Dominion Cove Point LNG, LP
Cove Point Liquefaction Project
Docket No. CP13- -000

Resource Report 5
Socioeconomics

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Summary of Required FERC Report Information		
Topic	**FERC Reference**	**Report Reference or Not Applicable**
1. For major aboveground facilities and major pipeline projects that require an EIS, describe existing socioeconomic conditions within the project area	§ 380.12(g)(1)	Section 5.1
2. For major aboveground facilities, quantify impact on employment, housing, local government services, local tax revenues, transportation, and other relevant factors within the project area.	§ 380.12(g)(2-6)	Section 5.2

Additional Information	**Report Reference or Not Applicable**
Evaluate the impact of any substantial immigration of people on governmental facilities and services and describe plans to reduce the impact on local infrastructure.	NA
Describe onsite manpower requirements, including the number of construction personnel who currently reside within the impact area, would commute daily to the site from outside the impact area, or would relocate temporarily within the impact area.	Section 5.2.1
Estimate total worker payroll and material purchases during construction and operation.	Section 5.2.3
Determine whether existing housing within the impact area is sufficient to meet the needs of the additional population.	Section 5.2.5
Describe the number and types of residences and businesses that would be displaced by the project, procedures to be used to acquire these properties, and types and amounts of relocation assistance payments.	Section 5.2.6
Conduct a fiscal impact analysis evaluating incremental local government expenditures in relation to incremental local government revenues that would result from construction of the project. Incremental expenditures include, but are not limited to, school operating costs, road maintenance and repair, public safety, and public utility costs.	Section 5.2.4

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Acronym List

AADT	Annual Average Daily Traffic
Bay	Chesapeake Bay
CLV	Critical Lane Volume
Corps	U.S. Army Corps of Engineers
ESD	emergency shutdown
FERC	Federal Energy Regulatory Commission
FY	fiscal year
DCP	Dominion Cove Point LNG, LP
DTI	Dominion Transmission, Inc.
HCS	Highway Capacity Software
hp	horsepower
LNG	liquefied natural gas
LNG Terminal	Cove Point LNG Terminal
LOS	Level of Service
MTPA	million tons per annum
M&R	Metering and Regulating
n.d	No date
NGA	Natural Gas Act
Project	Cove Point Liquefaction Project
ROW	right-of-way
SHA	State Highway Administration
VDOT	Virginia Department of Transportation

RESOURCE REPORT 5 – SOCIOECONOMICS
DOMINION COVE POINT LNG, LP
COVE POINT LIQUEFACTION PROJECT

Dominion Cove Point LNG, LP (DCP) is seeking authorization from the Federal Energy Regulatory Commission (the FERC or Commission) to construct, modify, and operate facilities used for the export of liquefied natural gas (LNG) under Section 3 of the Natural Gas Act (NGA) and to construct, install, own, operate, and maintain facilities under Section 7 of the NGA which comprise the Cove Point Liquefaction Project (Project). The Project will involve construction of new facilities and expansion of existing DCP facilities to provide gas liquefaction and LNG export services to customers that will provide their own gas supply. Using facilities proposed as part of the Project, combined with existing facilities, DCP will provide a bi-directional service of receiving and gasifying imported LNG from LNG vessels, and liquefaction of natural gas for loading onto LNG ships for export at the Cove Point LNG Terminal (LNG Terminal).

The Project will consist of the following facilities in Calvert County, Maryland:

- Cove Point Liquefaction Facility
  - LNG Terminal
    - Construct liquefaction facilities on 49 acres within the 131-acre fenced area (Figure 1-3).
    - Install one LNG train capable of producing up to 5.75 million tons per annum (MTPA).
    - Install new natural gas fired turbines to drive the main refrigerant compressors.
    - Install additional electrical generation on site to meet power demands of the liquefaction plant, in the form of steam turbines to capture the waste heat produced from the natural gas turbines.
    - Install equipment to remove impurities from the gas stream, which have no heating value, have corrosive potential, or will crystallize during the liquefaction process.
  - Offsite Areas
    - Use the site as a temporary construction laydown/parking area, including temporary buildings and office trailers (Offsite Area A) (Figure 1-4).
    - Use the site as a temporary barge offloading area including a temporary pier (Offsite Area B) (Figure 1-5).

