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APPENDIX D.1
CROSSINGS OF THE SUSQUEHANNA RIVER

APPENDIX D.1 CROSSINGS OF THE SUSQUEHANNA RIVER

In order to help place the various existing mode choices in context, the following summarizes the number of vehicular and train trips which crossed the Susquehanna River on an average week**day** in 2000:

Roadways

77,200 vehicles
⇒ about 66,300 autos (86%)
about 120 buses (3,000 to 4,000 people)

TOTAL PERSON TRIPS
about 105,000 to 110,000 people per day

⇒ about 1,200 light (3 axles) trucks (1.6%)
⇒ about 1,100 medium (4 axles) trucks (1.4%)
⇒ about 8,500 heavy (5+ axles) trucks (11%)

TOTAL FREIGHT MOVEMENT
about 190,000 tons per day

25,000 vehicles (autos and trucks)

8,000 vehicles (autos and trucks)

Amtrak's NorthEastern Corridor (NEC)

⇒ AMTRAK ⇒ 75 passenger trains; about 10,000 to 15,000 people (4,637,100 passengers in FY 2000)
Also, AMTRAK carries a limited amount of "priority" freight each day

⇒ MARC ⇒ 7 passenger trains; about 100 to 110 people

⇒ Norfolk Southern ⇒ 10 to 15 freight trains (each with about 100 cars). While data on daily tonnage over the Susquehanna River is not available, Norfolk Southern reports that 45 million to 60 million tons of freight are moved per year along the NEC.

CSXT

⇒ about 25 freight trains per day (each with about 80 cars, daily tonnage of freight moved about 95,000 to 100,000 tons)

APPENDIX D.2
EXISTING BUS/RAIL TRANSIT AND FREIGHT RAIL OPERATIONS

APPENDIX D.2 EXISTING BUS/RAIL TRANSIT AND FREIGHT RAIL OPERATIONS

1. Rail Passenger Service

Amtrak Rail Service - The National Railroad Passenger Corporation (Amtrak) initiated operations in 1971. Amtrak operates a multi-track, high-speed NorthEast Corridor (NEC) line with major Amtrak terminals in Washington D.C., Baltimore, Wilmington, Philadelphia, New York, and Boston. Amtrak operates 75 to 80 passenger trains per day along the NEC and includes high-speed, limited-stop Acela Express trains and multi-stop regional trains. These trains provide service to Washington, Philadelphia, New York, Boston, and other northeast destinations. Amtrak long-distance trains to Florida, New Orleans, and Newport News also traverse the NEC. Amtrak ridership along the NEC represents approximately 57% of the total Amtrak ridership nationwide. Rail passenger service in the I-95 study area is shown on Figures A-5 and A-6.

There is one Amtrak station located within the study area in Aberdeen, Maryland. Amtrak service to/from Aberdeen includes six northbound and six southbound weekday trains (Monday-Friday). Amtrak weekend service to/from Aberdeen is five northbound and five southbound trains. Aberdeen is a staffed station (tickets may also be purchased online, by telephone prior to trip, or on the train).

MTA MARC Commuter Rail Service - The Maryland Transit Administration operates the Maryland Rail Commuter Service (MARC). MARC commuter rail provides peak-direction, peak-period service linking outlying suburban communities to downtown areas. A majority of MARC commuters travel to and from the station by personal auto. MARC train service is provided by the MTA along National Railroad Passenger Corporation (Amtrak) and CSX Transportation (CSXT) tracks. MARC service operates 5:00 a.m. to 12:00 a.m., Monday through Friday.

In northeastern Maryland, MARC trains operate on Amtrak's Penn Line, which roughly parallels US 40 (Pulaski Highway). Four MARC train stations are within the study area vicinity including Martin State Airport, Baltimore County; Edgewood and Aberdeen, Harford County; and Perryville, Cecil County.

In 2001, MARC daily ridership is 20,000 passengers system-wide. The total MARC fleet consists of 132 passenger cars and 30 locomotives. MARC operates 42 trains between Perryville and Washington on the Penn Line. Daily ridership between Perryville and Baltimore Penn Station is 370 riders (740 trips).

SEPTA R2 Commuter Rail Service - North of the study area, the Southeastern Pennsylvania Transportation Authority (SEPTA) operates commuter rail service on the R2 line from northern Delaware to Philadelphia along the Amtrak northeast corridor track. SEPTA stations in Delaware are located in Newark, Churchmans Crossing, Wilmington, and Claymont. The main terminal in downtown Philadelphia is 30th Street Station where riders can transfer to other SEPTA regional rail lines, subway (Market-Frankford Line), downtown trolleys (West Philadelphia suburbs to Center City), SEPTA buses, Amtrak, and Greyhound.

Passengers from Delaware primarily utilize this service to reach employment centers in downtown Philadelphia, the main movement is northbound in the morning and southbound in the afternoon. Off-peak and reverse direction trains also operate. All Delaware stations have parking lots and most riders travel to and from the lot by personal auto. SEPTA operates 36 week**day** trains and 10 Saturday trains northbound and southbound along the R2 corridor. In FY2001, SEPTA trains serving Delaware carried a total of 2,750 trips per average weekday.

2. Bus Passenger Service

MTA Core Bus Service

The Maryland Transit Administration (MTA) directly operates local bus routes in the City of Baltimore and Baltimore and Anne Arundel counties. Core bus service is not provided by MTA in Harford or Cecil counties. In eastern Baltimore County, four local (core) bus routes operate and primarily serve local trips to and from downtown Baltimore. Bus transit service is shown on Figure A-5. These four routes are summarized below:

- **No. 15** – Perry Hall/White Marsh/Overlea/ Social Security Mall
- **No. 23** – Middle River/Fox Ridge/US 40 & Rolling Road
- **No. 24** – Whispering Woods (Chase)/ Franklin Square Hospital
- **No. 35** – White Marsh/Rosedale to Downtown Baltimore (University of Maryland Transit Center)

MTA Commuter Bus Service

The Maryland Transit Administration (MTA) directly operates and also contracts private companies' services for 10 commuter bus routes from suburban communities in Baltimore, Anne Arundel, Howard, and Harford counties to downtown Baltimore. MTA commuter buses are oriented for peak-period, peak-direction trips (i.e., to downtown Baltimore in morning and the reverse movement in the afternoon). In the northeast Baltimore metropolitan area, five MTA premium express commuter bus routes operate along or near the I-95 study area. Premium express lines offer long distance service at high travel speeds from a limited number of pick-up points to major employment centers.

- **Route 120:** White Marsh to Baltimore
- **Route 160:** Essex Park-and-Ride/Oliver Beach/Fox Ridge to Baltimore
- **Route 410:** Churchville/Bel Air to Balt.
- **Route 411:** Bel Air to Baltimore
- **Route 420:** Havre de Grace to Baltimore
- **Route 731**: Perryville to Baltimore, with stops at MARC stations

Harford County Bus Service

Harford County Transportation Service (HCTS) provides fixed route and demand-response bus services to the general public, elderly, and persons with disabilities who reside in Harford County. The hours of operation (Monday to Friday) are 6:30 a.m. to 6:30 p.m. for fixed routes and 8:30 a.m. to 4:30 p.m. for demand-response services. The fixed route service includes five routes that link Havre de Grace, Aberdeen, Bel Air, Fallston, Edgewood, and Joppatowne.

- **Route 1:** Havre de Grace – Aberdeen – Bel Air
- **Route 2:** Joppatowne – Edgewood – Bel Air – Fallston
- **Route 3:** Bel Air (Bel Air Town-Go-Round)
- **Route 4:** Aberdeen – Perryman (Aberdeen Doodlebug)
- **Route 6:** Edgewood – Riverside – Perryman – Aberdeen

The demand-response service is provided throughout Harford County and is offered on a first-come, first-serve basis. The HCTS stops at the Aberdeen Amtrak/MARC train station and connects with MTA commuter bus routes, 410 and 411. The Harford County transit system enables transit-dependent individuals to access shopping and business areas in the town of Bel Air.

In fiscal year 1999, HCTS provided an average of 560 passenger trips per day with a bus fleet of 34 vehicles. The HCTS annual ridership was approximately 153,000.

Cecil County Bus Service

The Cecil County Department of Aging provides the only public transportation services in Cecil County, excluding taxi services. The agency operates one fixed route, the Cecil Midday Transit, seven deviated fixed routes, and demand-response services. The demand-responsive services provide general purpose trips for the elderly and persons with disabilities throughout Cecil County as well as medical trips for county residents. The Cecil Midday Transit (The Bus) operates Monday through Friday from 8:00 a.m. to 4:00 p.m. as a loop or small, circulator route in downtown Elkton. The circulator route also provides a connection to three DART First State Routes at Glasgow.

The Cecil County bus fleet comprises ten vehicles. In FY 1998, the agency recorded a daily average of 109 passenger trips.

DART First State Bus Route 65 connects Elkton, Maryland to Newark, Delaware. Service operates Monday-Friday from 5:30 a.m. to 7:30 p.m. with 20 trips per day (every 45 minutes).

Private Bus Service

Greyhound and Peter Pan Bus Lines have joint operations (combined services) for all buses between Washington, D.C. and Boston, Massachusetts. In general, Greyhound comprises about 59% and Peter Pan about 41% of the total mileage along the NEC.

Greyhound provides bus service along the I-95 study area in northeastern Maryland between Baltimore and Wilmington. Greyhound has a major stop at the Baltimore I-95 Travel Plaza, which is located approximately 2.5 miles south of the I-95/I-895 split. Within the study area, Greyhound provides limited service to Aberdeen and Elkton.

Greyhound makes nine stops per day at the Aberdeen Amtrak/MARC station on East Bel Air Road, which is approximately two miles east of I-95, Exit 85. Three southbound and three northbound bus trips leave daily from Aberdeen. In addition, three separate trips arrive daily from the northeast (New York). Hours of operation are from 7:00 a.m. to 10:00 p.m. with service frequency ranging from 30 minutes to eight hours.

The Elkton Greyhound bus stop is located along Elkton Road near I-95, Exit 109B. Only one northbound bus services this stop daily. The northbound bus (direct) departs from Elkton at 8:10 a.m. and arrives in New York City at 10:40 AM. No southbound buses leave from Elkton or arrive to Elkton from points north (Wilmington, Philadelphia, New York).

Peter Pan bus lines also provides inner-city bus service along the east cost from Washington, D.C. to Boston, Maine. Within the study area, Peter Pan Buses serve exclusively long distance, interstate trips along I-95. Peter Pan does not make any stops within the study area. Similar to Greyhound, Peter Pan Buses stop at the Baltimore I-95 Travel Plaza, as well as downtown Baltimore, Maryland and Wilmington, Delaware. Nineteen northbound buses travel daily from the I-95 Travel Plaza and the downtown Baltimore stops to

Wilmington, Philadelphia, and New York City. Eleven southbound buses travel daily through the study area to the Baltimore I-95 Travel Plaza.

In 2000, private bus ridership along the East Coast was approximately 1.5 million passengers.

3. Freight Rail Service

Overview

The existing railroad network in the study area consists of three major rail lines. Two north-south oriented lines are generally parallel to I-95: the Amtrak Northeast Corridor (NEC) and the CSX Transportation (CSXT) Philadelphia Subdivision. Both lines connect Baltimore with Wilmington and Philadelphia. In the study area, both lines are located east of I-95 from I-895(N) to the Delaware state line. The third line, the Norfolk Southern Railway (NS) Port Road Line, is an east-west oriented line parallel to the Susquehanna River. The Port Road Line extends from Perryville, MD (its connection with the Amtrak NEC) to Harrisburg, PA. Freight rail service in the study area is shown on Figure A-6.

Rail Service

Although Amtrak's priority service is to their rail passengers, Amtrak trains also carry high priority/low bulk and weight packages on their trains. Amtrak operates a total fleet of 807 freight cars nationwide.

Norfolk Southern Railway has obtained trackage rights to carry freight on Amtrak's Northeast Corridor and operates 10 to 15 freight trains daily through the study area. Freight movement on the NEC typically occurs between 10:00 p.m. and 6:00 a.m. to minimize conflicts between slower-moving freight trains and high-speed passenger trains. Most NS trains in the study area are east-west trains using the Port Road Line, connecting with the NEC to access Baltimore to the south and Delaware to the north. Approximately 20 trains use the Port Road Line daily, mainly between 10:00 p.m. and 6:00 a.m. to comply with operational restrictions on the NEC. NS hauls intermodal trailers and containers, automobiles, coal and other general merchandise through the study area. NS serves the Port of Baltimore, the Port of Wilmington, auto manufacturing plants, and other shippers in the study area. In addition, NS provides rail access to the Delmarva Peninsula from the NEC.

The Philadelphia Subdivision is a major link in CSXT's network, linking the Northeast with the Southeast as well as the Mid-Atlantic region with the Midwest. CSXT operates 30 to 35 trains through the study area. CSXT serves the Port of Baltimore, the Port of Wilmington, auto manufacturing and distribution facilities, and connects with various short line railroads.

