SECTION I
PURPOSE AND NEED

CHAPTER I

PURPOSE AND NEED

A. PROJECT LOCATION

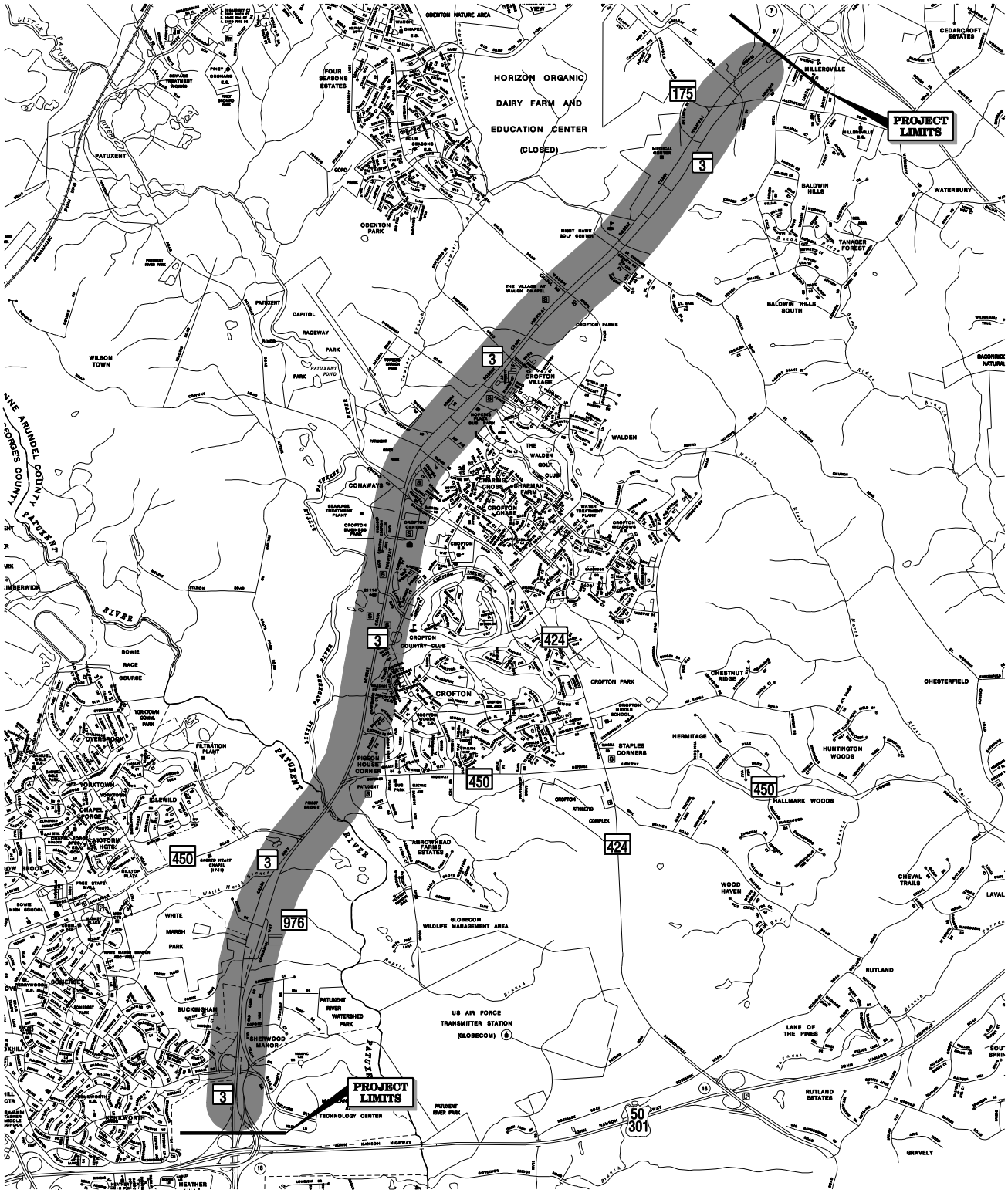
The study area of MD 3 between US 50 and MD 32 is a major north-south highway corridor, 9.28 miles in length. Located in the southwestern portion of Anne Arundel County and the northeastern portion of Prince George's County, MD 3 connects the Bowie, Crofton, Odenton, and Millersville communities to regional expressways serving Baltimore, Washington D.C., and Annapolis. A Project Location Map is shown on **Figure I-1**.