The customers' natural gas will be delivered to the LNG Terminal via the existing Cove Point Pipeline. Additional compression on the Cove Point Pipeline is required to deliver the inlet gas to the LNG Terminal. DCP proposes to install additional compression, totaling up to approximately 62,500 horsepower (hp), at its existing Pleasant Valley Compressor Station located in Fairfax County, Virginia (Figure 1-6 and Figure 1-7). DCP will also make miscellaneous piping and measurement upgrades at the Loudoun Metering and Regulating

(M&R) site (Figure 1-6 and Figure 1-8). Dominion Transmission, Inc.'s (DTI's)[1] Leesburg Compressor Station will be used as a contractor staging area for the Project (Figure 1-8).

To accommodate the gas associated with the Project moving through the Cove Point Pipeline system, DCP proposes to install and/or modify the following existing facilities.

- Virginia Facilities
  - Pleasant Valley Compressor Station
    - Install additional electric-driven compressor units at the existing Pleasant Valley Compressor Station with four new compressor units totaling up to approximately 62,500 hp (Figure 1-7).
    - Install equipment and facilities, including a new compressor building and extension of the existing compressor building, gas coolers, filter/separators, valves, piping and headers, electrical facilities, etc.
    - Install a new 36-inch diameter suction line from the Pleasant Valley Compressor Station to a new tap into the existing 36-inch diameter TL-522.
  - Pleasant Valley Suction/Discharge Pipelines and M&R Site
    - Install approximately 1,200 feet of 36-inch diameter suction pipeline within the existing pipeline right-of-way (ROW), extending from the Pleasant Valley Compressor Station to the existing Pleasant Valley M&R site (Figure 1-7).
    - Replace (i.e., lift and lay) the existing 1,200 feet of 16-inch diameter discharge pipeline TL-531 extending from the Pleasant Valley Compressor Station to the existing Pleasant Valley M&R site with a new 36-inch diameter pipeline.
    - Install miscellaneous piping and measurement upgrades, including additional meter runs and/or pipe, fittings, and valves, at the Pleasant Valley M&R site.
  - Loudoun M&R Site[2]
    - Install miscellaneous piping and measurement upgrades, including additional meter runs and/or pipe, fittings, and valves, at the Loudoun M&R site (Figure 1-8).
  - DTI's Leesburg Compressor Station Contractor Staging Area
    - Use the existing DTI Leesburg Compressor Station for construction activities such as temporary construction laydown, parking and staging (Figure 1-8).

[1] DTI, an affiliate of DCP and a subsidiary of Dominion Resources, Inc., is primarily a provider of interstate natural gas transportation and storage services. It owns and operates one of the nation's largest underground natural gas storage systems, and has approximately 8,000 miles of pipeline in six states including Ohio, West Virginia, Pennsylvania, New York, Maryland, and Virginia.

[2] The additional compression proposed at the Loudoun Compressor Station during the FERC Pre-filing Process was eliminated from the proposed Project. Instead, only changes to the Loudoun M&R site will be required.

This Resource Report describes the socioeconomic conditions affected by the Project. This Report addresses the existing socioeconomic conditions in the Project area, the socioeconomic impact of construction on the Project area, and the environmental effects (including human health, social, and economic) of the Project on minority, low-income, and American Indian communities. This Report also addresses comments received from the public during the FERC Pre-filing Process, as well as comments received directly from the FERC and other federal and state agencies.

5.1 Socioeconomic Impact Area

Calvert County, Maryland is the local impact area for the Cove Point Liquefaction Facility and Offsite Areas (Figure 1-2 in Resource Report 1). The statewide socioeconomic impacts for Maryland are also described.

The socioeconomic impacts for the Loudoun M&R site and the DTI Leesburg Compressor Station Contractor Staging Area will be negligible because there are no significant aboveground or pipeline facilities proposed for these areas. The impact area for the Pleasant Valley Compressor Station, including the Pleasant Valley Suction/Discharge Pipelines and Pleasant Valley M&R site, is Fairfax County, Virginia (Figure 1-6 in Resource Report 1).

5.1.1 Population

5.1.1.1 Cove Point Liquefaction Facility

The Cove Point Liquefaction Facility will be constructed in southern Calvert County, Maryland, on the shore of the Chesapeake Bay (the Bay), approximately 60 miles from Washington, DC, 53 miles from the Maryland state capital in Annapolis, and 77 miles from Baltimore, Maryland. Calvert County is a peninsula in southern Maryland, bordered by the Bay to the east and the Patuxent River to the west and south. Major population and commercial centers in the County include Solomons, eight miles to the south of Cove Point (population 2,368); the County seat at Prince Frederick, 16 miles to the north of Cove Point (population 2,538); Huntingtown, 21 miles to the north of Cove Point (population 3,311); and Dunkirk, 30 miles to the north of Cove Point (population 2,520). To the west of Calvert County, across the Patuxent River, are St. Mary's and Charles Counties, and to the north are Prince George's and Anne Arundel Counties.