Two freight switching railroads operate in the Baltimore area – the Canton Railroad and the Patapsco and Back Rivers Railroad. The Canton Railroad operates a six-mile line, consisting of 17 miles of track, in the Canton industrial area (adjacent to the east portals of the Baltimore Harbor and Fort McHenry Tunnels). The line is owned by the Maryland Transportation Authority and provides switching duties for various facilities of the Port of Baltimore as well as serving over 30 on-line shippers. The line connects with CSXT at Penn-Mary yard and with Norfolk Southern at Canton Junction. The Patapsco and Back Rivers Railroad is owned and operated by the Bethlehem Steel Corporation as a switching railroad for the Sparrows Point steel plant. The railroad switches cars between various parts of the steel plant and connects with CSXT and Norfolk Southern at Grays Yard (just north of I-695 at the MD 151 interchange).

Infrastructure

The Amtrak Northeast Corridor is primarily a three track system through most of the study area. The two main tracks have maximum speeds of 110 to 125 miles per hour except for station and yard areas. The speed limit on the third track varies between 90 to 110 miles per hour. The entire line includes overhead electric catenary lines to provide power to Amtrak's electric locomotives. Concrete ties have been installed in most areas to facilitate a smoother ride for passengers.

The railroad is limited to two tracks in the following locations (see Figure A-6 for locations):

- 1 the 6 mile segment between Prince Interlocking (near Perryville) and Bacon Interlocking (near North East) in Cecil County
- 2 the bridge over the Susquehanna River
- 3 the bridge over the Bush River in Baltimore County
- 4 the Baltimore and Potomac (B&P) Tunnel west of Baltimore Penn Station in Baltimore City

NS operates various freight facilities throughout the study area. Bayview Yard is the major freight classification yard in the Baltimore area. Other facilities include an intermodal facility adjacent to Bayview Yard, a freight yard adjacent to the Chrysler manufacturing plant in Newark, DE, and Edgemoor Yard just east of Wilmington.

In addition to the previously listed two track segments, other locations on the NEC where operations can become constrained include:

- Perryville, with the 2-track Susquehanna River bridge, the MARC Penn Line storage yard, and the connection with the NS Port Road Line
- Newark, with the NS Chrysler Yard, the Newark Rail Station, and connection to the NS Delmarva Secondary to Harrington, DE

The CSXT Philadelphia Subdivision is a single track railroad with passing sidings through most of the study area. The line has a maximum speed of 45 to 60 miles per hour except for yard areas. The line is not electrified and trains operate with diesel locomotives. The line consists of continuous welded rail and is controlled from CSXT's centralized traffic control center in Jacksonville, Florida.

CSXT operates various freight facilities throughout the study area. Bayview Yard is a major freight classification yard in the Baltimore area for CSXT as well as NS. At Bayview, CSXT connects to the Canton Industrial Area where it operates the Seagirt Intermodal Yard, the Penn-Mary merchandise freight yard, connects with the Canton Railroad, and gains access to various Port of Baltimore terminals. CSXT also provides access to Port of Baltimore facilities at the Curtis Bay yard and the Locust Point yard. In the northern portions of the study area, CSXT operates Wilsmere Yard as the major classification yard in the Wilmington area.

One major constraint on CSXT is the Howard Street Tunnel in Baltimore City which has a single track and limited height clearances. The line contains other vertical clearance limitations which prohibit operation of highly efficient double-stack container trains. Once entirely double-tracked from Baltimore to Philadelphia, operations on the CSXT Philadelphia Subdivision are now constrained by its single track system.

Freight rail is normally more economical than truck freight for long-haul, heavy-cargo movements. A general evaluation of current freight movements originating and/or destined for the I-95 study area indicates that the potential for significant diversion of freight, from trucks to rail, is limited.

APPENDIX D.3
TRANSPORTATION DEMAND MANAGEMENT (TDM) and CONGESTION MANAGEMENT STRATEGY (CMS) CONSIDERATIONS

APPENDIX D.3 TRANSPORTATION DEMAND MANAGEMENT (TDM) AND CONGESTION MANAGEMENT STRATEGY (CMS) CONSIDERATIONS

Executive Summary from Corridor #17 CMS

The following text is directly reproduced from the "Maryland Congestion Management System Corridor #17 Report Harford County to Baltimore" prepared by the Maryland Department of Transportation (State Highway Administration and Mass Transit Administration) and dated December, 1996. The full report was approved by the BRTB in February, 1999.

Please see Appendix D.3. 2. for cross references to updated information for the I-95 study area.

Please note that in the following text references to Mass Transit Administration should now state Maryland Transit Administration.

Corridor #17, I-95 from Harford County to Baltimore, *has been targeted as a high priority corridor for study as part of the CMS due to the high level of congestion occurring in the corridor. The CMS analysis is a necessary part of establishing the feasibility of future capacity improvement projects, and ensures that suitable non-single occupancy vehicle (SOV) strategies will be identified and implemented along with any SOV projects.*

The major facility that defines the primary directional movement in this corridor is I-95. I-95 is a six to eight-lane interstate highway that serves both through traffic as well as local, commercial, industrial and residential traffic in the study area and beyond. There are other facilities in the corridor that serve the same directional demand including US 40, US 1, and MD 147.

In the study area, congestion is at its highest on and near the heaviest traveled facility in the corridor, I-95, which connects the mainly residential areas of Harford County to the Baltimore Beltway (I-695) and Baltimore City. Currently, the average ADT along the entire section of I-95 within the study area is 79,275. The heaviest traffic volumes along I-95 occur in the sections approaching the I-695 Beltway and between I-695 and I-895. Transit ridership in the corridor includes around 400 daily riders on the MARC Penn Line at the stations from the Martin Airport north to Perryville. Ridership on the MTA express bus service currently averages slightly over 1400 daily passengers. The Harford County Transit Service routes average close to 422 daily riders.

A corridor #17 team was formed which consisted of members representing the Maryland Department of Transportation, State Highway Administration, Mass (now Maryland) *Transit Administration, Baltimore Metropolitan Council* (now Baltimore Regional Transportation Board, BRTB*), Maryland Office of Planning, Maryland Transportation Authority, Harford and Baltimore County. Through a series of team meetings, a number of congestion management strategies were identified for testing in this corridor to determine their effectiveness in reducing congestion and to address the long-range problem or recurring and non-recurring congestion. Various combinations of the defined alternatives were developed into "packages" for use in testing strategy effectiveness. These packages were then simulated in the BMC* (now BRTB*) network to determine the effect each combination would have on I-95 congestion levels in the target year 2020. These strategies chosen include:*

- *Package 1 – Base Case,*
- *Package 2 – TSM/TDM/Bike/ Pedestrian Access,*

- *Package 3 – Bus/HOV Option 1 with TSM/TDM/Bike/Pedestrian Access,*
- *Package 3 – Bus/HOV Option 2 with TSM/TDM/Bike/Pedestrian Access,*
- *Package 4 – Rail/TSM/TDM/ Pedestrian Access,*
- *Package 5 – Highway Capacity Enhancements (HCE)/HOV Option 1 with BUS/TSM/TDM/Bike/Pedestrian Access,*
- *Package 5 – HCE/HOV Option 2 with BUS/TSM/TDM/Bike/Pedestrian Access.*

Key indicators of performance were used to evaluate the effectiveness of each package. These indicators included average daily traffic (ADT), speed, volume to capacity ratios (V/C), levels of service (LOS), congestion levels by vehicle miles traveled, transit ridership, travel times and delay. Results of the package testing indicated the following:

- *The average ADT along I-95 is highest under the base case alternative as compared to all other packages tested in the study area. This is a result of the planned HOV lane being returned to general purpose traffic use along I-95 and no ride share incentives or transit improvements to reduce traffic demand along I-95 under the base case alternative as compared to all other alternatives.*

- *A comparison of the average speeds associated with each alternative indicates the TSM/TDM alternative has the highest average daily speed along I-95 compared to all other packages.*

- *Comparing transit ridership between alternatives indicates that the MARC Penn commuter rail line will experience similar ridership under all alternatives. The Mass Transit Administration premium express bus routes from Bel Air will experience similar ridership under all alternatives. The Mass Transit Administration premium express bus routes from Bel Air will experience a greater than 2,000 rider increase under the HOV alternatives, due to the decreased travel times associated with the bus routes using the quicker HOV lane on I-95 to reach downtown Baltimore. The ridership on these routes, however, will decrease dramatically under the Rail/TSM/TDM alternative because riders will switch from bus to rail. General improvements in the express bus service indicate that ridership will also increase by around 2,000 passengers in the 2020 base case and TSM/TDM alternative. The county bus service experiences similar demand for it's service under all alternatives.*

- *The light rail from White Marsh to downtown Baltimore is anticipated to attract close to 16,000 daily riders. A comparison of the mode share breakdown between each alternative indicates that none of the alternatives, including the rail alternative package, makes an appreciable change in the resultant mode share within the study area.*

- *A comparison of anticipated levels of service or operation indicated that no sections of I-95 are anticipated to operate at a level of service A to C or F under any of the future package alternatives.*

- *As with the levels of service, congestion levels for all alternatives are similar, with indications that moderate to severe peak congestion can still be expected under all alternatives.*

A summary of the projected costs indicated that the least expensive package, other than the base case, is the TSM/TDM package number 2 at approximately $9,800,000. Package number 3 option 1 is anticipated to have a similar, yet slightly higher, cost. The most expensive package is package 5, HOV option 2, the

highway capacity enhancements with an accompanying HOV lane from MD 24 to I-395 in addition to the TSM/TDM improvements. This package is anticipated to cost approximately $628,000,000.

The CMS analysis of Corridor #17 leads to the following conclusions:

- *The inclusion of an HOV lane along I-95 results in a reduction of general purpose lanes along the roadway as compared to non-HOV alternatives. As a result, operating conditions on these general purpose lanes deteriorate slightly from a base case scenario. Although travel times along the HOV lane are less than all other alternatives, total daily volumes on the lanes range from 3,000 to close to 6,000 vehicles, which is somewhat low.*

- *The highway capacity enhancements mainly implemented along US 1 do not greatly affect the operation of I-95. Traffic volumes and speeds, however, along US 1 in the improvement areas are seen to increase.*

- *The TDM and TSM measures, including bus transit service improvements, by themselves, are insufficient in providing congestion relief and noticeable mobility improvement in the corridor. However, as elements of an overall strategy in support of other more capital intensive elements they are useful and, given their relatively low cost ($9 million), are cost effective improvements.*

- *The light transit alternative indicates the potential for strong ridership numbers on the northeast rail line where daily ridership of close to 16,000 passengers could be expected. The light rail alternative itself does not greatly affect the operations of I-95.*

Analysis of the CMS strategies indicates that none of the packages adequately address the congestion problems anticipated in this corridor. *As a result, combinations of the improvements tested here and proactive management in other non-typical areas, such as growth management, are needed to effectively address and help mitigate the congestion situation. Strategies such as TSM/TDM, HOV and Enhanced Bus Transit, will not fully solve the congestion problem, but do help manage congestion.*

Further planning for congestion relief and mobility improvements in Corridor #17 should focus on more detailed consideration of all the alternative packages. While no one package was successful in significantly reducing congestion within the corridor, each package had some positive impacts. Based on this, the core team decided that no package should be eliminated from more detailed analysis of feasibility.

1. Updated Information for the I-95 Study Area

As a part of the I-95 Master Plan Study and in cooperation with the MPOs and MTA, the Authority has updated the transportation analyses for the I-95 study area, including the portion addressed by the CMS for Corridor #17. Cross referencing to the updates provided in Section B of this I-95 Paper are as follows:

- B.1 and B.2 ⇒ updated transportation modeling (including current land use data provided by the MPOs)
- B.3 & B.5 ⇒ updated traffic operations for Concepts C-1 through C-6.
- B.4 ⇒ updated transit options.

Please refer to these sections for updates on the CMS for Corridor #17.

APPENDIX D.4
PUBLIC INVOLVEMENT

APPENDIX D.4 PUBLIC INVOLVEMENT

1. Introduction

The I-95 Master Plan incorporated a comprehensive outreach program to ensure that study area stakeholders had an opportunity to comment early in the decision making process. Three working groups were established: a "Regulatory Agency Working Group"; a "State and Local Working Group"; and a "Stakeholders Working Group".

2. Regulatory Agency Working Group

The Regulatory Agency Working Group was developed to ensure identification of environmental and community concerns and/or issues. Activities completed by this Working Group include:

- Agreed on concurrence points and concurrence methods.
- Identified sensitive environmental and community issues to be inventoried and provided existing inventory data.
- Discussed extent of Master Plan Study vs. future independent project studies.
- Discussed public involvement efforts.

Table D.4-1 provides a list of participating regulatory agencies.

3. State and Local Working Group

A State and Local Working Group was initiated to develop a forum for local, state, and federal agency representatives to cooperate in data collection and analysis efforts. The Working Group also assisted in the identification of state and local concerns; developed and reviewed the purpose and need statement for the entire study area; and reviewed the logical termini for the future independent projects.

The goals of the State and Local Working Group are to:

- Provide a forum for a cooperative data collection and analysis effort
- Identify state and local concerns and/or needs
- Develop purpose and need statements
- Develop modal alternatives

Table D.4-1lists participants of the State and Local Working Group.