B. PROJECT BACKGROUND AND HISTORY

Since the early 1980's, there have been numerous studies and attempts to address transportation needs in the MD 3 study area. Prior to the construction of I-97 between Baltimore and Annapolis, studies of MD 3 sought to establish direct interstate connections between Baltimore, Washington, D.C. and Annapolis. The original alternate was to upgrade MD 3 between US 50 and MD 32 to interstate roadway standards and re-designate the roadway as I-297. In 1983, the Federal Highway Administration issued a Record of Decision allowing the existing alignment of MD 3 to be upgraded to an interstate roadway. The I-297 proposal, however, was ended due to strong opposition from the Bowie and Crofton communities, and federal funds were diverted to other roadway projects using interstate transfer provisions.

Traffic congestion, inadequate intersections, increased residential and commercial development, and the need for pedestrian/bicycle safety have accelerated the need for improvements to MD 3. The Maryland State Highway Administration (SHA) continued to study non-interstate upgrades for the MD 3 study area until the project was dropped from the Consolidated Transportation Program (CTP) in 1990. In 1992, at the request of Bowie and Crofton, a MD 3 Task Force comprised of citizen representatives of the Crofton, Bowie, and Odenton communities met to address the traffic congestion along MD 3 between US 50 to MD 32. The task force, which disbanded in March 1998, reached consensus on a concept to upgrade the existing corridor, but did not reach consensus on a bypass option after five years of study. At the urging of State and local elected officials, SHA initiated a project planning study in July 2001. The MD 3 study area is included in the Fiscal Years 2009-2014 CTP in the Development and Evaluation program and is funded for project planning only.

Starting from south to north, the typical roadway section for MD 3 from US 50 to White Marsh Branch, just south of MD 450 West, is a four-lane divided roadway with 12-foot travel lanes, 10-foot outside shoulders and a median width that varies from 30 feet to more than 300 feet. From that point to just north of MD 424, MD 3 is a six-lane divided roadway with 12-foot travel lanes, 10-foot outside shoulders and a grass median varying between 35 and 56 feet wide. From just north of MD 424 to St. Stephens Church Road, MD 3 is a six-lane section with a median width that varies from 50 feet to more than 300 feet, with many businesses located in the median.



MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

MD 3 PROJECT PLANNING STUDY

Final Environmental Impact Statement

PROJECT LOCATION MAP

SCALE		FIGURE
1" = 1 MILE		I–1

From St. Stephens Church Road to MD 175, MD 3 is a four-lane section with varying median width, and north of MD 175 it is a four-lane section with 12-foot travel lanes and 10-foot shoulders up to the MD 32 interchange. The roadway provides uncontrolled access throughout the corridor. Along the study corridor there are a total of 197 access points, comprised predominantly of commercial and private entrances.

C. PURPOSE AND NEED FOR THE PROJECT

The purpose of this project is to address existing and projected operational and safety issues for local traffic (vehicles and pedestrians) along MD 3 from north of US 50 to south of MD 32.

Improvements are needed to address existing traffic congestion and projected operational and safety deficiencies resulting from development in and around the study area. Sections of MD 3 within the project limits are currently failing to meet acceptable traffic performance or are experiencing failing conditions during the PM peak hours. This will continue to worsen as all the intersections within the study area are projected to fail by 2025, except for the ramps at Belair Drive.

1. Traffic Analysis

a. Background

To understand the operations at the key intersections in the study area, a capacity analysis was conducted to determine the volume to capacity (v/c) ratio and levels of service (LOS) at these intersections for both the existing and future conditions. The v/c ratio is a parameter that describes the relationship between the capacity of the roadway (the maximum amount of traffic that intersection, roadway segment, ramp, or interchange can process in a given time frame) and the amount of traffic using that portion of the roadway during a particular time period. The LOS is a quantitative measure of traffic operations. On most arterials with signalized intersections, LOS is also a measure of the intersection delays. The characteristics of the LOS letter grades are presented below.

- LOS A: Free traffic flow, low traffic volumes, minimal delays. Traffic volumes are significantly below the roadway feature's capacity.

- LOS B: Stable traffic flow, low to moderate traffic volumes, minor delays. Traffic volumes are well below the roadway feature's capacity.

- LOS C: Stable traffic flow, moderate traffic volumes, noticeable but acceptable delays. Traffic volumes are increasing, but are still well below the roadway feature's capacity.

- LOS D: Approaching unstable traffic flow, moderate to heavy traffic volumes, noticeable delays. Traffic volumes are approaching the roadway feature's capacity.