5.1.1.2 Pleasant Valley Compressor Station

The Pleasant Valley Compressor Station, including the Pleasant Valley Suction/Discharge Pipelines and M&R site, is located approximately 25 miles from Washington, DC, in Fairfax County, Virginia. Fairfax County is in northeast Virginia, with Maryland to the north and east and Washington, DC, in the northeast corner. Prince William County, Virginia, is located to the south with Loudoun County, Virginia, to the west. Major population and commercial centers in Fairfax County, Virginia, include: Centreville (population 71,135), approximately 3.5 miles to the west of the Pleasant Valley Compressor Station; Annandale (population 54,994), approximately 16 miles northeast of the Pleasant Valley Compressor Station; and Reston (population 56,407), approximately 10 miles north of the Pleasant Valley Compressor Station.

5.1.2 Population/Demographics/Ethnicity in Local and State Project Impact Areas

Tables 5-1 and 5-2 summarize existing population and demographic conditions for Calvert County, Maryland. In 2011, the population of Calvert County was 89,256. Since 2010, this represents a 0.6 percent population increase for the County, compared to a 1.1 percent population increase in Maryland during that same period. The population density in 2010 was an estimated 416 persons per square mile for Calvert County. Calvert County's population is primarily white (81.7 percent), with 13.8 percent black, 2.9 percent of Hispanic or Latino origin, and 1.5 percent Asian. Hispanics may be of any race and are included in applicable race categories, so the numbers do not add up to 100 percent.

Table 5-1
Existing Population in Calvert County and State Project Impact Area

Demographic	Calvert County	Maryland
2011 Population	89,256	5,839,572
2010 Estimated Population Density (persons per square mile)	416.3	594.8
Population Change Since 2010 (percent)	0.6	1.1
Persons per household (2007-2011)	9	3

Source:
(U.S. Census Bureau, 2013)

Table 5-2
Percentage Population by Ethnicity in Calvert County and State Project Impact Area

Demographic	Calvert County	Maryland
2011 White Individuals (percent)	81.7	61.1
2011 Black Individuals (percent)	13.8	30.0
2011 American Indian and Alaskan Native Individuals (percent)	0.4	0.4
2011 Asian Individuals (percent)	1.5	5.8
2011 Native Hawaiian and Other Pacific Islander (percent)	0.1	0.1
2011 Individuals of Hispanic or Latino Origin (percent)	2.9	8.4

Source:
(U.S. Census Bureau, 2013)

5.1.2.2 Pleasant Valley Compressor Station

In 2011, Fairfax County, Virginia had a population of 1,100,692, increasing by 1.8 percent from 2010 (Table 5-3). In 2010, the population density for Fairfax County, Virginia was 2,767 persons per square mile. Fairfax County Virginia's population is primarily white (68.1 percent), with 18.0 percent Asian, 9.9 percent black, and 15.8 percent Hispanic or Latino origin (U.S. Census Bureau, 2012a) (Table 5-4). Hispanics may be of any race and are included in applicable race categories, so numbers do not add up to 100 percent.

Table 5-3
Existing Population in Fairfax County and State Project Impact Area

Demographic	Fairfax County[a]	Virginia[b]
2011 Population	1,100,692	8,104,384
2010 Population Density (people per square mile)	2,766.8	202.6
2011 Population Change	1.8	1.3
2011 Persons per household[c]	2.74	2.57

Sources:
[a] (U.S. Census Bureau, 2012a)
[b] (U.S. Census Bureau, 2013)
[c] (U.S. Census Bureau, 2011)

Table 5-4
Percentage Population by Ethnicity in Fairfax County and State Project Impact Area

Demographic	Fairfax County[a]	Virginia[b]
2011 White Individuals (percent)	68.1	71.3
2011 Black Individuals (percent)	9.9	19.8
2011 American Indian and Alaskan Native Individuals (percent)	0.6	0.5
2011 Asian Individuals (percent)	18.0	5.8
2011 Native Hawaiian and Other Pacific Islander (percent)	0.1	0.1
2011 Individuals of Hispanic or Latino Origin (percent)	15.8	8.2

Sources:
[a] (U.S. Census Bureau, 2012a)
[b] (U.S. Census Bureau, 2012b)

5.1.3 Employment/Income by Industry in Local and State Project Impact Areas

The 2011 census recorded the local economy and workforce composition for Calvert County, Maryland, and Fairfax County, Virginia. Tables 5-5 and 5-6 display the existing income, employment and employment by industry in Calvert County, Maryland. Tables 5-7 and 5-8 display the local economy composition within Fairfax County, Virginia. The tables include per capita income, current unemployment rates (latest record), civilian labor force statistics, and composition for industry (e.g., manufacturing, transportation and public utilities, wholesale trade, retail trade, finance, agriculture, and construction).