4. Stakeholders Working Group

The Transportation Equity Act for the 21st Century (TEA-21) calls for improved and early coordination among agencies involved in the transportation project decision-making process. To address this directive, the Mid-Atlantic Transportation and Environmental (MATE) Task Force developed streamlining guidelines for transportation project development. One of the streamlining goals was to:

> *...encourage the participation of all stakeholders, including the Metropolitan Planning Organizations and the public, throughout the transportation planning and project development process.*

In addition, its guiding principles state that

> *...after a formal concurrence, agencies will not revisit a milestone unless there is substantive new information that warrants reconsideration.*

A Stakeholder Working Group was initiated to ensure that the issues and concerns of a broad cross section of transportation users/dependents and neighbors was discussed as early as possible in the planning process.

Table D.4.-1 provides a list of the Stakeholders Working Group participants.

5. Public Involvement

Web Site – The Maryland Transportation Authority has a website dedicated to the I-95 Master Plan. This site is accessible through the Authority's home page:

http://www.mdtransportationauthority.com

Public Workshops are being held to gather additional information and input from the public and local agencies. Announcements for these workshops were placed in regional and local area newspaper, and distributed via electronic media. A brief brochure was also prepared for distribution at the workshops. Workshops will be held:

- June 5, 2001 @ the Middle River Middle School, Baltimore County
- June 21, 2001 @ the Perryville High School, Cecil County

MEETING TO BE RESCHEDULED

Harford County Public Workshop to be scheduled in 2002.

Table D.4-1
WORKING GROUP PARTICIPANTS

CHAIR - MARYLAND TRANSPORTATION AUTHORITY

Regulatory Agency Working Group	State and Local Working Group	Stakeholders Working Group
Representatives of:	Representatives of:	Representatives of:
Baltimore Regional Transportation Board (BRTB)	Baltimore City	1000 Friends of Maryland*
Federal Highway Administration (FHWA)	Baltimore County	AAA - Baltimore Area *
Federal Transit Administration (FTA)[1]	Baltimore Regional Transportation Board/	Amtrak*
Maryland Department of Environment (MDE)	Baltimore Metropolitan Council (BRTB)/(BMC)	Baltimore County Chamber of Commerce*
Maryland Department of Natural Resources (MDNR)	Cecil County	Case Industrial Partners
Maryland Department of Planning (MDP)	Cecil County Municipalities –	Cecil County Chamber of Commerce
Maryland Department of Transportation (MDOT)	Represented by Town of Elkton	Cecil County Historical Society
Maryland Historic Trust (MHT)	City of Aberdeen	Chesapeake Bay Foundation
National Park Service (NPS)[2]	City of Havre de Grace	Commercial Transportation Inc.
U.S. Army Corps of Engineers (ACOE)	Delaware Department of Transportation	CSX Transportation
U.S. Department of the Interior – Fish and Wildlife (FWS)[3]	Federal Highway Administration	DelMarVa Rail Passenger Assoc.
U.S. Environmental Protection Agency (EPA)	Federal Transit Administration	DEN-EL Transfer*
U.S. National Marine Fisheries (NMFS)	Harford County	Environmental Defense Fund*
Wilmington Area Planning Council (WILMAPCO)	Maryland Department of Planning	Greyhound Commercial Services
- -	Maryland Department of Transportation	Harford County Chamber of Commerce
1 National Park Service did not participate as no federal parks were identified within the study area.	Maryland State Highway Administration	Independent Truckers & Drivers Assoc.*
	Maryland Transit Administration	Maryland Department of Transportation*
2 The Federal Transit Administration requested that their status be changed from a concurring agency to a commenting agency.	Town of Bel Air	Maryland Port Administration*
	Wilmington Area Planning Council (WILMAPCO)	Marylanders for Efficient & Safe Highways*
		Maryland Distribution Council *
3 The US Fish and Wildlife Service has requested a position of No Action due to their inability to provide staff to the Master Plan concurrence points.		Norfolk Southern Corp.*
		Terminal Transportation Services*
		* Active participants

APPENDIX D.5
TRAVEL FORECASTING

APPENDIX D.5 TRAVEL FORECASTING

Introduction

Seven travel demand scenarios (identified as scenarios A through G) were developed for the I-95 Master Plan study for the year 2020. Five of the travel demand scenario runs (C through G) assumed improvements on I-95.

Travel demand analyses were conducted and refined to produce year 2020 forecasts as follows:

- Average Daily Traffic (ADT)
- a.m. Peak Hour Week**day** Volumes
- p.m. Peak Hour Week**day** Volumes
- Week**end** Peak Period (Hour) Volumes

Section B of this report presents details on the Base Roadway Network, I-95 Roadway Network, Base Transit Network, and Enhanced Transit Network assessed for these various scenarios. The following tables, in Section B.2, present the findings of these travel demand analyses:

Table B-5: Comparison of Screenline Average Daily Traffic Volumes Based on Modeling Analyses

Table B-6: Comparison of Screenline Peak Hour Traffic Volumes Based on Modeling Analyses

Table B-7: Comparison of Screenline Peak Hour Traffic Volumes Based on Modeling Analyses

Table B-8: Comparison of Screenline Transit Patrons - Average Daily Volumes for Transit (2-way trips)

Table D.5-1 summarizes key features of the seven travel demand scenarios.

Table D-5-1: SUMMARY OF DESIGN YEAR 2020 TRAVEL DEMAND SCENARIOS

Travel Demand Scenario		Description	
		Roadway Assumptions	**Transit Assumptions**
A	No-Build – Constrained	• No improvements along I-95. • Base Roadway (1).	Base Transit (2)
B	No-Build – Constrained (screenlines only)	• No improvements along I-95. • Base Roadway (1).	Enhanced Transit (3).
C	Build – Unconstrained	• Base Roadway (1) • **Plus** one Managed lane in each direction between I-895 and Susquehanna River and one general purpose lane in each direction between the Susquehanna River and Delaware.	Base Transit (2).
D	Build – Constrained	• Base Roadway (1). • **Plus** one Managed lane in each direction between I-895 and Susquehanna River and one general purpose lane in each direction between the Susquehanna River and Delaware.	Base Transit (2).
E	Build – Unconstrained	• Base Roadway (1). • **Plus** one lane in each direction between I-895 and Susquehanna River (Tolled or HOV lane from I-695 to MD 24) and one general purpose lane in each direction between the Susquehanna River and Delaware.	Enhanced Transit (3).
F	Build – Constrained	• Base Roadway (1). • **Plus** one Tolled lane in each direction between I-895 and Susquehanna River and one general purpose lane between the Susquehanna River and Delaware.	Enhanced Transit (3).
G	Build – Unconstrained (screenlines only) Tolled Lanes	• Base Roadway (1). • **Plus** one additional lane between I-895 between the Susquehanna River and Delaware. ALL LANES TOLLED	Enhanced Transit (3).

NOTES:
(1) See description of Base Roadway network in Section B.1.
(2) See description of Base Transit network in Section B.1.
(3) See description of Enhanced Transit network in Section B.1.

a. Travel Demand Scenario A – No-Build, Constrained with Base Transit

Based on Scenario A, the average daily traffic along I-95 through the study area is projected to grow to between 108,000 vehicles per day at the Delaware state line and approximately 231,000 vehicles per day south of MD 43. Interchange traffic volume increases will be most pronounced at MD 24 and MD 543, with an increase of more than 62,000 vehicles per day from north of MD 543 to south of MD 24. Traffic volumes at the Susquehanna River are expected to be approximately 118,000 vehicles per day. The increase in volume will range from approximately 40% to 60%.

Peak hour volumes were developed for the a.m., p.m., and week**end** peak periods. The volumes were constrained based on the existing capacity of I-95. Traffic along I-95 is expected to range from 10,200 vehicles per hour in the p.m. peak northbound, south of MD 43 to approximately 2,300 vehicles per hour southbound in the a.m. peak at the Delaware state line. Week**end** traffic volumes are projected to range from approximately 6,100 vehicles per hour northbound at the Delaware state line to 9,000 vehicles per hour south of MD 43.

Table D.5-2 summarizes the existing year 2000 and design year 2020 No-Build Average Daily Traffic (ADT) volumes, as well as the year level of service F "severe congestion" is anticipated.

Table D.5-2 - EXISTING YEAR 2000 AND DESIGN YEAR 2020 NO-BUILD ADT'S

Location		No-Build Average Daily Traffic		Year LOS "F" is Anticipated
		2000	Projected 2020	
1	I-895(N) split to I-695	154,000	220,000	TODAY (1)
2	I-695 to MD 43	165,000	231,000	
3	MD 43 to MD 152	160,000	224,000	2005 (1)
4	MD 152 to MD 24	145,000	208,000	2010 to 2015 (1)
5	MD 24 to MD 543	114,000	175,000	
6	MD 543 to MD 22	96,000	145,000	
7	MD 22 to MD 155	83,000	127,000	2015 (2)
8	MD 155 to MD 222	77,000	118,000	
9	MD 222 to MD 272	75,000	116,000	2020 (2)
10	MD 272 to MD 279	75,000	118,000	Beyond 2020 (2)
11	MD 279 to Delaware State Line	67,000	108,000	

SOURCE: Travel Demand Scenario A: I-95 Constrained and Base Transit
1. Based on Week**day** peak hour volumes
2. Based on Week**end** peak period volumes

b. Travel Demand Scenario B – No-Build, Constrained with Enhanced Transit

Scenario B assumed the same roadway network as Scenario A, with the addition of the Enhanced Transit network throughout the study area. This scenario was analyzed to a level of detail where select screenlines would determine the impact enhanced transit would have on projected I-95 traffic volumes. The projections indicate that the section of I-95 south of MD 43 is anticipated to have the highest traffic volumes. Average daily traffic through this area would be approximately 227,000 vehicles per day. The peak hour volumes would be approximately 10,000 vehicles per hour in the northbound direction in the p.m. peak. These I-95 peak hour traffic volumes with the enhanced transit option are similar to the peak hour traffic for the base

transit option along I-95. This is due to the desire of motorists who, under the no build condition would use other routes (eg. U.S. 1, U.S. 40), but would be likely to use I-95 if capacity along I-95 were available as a result of the increase in transit ridership.

c. Travel Demand Scenario C – Build, Unconstrained with Base Transit

Based on Scenario C, the average daily traffic along I-95 through the study area is projected to grow to between 109,200 vehicles per day at the Delaware state line and approximately 243,100 vehicles per day south of MD 43. Interchange traffic volume increases will be most pronounced at MD 24 and MD 543 with an increase of over 65,000 vehicles per day from north of MD 543 to south of MD 24. Traffic volumes at the Susquehanna River are expected to be approximately 120,000 vehicles per day. The increase in volume is projected to range from approximately 45% to 65%.

Peak hour volumes were developed for the a.m., p.m., and week**end** peak periods. The volumes were unconstrained. Traffic along I-95 south of MD 43 is expected to range from 12,800 vehicles per hour northbound in the p.m. peak period to approximately 2,400 vehicles per hour southbound in the a.m. peak at the Delaware state line. Week**end** traffic volumes are projected to range from approximately 6,400 vehicles per hour northbound at the Delaware state line to 9,300 vehicles per hour south of MD 43.

d. Travel Demand Scenario D – Build, Constrained with Base Transit

Based on Scenario D, the average daily traffic along I-95 through the study area is projected to grow to between 109,200 vehicles per day at the Delaware state line and approximately 238,000 vehicles per day south of MD 43. Interchange traffic volume increases will be most pronounced at MD 24 and MD 543 with an increase of over 64,000 vehicles per day from north of MD 543 to south of MD 24. Traffic volumes at the Susquehanna River are expected to be approximately 120,000 vehicles per day. The increase in volume will range from approximately 45% to 65%.

Peak hour volumes were developed for the a.m., p.m., and week**end** peak periods. The volumes were constrained based on the existing capacity of I-95. Traffic along I-95 is expected to range from 11,500 vehicles per hour in the p.m. peak northbound, south of MD 43 to approximately 2,400 vehicles per hour southbound in the a.m. peak at the Delaware state line. Week**end** traffic volumes are projected to range from approximately 6,400 vehicles per hour northbound at the Delaware state line to 9,300 vehicles per hour south of MD 43.

e. Travel Demand Scenario E - Build, Unconstrained with Enhanced Transit

Based on Scenario E, the average daily traffic along I-95 through the study area is projected to grow to between 107,900 vehicles per day at the Delaware state line and approximately 236,700 vehicles per day south of MD 43. Interchange traffic volume increases will be most pronounced at MD 24 and MD 543 with an increase of over 65,000 vehicles per day from north of MD 543 to south of MD 24. Traffic volumes at the Susquehanna River are expected to be approximately 119,000 vehicles per day. The increase in volume will range from approximately 45% to 60%.