- LOS E: Unstable traffic flow, heavy traffic volumes, significant delays and vehicle backups, intersection warrants upgrade to address operations. Traffic volumes are reaching the roadway feature's capacity (the v/c ratio is approaching 1.0).

- LOS F: Unstable traffic flow, extensive delays and vehicle backups, intersection warrants upgrade to address deficiencies. Traffic volumes have exceeded the roadway feature's capacity (the v/c ratio has exceeded 1.0).

Traffic analyses are based on the morning peak period and the evening peak period of the day with the highest hourly traffic volumes, commonly known as the AM and PM peak hours. Roadways should ideally be designed to adequately serve the peak hour traffic volume in the peak direction of flow. Since most traffic traveling one way during the morning peak is traveling the opposite way during the evening peak, both sides of a facility must generally be designed to accommodate the peak directional flow during the peak hour.

Critical Lane Analysis (CLA) is the standard SHA tool for the preliminary analysis of intersection improvements, and was used to determine the critical lane volume (CLV) and the v/c ratio of each intersection. If the CLV for an intersection during the peak hour is below its capacity, then the v/c ratio will be below 1.0. As the volume flowing through the intersection increases (as time passes and new developments are constructed, increasing the local number of trips occurring during the peak hours), the v/c ratio will climb towards 1.0, and the LOS will gradually degrade toward LOS F. For this study, if an intersection functioned at LOS F during a particular peak hour with existing lane configurations, then improvement concepts were developed to allow the intersection to function at improved v/c ratios of LOS F or better during that peak hour. Some intersections were greatly enhanced and improved from excessive failing levels to passing levels; however others were limited to small enhancements and could only be improved from severely degraded LOS F (i.e., 1.25) to near passing LOS F (i.e., 1.02).

b. Traffic Analysis for MD 3

Traffic volume analysis for AM and PM peak hour conditions was conducted for the year 2000 existing condition (**see Figure I-2**) and the 2025 No-Build condition (**see Figure I-3**). (Note: These volumes were verified as part of a 2009 traffic sensitivity analysis and approved by FHWA for use in this document.) The highest volumes on MD 3 within the study area occur primarily in the weekday AM and PM peak hours. Existing Average Daily Traffic (ADT) volumes vary from 52,000 to 67,000 vehicles/day, with the highest volume occurring between the two MD 450 intersections. Approximately 67,125 vehicles/day travel on the section of MD 3 between MD 450 West (Annapolis Road) and MD 450 East (Defense Highway) compared to 52,750 vehicles/day on the section just south of the Waugh Chapel/Reidel Road intersection. Truck traffic is between nine and 16 percent of the ADT with the heaviest truck volume north of MD 450 and south of Waugh Chapel Road.

The ADT on MD 3 within the study area is projected to increase from 57 to 60 percent by 2025. For 2025, the forecasted volumes range from 89,150 vehicles/day between Belair Drive and Forest Drive to 105,375 vehicles/day between MD 450 West and MD 450 East.

As noted above, level-of-service analysis reflects peak hour performance of a typical weekday. PM peak demand usually determines the worst traffic condition, because it combines commuter traffic with various local trips. However, in the case of MD 3, which serves primarily as a local route (trips originating or terminating within the study area), analysis of both the AM and PM peak demand provides a more accurate assessment of traffic volumes.