Table 5-5
Existing Income and Employment in Calvert County and State Project Impact Area

Income Characteristic	Calvert County	Maryland
2011 Per Capita Income (dollars)	37,321	35,751
2007-2011 Population Below Poverty Level (percent)	4.6	9.0
2007-2011 Civilian Labor Force	47,794	3,137,066
December 2012 Unemployment Rate (percent)	5.5	6.6
Wholesale Trade Sales 2008 ($1,000)	5,590	411,394
Retail Sales 2008 ($1,000)	14,667	1,021,505
Accommodation and Food Service Sales 2008 ($1,000)	1,977	217,551

Sources:
(U.S. Census Bureau, 2011)
(U.S. Department of Labor, 2013)

Table 5-6
Employment by Industry in Calvert County and State Project Impact Area

Industry	Calvert County	Maryland
Civilian employed population 16 years and over	46,062	2,894,566
Agriculture, forestry, fishing and hunting, and mining	16	14,335
Construction	5,218	195,395
Manufacturing	1,637	147,304
Wholesale trade	1,100	58,101
Retail trade	5,589	279,098
Transportation and warehousing, and utilities	2,347	128,092
Information	1,232	67,052
Finance and insurance, and real estate and rental and leasing	2,125	175,054
Professional, scientific, and management and administrative and waste management	6,142	425,233
Educational service, and health care and social assistance	8,450	672,698
Arts, entertainment, and recreation, and accommodation and food services	3,243	234,397
Other service, except public administration	2,477	161,489
Public administration	6,486	336,318

Source:
(U.S. Census Bureau, 2011)

Table 5-7
Existing Income and Employment in Fairfax County and State Project Impact Area

Income Characteristic	Fairfax County[a]	Virginia[a]
2011 Per Capita Income (dollars)	$50,145	$33,040
2011 Poverty Rate (percent)	5.5	10.7
2011 Civilian Labor Force	615,665	4,144,559
December 2012 Unemployment Rate (percent)[b]	3.7	5.5
Wholesale Trade Sales 2007 ($1,000)	13,299,493	60,513,396
Retail Sales 2007 ($1,000)	14,002,361	105,663,299
Accommodation and Food Service Sales 2007 ($1,000)	2,705,714	15,340,483

Sources:
[a] (U.S. Census Bureau, 2011)
[b] (U.S. Department of Labor, 2013)

Table 5-8
Employment by Industry in Fairfax County and State Project Impact Area

Industry	Fairfax County	Virginia
Civilian employed population 16 years and over	581,115	3,8,31,491
Agriculture, forestry, fishing and hunting, and mining	1,251	41,449
Construction	32,349	255,916
Manufacturing	18,547	290,367
Wholesale trade	7,474	79,636
Retail trade	45,984	413,623
Transportation and warehousing, and utilities	16,949	158,889
Information	19,501	85,742
Finance and insurance, and real estate and rental and leasing	40,334	250,414
Professional, scientific, and management and administrative and waste management	139,723	556,573
Educational service, and health care and social assistance	97,185	815,573
Arts, entertainment, and recreation, and accommodation and food services	49,564	323,990
Other service, except public administration	36,322	199,537
Public administration	75,932	359,782

Source:
(U.S. Census Bureau, 2013)

5.1.3.1 Cove Point Liquefaction Facility

The unemployment rate in Calvert County, Maryland, as of December 2012 was 5.5 percent, which is below the statewide average of 6.6 percent and the national average of 7.8 percent. The County reports that its relatively low unemployment is a result of its proximity to Washington, DC [Calvert County fiscal year (FY) 2013 Commissioners Budget]. In 2011, per capita income for Calvert County was relatively high at $37,321, compared with $35,751 for Maryland.

During 2007-2011, the average civilian labor force in Calvert County, Maryland, was 47,794. This represents 1.5 percent of the statewide civilian labor force of 3,137,066. Table 5-6 summarizes the top employment sectors as of 2011 for Calvert County and Maryland. "Education, health care, and social assistance" is the leading employment sector in all regions, accounting for 8,450 jobs in Calvert County and 672,698 jobs statewide. "Public administration" is the second-highest employment category, accounting for 6,486 jobs in Calvert County and 336,318 jobs statewide. "Professional, scientific, management, administrative and waste" was the third-highest source of jobs in Calvert County, with 6,142 jobs. Retail trade came in fifth with 5,589 jobs in Calvert County. Statewide construction was the sixth highest source of jobs behind "professional, scientific, management, administrative and waste management;" "public administration;" "retail trade;" and "arts, entertainment, recreation, accommodation and food services."