Peak hour volumes were developed for the a.m., p.m., and week**end** peak periods. The volumes were unconstrained. Traffic along I-95 south of MD 43 is expected to range from 12,100 vehicles per hour northbound in the p.m. peak to approximately 2,400 vehicles per hour southbound in the a.m. peak at the Delaware state line. Week**end** traffic volumes are projected to range from approximately 6,300 vehicles per hour northbound at the Delaware state line to 9,000 vehicles per hour south of MD 43.

f. Travel Demand Scenario F - Build, Constrained with Enhanced Transit

Based on Scenario F, the average daily traffic along I-95 through the study area is projected to grow to between 107,900 vehicles per day at the Delaware state line and approximately 233,600 vehicles per day south of MD 43. Interchange traffic volume increases will be most pronounced at MD 24 and MD 543 with an increase of over 64,000 vehicles per day from north of MD 543 to south of MD 24. Traffic volumes at the Susquehanna River are expected to be approximately 119,000 vehicles per day. The increase in volume will range from approximately 40% to 60%.

Peak hour volumes were developed for the a.m., p.m., and week**end** peak periods. The volumes were constrained based on the existing capacity of I-95. Traffic along I-95 south of MD 43 is expected to range from 11,200 vehicles per hour northbound in the p.m. peak to approximately 2,400 vehicles per hour southbound in the a.m. peak at the Delaware state line. Week**end** traffic volumes are projected to range from approximately 6,300 vehicles per hour northbound at the Delaware state line to 9,300 vehicles per hour south of MD 43.

g. Travel Demand Scenario G – Build – Unconstrained All Tolled, with Enhanced Transit

Under Scenario G, all lanes on I-95 were assumed to be tolled. For this scenario, selected screenlines were performed to determine the traffic volumes. The highest volume on an average daily traffic basis is projected to take place between I-695 and MD 43. The approximate average daily traffic should exceed 160,000 vehicles per day. Parallel roadways to I-95 such as U.S. 40, U.S. 1 and MD 7, however, would experience substantial increases in the volume of traffic. This increase would range from approximately 25% to 70% of the traffic that is presently projected for these roadways. The highest projected peak hour volumes for I-95 with all lanes tolled was approximately 9,400 vehicles in the northbound direction in the p.m. peak. In essence, the application of tolling to ALL lanes of I-95 would result in year 2020 traffic volumes along I-95 that approximate today's traffic volumes, with a correspondingly significant increase in traffic on the parallel roadway network.

In accordance with a Baltimore Regional Transportation Board (BRTB) regional transportation study model, peak period tolls for the toll scenario were set at $0.20 per mile; a $0.10 per mile charge was assumed for the off-peak periods.

MAINLINE LEVELS OF SERVICE FOR YEAR 2020

The study team used the Freeway Module of the Highway Capacity Software Version 3.2, based on the 1997 Highway Capacity Manual, to evaluate the mainline traffic operations on I-95 between the I-95/I-895(N) split to the Delaware state line. The mainline is those segments of the freeway that are outside of the influence of ramps or weaving areas. The level of service (LOS), which represents how well or poorly the freeway accommodates traffic flow, is used to define the traffic operation. LOS ranges from A through F. LOS A is the best traffic condition, signifying free-flow operation. LOS F is the worst traffic condition, signifying severe congestion and forced or breakdown flow. The tables also provide the volume to capacity (v/c) ratio for those freeway segments that operate at LOS E or F.

The LOS analyses are dependent upon several variables. The following assumptions were used in the highway capacity analyses:

- Peak-hour factor = 0.95,
- Level terrain,
- Truck percentages as per Table D.5-2,
- Normal driver population, and
- Free-flow speed: I-95 mainline = 70 mph; and I-95 CD lanes = 60 mph.

The levels of service were determined for the Year 2020 northbound/southbound a.m./p.m. weekday peak/off-peak and weekend peak hour. The detailed traffic analyses for the conceptual alternatives are shown in Tables D.5-3 through D.5-8 as follows:

Table D.5-3: Peak Hour Truck Percentages
Table D.5-4: Concept C-1 (Travel Demand Scenario A)
Table D.5-5: Concept C-3 (Travel Demand Scenario E (HOV))
Table D.5-6: Concept C-4 (Travel Demand Scenario E)
Table D.5-7A: Concept C-5 (Travel Demand Scenario C)
Table D.5-7B: Concept C-5 (Travel Demand Scenario D)
Table D.5-7C: Concept C-5 (Travel Demand Scenario E)
Table D.5-7D: Concept C-5 (Travel Demand Scenario F)
Table D.5-7E: Concept C-5 (Travel Demand Scenario D (Trucks-Only))
Table D.5-8: Concept C-6 (Travel Demand Scenario C)

Table D.5-3
Peak Hour Truck Percentages

I-95 Study Area Segment	Northbound AM Peak				Northbound PM Peak				Northbound Weekend Peak			Southbound AM Peak			Southbound PM Peak			Southbound Weekend Peak	
	SHA Tube Count[1]	Authority Loop Count[2]	Authority Permanent Count[3]	I-95 Master Plan Study Assumption[4]	SHA Tube Count[1]	Authority Loop Count[2]	Authority Permanent Count[3]	I-95 Master Plan Study Assumption[4]	Authority Loop Count[2]	Authority Permanent Count[3]	I-95 Master Plan Study Assumption[4]	SHA Tube Count[1]	Authority Permanent Count[3]	I-95 Master Plan Study Assumption[4]	SHA Tube Count[1]	Authority Permanent Count[3]	I-95 Master Plan Study Assumption[4]	Authority Permanent Count[3]	I-95 Master Plan Study Assumption[4]
Between I-895 and I-695				15%				10%			5%			10%			15%		5%
Between I-695 and MD 43			11%	15%			5%	10%		3%	5%			10%			15%	4%	5%
Between MD 43 and MD 152		15%	10%	15%		8%	8%	10%	5%	7%	5%		8%	10%		10%	15%	3%	5%
Between MD 152 and MD 24	16%		11%	15%	10%		7%	10%		4%	5%	8%	9%	10%	11%	9%	15%	7%	5%
Between MD 24 and MD 543	15%		10%	15%	12%		7%	10%		5%	5%	12%	11%	10%	16%	10%	15%	3%	5%
Between MD 543 and MD 22			9%	15%			7%	10%		5%	5%		10%	10%		11%	15%	5%	5%
Between MD 22 and MD 155			9%	14%			7%	14%		5%	6%		9%	14%		11%	14%	6%	6%
Between MD 155 and MD 222				14%				14%			6%			14%			14%		6%
Between MD 222 and MD 272			14%	14%			13%	14%		5%	6%		14%	14%		13%	14%	3%	6%
Between MD 272 and MD 279			16%	14%			17%	14%		4%	6%		15%	14%		14%	14%	6%	6%
Between MD 279 and Delaware				14%				14%			6%			14%			14%		6%

Notes:

[1]State Highway Administration (SHA) 24-hour tube counts collected on October 25, 1999.

[2]Authority 24-hour pavement loop counts collected April 17-23, 2000.

[3]Authority permanent count stations, peak hour counts collected March 3-23, 2001.

[4]Assumed truck percentages for the I-95 Master Plan Study from I-895(N) to the Delaware state line based on all available truck traffic counts.

Table D.5-4
Concept C-1 – No-Build with Base Transit
(Travel Demand Scenario A)

Mainline Segment (Existing Number of Lanes)	Weekday										Weekend				
	Peak Direction					Off Peak Direction									
	Number of General Purpose Lanes per Direction	AM Peak Hour Southbound		PM Peak Hour Northbound		Number of General Purpose Lanes per Direction	AM Peak Hour Northbound		PM Peak Hour Southbound		Number of General Purpose Lanes per Direction	NB Peak Hour		SB Peak Hour	
		General Purpose Lane Volume (vph)	General Purpose Lane LOS	General Purpose Lane Volume (vph)	General Purpose Lane LOS		General Purpose Lane Volume (vph)	General Purpose Lane LOS	General Purpose Lane Volume (vph)	General Purpose Lane LOS		General Purpose Lane Volume (vph)	General Purpose Lane LOS	General Purpose Lane Volume (vph)	General Purpose Lane LOS
Between I-895 and I-695 (4 Lanes)	4	9,950	F (v/c=1.15)	9,975	F (v/c=1.16)	4	5,150	C	6,350	D	4	8,200	E (v/c=0.93)	8,300	E (v/c=0.94)
Between I-695 and MD 43 (4 Lanes)	4	10,000	F (v/c=1.16)	10,200	F (v/c=1.18)	4	6,600	D	7,450	E (v/c=0.88)	4	9,050	F (v/c=1.02)	8,700	E (v/c=0.98)
Between MD 43 and MD 152 (4 Lanes)	4	9,825	F (v/c=1.14)	10,050	F (v/c=1.16)	4	6,425	D	7,325	E (v/c=0.87)	4	8,700	E (v/c=0.98)	8,600	E (v/c=0.97)
Between MD 152 and MD 24 (4 Lanes)	4	8,100	E (v/c=0.94)	8,875	F (v/c=1.03)	4	6,400	D	6,925	D	4	8,200	E (v/c=0.93)	8,100	E (v/c=0.92)
Between MD 24 and MD 543 (3 Lanes)	3	5,500	E (v/c=0.85)	6,875	F (v/c=1.07)	3	5,650	E (v/c=0.90)	5,925	E (v/c=0.94)	3	7,300	F (v/c=1.11)	7,400	F (v/c=1.12)
Between MD 543 and MD 22 (3 Lanes)	3	3,850	C	5,575	E (v/c=0.87)	3	4,325	D	4,600	D	3	7,000	F (v/c=1.06)	7,200	F (v/c=1.09)
Between MD 22 and MD 155 (3 Lanes)	3	3,450	C	4,750	D	3	3,500	C	3,850	C	3	6,600	F (v/c=1.01)	7,000	F (v/c=1.07)
Between MD 155 and MD 222 (3 Lanes)	3	2,975	C	4,150	C	3	3,150	C	3,750	C	3	6,450	E (v/c=0.98)	6,900	F (v/c=1.05)
Between MD 222 and MD 272 (3 Lanes)	3	2,800	B	4,125	C	3	3,125	C	3,500	C	3	6,300	E (v/c=0.96)	6,700	F (v/c=1.02)
Between MD 272 and MD 279 (3 Lanes)	3	2,650	B	4,125	C	3	3,400	C	3,750	C	3	6,200	E (v/c=0.95)	6,500	E (v/c=0.99)
Between MD 279 and Delaware State Line (3 Lanes)	3	2,275	B	3,700	C	3	2,900	C	3,275	C	3	6,100	E (v/c=0.93)	6,300	E (v/c=0.96)

- Modeling Assumptions:
  a. Background Highway Network assumes improvements as per the Metropolitan Planning Organization.
  b. Base Transit Network assumes improvements as per the Metropolitan Planning Organization.
- Analysis Assumptions:
  a. Highway capacity analysis assumes level terrain, 70 mph free-flow speed, normal driver population, and a 0.95 peak hour factor. The analysis is based on the 1997 Highway Capacity Manual (i.e., using v/c ratios).
  b. Assumed truck percentages as per Table D.5-2.
  c. "Desirable" LOS for weekday peak period/peak direction is "E".
  d. "Desirable" LOS for weekend peak period is "D".
- Analysis Criteria
  a. Maximum v/c ratio per LOS for mainline segments with assumed 70 mph free-flow speed: LOS A: v/c < 0.29, LOS B: v/c < 0.47, LOS C: v/c < 0.68, LOS D: v/c < 0.85, LOS E: v/c < 1.00, LOS F: v/c > 1.00
- vph = Vehicles per hour
  v/c = Volume to capacity ratio

Table D.5-5
Concept C-3 – High Occupancy Vehicle (HOV) Lanes with Enhanced Transit
(Travel Demand Scenario E (HOV))