MD 3 PROJECT PLANNING STUDY

2000 AM(PM) Peak Hour Traffic Volumes and Level of Service

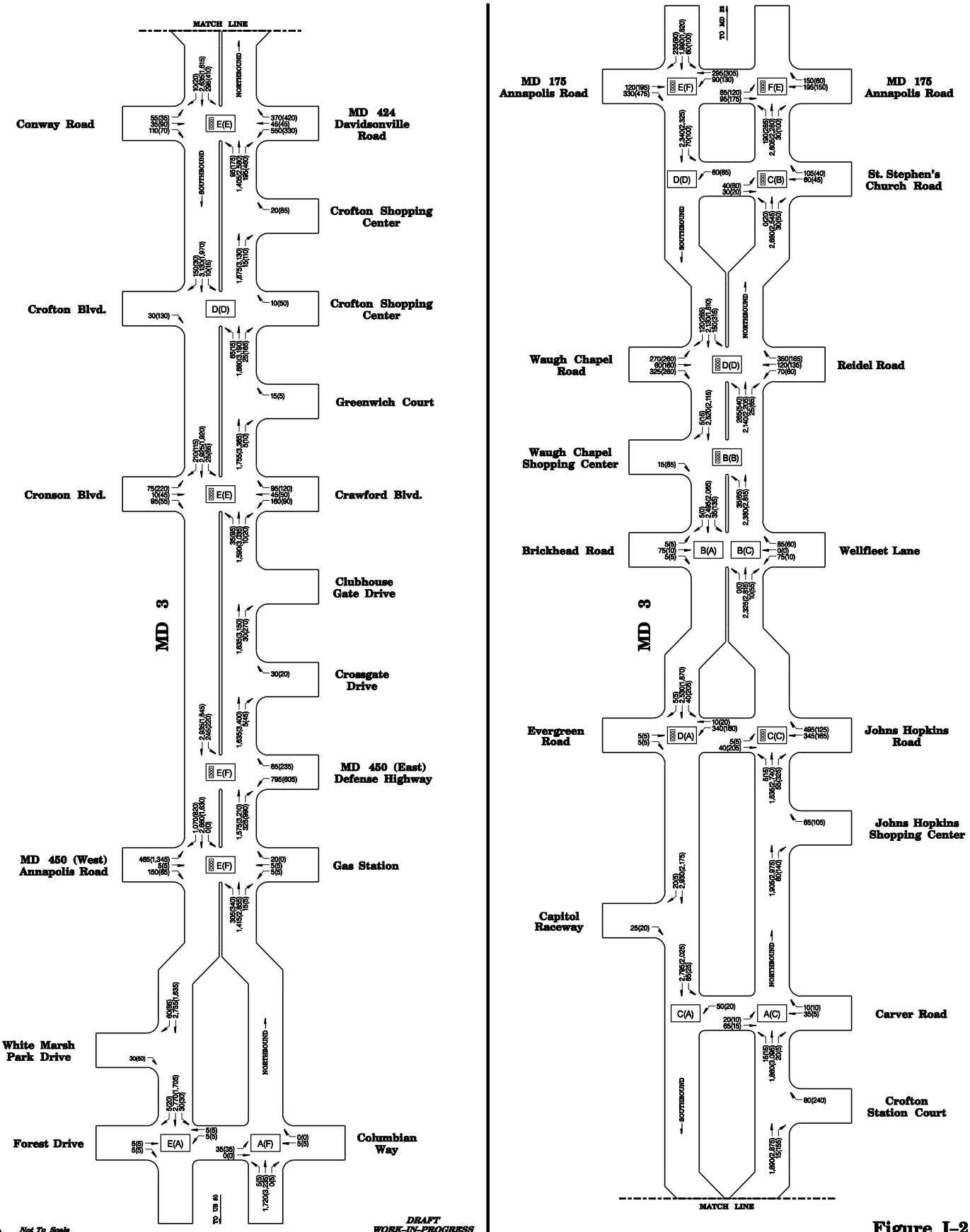
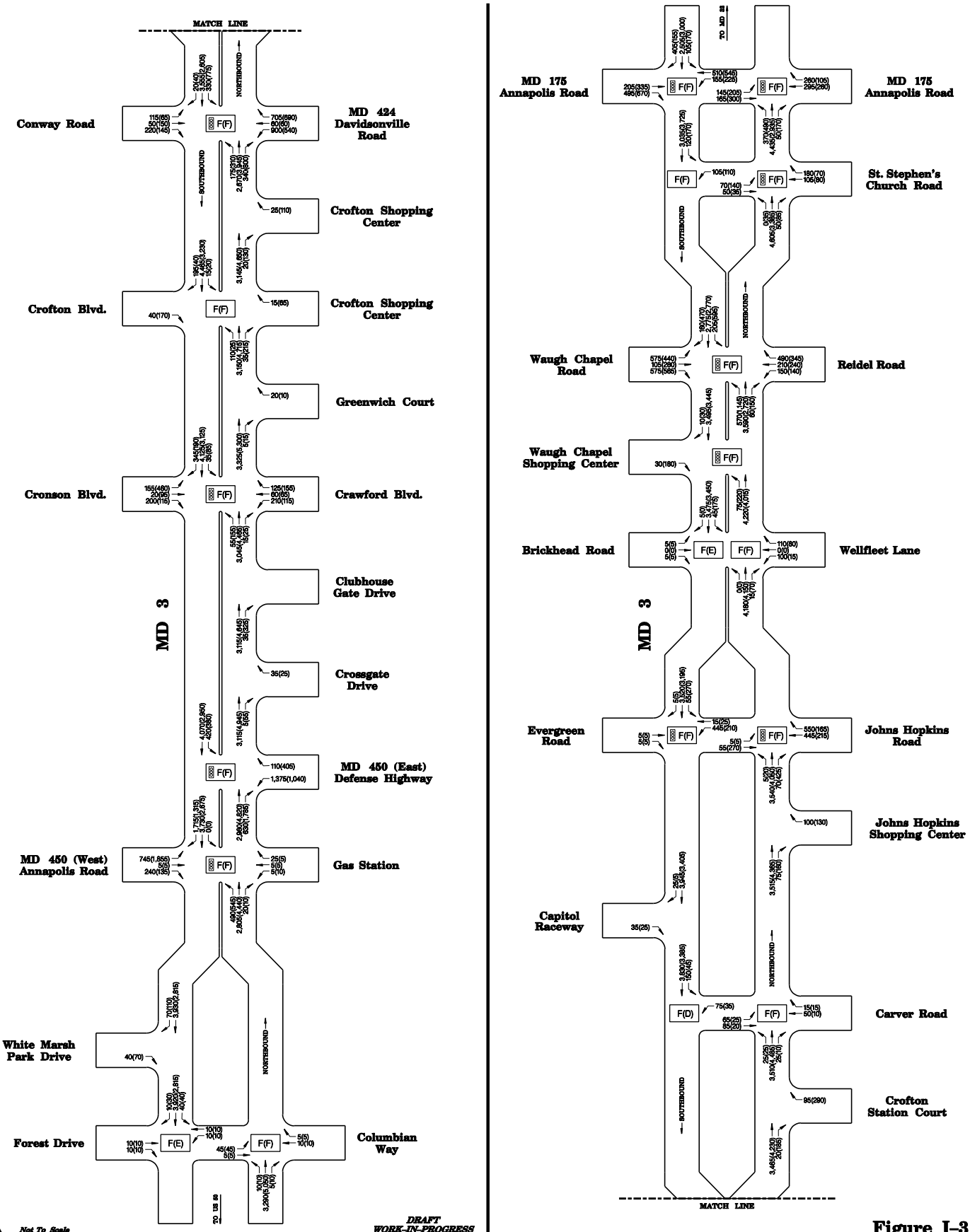