5.1.3.2 Pleasant Valley Compressor Station

Fairfax County, Virginia, has a high per capita income of $50,145 compared to the State's average per capita income of $33,040 (U.S. Census Bureau, 2013). The unemployment rate in December 2012 was 3.7 percent for Fairfax County, which is below the Virginia unemployment rate of 5.5 percent (Table 5-7) (U.S. Department of Labor, 2013). In Fairfax County, the leading employment sector is "professional, scientific, management, administrative and waste management," with 139,723 jobs, and the second-highest employment category is "education service, and health care and social assistance," with 97,185 jobs (Table 5-8).

5.1.4 Temporary Housing Units Available in Local/State Project Impact Areas

5.1.4.1 Cove Point Liquefaction Facility

In Calvert County, Maryland, during the period of 2007-2011, there was an average of 3,180 vacant housing units, representing a vacancy rate of 1.6 percent, and an average of 4,868 renter-occupied housing units. There are 12 hotels, motels, and bed-and-breakfasts in Calvert County providing close to 800 rooms (Table 5-9). There are also many additional hotels, motels, and bed-and-breakfasts within 50 miles of Cove Point providing approximately 12,500 rooms. In addition, there are two campgrounds/RV parks in Calvert County, offering 175 sites (Table 5-9).

Table 5-9
Temporary Housing Units Available in Calvert County and State Project Impact Areas

Housing Characteristics	Calvert County	Maryland
2007 -2011 Number of Vacant Housing Units	3,180	240,791
2007-2011 Homeowner Vacancy Rate (percent)	1.6	2.0
2007-2011 Number of Renter Occupied Housing Units	4,868	666,669
2007-2011 Rental Vacancy Rate (percent)	5.5	8.1
2012 Number of Hotels/Motels/B&Bs	12	903
2012 Number of Campgrounds and RV Parks	2	37

Sources:
(U.S. Census Bureau, 2011)
(Calvert County, Maryland, Department of Economic Development, 2012)
(State of Maryland, 2012a)

5.1.4.2 Pleasant Valley Compressor Station

In Fairfax County, Virginia, the average number of vacant housing units from 2007-2011 was 20,824 units, representing a vacancy rate of 1.3 percent. In 2010, there were 125,616 occupied rental-housing units (Table 5-10) (U.S. Census Bureau, 2012d).

Table 5-10
Temporary Housing Units Available in the Fairfax County and State Project Impact Areas

Housing Characteristics	Fairfax County	Virginia
2007-2011 Number of Vacant Housing Units [a]	20,824	354,873
2007-2011 Homeowner Vacancy Rate (Percent)[a]	1.3	2.0
2010 Number of Renter Occupied Housing Units [b]	125,616	2,990,650
2007-2011 Rental Vacancy Rate (Percent)[a]	4.8	6.9
2012 Number of Hotels/Motels/B&Bs [c]	67	1868
2012 Number of Campgrounds and RV Parks[c]	2	248

Sources:
[a] (U.S. Census Bureau, 2011)
[b] (U.S. Census Bureau, 2012d)
[c] (Virginia, 2012)

Other temporary housing includes hotels, motels, bed-and-breakfasts, campgrounds/RV parks. Fairfax County, Virginia, contains 67 hotels, motels, and bed-and-breakfasts. Two campground/RV parks are located in Fairfax County. Within the two campgrounds/RV parks located in Fairfax County, Virginia, there are 236 sites with some providing electrical hookups for RVs and popups (Virginia, 2012).

5.1.5 County Revenues and Expenditures of Local and State Project Impact Area

5.1.5.1 Cove Point Liquefaction Facility

For FY2011, Calvert County, Maryland, reported General Fund Revenues of $230 million, with real property taxes accounting for $147 million, or 62.5 percent of revenues. Real property taxes include corporate taxes, payments in lieu of tax, and public utility taxes, which, combined, accounted for $39 million or 17 percent of County general fund revenues (Table 5-11). Calvert County reports that most revenues in this category are generated by the Calvert Cliffs Nuclear Power Plant and the LNG Terminal. In Maryland, localities levy an income tax that is based on statewide taxable income. In Calvert County, the local income tax rate is 2.8 percent, slightly below the Maryland average, and the local tax accounts for approximately 29 percent of County revenues.