Mainline Segment (Existing Number of Lanes)	Weekday										Weekend				
	Peak Direction					Off Peak Direction									
		AM Peak Hour Southbound		PM Peak Hour Northbound			AM Peak Hour Northbound		PM Peak Hour Southbound			NB Peak Hour		SB Peak Hour	
	Number of General Purpose Lanes per Direction Number of HOV Lanes per Direction	General Purpose Lane Volume (vph) HOV Lane Volume (vph)	General Purpose Lane LOS HOV Lane LOS	General Purpose Lane Volume (vph) HOV Lane Volume (vph)	General Purpose Lane LOS HOV Lane LOS	Number of General Purpose Lanes per Direction	General Purpose Lane Volume (vph)	General Purpose Lane LOS	General Purpose Lane Volume (vph)	General Purpose Lane LOS	Number of General Purpose Lanes per Direction	General Purpose Lane Volume (vph)	General Purpose Lane LOS	General Purpose Lane Volume (vph)	General Purpose Lane LOS
Between I-895 and I-695 (4 Lanes)	6 General Purpose	11,275	E (v/c=0.87)	11,550	E (v/c=0.89)	6	5,025	B	6,350	C	6	8,075	C	8,350	C
Between I-695 and MD 43 (4 Lanes)	4 General Purpose 1 HOV	10,100 1,075	F (v/c=1.17) C	10,600 1,200	F (v/c=1.23) C	5	6,450	C	7,425	D	5	8,975	D	8,800	D
Between MD 43 and MD 152 (4 Lanes)	4 General Purpose 1 HOV	9,775 1,025	F (v/c=1.13) C	10,225 1,125	F (v/c=1.18) C	5	6,325	C	7,250	D	5	8,850	D	8,750	D
Between MD 152 and MD 24 (4 Lanes)	4 General Purpose 1 HOV	8,075 825	E (v/c=0.94) B	9,025 925	F (v/c=1.05) B	5	6,300	C	6,850	C	5	8,350	D	8,250	D
Between MD 24 and MD 543 (3 Lanes)	4	5,850	D	7,350	E (v/c=0.85)	4	5,575	C	5,875	D	4	7,550	E (v/c=0.85)	7,600	E (v/c=0.86)
Between MD 543 and MD 22 (3 Lanes)	4	4,025	C	5,825	D	4	4,300	C	4,600	C	4	7,275	D	7,400	D
Between MD 22 and MD 155 (3 Lanes)	4	3,550	B	4,900	C	4	3,475	B	3,825	B	4	6,875	D	7,150	D
Between MD 155 and MD 222 (3 Lanes)	4	3,050	B	4,275	C	4	3,125	B	3,725	B	4	6,725	D	7,050	D
Between MD 222 and MD 272 (3 Lanes)	4	2,900	B	4,250	C	4	3,100	B	3,475	B	4	6,550	D	6,850	D
Between MD 272 and MD 279 (3 Lanes)	4	2,750	B	4,250	C	4	3,350	B	3,700	B	4	6,400	D	6,600	D
Between MD 279 and Delaware State Line (3 Lanes)	4	2,375	A	3,850	B	4	2,825	B	3,200	B	4	6,300	D	6,400	D

- Modeling Assumptions:
  - a. Background Highway Network assumes improvements as per the Metropolitan Planning Organization.
  - b. Enhanced Transit Network assumes Base Transit improvements as per the Metropolitan Planning Organization plus unfunded transit improvements.
  - c. Unconstrained I-95 assumes no capacity constraints on I-95 mainline and I-95 interchange ramps.
- Analysis Assumptions:
  - a. Highway capacity analysis assumes level terrain, 70 mph free-flow speed, normal driver population, and a 0.95 peak hour factor. The analysis is based on the 1997 Highway Capacity Manual (i.e., using v/c ratios).
  - b. Assumed truck percentages as per Table D.5-2.
  - c. "Desirable" LOS for weekday peak period/peak direction is "E".
  - e. "Desirable" LOS for weekend peak period is "D".
- Analysis Criteria
  - a. Maximum v/c ratio per LOS for mainline segments with assumed 70 mph free-flow speed: LOS A: v/c < 0.29, LOS B: v/c < 0.47, LOS C: v/c < 0.68, LOS D: v/c < 0.85, LOS E: v/c < 1.00, LOS F: v/c > 1.00
- vph = Vehicles per hour
  v/c = Volume to capacity ratio
  = High Occupancy Vehicle (HOV) lane

Table D.5-6
Concept 4 – Two-Lane Separated and Reversible Roadway in Median with Enhanced Transit
(Travel Demand Scenario E)

Mainline Segment (Existing Number of Lanes)	Weekday										Weekend					
	Peak Direction					Off Peak Direction										
		AM Peak Hour Southbound		PM Peak Hour Northbound			AM Peak Hour Northbound		PM Peak Hour Southbound		NB Peak Hour			SB Peak Hour		
	Number of General Purpose Lanes per Direction Number of Reversible Lanes per Direction	General Purpose Lane Volume (vph) Reversible Lane Volume (vph)	General Purpose Lane LOS Reversible Lane LOS	General Purpose Lane Volume (vph) Reversible Lane Volume (vph)	General Purpose Lane LOS Reversible Lane LOS	Number of Lanes per Direction	Volume (vph)	LOS	Volume (vph)	LOS	Number of Lanes per Direction	Volume (vph)	LOS	Number of General Purpose Lanes per Direction Number of Reversible Lanes per Direction	General Purpose Lane Volume (vph) Reversible Lane Volume (vph)	General Purpose Lane LOS Reversible Lane LOS
Between I-895 and I-695 (4 Lanes)	4 General Purpose 2 Reversible	9,775 1,500	F (v/c=1.14) B	10,000 1,550	F (v/c=1.16) B	4	5,025	C	6,350	D	4	8,075	E (v/c=0.91)	4 General Purpose 2 Reversible	6,850 1,500	D B
Between I-695 and MD 43 (4 Lanes)	4 General Purpose 2 Reversible	9,675 1,500	F (v/c=1.12) B	10,525 1,600	F (v/c=1.22) B	4	6,450	D	7,425	E (v/c=0.88)	4	8,975	F (v/c=1.02)	4 General Purpose 2 Reversible	7,225 1,575	D B
Between MD 43 and MD 152 (4 Lanes)	4 General Purpose 2 Reversible	9,500 1,300	F (v/c=1.10) B	9,650 1,500	F (v/c=1.12) B	4	6,325	D	7,250	E (v/c=0.86)	4	8,850	F (v/c=1.00)	4 General Purpose 2 Reversible	7,200 1,550	D B
Between MD 152 and MD 24 (4 Lanes)	4 General Purpose 2 Reversible	8,000 900	E (v/c=0.93) A	8,825 1,125	F (v/c=1.02) A	4	6,300	D	6,850	D	4	8,350	E (v/c=0.94)	4 General Purpose 2 Reversible	6,775 1,475	D B
Between MD 24 and MD 543 (3 Lanes)	4 General Purpose 2 Reversible	5,625 225	C A	6,700 650	D A	4	5,575	C	5,875	D	4	7,550	E (v/c=0.85)	4 General Purpose 2 Reversible	6,225 1,375	D B
Between MD 543 and MD 22 (3 Lanes)	4 General Purpose	4,025	C	5,825	D	4	4,300	C	4,600	C	4	7,275	D	4 General Purpose	7,400	D
Between MD 22 and MD 155 (3 Lanes)	4 General Purpose	3,550	B	4,900	C	4	3,475	B	3,825	B	4	6,875	D	4 General Purpose	7,150	D
Between MD 155 and MD 222 (3 Lanes)	4 General Purpose	3,050	B	4,275	C	4	3,125	B	3,725	B	4	6,725	D	4 General Purpose	7,050	D
Between MD 222 and MD 272 (3 Lanes)	4 General Purpose	2,900	B	4,250	C	4	3,100	B	3,475	B	4	6,550	D	4 General Purpose	6,850	D
Between MD 272 and MD 279 (3 Lanes)	4 General Purpose	2,750	B	4,250	C	4	3,350	B	3,700	B	4	6,400	D	4 General Purpose	6,600	D
Between MD 279 and Delaware State Line (3 Lanes)	4 General Purpose	2,375	A	3,850	B	4	2,825	B	3,200	B	4	6,300	D	4 General Purpose	6,400	D

- Modeling Assumptions:
  - a. Background Highway Network assumes improvements as per the Metropolitan Planning Organization.
  - b. Enhanced Transit Network assumes Base Transit improvements as per the Metropolitan Planning Organization plus unfunded transit improvements.
  - c. Unconstrained I-95 assumes no capacity constraints on I-95 mainline and I-95 interchange ramps.
- Analysis Assumptions:
  - a. Highway capacity analysis assumes level terrain, 70 mph free-flow speed, normal driver population, and a 0.95 peak hour factor. The analysis is based on the 1997 Highway Capacity Manual (i.e., using v/c ratios).
  - b. Assumed truck percentages as per Table D.5-2.
  - c. "Desirable" LOS for weekday peak period/peak direction is "E".
  - d. "Desirable" LOS for weekend peak period is "D".
  - e. "Desirable" LOS for the reversible (managed) lanes is "C/D".
  - f. Assumed the reversible (managed) lanes are in operation in the southbound direction during the weekend peak period.
  - g. Assumed peak direction, peak hour unconstrained managed lane volumes are the same as the constrained managed lane volumes.
  - h. Assumed peak direction, peak hour unconstrained general purpose volumes as the original unconstrained traffic demand minus the difference between the constrained and original unconstrained managed lane volumes.
- Analysis Criteria
  - a. Maximum v/c ratio per LOS for mainline segments with assumed 70 mph free-flow speed: LOS A: v/c < 0.29, LOS B: v/c < 0.47, LOS C: v/c < 0.68, LOS D: v/c < 0.85, LOS E: v/c < 1.00, LOS F: v/c > 1.00
- vph = Vehicles per hour

  v/c = Volume to capacity ratio

  = Reversible lanes

Table D.5-7A
Concept 5 – Separated Two-Lane Managed Roadway in Median with Base Transit
(Travel Demand Scenario C)

Mainline Segment (Existing Number of Lanes)	Weekday										Weekend				
	Peak Direction					Off Peak Direction									
		AM Peak Hour Southbound		PM Peak Hour Northbound			AM Peak Hour Northbound		PM Peak Hour Southbound			NB Peak Hour		SB Peak Hour	
	Number of General Purpose Lanes per Direction Number of Managed Lanes per Direction	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	Number of General Purpose Lanes per Direction Number of Managed Lanes per Direction	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	Number of General Purpose Lanes per Direction Number of Managed Lanes per Direction	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS
Between I-895 and I-695 (4 Lanes)	4 General Purpose 2 Managed	10,400 1,525	F (v/c=1.21) B	11,000 1,575	F (v/c=1.27) B	4 General Purpose 2 Managed	5,000 150	C A	6,275 250	D A	4 General Purpose 2 Managed	6,900 1,500	D B	6,925 1,522	D B
Between I-695 and MD 43 (4 Lanes)	3 General Purpose 2 CD 2 Managed	7,200 3,075 1,525	F (v/c=1.12) D B	7,825 3,350 1,625	F (v/c=1.22) E (v/c=0.82) B	3 General Purpose 2 CD 2 Managed	4,450 1,900 250	D C A	5,125 2,200 300	D C A	3 General Purpose 2 CD 2 Managed	6,125 1,525 1,650	E (v/c=0.93) B B	5,850 1,450 1,600	E (v/c=0.89) B B
Between MD 43 and New Forge Road (4 Lanes)	3 General Purpose 2 CD 2 Managed	7,400 2,475 1,300	F (v/c=1.15) D B	7,675 2,575 1,425	F (v/c=1.19) D B	3 General Purpose 2 CD 2 Managed	4,650 1,550 225	D B A	5,325 1,775 275	D C A	3 General Purpose 2 CD 2 Managed	6,250 1,100 1,600	E (v/c=0.95) B B	6,150 1,075 1,575	E (v/c=0.93) B B
Between New Forge Road and MD 152 (4 Lanes)	4 General Purpose 2 Managed	9,875 1,300	F (v/c=1.14) B	10,250 1,425	F (v/c=1.19) B	4 General Purpose 2 Managed	6,200 225	D A	7,100 275	D A	4 General Purpose 2 Managed	7,350 1,600	D B	7,225 1,575	D B
Between MD 152 and MD 24 (4 Lanes)	4 General Purpose 2 Managed	8,300 900	E (v/c=0.96) A	9,125 1,125	F (v/c=1.06) A	4 General Purpose 2 Managed	6,175 225	D A	6,725 250	D A	4 General Purpose 2 Managed	6,925 1,525	D B	6,800 1,500	D B
Between MD 24 and MD 543 (3 Lanes)	4 General Purpose 2 Managed	5,800 225	C A	6,900 650	D A	4 General Purpose 2 Managed	5,475 175	C A	5,750 225	D A	4 General Purpose 2 Managed	6,250 1,400	D B	6,250 1,400	D B
Between MD 543 and MD 22 (3 Lanes)	4	4,150	C	5,950	D	4	4,325	C	4,600	C	4	7,350	D	7,450	D
Between MD 22 and MD 155 (3 Lanes)	4	3,625	B	4,975	C	4	3,500	B	3,850	B	4	6,950	D	7,200	D
Between MD 155 and MD 222 (3 Lanes)	4	3,125	B	4,350	C	4	3,150	B	3,750	B	4	6,800	D	7,100	D
Between MD 222 and MD 272 (3 Lanes)	4	2,925	B	4,275	C	4	3,125	B	3,500	B	4	6,600	D	6,900	D
Between MD 272 and MD 279 (3 Lanes)	4	2,775	B	4,275	C	4	3,400	B	3,750	B	4	6,450	D	6,650	D
Between MD 279 and Delaware State Line (3 Lanes)	4	2,400	A	3,875	B	4	2,900	B	3,275	B	4	6,350	D	6,450	D

