	28	9	12.7	0.71
MD 100 Ramps / US 1	28	9	31.9	0.28
Amberton Drive / US 1	20	7	14.2	0.49
Troy Hill Drive / US 1	3	1	13.0	0.08
Ducketts Lane / US 1	14	5	12.5	0.40
Loudon Avenue / US 1	19	6	12.4	0.48
Hunt Club Road / US 1	4	1	11.3	0.09
Rowanberry Drive / US 1	16	5	11.8	0.42
Old Washington Road South / US 1	18	6	10.6	0.57
Montgomery Road / US 1	43	14	14.5	0.97
Old Washington Road North/ US 1	13	4	11.0	0.37
Levering Avenue / US 1	23	8	10.7	0.75

MEV – Million Entering Vehicles
Source: MD SHA OOTS crash data

The highest crash rates on the corridor occurred at the US 1 intersections with Whiskey Bottom Road, Guilford Road, Assateague Drive, Kit Kat Road, Montgomery Road, Lynn

Buff Court, Corridor Road, and Montevideo Road. The types and severity of crashes at these intersections were further examined, as shown in Table 7.

Safety improvements were completed at Whiskey Bottom Road and Guilford Road in 2004. Because the crash data period precedes these improvements, this analysis does not reflect the safety results expected from these intersection improvements. Safety improvements are planned for the Corridor Road intersection in 2006 and 2007.

Table 7 Crash Summary for High Crash Rate Intersections, 2002 to 2004

Intersection	Number of Crashes	Crash Rate (per MEV)	Collision Type				Severity		
			Turning	Rear-End	Angle	Other	Property Damage Only	Personal Injury	Fatal
Whiskey Bottom Road / US 1*	51	1.16	6	24	11	10	38	13	0
Lynn Buff Court / US 1	33	0.89	0	24	1	8	18	15	0
Corridor Road / Howard Street / US 1	41	0.86	2	24	4	11	17	24	0
Guilford / US 1*	51	1.28	13	13	12	13	33	18	0
Assateague Drive / US 1	27	0.98	9	6	4	8	15	12	0
Montevideo Road / US 1	23	0.90	3	10	5	5	13	10	0
Kit Kat Road / US 1	37	1.49	3	8	17	9	21	16	0
Montgomery Road / US 1	43	0.97	8	10	13	12	28	15	0

*Improvements to these intersections were completed in 2004 as discussed below

Source: MD SHA OOTS crash data

The high proportion of rear-end crashes at the Whiskey Bottom Road, Lynn Buff Court, and Corridor Road/Howard Street intersections may be due to inadequate stopping sight distance for one or more approaches.

The higher crash rate and the proportion of angle crashes at the Kit Kat Road/US 1 intersection are typical of highly congested corridors. The crash pattern may indicate that drivers are not waiting for adequate gaps when turning onto US 1 from the stop controlled approach; however, collision diagrams showing the exact location and movements involved in the crashes were not considered in this analysis. It should also be noted that because Kit Kat Road is a low-volume facility, the crash rate calculation may vary significantly due to random variation in daily traffic volumes and frequency of crashes.

No other collision patterns were identified that indicate specific safety deficiencies; however, high crash rates indicate that safety issues may exist and safety should continue to be monitored at these intersections.

CANDIDATE SAFETY IMPROVEMENT INTERSECTIONS

The Whiskey Bottom Road/US 1, Corridor Street/Howard Street/US 1, and Guilford Road/US 1 intersections were listed as either Primary or Secondary Candidate Safety Im-

provement Intersections for years 2001 through 2004. These lists are compiled by SHA to prioritize intersection safety improvements throughout the state of Maryland. SHA develops the lists by calculating crash rates for specific locations and comparing them to state-wide average crash rates for state-maintained facilities with similar access control, urban/rural designation, number of lanes, and median type. In 2004, there were three Primary Candidate Safety Improvement Intersections and twelve Secondary Candidate Safety Improvement Intersections in Howard County. Table 8 summarizes the crash history at each of the three Primary Candidate Safety Improvement intersections in the study area.

Table 8 Crash Summary for Safety Improvement Intersections, 1999 to 2004

Intersection	Number of Crashes	Collision Type				Severity		
		Turning	Rear-End	Angle	Other	Property Damage Only	Personal Injury	Fatal
Guilford / US 1	87	22	27	26	12	52	35	0
Corridor Road / Howard Street / US 1	75	10	40	15	10	55	20	0
Whiskey Bottom Road / US 1	95	20	43	19	13	63	32	0

Source: MD SHA Office of Traffic Safety crash data

GUILFORD ROAD / US 1

A series of improvements at the Guilford Road/US 1 intersection were completed by June 2004. The improvements consisted of installing an eastbound right-turn overlap phase that runs concurrent with the northbound left-turn phase; replacing the southbound exclusive/permissive left-turn phasing with a flashing left-turn signal arrow that is set to exclusive during the peak periods; implementing a lead-and-lag left-turn phase on the northbound approach; and revising the southbound static Hazard Identification Beacon to active.