Figure I–2

MD 3 PROJECT PLANNING STUDY

2025 AM(PM) Peak Hour Traffic Volumes and Level of Service



Not To Scale

DRAFT WORK-IN-PROGRESS

Figure I-3

LOS analyses were conducted for the major intersections and interchanges within the MD 3 study area for the Existing (year 2000) (**see Table I-1**) and the No-Build (year 2025) conditions (**see Table I-2**). The Critical Lane Volume analysis was used to conduct the LOS analyses.

Based on the traffic analysis, only three of the nine signalized intersections operate at a LOS "F" (failing) under existing year 2000 traffic conditions. Signalized intersections that have a failing LOS are MD 175 in both the AM and PM peak hours and MD 450 East and West in the PM peak hour only. Non-signalized intersections that have a failing LOS "F" are Columbian Way and Sylvan Drive (east) in the PM peak hour only. With the exception of Belair Drive, all of the signalized intersections are projected to fail by 2025 during both AM and PM peak hours under the No-Build condition. Under the 2025 No-Build condition, only the Belair Drive northbound and southbound ramps during both AM and PM peak hours and the Carver Road (west) and Brickhead Road (west) in the PM peak hours are projected to operate at LOS "D" or better.

2. MD 3 Origin/Destination Survey

A license plate survey on MD 3 within the study area was conducted in May 2001. The purpose of the survey was to determine the percentage of vehicles (both automobiles and trucks) that use the MD 3 study area for through trip purposes, as well as those that travel between MD 450 East and MD 450. The hours for the license plate survey were from 6:00 AM to 9:00 AM and from 4:00 PM to 7:00 PM. The following locations were included in the license plate survey:

During the AM peak period:

- MD 3 SB, just north of MD 175
- MD 3 SB, just south of ramp from SB MD 3 to WB US 50
- Ramp from SB MD 3 to WB US 50
- MD 450 East WB, just east of MD 3
- MD 450 West WB, just west of MD 3

During the PM peak period:

- MD 3 NB, just north of MD 175
- MD 3 NB, just south of Ramp from EB US 50 to NB MD 3
- Ramp from EB US 50 to NB MD 3/Belair Drive
- Ramp from WB US 50 to NB MD 3/Belair Drive
- MD 450 East EB, just east of MD 3
- MD 450 West EB, just west of MD 3

Table I-1
Level of Service and Volume-to-Capacity (v/c) Ratio:
Year 2000 Existing Conditions
As of March 2003

Intersection with MD 3	AM Peak Hour		PM Peak Hour	
	LOS	v/c	LOS	v/c
Belair Drive – MD 3 NB Ramps*	A	0.19	A	0.20
Belair Drive – MD 3 SB Ramps*	A	0.22	A	0.19
Forest Drive	E	0.96	A	0.60
Columbian Way	A	0.62	F	1.14
Sylvan Drive – West	E	0.99	B	0.65
Sylvan Drive – East	A	0.60	F	1.10
MD 450 (Annapolis Road)*	E	0.91	F	1.06
MD 450 (Defense Highway)*	E	0.96	F	1.11
Cronson Boulevard*	E	0.94	E	1.00
Crofton Boulevard	D	0.82	D	0.88
MD 424 (Conway Road)*	E	0.96	E	0.98
Carver Road – West	C	0.73	A	0.52
Carver Road – East	A	0.52	C	0.79
Johns Hopkins Road – West*	D	0.88	A	0.60
Johns Hopkins Road – East*	C	0.77	C	0.77
Brickhead Road – West	B	0.68	A	0.53
Brickhead Road – East	B	0.68	C	0.79
Waugh Chapel Shopping Center *	B	0.64	B	0.70
Waugh Chapel Road*	D	0.88	D	0.88
St. Stephen's Church Road – West	D	0.84	D	0.84
St. Stephen's Church Road – East*	C	0.76	B	0.71
MD 175 (Annapolis Road) – West*	E	0.95	F	1.00
MD 175/Millersville Road – East*	F	1.07	E	0.95

** Signalized Intersections*
Note: all locations analyzed using Critical Lane Volume Analysis (both signalized and unsignalized intersections)

Table I-2
Level of Service and Volume-to-Capacity (v/c) Ratio:
Year 2025 No-Build Conditions
As of March 2003

Intersection with MD 3	AM Peak Hour		PM Peak Hour	
	LOS	v/c	LOS	v/c
Belair Drive – MD 3 NB Ramps*	A	0.34	A	0.38
Belair Drive – MD 3 SB Ramps*	A	0.34	A	0.30
Forest Drive	F	1.37	E	0.99
Columbian Way	F	1.17	F	1.77
Sylvan Drive – West	F	1.39	F	1.05
Sylvan Drive – East	F	1.14	F	1.72
MD 450 (Annapolis Road)*	F	1.46	F	1.58
MD 450 (Defense Highway)*	F	1.40	F	1.68
Cronson Boulevard*	F	1.34	F	1.46
Crofton Boulevard	F	1.19	F	1.29
MD 424 (Conway Road)*	F	1.42	F	1.51
Carver Road – West	F	1.00	D	0.87
Carver Road – East	E	0.99	F	1.15
Johns Hopkins Road – West*	F	1.21	E	0.97
Johns Hopkins Road – East*	F	1.29	F	1.12
Brickhead Road – West	E	0.94	D	0.88
Brickhead Road – East	F	1.18	F	1.15
Waugh Chapel Shopping Center *	F	1.06	F	1.00
Waugh Chapel Road*	F	1.44	F	1.39
St. Stephen's Church Road – West	F	1.11	F	1.35
St. Stephen's Church Road – East*	F	1.31	E	0.98
MD 175 (Annapolis Road) – West*	F	1.27	F	1.59
MD 175/Millersville Road – East*	F	1.80	F	1.30

**Signalized Intersections*
Note: all locations analyzed using Critical Lane Volume Analysis (both signalized and unsignalized intersections)

In addition to the license plate survey, a truck survey was conducted. This survey consisted of recording the company name of all trucks on MD 3 between the intersections of MD 175 and MD 450 West. This survey was conducted between the hours of 7:00 AM and 7:00 PM. The locations for the survey included:

- MD 3 NB and SB, just north of MD 175
- MD 3 NB and SB, just south of MD 450 West
- MD 450 West EB to NB movement, just west of MD 3.