- Modeling Assumptions:
  - a. Background Highway Network assumes improvements as per the Metropolitan Planning Organization.
  - b. Base Transit Network assumes improvements as per the Metropolitan Planning Organization.
  - c. Unconstrained I-95 assumes no capacity constraints on I-95 mainline and I-95 interchange ramps.
- Analysis Assumptions:
  - a. Highway capacity analysis assumes level terrain, 70 mph mainline/60 mph CD road free-flow speed, normal driver population, and a 0.95 peak hour factor. The analysis is based on the 1997 Highway Capacity Manual (i.e., using v/c ratios).
  - b. Assumed truck percentages as per Table D.5-2.
  - c. "Desirable" LOS for weekday peak period/peak direction is "E".
  - d. "Desirable" LOS for weekend peak period is "D".
  - e. "Desirable" LOS for the managed lanes is "C/D".
  - f. Assumed a general purpose traffic volume split of 70% mainline/30% CD during the weekday peak hour and 80% mainline/20% CD during the weekend peak hour between MD 43 and New Forge Road.
  - g. Assumed a general purpose traffic volume split of 75% mainline/25% CD during the weekday peak hour and 85% mainline/15% CD during the weekend peak hour between New Forge Road and MD 152.
  - h. Assumed peak direction, peak hour unconstrained managed lane volumes are the same as the constrained managed lane volumes.
  - f. Assumed peak direction, peak hour unconstrained general purpose volumes as the original unconstrained traffic demand minus the difference between the constrained and original unconstrained managed lane volumes.
- Analysis Criteria
  - a. Maximum v/c ratio per LOS for mainline segments with assumed 70 mph free-flow speed: LOS A: v/c < 0.29, LOS B: v/c < 0.47, LOS C: v/c < 0.68, LOS D: v/c < 0.85, LOS E: v/c < 1.00, LOS F: v/c > 1.00
  - b. Maximum v/c ratio per LOS for CD segments with assumed 60 mph free-flow speed : LOS A: v/c < 0.26, LOS B: v/c < 0.42, LOS C: v/c < 0.63, LOS D: v/c < 0.81, LOS E: v/c < 1.00, LOS F: v/c > 1.00
- vph = Vehicles per hour
  v/c = Volume to capacity ratio
  = Managed lanes = CD lanes

Table D.5-7B
Concept 5 – Separated Two-Lane Managed Roadway in Median with Base Transit
(Travel Demand Scenario D)

Mainline Segment (Existing Number of Lanes)	Weekday										Weekend				
	Peak Direction					Off Peak Direction									
		AM Peak Hour Southbound		PM Peak Hour Northbound			AM Peak Hour Northbound		PM Peak Hour Southbound			NB Peak Hour		SB Peak Hour	
	Number of General Purpose Lanes per Direction Number of Managed Lanes per Direction	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	Number of General Purpose Lanes per Direction Number of Managed Lanes per Direction	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	Number of General Purpose Lanes per Direction Number of Managed Lanes per Direction	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS
Between I-895 and I-695 (4 Lanes)	4 General Purpose 2 Managed	9,625 1,525	F (v/c=1.12) B	9,725 1,575	F (v/c=1.13) B	4 General Purpose 2 Managed	5,000 150	C A	6,275 250	D A	4 General Purpose 2 Managed	6,900 1,500	D B	6,925 1,522	D B
Between I-695 and MD 43 (4 Lanes)	3 General Purpose 2 CD 2 Managed	6,725 2,875 1,525	F (v/c=1.05) D B	6,900 2,950 1,625	F (v/c=1.07) D B	3 General Purpose 2 CD 2 Managed	4,450 1,900 250	D C A	5,125 2,200 300	D C A	3 General Purpose 2 CD 2 Managed	6,125 1,525 1,650	E (v/c=0.93) B B	5,850 1,450 1,600	E (v/c=0.89) B B
Between MD 43 and New Forge Road (4 Lanes)	3 General Purpose 2 CD 2 Managed	7,000 2,325 1,300	F (v/c=1.09) C B	7,150 2,400 1,425	F (v/c=1.11) C B	3 General Purpose 2 CD 2 Managed	4,650 1,550 225	D B A	5,325 1,775 275	D C A	3 General Purpose 2 CD 2 Managed	6,250 1,100 1,600	E (v/c=0.95) B B	6,150 1,075 1,575	E (v/c=0.93) B B
Between New Forge Road and MD 152 (4 Lanes)	4 General Purpose 2 Managed	9,325 1,300	F (v/c=1.08) B	9,550 1,425	F (v/c=1.11) B	4 General Purpose 2 Managed	6,200 225	D A	7,100 275	D A	4 General Purpose 2 Managed	7,350 1,600	D B	7,225 1,575	D B
Between MD 152 and MD 24 (4 Lanes)	4 General Purpose 2 Managed	7,925 900	E (v/c=0.92) A	8,775 1,125	F (v/c=1.02) A	4 General Purpose 2 Managed	6,175 225	D A	6,725 250	D A	4 General Purpose 2 Managed	6,925 1,525	D B	6,800 1,500	D B
Between MD 24 and MD 543 (3 Lanes)	4 General Purpose 2 Managed	5,800 225	C A	6,850 650	D A	4 General Purpose 2 Managed	5,475 175	C A	5,750 225	D A	4 General Purpose 2 Managed	6,250 1,400	D B	6,250 1,400	D B
Between MD 543 and MD 22 (3 Lanes)	4	4,150	C	5,950	D	4	4,325	C	4,600	C	4	7,350	D	7,450	D
Between MD 22 and MD 155 (3 Lanes)	4	3,625	B	4,975	C	4	3,500	B	3,850	B	4	6,950	D	7,200	D
Between MD 155 and MD 222 (3 Lanes)	4	3,125	B	4,350	C	4	3,150	B	3,750	B	4	6,800	D	7,100	D
Between MD 222 and MD 272 (3 Lanes)	4	2,925	B	4,275	C	4	3,125	B	3,500	B	4	6,600	D	6,900	D
Between MD 272 and MD 279 (3 Lanes)	4	2,775	B	4,275	C	4	3,400	B	3,750	B	4	6,450	D	6,650	D
Between MD 279 and Delaware State Line (3 Lanes)	4	2,400	A	3,875	B	4	2,900	B	3,275	B	4	6,350	D	6,450	D

- Modeling Assumptions:
  - a. Background Highway Network assumes improvements as per the Metropolitan Planning Organization.
  - b. Base Transit Network assumes improvements as per the Metropolitan Planning Organization.
  - c. Constrained I-95 assumes one (1) additional travel lane per direction (Managed).
- Analysis Assumptions:
  - a. Highway capacity analysis assumes level terrain, 70 mph mainline/60 mph CD road free-flow speed, normal driver population, and a 0.95 peak hour factor. The analysis is based on the 1997 Highway Capacity Manual (i.e., using v/c ratios).
  - b. Assumed truck percentages as per Table D.5-2.
  - c. "Desirable" LOS for weekday peak period/peak direction is "E".
  - d. "Desirable" LOS for weekend peak period is "D".
  - e. "Desirable" LOS for the managed lanes is "C/D".
  - g. Assumed a general purpose traffic volume split of 70% mainline/30% CD during the weekday peak hour and 80% mainline/20% CD during the weekend peak hour between MD 43 and New Forge Road.
  - h. Assumed a general purpose traffic volume split of 75% mainline/25% CD during the weekday peak hour and 85% mainline/15% CD during the weekend peak hour between New Forge Road and MD 152.
- Analysis Criteria
  - a. Maximum v/c ratio per LOS for mainline segments with assumed 70 mph free-flow speed: LOS A: v/c < 0.29, LOS B: v/c < 0.47, LOS C: v/c < 0.68, LOS D: v/c < 0.85, LOS E: v/c < 1.00, LOS F: v/c > 1.00
  - b. Maximum v/c ratio per LOS for CD segments with assumed 60 mph free-flow speed : LOS A: v/c < 0.26, LOS B: v/c < 0.42, LOS C: v/c < 0.63, LOS D: v/c < 0.81, LOS E: v/c < 1.00, LOS F: v/c > 1.00
- vph = Vehicles per hour
  v/c = Volume to capacity ratio
  = Managed lanes = CD lanes

Table D.5-7C
Concept 5 – Separated Two-Lane Managed Roadway in Median with Enhanced Transit
(Travel Demand Scenario E)

Mainline Segment (Existing Number of Lanes)	Weekday										Weekend				
	Peak Direction					Off Peak Direction									
		AM Peak Hour Southbound		PM Peak Hour Northbound			AM Peak Hour Northbound		PM Peak Hour Southbound			NB Peak Hour		SB Peak Hour	
	Number of General Purpose Lanes per Direction Number of Managed Lanes per Direction	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	Number of General Purpose Lanes per Direction Number of Managed Lanes per Direction	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	Number of General Purpose Lanes per Direction Number of Managed Lanes per Direction	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS
Between I-895 and I-695 (4 Lanes)	4 General Purpose 2 Managed	9,775 1,500	F (v/c=1.14) B	10,000 1,500	F (v/c=1.16) B	4 General Purpose 2 Managed	4,875 150	C A	6,100 250	D A	4 General Purpose 2 Managed	6,225 1,450	D B	6,850 1,500	D B
Between I-695 and MD 43 (4 Lanes)	3 General Purpose 2 CD 2 Managed	6,775 2,900 1,500	F (v/c=1.05) D B	7,375 3,150 1,600	F (v/c=1.15) D B	3 General Purpose 2 CD 2 Managed	4,350 1,850 250	D C A	5,000 2,125 300	D C A	3 General Purpose 2 CD 2 Managed	5,875 1,475 1,625	E (v/c=0.89) B B	5,775 1,450 1,575	E (v/c=0.88) B B
Between MD 43 and New Forge Road (4 Lanes)	3 General Purpose 2 CD 2 Managed	7,125 2,375 1,300	F (v/c=1.11) C B	7,225 2,425 1,500	F (v/c=1.12) D B	3 General Purpose 2 CD 2 Managed	4,575 1,525 225	D B A	5,225 1,750 275	D C A	3 General Purpose 2 CD 2 Managed	6,175 1,100 1,575	E (v/c=0.94) B B	6,125 1,075 1,550	E (v/c=0.93) B B
Between New Forge Road and MD 152 (4 Lanes)	4 General Purpose 2 Managed	9,500 1,300	F (v/c=1.10) B	9,650 1,500	F (v/c=1.12) B	4 General Purpose 2 Managed	6,100 225	D A	6,975 275	D A	4 General Purpose 2 Managed	7,275 1,575	D B	7,200 1,550	D B
Between MD 152 and MD 24 (4 Lanes)	4 General Purpose 2 Managed	8,000 900	E (v/c=0.93) A	8,825 1,125	F (v/c=1.02) A	4 General Purpose 2 Managed	6,075 225	D A	6,600 250	D A	4 General Purpose 2 Managed	6,775 1,475	D B	6,775 1,475	D B
Between MD 24 and MD 543 (3 Lanes)	4 General Purpose 2 Managed	5,625 225	C A	6,700 650	D A	4 General Purpose 2 Managed	5,400 175	C A	5,625 225	C A	4 General Purpose 2 Managed	6,200 1,350	D B	6,225 1,375	D B
Between MD 543 and MD 22 (3 Lanes)	4	4,025	C	5,825	D	4	4,300	C	4,600	C	4	7,275	D	7,400	D
Between MD 22 and MD 155 (3 Lanes)	4	3,550	B	4,900	C	4	3,475	B	3,825	B	4	6,875	D	7,150	D
Between MD 155 and MD 222 (3 Lanes)	4	3,050	B	4,275	C	4	3,125	B	3,725	B	4	6,725	D	7,050	D
Between MD 222 and MD 272 (3 Lanes)	4	2,900	B	4,250	C	4	3,100	B	3,475	B	4	6,550	D	6,850	D
Between MD 272 and MD 279 (3 Lanes)	4	2,750	B	4,250	C	4	3,350	B	3,700	B	4	6,400	D	6,600	D
Between MD 279 and Delaware State Line (3 Lanes)	4	2,375	A	3,850	B	4	2,825	B	3,200	B	4	6,300	D	6,400	D

- Modeling Assumptions:
  - a. Background Highway Network assumes improvements as per the Metropolitan Planning Organization.
  - b. Enhanced Transit Network assumes Base Transit improvements as per the Metropolitan Planning Organization plus unfunded transit improvements.
  - c. Unconstrained I-95 assumes no capacity constraints on I-95 mainline and I-95 interchange ramps.
- Analysis Assumptions:
  - a. Highway capacity analysis assumes level terrain, 70 mph mainline/60 mph CD road free-flow speed, normal driver population, and a 0.95 peak hour factor. The analysis is based on the 1997 Highway Capacity Manual (i.e., using v/c ratios).
  - b. Assumed truck percentages as per Table D.5-2.
  - c. "Desirable" LOS for weekday peak period/peak direction is "E".
  - d. "Desirable" LOS for weekend peak period is "D".
  - e. "Desirable" LOS for the managed lanes is "C/D".
  - f. Assumed a general purpose traffic volume split of 70% mainline/30% CD during the weekday peak hour and 80% mainline/20% CD during the weekend peak hour between MD 43 and New Forge Road.
  - g. Assumed a general purpose traffic volume split of 75% mainline/25% CD during the weekday peak hour and 85% mainline/15% CD during the weekend peak hour between New Forge Road and MD 152.
  - h. Assumed peak direction, peak hour unconstrained managed lane volumes are the same as the constrained managed lane volumes.
  - i. Assumed peak direction, peak hour unconstrained general purpose volumes as the original unconstrained traffic demand minus the difference between the constrained and original unconstrained managed lane volumes.
- Analysis Criteria
  - a. Maximum v/c ratio per LOS for mainline segments with assumed 70 mph free-flow speed: LOS A: v/c < 0.29, LOS B: v/c < 0.47, LOS C: v/c < 0.68, LOS D: v/c < 0.85, LOS E: v/c < 1.00, LOS F: v/c > 1.00
  - b. Maximum v/c ratio per LOS for CD segments with assumed 60 mph free-flow speed : LOS A: v/c < 0.26, LOS B: v/c < 0.42, LOS C: v/c < 0.63, LOS D: v/c < 0.81, LOS E: v/c < 1.00, LOS F: v/c > 1.00
- vph = Vehicles per hour
  v/c = Volume to capacity ratio = Managed lanes = CD lanes