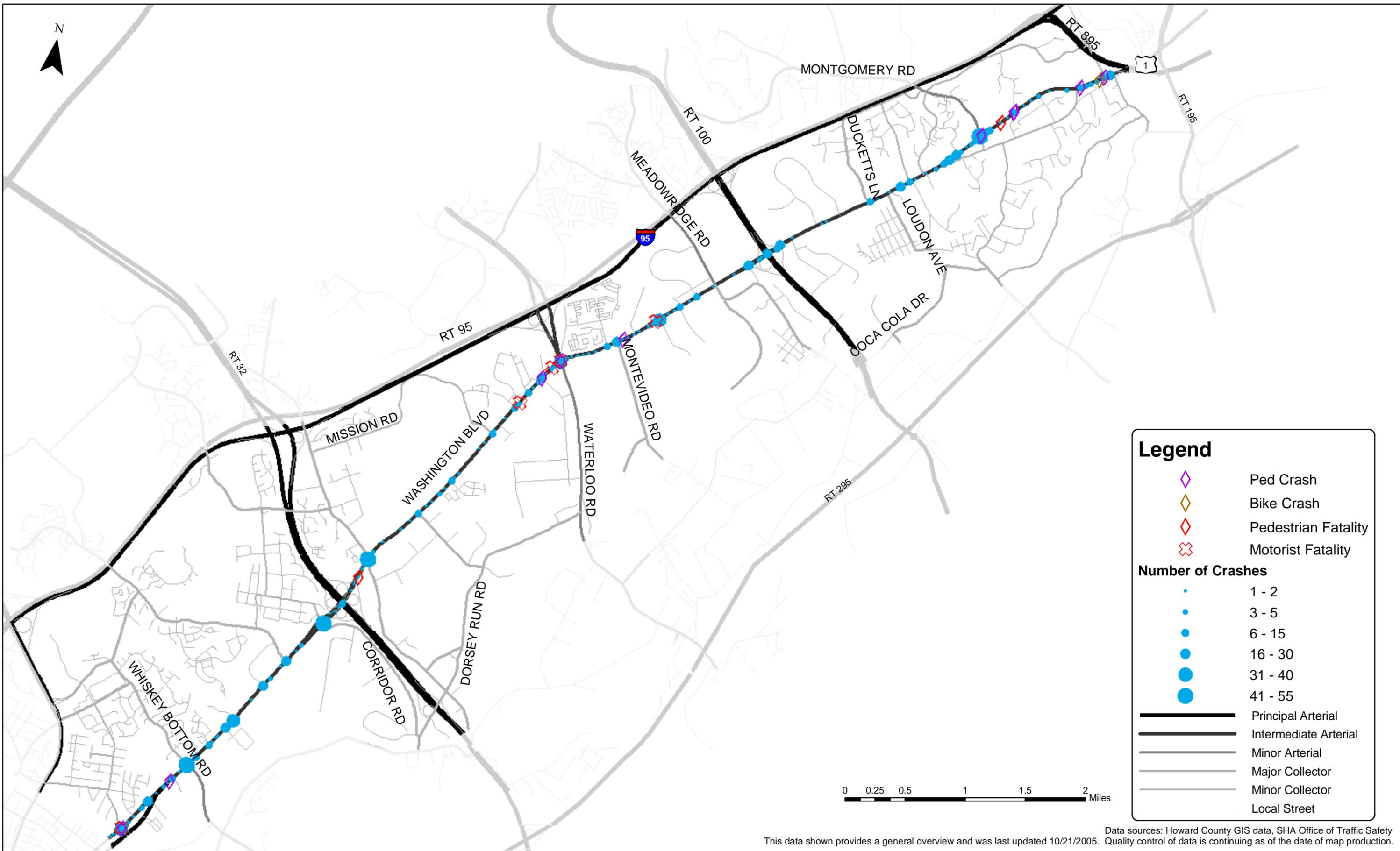
HOWARD STREET / CORRIDOR ROAD / US 1

There is currently a project at the Howard Street/Corridor Road/US 1 intersection to resurface US 1 and re-stripe the southbound approach to provide a third through lane between MD 32 and Gorman Road. The project is scheduled to be completed in 2006. There is also a proposal to upgrade the US 1 signal displays with black faced signal heads and an additional signal head on the northbound approach. The proposed improvements are not scheduled at this time, but SHA anticipates that they will be included in the 2007 fiscal year program.

WHISKEY BOTTOM ROAD / US 1

SHA identified that a sharp vertical crest curve on the approach to the Whiskey Bottom Road/US 1 intersection was a primary contributor to the number of rear-end collisions occurring at the intersection. In June 2004, SHA reconstructed the curve to lower the vertical curvature and upgraded the advance warning of the traffic signal to include Hazard Identification Beacons. The project also included pedestrian push buttons, indications, and a crosswalk across the south leg of US 1. There are future plans to lengthen the southbound left-turn leg approximately 85 feet to accommodate additional traffic generated by the expansion of the Dreyer's Ice Cream Plant.

The crash analysis does not reflect the safety improvements described above, because none of them were in place for the entire analysis period. Safety improvements are expected to result from these intersection improvements.



Data sources: Howard County GIS data, SHA Office of Traffic Safety. This data shown provides a general overview and was last updated 10/21/2005. Quality control of data is continuing as of the date of map production.

Figure 12: Crashes, Jan 2002 - Dec 2004
US 1 Reconnaissance Survey