The conclusions of the Origin/Destination Study are as follows:

1. The ADT volumes have increased between 1995 and 2001 by approximately 32 percent on MD 3, and by approximately 17 percent on MD 450 west of MD 3. The peak hour volumes have increased in approximately the same proportion as the ADT volumes.

2. The hourly volume of trucks remains somewhat constant throughout the day (7:00 AM to 4:00 PM), with a decline in truck volumes later in the afternoon.

3. The Origin/Destination Study shows that at each end of the study corridor (north of MD 175 and south of MD 450), approximately 74 percent of the peak hour directional volume is made up of local traffic (trips originating or terminating within the study area). This is significantly higher than the results from the MD 3 Task Force Origin/Destination Study conducted in 1995. That study showed approximately 65 percent of the peak hour volume was made up of local traffic.

4. The MD 3 truck survey showed only 28.9 percent of all trucks entering the study corridor north of MD 175 continued southbound towards US 301 or US 50 during peak period. The remaining 71 percent of trucks were either beginning or ending their trips within the study area.

5. The MD 3 truck survey showed only 31.8 percent of all peak hour northbound trucks entering the study corridor south of MD 450 continued past MD 175.

6. During the truck survey, trucks from 27 different companies were recorded with a frequency of 10 or more trips.

3. Accident Data

When the Purpose and Need concurrence was obtained in 2001, the study area data showed that there were 649 police-reported accidents during the period of 1998-2000. This data, combined with the travel forecasts supporting a significant increase in ADT by 2025, made addressing safety issues a top priority for the study team.

Recently updated accident data for the study area showed an overall increase in the number of accidents; specifically 716 police-reported incidents were recorded during the period of 2006-2008 (**see Table I-3**). This nine percent increase in accidents resulted in a rate of

117.7 accidents per every 100 million-vehicle-miles of travel (acc/100mvm) for the portion of the corridor in Anne Arundel County (an urban divided highway with no access controls), and 66.5 acc/100mvm for the portion of the corridor in Prince George's County (one third access controlled urban highway and two thirds urban divided highway with no access controls).

The current accident rates are lower than the corresponding statewide averages for similarly designed state maintained highways (211.4 acc/100mvm for Anne Arundel County roadway type and 155.9 acc/100mvm for Prince George's County roadway type). However, the potential 60 percent increase in ADT combined with operational forecasts that all 14 of the signalized intersections in the corridor will operate at LOS F by 2025 support concerns that accident rates may surpass the statewide averages if the traffic related safety issues are not addressed.

Table I-3
Accident Experience by Year, Severity, Accident Rate and Comparable Statewide Average Accident Rates

	2006	2007	2008	Total	Study Rate (acc/100 mvm)	Statewide Rate (acc/100 mvm)
Anne Arundel County (urban divided highway with no access controls)						
Fatal Accidents	3	1	2	6	1.2	1.2
Number Killed	3	1	2	6	-	-
Injury Accidents	80	83	63	226	46.1	88.7
Number Injured	114	113	91	318	-	-
Property Damage	130	97	118	345	70.4	121.5
Total Accidents	213	181	183	577	117.7	211.4
Prince George's County (access controlled urban highway & urban divided highway with no access controls)						
Fatal Accidents	0	0	0	0	0.0	0.9
Number Killed	0	0	0	0	-	-
Injury Accidents	16	21	11	48	23.0	64.8
Number Injured	87	25	14	126	-	-
Property Damage	33	17	41	91	43.6	90.2
Total Accidents	49	38	52	139	66.5	155.9

Accidents based on collision type are identified in **Table I-4.** With respect to collision type in Anne Arundel County, data received from police reports revealed that "failure to give full time and attention" comprised 23.1 percent (133 of 577) of the total accidents from 2006 to 2008 and was the most prominent single probable cause listed. The data also shows 18 percent (104 of 577) of the total accidents in Anne Arundel County were listed as either "failure to obey: traffic signal, stop sign, yield right-of-way, or other traffic control" as the probable cause. In addition, 146 accidents (25 percent) were categorized as either "too fast for conditions, following too closely, improper lane change, or failure to drive in a single lane." Of the 1,129 total vehicles involved in Anne Arundel County, 70 were heavy-duty or tractor-trailer trucks (6.2 percent).

With respect to collision type in Prince George's County, data received from police reports revealed that "too fast for conditions" comprised 25.2 percent (35 of 139) of the total accidents from 2006 to 2008 and was the most prominent single probable cause listed. In addition, 58 accidents (42 percent) were categorized as either "following too closely, improper lane change or failure to drive in a single lane" as the probable cause. Of the 291 total vehicles involved in Prince George's County, 16 were heavy-duty or tractor-trailer trucks (5.5 percent).