Table D.5-7D
Concept 5 – Separated Two-Lane Managed Roadway in Median with Enhanced Transit
(Travel Demand Scenario F)

Mainline Segment (Existing Number of Lanes)	Weekday										Weekend				
	Peak Direction					Off Peak Direction									
		AM Peak Hour Southbound		PM Peak Hour Northbound			AM Peak Hour Northbound		PM Peak Hour Southbound			NB Peak Hour		SB Peak Hour	
	Number of General Purpose Lanes per Direction Number of Managed Lanes per Direction	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	Number of General Purpose Lanes per Direction Number of Managed Lanes per Direction	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	Number of General Purpose Lanes per Direction Number of Managed Lanes per Direction	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS
Between I-895 and I-695 (4 Lanes)	4 General Purpose 2 Managed	9,275 1,500	F (v/c=1.07) B	9,450 1,550	F (v/c=1.09) B	4 General Purpose 2 Managed	4,875 150	C A	6,100 250	D A	4 General Purpose 2 Managed	6,225 1,450	D B	6,850 1,500	D B
Between I-695 and MD 43 (4 Lanes)	3 General Purpose 2 CD 2 Managed	6,500 2,775 1,500	F (v/c=1.01) D B	6,725 2,875 1,600	F (v/c=1.05) D B	3 General Purpose 2 CD 2 Managed	4,350 1,850 250	D C A	5,000 2,125 300	D C A	3 General Purpose 2 CD 2 Managed	5,875 1,475 1,625	E (v/c=0.89) B B	5,775 1,450 1,575	E (v/c=0.88) B B
Between MD 43 and New Forge Road (4 Lanes)	3 General Purpose 2 CD 2 Managed	6,850 2,300 1,300	F (v/c=1.06) C B	7,050 2,350 1,500	F (v/c=1.10) C B	3 General Purpose 2 CD 2 Managed	4,575 1,525 225	D B A	5,225 1,750 275	D C A	3 General Purpose 2 CD 2 Managed	6,175 1,100 1,575	E (v/c=0.94) B B	6,125 1,075 1,550	E (v/c=0.93) B B
Between New Forge Road and MD 152 (4 Lanes)	4 General Purpose 2 Managed	9,150 1,300	F (v/c=1.06) B	9,400 1,500	F (v/c=1.09) B	4 General Purpose 2 Managed	6,100 225	D A	6,975 275	D A	4 General Purpose 2 Managed	7,275 1,575	D B	7,200 1,550	D B
Between MD 152 and MD 24 (4 Lanes)	4 General Purpose 2 Managed	7,750 900	E (v/c=0.90) A	8,600 1,125	E (v/c=1.00) A	4 General Purpose 2 Managed	6,075 225	D A	6,600 250	D A	4 General Purpose 2 Managed	6,775 1,475	D B	6,775 1,475	D B
Between MD 24 and MD 543 (3 Lanes)	4 General Purpose 2 Managed	5,625 225	C A	6,675 650	D A	4 General Purpose 2 Managed	5,400 175	C A	5,625 225	C A	4 General Purpose 2 Managed	6,200 1,350	D B	6,225 1,375	D B
Between MD 543 and MD 22 (3 Lanes)	4	4,025	C	5,825	D	4	4,300	C	4,575	C	4	7,275	D	7,400	D
Between MD 22 and MD 155 (3 Lanes)	4	3,550	B	4,900	C	4	3,475	B	3,825	B	4	6,875	D	7,150	D
Between MD 155 and MD 222 (3 Lanes)	4	3,050	B	4,275	C	4	3,125	B	3,725	B	4	6,725	D	7,050	D
Between MD 222 and MD 272 (3 Lanes)	4	2,900	B	4,250	C	4	3,100	B	3,475	B	4	6,550	D	6,850	D
Between MD 272 and MD 279 (3 Lanes)	4	2,750	B	4,250	C	4	3,350	B	3,700	B	4	6,400	D	6,600	D
Between MD 279 and Delaware State Line (3 Lanes)	4	2,375	A	3,850	B	4	2,825	B	3,200	B	4	6,300	D	6,400	D

- Modeling Assumptions:
  - a. Background Highway Network assumes improvements as per the Metropolitan Planning Organization.
  - b. Enhanced Transit Network assumes Base Transit improvements as per the Metropolitan Planning Organization plus unfunded transit improvements.
  - c. Constrained I-95 assumes one (1) additional travel lane per direction (Managed).
- Analysis Assumptions:
  - a. Highway capacity analysis assumes level terrain, 70 mph mainline/60 mph CD road free-flow speed, normal driver population, and a 0.95 peak hour factor. The analysis is based on the 1997 Highway Capacity Manual (i.e., using v/c ratios).
  - b. Assumed truck percentages as per Table D.5-2.
  - c. "Desirable" LOS for weekday peak period/peak direction is "E".
  - d. "Desirable" LOS for weekend peak period is "D".
  - e. "Desirable" LOS for the managed lanes is "C/D".
  - j. Assumed a general purpose traffic volume split of 70% mainline/30% CD during the weekday peak hour and 80% mainline/20% CD during the weekend peak hour between MD 43 and New Forge Road.
  - k. Assumed a general purpose traffic volume split of 75% mainline/25% CD during the weekday peak hour and 85% mainline/15% CD during the weekend peak hour between New Forge Road and MD 152.
- Analysis Criteria
  - a. Maximum v/c ratio per LOS for mainline segments with assumed 70 mph free-flow speed: LOS A: v/c < 0.29, LOS B: v/c < 0.47, LOS C: v/c < 0.68, LOS D: v/c < 0.85, LOS E: v/c < 1.00, LOS F: v/c > 1.00
  - b. Maximum v/c ratio per LOS for CD segments with assumed 60 mph free-flow speed : LOS A: v/c < 0.26, LOS B: v/c < 0.42, LOS C: v/c < 0.63, LOS D: v/c < 0.81, LOS E: v/c < 1.00, LOS F: v/c > 1.00
- vph = Vehicles per hour

  v/c = Volume to capacity ratio

  = Managed lanes = CD lanes

Table D.5-7E
Concept 5 – Separated Two-Lane Managed Roadway in Median with Base Transit (Off-Peak Truck Only Option)
(Travel Demand Scenario D)

Mainline Segment (Existing Number of Lanes)	Weekday										Weekend				
	Peak Direction					Off Peak Direction									
		AM Peak Hour Southbound		PM Peak Hour Northbound			AM Peak Hour Northbound		PM Peak Hour Southbound			NB Peak Hour		SB Peak Hour	
	Number of General Purpose Lanes per Direction Number of Managed Lanes per Direction	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	Number of General Purpose Lanes per Direction Number of Truck Only Lanes per Direction	General Purpose Lane Volume (vph) Truck Only Lane Volume (vph)	General Purpose Lane LOS Truck Only Lane LOS	General Purpose Lane Volume (vph) Truck Only Lane Volume (vph)	General Purpose Lane LOS Truck Only Lane LOS	Number of General Purpose Lanes per Direction Number of Managed Lanes per Direction	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS	General Purpose Lane Volume (vph) Managed Lane Volume (vph)	General Purpose Lane LOS Managed Lane LOS
Between I-895 and I-695 (4 Lanes)	4 General Purpose 2 Managed	9,625 1,525	F (v/c=1.12) B	9,725 1,575	F (v/c=1.13) B	4 General Purpose 2 Truck-Only	4,575 575	C A	5,800 725	C A	4 General Purpose 2 Managed	6,900 1,500	D B	6,925 1,522	D B
Between I-695 and MD 43 (4 Lanes)	3 General Purpose 2 CD 2 Managed	6,725 2,875 1,525	F (v/c=1.05) D B	6,900 2,950 1,625	F (v/c=1.07) D B	3 General Purpose 2 CD 2 Truck Only	4,100 1,750 750	C C A	4,750 2,025 850	D C A	3 General Purpose 2 CD 2 Managed	6,125 1,525 1,650	E (v/c=0.93) B B	5,850 1,450 1,600	E (v/c=0.89) B B
Between MD 43 and New Forge Road (4 Lanes)	3 General Purpose 2 CD 2 Managed	7,000 2,325 1,300	F (v/c=1.09) C B	7,150 2,400 1,425	F (v/c=1.11) C B	3 General Purpose 2 CD 2 Truck Only	4,275 1,425 725	C B A	4,900 1,650 825	D B A	3 General Purpose 2 CD 2 Managed	6,250 1,100 1,600	E (v/c=0.95) B B	6,150 1,075 1,575	E (v/c=0.93) B B
Between New Forge Road and MD 152 (4 Lanes)	4 General Purpose 2 Managed	9,325 1,300	F (v/c=1.08) B	9,550 1,425	F (v/c=1.11) B	4 General Purpose 2 Truck Only	5,700 725	C A	6,550 825	D A	4 General Purpose 2 Managed	7,350 1,600	D B	7,225 1,575	D B
Between MD 152 and MD 24 (4 Lanes)	4 General Purpose 2 Managed	7,925 900	E (v/c=0.92) A	8,775 1,125	F (v/c=1.02) A	4 General Purpose 2 Truck Only	5,675 725	C A	6,200 775	D A	4 General Purpose 2 Managed	6,925 1,525	D B	6,800 1,500	D B
Between MD 24 and MD 543 (3 Lanes)	4 General Purpose 2 Managed	5,800 225	C A	6,850 650	D A	4 General Purpose 2 Truck Only	5,025 625	C A	5,300 675	C A	4 General Purpose 2 Managed	6,250 1,400	D B	6,250 1,400	D B
Between MD 543 and MD 22 (3 Lanes)	4	4,150	C	5,950	D	4	4,325	C	4,600	C	4	7,350	D	7,450	D
Between MD 22 and MD 155 (3 Lanes)	4	3,625	B	4,975	C	4	3,500	B	3,850	B	4	6,950	D	7,200	D
Between MD 155 and MD 222 (3 Lanes)	4	3,125	B	4,350	C	4	3,150	B	3,750	B	4	6,800	D	7,100	D
Between MD 222 and MD 272 (3 Lanes)	4	2,925	B	4,275	C	4	3,125	B	3,500	B	4	6,600	D	6,900	D
Between MD 272 and MD 279 (3 Lanes)	4	2,775	B	4,275	C	4	3,400	B	3,750	B	4	6,450	D	6,650	D
Between MD 279 and Delaware State Line (3 Lanes)	4	2,400	A	3,875	B	4	2,900	B	3,275	B	4	6,350	D	6,450	D

- Modeling Assumptions:
  - a. Background Highway Network assumes improvements as per the Metropolitan Planning Organization.
  - b. Base Transit Network assumes improvements as per the Metropolitan Planning Organization.
  - c. Constrained I-95 assumes one (1) additional travel lane per direction (Managed).
- Analysis Assumptions:
  - a. Highway capacity analysis assumes level terrain, 70 mph mainline/60 mph CD road free-flow speed, normal driver population, and a 0.95 peak hour factor. The analysis is based on the 1997 Highway Capacity Manual (i.e., using v/c ratios).
  - b. Assumed truck percentages as per Table D.5-2.
  - c. "Desirable" LOS for weekday peak period/peak direction is "E".
  - d. "Desirable" LOS for weekend peak period is "D".
  - e. "Desirable" LOS for the managed lanes is "C/D".
  - f. Assumed a general purpose traffic volume split of 70% mainline/30% CD during the weekday peak hour and 80% mainline/20% CD during the weekend peak hour between MD 43 and New Forge Road.
  - g. Assumed a general purpose traffic volume split of 75% mainline/25% CD during the weekday peak hour and 85% mainline/15% CD during the weekend peak hour between New Forge Road and MD 152.
  - h. Assumed 75% of the truck volume uses the truck only lane in the weekday off peak direction.
- Analysis Criteria
  - a. Maximum v/c ratio per LOS for mainline segments with assumed 70 mph free-flow speed: LOS A: v/c < 0.29, LOS B: v/c < 0.47, LOS C: v/c < 0.68, LOS D: v/c < 0.85, LOS E: v/c < 1.00, LOS F: v/c > 1.00
  - b. Maximum v/c ratio per LOS for CD segments with assumed 60 mph free-flow speed : LOS A: v/c < 0.26, LOS B: v/c < 0.42, LOS C: v/c < 0.63, LOS D: v/c < 0.81, LOS E: v/c < 1.00, LOS F: v/c > 1.00
- vph = Vehicles per hour
  v/c = Volume to capacity ratio
  = Managed/Truck lanes = CD lanes