Table 5-11
County Revenues and Expenditures in State Project Impact Area

Income Characteristic	Calvert County	Maryland
Revenues (2011 actual) (dollars)	230,753,440	13,564,128,890
Expenditures (2011 actual) (dollars)	222,892,676	13,262,080,593
Primary Revenue Source	Property Tax	Sales and Use Tax

Sources:
(Calvert County, Maryland, 2012a)
(State of Maryland, 2012b)

Total FY2011 General Fund Expenditures for Calvert County were $223 million, which was $7 million less than General Fund Revenues. Education accounted for $113 million, or 50.7 percent of County expenditures, and public safety accounted for $26 million, or 11.7 percent, of County expenditures.

5.1.5.2 Pleasant Valley Compressor Station

From FY2011, the Fairfax County, Virginia, General Fund Revenue was $3.5 billion (Table 5-12). The general fund real estate tax rate is $1.075 per $100 of assessed value for the FY2013. The personal property tax rate is $4.57 per $100 of assessed value for the FY2013. Personal property taxes in the FY2011 brought in $2.0 billion from real property taxes, and general fund real estate tax brought in $302 million. Fairfax County's FY2011 total expenditure was $3.3 billion. Public school operations in 2011 cost Fairfax County $1.6 billion (Fairfax County, 2012a).

Table 5-12
County Revenues and Expenditures in Fairfax County and State Project Impact Area

Income Characteristic	Fairfax County
Revenues (2011 actual) (dollars)	3,569,346,410
Expenditures (2011 actual) (dollars)	3,333,110,449
Primary Revenue Source	Property Taxes

Source:
(Fairfax County, 2012a)

5.1.6 Public Service Data

The public services data include the number of police and fire protection stations, hospitals, and public schools per county for the impact areas (Tables 5-13 and 5-14).

Table 5-13
Public Service Data for Calvert County and State Project Impact Area

	Calvert County	Maryland
Number of Public Schools	28	1,444
Number of Police Departments	1	88
Number of Fire Stations	7	342
Number of Hospitals	1	46
Number of Hospital Beds	98	10,729

Sources:
(50 States.com Maryland Police, 2012)
(50 States.com Maryland Fire Departments, 2012)
(Calvert County, Maryland, 2012b)
(Maryland Health Care Commission, 2012)
(Maryland State Department of Education, 2012a)
(Maryland Public Safety, 2012)

Table 5-14
Public Service Data for Fairfax County Project Impact Areas

	Fairfax County
Number of Public Schools	194
Number of Police Departments	8
Number of Fire Departments	38
Number of Hospitals	2
Number of Hospitals Beds	867

Source:
(Fairfax County, 2012b)

5.1.6.1 Cove Point Liquefaction Facility

Calvert County, Maryland is served by one hospital, the 98-bed Calvert Memorial Hospital in Prince Frederick, which is 17.8 miles north of Cove Point. Calvert County also includes seven fire stations, with the nearest station to the Cove Point Liquefaction Facility located 1.2 miles away on Little Cove Point Road in Lusby, Maryland.

The Calvert County Sheriff's Department, with 120 full-time deputies, is located in Prince Frederick, which is 16 miles from the Cove Point Liquefaction Facility. A Maryland State Police precinct station housing approximately 20 state troopers is also located in Prince Frederick.

5.1.6.2 Pleasant Valley Compressor Station

The 833-bed Inova Fairfax Hospital and the 34-bed Inova Fair Oaks Hospital serve Fairfax County, Virginia. The Inova Fair Oaks Hospital is approximately eight miles northeast of the Pleasant Valley Compressor Station, Suction/Discharge Pipelines, and M&R site (Fairfax County, 2012b). In Fairfax County, there are 38 fire and rescue stations with 300 volunteer and 1,600 career firefighters and emergency medical technicians. The closest fire station is the West Centerville Station 38, which is approximately 2.7 miles east of the Pleasant Valley Compressor Station, Suction/Discharge Pipelines, and M&R site (Fairfax County, 2012b).

In Fairfax County, the Sheriff's Department is located in Fairfax, Virginia, with 518 deputy sheriffs. The Fairfax police department has 1,402 officers. The closest district to the Pleasant Valley Compressor Station and the Pleasant Valley Suction/Discharge Pipelines is the Fair Oaks District. The Virginia State Police, Division 7, also patrols and has field stations throughout Fairfax County (Fairfax County, 2012b). The closest State Police field station to the Pleasant Valley Compressor Station, Suction/Discharge Pipelines, and M&R site is located in Leesburg, Virginia.