Table I-4
Overall Accident Experience by Year, Collision Type, Accident Rate and Comparable Statewide Average Accident Rate

Collision Type	2006	2007	2008	Total	Accident Study Rate (acc/100 mvm)	Statewide Average Rate (acc/100 mvm)
Anne Arundel County (urban divided highway with no access controls)						
Angle	23	23	14	60	12.2	29.7
Rear End	93	86	89	268	54.7	82.7
Fixed Object	39	22	26	87	17.8	22.0
Opposite Direction	3	0	0	3	0.6	4.3
Sideswipe	21	24	16	61	12.4	19.8
Left Turn	9	7	8	24	4.9	20.6
Pedestrian	1	2	4	7	1.4	6.6
Parked Vehicle	4	1	5	10	2.0	3.3
Other	20	16	21	57	11.6	14.9
Total	213	181	183	577	117.7	211.4
Prince George's County (access controlled urban highway & urban divided highway with no access controls)						
Angle	2	2	3	7	3.4	19.7
Rear End	27	24	30	81	38.8	60.9
Fixed Object	10	4	2	16	7.7	18.9
Opposite Direction	0	0	1	1	0.5	2.9
Sideswipe	5	3	6	14	6.7	15.4
Left Turn	0	2	0	2	1.0	13.6
Pedestrian	0	0	0	0	0.0	4.4
Parked Vehicle	0	0	0	0	0.0	2.5
Other	5	3	10	18	8.6	10.7
Total	49	38	52	139	66.5	155.9

Below, **Table 1-5** compares historical accident data within the study area for the years between 1998-2000 and 2006-2008. Note that the angle, left turn and pedestrian accident types remained roughly the same over the eight year period, while opposite direction and parked vehicle accidents decreased slightly. The rate of rear end collisions (increased 54 percent), fixed object (up 32 percent), sideswipe (increased 20 percent) and total accidents (up nine percent) increased

an average of 29 percent throughout the corridor. These accidents types are indicative of poor traffic operations, insufficient merge conditions, and numerous conflict points.

Table I-5
Overall Accident Experience over Time (1998-2000 vs. 2006-2008)

Collision Type	Study Area 1998-2000	Study Area 2006-2008
Angle	67	67
Rear End	277	349
Fixed Object	78	103
Opposite Direction	10	4
Sideswipe	62	75
Left Turn	27	26
Pedestrian	8	7
Parked Vehicle	13	10
Other	107	75
Total	649	706

Further supporting the need for safety improvements within the corridor, the intersection of MD 3 at Waugh Chapel Road/Reidel Road was listed as a primary Candidate Safety Improvement Intersection for Year 2000. A corresponding study to improve safety and capacity by SHA's District 5 Office of Traffic in 2008 now lists two locations within the study limits as priority Candidate Safety Improvement Intersections: MD 3 at Waugh Chapel Road/Reidel Road and MD 3 at MD 424.

4. Bicycle and Pedestrian Accommodation

Roadway improvements to accommodate bicycle and pedestrian traffic are needed throughout the MD 3 study area. Residential and commercial properties along MD 3 are not easily accessible to pedestrian and bicycle traffic from nearby communities. In Anne Arundel County, examples include the Crofton Post Office and businesses that are located on the west side of MD 3 directly across from the Crofton Community on the east side of MD 3. Waugh Chapel Village is located on the west side of MD 3, with several residential communities located on the east side of MD 3. In Prince George's County, public access to White Marsh Park is located along southbound MD 3. White Marsh Park contains many recreation facilities needing access by motor vehicle, pedestrian, and bicycle traffic.

MD 3 is currently used by bicyclists throughout the corridor for both recreational and commuter needs, despite the heavy traffic volumes. North of MD 424 to MD 175, several commercial and residential properties are located in the median of MD 3. Currently, no formal pedestrian or bicycle access is provided in these areas. The primary areas identified through the public involvement process in which crossings of MD 3 are of most concern to pedestrians and bicyclists include MD 3 at MD 450, Cronson/Crawford Boulevard, MD 424, Waugh Chapel/Reidel Roads, and MD 175. Pedestrians and bicyclists experience difficulty crossing

MD 3 due to the volume of traffic, vehicle speeds, and lack of striping or formal pedestrian refuge areas, such as medians and islands, at major intersections.