Table D.5-8
Concept 6 – All General Purpose Lanes with Base Transit
(Travel Demand Scenario C)

Mainline Segment (Existing Number of Lanes)	Weekday										Weekend				
	Peak Direction					Off Peak Direction									
	Number of General Purpose Lanes per Direction	AM Peak Hour Southbound		PM Peak Hour Northbound		Number of General Purpose Lanes per Direction	AM Peak Hour Northbound		PM Peak Hour Southbound		Number of General Purpose Lanes per Direction	NB Peak Hour		SB Peak Hour	
		General Purpose Lane Volume (vph)	General Purpose Lane LOS	General Purpose Lane Volume (vph)	General Purpose Lane LOS		General Purpose Lane Volume (vph)	General Purpose Lane LOS	General Purpose Lane Volume (vph)	General Purpose Lane LOS		General Purpose Lane Volume (vph)	General Purpose Lane LOS	General Purpose Lane Volume (vph)	General Purpose Lane LOS
Between I-895 and I-695 (4 Lanes)	6	11,925	E (v/c=0.92)	12,575	E (v/c=0.97)	6	5,150	B	6,525	C	6	8,400	C	8.450	C
Between I-695 and MD 43 (4 Lanes)	5 Mainline 2 CD	8,250 3,550	D E (v/c=0.87)	8,950 3,850	D E (v/c=0.94)	5 Mainline 2 CD	4,625 1,975	B C	5,325 2,300	C C	5 Mainline 2 CD	7,450 1,850	C C	7,100 1,800	C C
Between MD 43 and New Forge Road (4 Lanes)	5 Mainline 2 CD	8,375 2,800	D D	8,750 2,925	D D	5 Mainline 2 CD	4,825 1,600	B C	5,525 1,850	C C	5 Mainline 2 CD	7,600 1,350	D B	7,475 1,325	C B
Between New Forge Road and MD 152 (4 Lanes)	6	11,175	E (v/c=0.86)	11,675	E (v/c=0.90)	6	6,425	C	7,375	C	6	8,950	C	8,800	C
Between MD 152 and MD 24 (4 Lanes)	5	9,200	D	10,250	E (v/c=0.94)	5	6,400	C	6,975	C	5	8,450	D	8,300	D
Between MD 24 and MD 543 (3 Lanes)	5	6,025	C	7,550	D	5	5,650	C	5,975	C	5	7,650	D	7,650	D
Between MD 543 and MD 22 (3 Lanes)	4	4,150	C	5,950	D	4	4,325	C	4,600	C	4	7,350	D	7,450	D
Between MD 22 and MD 155 (3 Lanes)	4	3,625	B	4,975	C	4	3,500	B	3,850	B	4	6,950	D	7,200	D
Between MD 155 and MD 222 (3 Lanes)	4	3,125	B	4,350	C	4	3,150	B	3,750	B	4	6,800	D	7,100	D
Between MD 222 and MD 272 (3 Lanes)	4	2,925	B	4,275	C	4	3,125	B	3,500	B	4	6,600	D	6,900	D
Between MD 272 and MD 279 (3 Lanes)	4	2,775	B	4,275	C	4	3,400	B	3,750	B	4	6,450	D	6,650	D
Between MD 279 and Delaware State Line (3 Lanes)	4	2,400	A	3,875	B	4	2,900	B	3,275	B	4	6,350	D	6,450	D

- Modeling Assumptions:
  - a. Background Highway Network assumes improvements as per the Metropolitan Planning Organization.
  - b. Base Transit Network assumes improvements as per the Metropolitan Planning Organization.
  - c. Unconstrained I-95 assumes no capacity constraints on I-95 mainline and I-95 interchange ramps.
- Analysis Assumptions:
  - a. Highway capacity analysis assumes level terrain, 70 mph mainline/60 mph CD road free-flow speed, normal driver population, and a 0.95 peak hour factor. The analysis is based on the 1997 Highway Capacity Manual (i.e., using v/c ratios).
  - b. Assumed truck percentages as per Table D.5-2.
  - c. "Desirable" LOS for weekday peak period/peak direction is "E".
  - d. "Desirable" LOS for weekend peak period is "D".
  - i. Assumed a general purpose traffic volume split of 70% mainline/30% CD during the weekday peak hour and 80% mainline/20% CD during the weekend peak hour between MD 43 and New Forge Road.
  - j. Assumed a general purpose traffic volume split of 75% mainline/25% CD during the weekday peak hour and 85% mainline/15% CD during the weekend peak hour between New Forge Road and MD 152.
- Analysis Criteria
  - a. Maximum v/c ratio per LOS for mainline segments with assumed 70 mph free-flow speed: LOS A: v/c < 0.29, LOS B: v/c < 0.47, LOS C: v/c < 0.68, LOS D: v/c < 0.85, LOS E: v/c < 1.00, LOS F: v/c > 1.00
  - b. Maximum v/c ratio per LOS for CD segments with assumed 60 mph free-flow speed : LOS A: v/c < 0.26, LOS B: v/c < 0.42, LOS C: v/c < 0.63, LOS D: v/c < 0.81, LOS E: v/c < 1.00, LOS F: v/c > 1.00
- vph = Vehicles per hour
  v/c = Volume to capacity ratio
  = CD lanes

APPENDIX D.6
AUTO OCCUPANCY DATA
FOR I-95

APPENDIX D.6 AUTO OCCUPANCY DATA FOR I-95

As part of the traffic analyses for the I-95 Master Plan, current vehicle occupancy data for an average week**day** were collected along the following two sections of I-95 on Tuesday, April 24, 2001:

- Northbound and southbound I-95 at the New Forge Road overpass, slightly north of MD 43.
  - Selected time periods, all lanes by direction, all vehicles surveyed by direction.

- Northbound I-95 at the JFK Toll Plaza.
  - All day, all lanes, only blue vehicles surveyed.

Supplemental vehicle occupancy data for an average weekend were also collected on Saturday, May 19, 2001 and Sunday, May 20, 2001.

- Northbound I-95 at the JFK Toll Plaza.
  - All day, all lanes, only blue vehicles surveyed.

The results of this data collection were as follows:

- The percentages of passenger vehicles with two or more occupants at the New Forge Road overpass of I-95 during the weekday were:

  - AM Peak Hour: 12% (southbound)
  - Midday Peak Hour: 27% (southbound)
  - PM Peak Hour: 16% (northbound)

  Percentages Exclude Trucks

- On northbound I-95 at the JFK toll plaza, the percentages of sampled vehicles with two or more occupants during the weekday were:

  - AM Peak Hour: 32% (northbound)
  - Midday Peak Hour: 37% (northbound)
  - PM Peak Hour: 32% (northbound)

  Percentages Include Autos and Trucks

- At the JFK toll plaza during the peak midday hour on Saturday and Sunday, approximately 62% of the sampled weekend traffic stream were high occupancy vehicles.

With the goal of placing the above I-95 occupancy data in context with other "similar" facilities, occupancy data were gathered from seven other studies conducted on similar roadway class facilities around the Baltimore region. The locations of these studies were similar to the I-95 at the New Forge Road overpass location discussed previously. The data were collected during weekday morning peak hours on I-95 (four studies) and I-97 (two studies) south of I-695 (Baltimore Beltway), and on I-83 (one study) north of I-695. The data from all seven sites gave occupancy of passenger vehicles only, and ranged from 6% to 14% of these vehicles with two or more occupants per vehicle during the morning peak hour (7:00 AM to 8:00 AM). One of the sites was southbound I-95 north of I-695 (Baltimore Beltway) counted in July 1997. This site, which is near the New Forge Road overpass location surveyed for the I-95 study area, had a 2+ occupancy of 11% (based on 6,522 passenger vehicles). This is approximately the same percentage as was found at the New Forge Road site (12% based on 6,497 passenger vehicles).

APPENDIX D.7 COMMENTS ON INDEPENDENT PURPOSE AND NEED STATEMENTS

APPENDIX D.7 COMMENTS ON INDEPENDENT PURPOSE AND NEED STATEMENTS

Table D.7-1: EPA COMMENTS ON INDEPENDENT PURPOSE AND NEED STATEMENTS, AND RESPONSES

No.	I-95 SECTION	EPA COMMENT (1)	AUTHORITY'S RESPONSE
1	200	Intuitively, can probably agree that there will be congestion especially with the proposed growth. While the larger and less specific purpose and need discusses the level of truck traffic. Is this an issue here?	Truck traffic ranges from 4% of the total traffic on a weekend peak hour to 50% in the middle of the night. In general, truck traffic is approximately 10% to 15% of the total traffic. Many times trucks are involved in the most serious of the collisions along I-95.
2	200	Some of the studies that were referenced should be summarized, the goals and purpose of the study, the problems identified, and the conclusions, if the studies are complete. A description of the study was the only thing provided.	The referenced studies are currently on going and used to identify the initiatives in this section. It is assumed that the project team will have a much better feel for the status of these needs as we move closer to the horizon year.
3	200	Will there be a more specific purpose and need as more detailed studies are completed?	It is anticipated that the purpose and need statement will be augmented/refined with more detailed traffic information during the future project planning study.
4	200	How do you perceive the future analysis of congestion and access problems?	The traffic projections developed from the regional model will be applied to a no-build roadway network to identify potentially congested areas. Improvement alternates will be developed and analyzed to ensure that improvements address the forecasted congestion in those areas. Existing and proposed development in the vicinity of existing interchanges will be considered in the development and analysis of the alternates in order to provide appropriate levels of access to the development from the I-95 corridor.
5	400	What are some of the assumptions that went into future traffic growth?	The future traffic growth was based on the regionally accepted models, which take into account the long distance traffic growth along with the projected change to the socio-economic data within the model area.
6	400	Where is the growth in weekday and weekend traffic coming from? Is it anything in the particular study area or is it all regional in nature?	The growth in the weekday and weekend traffic is both regional and local. On weekends, the traffic tends to be more regional in nature with longer distance trips. The weekday traffic on the southern portion of I-95 is more local in nature, although there is a fair amount of regional traffic. On the northern portion of I-95, traffic is more regional with less commuter traffic.

No.	I-95 SECTION	EPA COMMENT (1)	AUTHORITY'S RESPONSE
7	400	What is the split between regional and local traffic? What's passing through on the long haul, medium haul and is it somewhat more regional in nature?	The split between local and regional traffic is dependent upon the location. For example, on I-95 northbound, 75% of the traffic that crosses the Susquehanna River on a weekday continues through to Delaware. North of MD 43, the split is more towards local traffic (approximately 40% regional).
8	400	Are there any key generators or attractors in the study areas?	There are numerous generators and attractors in the study area. For example, the Honeygo area near MD 43 is anticipated to grow by approximately 5,600 households by full build out. In Harford County, the Perryman area is tentatively slated for 13 to 15 million square feet of warehouse/light industrial development. Along MD 24 within approximately one mile of the I-95 interchange, developments such as Constant Friendship, Monmouth Meadows and Evergreen Farms are approved for over 800 additional households.
9	400	What amount of projected traffic increases can be attributed to the proposed growth areas?	This is dependent upon the location. In the area of MD 43, the growth areas contribute to the traffic volume increase at a slightly greater rate than the regional traffic. The opposite is true in Cecil County, where the regional traffic exceeds the proposed growth due to changes in local land use.
10	400	The referenced studies should be summarized a bit better, especially if they can support or provide additional data for the needs assessment and alternatives development.	The referenced studies are currently on going and were used to identify the initiatives in this section. It is assumed that the project team will have a much better feel for the status of these needs as we move closer to the horizon year.
11	400	The indirect effects of the access provided to the development areas should be assessed. If access to I-95 will be changed or added, the potential impacts of theses changes should be considered even if not directly on I-95.	No new interchanges are currently proposed in the I-95 study area. Any needed improvements to the existing interchanges will be addressed in future studies. It should be noted that the Maryland Transportation Authority has worked closely with planning officials in Baltimore City and Baltimore, Harford and Cecil counties. This coordination will help identify what future planned development (indirect effects) may result from the future master plan improvements.

NOTES:
(1) EPA comment letters are dated as follows:
Section 100: July 16, 2001
Sections 200, 200 and 400: May 1, 2002

Table D.7-2: Dates of Agency Comments On Independent Purpose and Need Statements, and Responses

Agency	Comments Dated	Response Dated
Baltimore Metropolitan Council	• June 19, 2001 letter on Draft Master Plan report (8 comments) - • August 1, 2001 e-mail (1 comment) • August 10, 2001 letter on Draft Master Plan report (3 comments)	July 20, 2001 Authority letter - December 19, 2001 Authority letter
Cecil County Government	• June 22, 2001 letter providing comments on Draft I-95 Master Plan Purpose and Need Statement (8 comments) • July 25, 2001 e-mail with comments on Working Draft of Master Plan Study report Sections A, B, C, and E (6 comments)	December 19, 2001 Authority letter
Harford County Government	• June 22, 2001 e-mail encompassing several reports (8 comments) • August 7, 2001 letter on Working Draft of the Master Plan Sections A, B, C, and E (16 comments)	December 19, 2001 Authority letter