5.1.7 Schools

5.1.7.1 Cove Point Liquefaction Facility

Calvert County, Maryland contains 28 public schools with a total enrollment of 16,369 (Table 5-15).

Table 5-15
School Districts and School Enrollment in Calvert County Impact Area as of 2011/2012 Enrollment

	Calvert County		
Public Schools	**Number of Districts**	**Number of Schools**	**School Enrollment**
Elementary (K-5)		13	6,890
Middle (6-8)		6	9,479
High (9-12)		4	
Other/Charter		5	
Total	1[a]	28	16,369

[a] Calvert County has one school district which includes numerous elementary, middle and high schools.
Sources:
(National Center for Education Statistics, 2012)
(Maryland State Department of Education, 2012a)
(Calvert County, Maryland Public Schools, 2012)
(Calvert County Board of Education, 2012)
(State of Maryland, Maryland State of Department of Education, 2012)

Maryland public schools ranked first in the nation, according to the January 2012 edition of Education Week's annual "Quality Counts" study, which examines six critical categories of education quality. Maryland received the highest grade, the only "B-plus" rating, followed by Massachusetts, New York, and Virginia, all of which received B grades. Most other states received grades in the C range or lower (Maryland State Board of Education, 2012).

According to a 2012 Washington Post analysis of the Maryland School Assessment, Calvert County schools are among the highest-performing in the State, with 50.7 percent of students reaching an “advanced” reading level (compared to 39.6 percent statewide), and only 6.9 percent reading at a “basic” (considered “not passing”) reading level (compared to 14.2 percent statewide). In mathematics, 42.5 percent of Calvert County students reach an advanced level (compared to 32.9 percent statewide) and only 10.8 percent reach only a basic level (compared to 20.0 percent statewide). In science, 15.3 percent are at an advanced level (8.2 percent statewide), and 13.9 percent are at a basic level (31.8 percent statewide) (Chandler et al., 2012).

According to the Calvert County Department of Planning and Zoning, Calvert County elementary school enrollment in 2012 is at 85.6 percent of capacity, middle schools are at 77.4 percent of capacity, and high schools are at 103.8 percent of capacity. One high school in the County, Northern High in the northern part of the county, has enrollment that is 121.4 percent of capacity and is the only school in the County with enrollment that exceeds capacity (Calvert County, Maryland Department of Planning and Zoning, 2012).

5.1.7.2 Pleasant Valley Compressor Station

Virginia public schools ranked fourth in the Nation, according to the January 2012, edition of Education Week’s annual “Quality Counts.” Virginia received a “B” rating following Maryland, Massachusetts and New York (Virginia Education, 2012). Fairfax County, Virginia, contains 194 schools with a total enrollment of 164,515. There are also 2,119 students that are homeschooled or exempt for religious purposes (Table 5-16).

Table 5-16
School Districts and School Enrollment in Fairfax County as of 2011/2012 Enrollment

	Fairfax County		
Public Schools	**Number of Districts**	**Number of Schools[b]**	**School Enrollment[c]**
Elementary (K-5)		141	69,950
Middle (6-8)		27	39,201
High (9-12)		26	55,364
Homeschool/religious exempt	N/A	N/A	2,119
Total	9[a]	194	166,634

[a] The number of elementary, middle and high schools in Fairfax County are spit among nine districts.
Sources:
[b] (Fairfax County Public Schools, 2011)
[c] (Virginia Department of Education, 2011)

Fairfax County public high schools were ranked as the top high schools by *Newsweek* in 2010. The Fairfax County public schools had a graduation rate of 4.6 percent higher than the average Virginia graduation rate of 86.6 percent (Fairfax County Public Schools, 2011).

5.1.8 Traffic and Transportation Routes

5.1.8.1 Cove Point Liquefaction Facility

Calvert County is bisected by one main artery, State Route 2/4, which runs from the northern end to the southern end of the County. The Cove Point Liquefaction Facility is accessible from Route 2/4 via Cove Point Road. During 2011, Annual Average Daily Traffic (AADT) data collected by the Maryland State Highway Administration (SHA) indicates that an average of 21,550 vehicles traveled daily in either direction on Route 4 at Cove Point Road. To the north (toward Washington, DC, Annapolis, and Baltimore), AADT increased to 37,910 vehicles in the Town of Prince Frederick (the Calvert County seat and major commercial center), and to 39,930 just before the highway forks in the directions of Washington, DC (State Route 4), and Annapolis (State Route 2). To the south, at the two-lane Governor Thomas Johnson Bridge, which crosses the Patuxent River at Solomons into St. Mary's County, AADT was 24,550 (Table 5-17). State Route 2 goes east at this point and terminates at Solomons Island.

Table 5-17
Traffic Routes with Annual Average Daily Traffic, Calvert County

Road	ADDT	ADDT Study Area
Governor Thomas Johnson Bridge (State Route 4)	24,550	Governor Thomas Johnson Bridge over the Patuxent River at Solomons into St. Mary's County
State Route 4	21,550	State Route 4 at Cove Point Road
State Route 4	37,910	State Route 4 through Prince Frederick
State Route 4	39,930	Before State Route 4 folks in the directions of Washington, DC and Annapolis
Route 765 (H.G. Trueman Boulevard)	3,670	Route 765 at Cove Point Road
Cove Point Road	7,370	All of Cove Point Road

Source:
(Maryland Department of Transportation, 2012)

H.G. Trueman Boulevard (Route 765) runs roughly parallel to Route 2/4. In 2011, the intersection of Route 765 and Cove Point Road had an AADT of 3,670. The estimated 2011 AADT for Cove Point Road itself was 7,370, which consists of vehicles turning on or off Cove Point Road from both Route 2/4 and Route 765.

Maryland has a comprehensive intermodal freight network that includes the Port of Baltimore. The port has a main shipping channel that is 800-feet wide and has a controlling depth of 50 feet and is one of only two east coast deepwater ports that can support large, modern, deep-draft ships. The Port of Baltimore is approximately 84 nautical miles north of Cove Point by water and 76 statute miles north of Cove Point by land. Baltimore Washington Thurgood Marshall International Airport is 70 miles from the LNG Terminal, and is one of three major airports serving the greater Baltimore-Washington region. The other two airports, Washington Dulles International and Ronald Reagan Washington National Airport, are 84 and 60 miles, respectively, from the LNG Terminal. Maryland also has a 1,157-mile rail network, including two Class I freight railroads, four Class III short line freight carriers, one switching/terminal railroad, and one passenger railroad. The closest rail freight access to/from the LNG Terminal is in Baltimore, which is 74 highway miles away, or Washington, DC, which is 54 highway miles away (Maryland Department of Transportation, 2009).

5.1.8.2 Pleasant Valley Compressor Station

Major highways that run through Fairfax County include the Capital Beltway (Interstate 495), Interstate 66, Interstate 95, and Interstate 395. Major roads close to the Pleasant Valley Compressor Station, Suction/Discharge Pipelines, and M&R site, include State Route 609, east of the Compressor Station, and State Route 620, north of the Compressor Station. State Route 609 and State Route 620 were not included in the Virginia Department of Transportation (VDOT) 2010 AADT survey (Commonwealth of VDOT, 2010).

Air transportation in Fairfax County is provided by Washington Dulles International Airport, approximately seven miles north of the Pleasant Valley Compressor Station and the Pleasant

Valley Suction/Discharge Pipelines. Public transportation is also available using metro bus service and Washington metro trains for Fairfax County (Fairfax County, 2012b).

5.2 Impacts during Project Construction and Operation

The following sections describe the potential socioeconomic impacts of the Project during the approximately three-year construction period and during operation. These impacts include increases in employment, household income, business sales, tax revenues associated with direct Project spending, and indirect impacts associated with spending by new employees. Potential negative impacts include new demands placed on the road network, schools, emergency and medical capacities, and other public services. Although increased demand for goods and services provided by local businesses, such as hotels and restaurants, will have mostly positive socioeconomic impacts, it may also result in some temporary supply shortages that could have negative impacts. As discussed in the economic study (Appendix 5-A), DCP expects positive socioeconomic impacts on the Maryland and Virginia Project areas from construction and operation of the Project.

5.2.1 Population and Employment

5.2.1.1 Cove Point Liquefaction Facility

Upon receipt of authorizations and approvals, construction of the Project is proposed to begin in first quarter 2014, and operations in June 2017. Numerous comments were received during the FERC Pre-filing Process on the employment opportunities at the Cove Point Liquefaction Facility. Table 5-18 summarizes the employment impact of the Project's construction and operations. A job-year is defined as one person working one job for one year. For Calvert County, Maryland, the mid-case estimate is that approximately 12,361 job-years will be supported. Of these job-years, about six of every seven workers are associated with construction. For the rest of Maryland, almost 6,187 job-years are linked to the total project with about three of every four of these jobs occurring during the construction phase. Table 5-19 summarizes the employment impacts of Project construction. Over the life of the construction period, almost 8,966 job-years will be created in Calvert County. An additional 2,818 job-years will occur in other jurisdictions in Maryland. The peak year for impacts will be 2015 in the midst of actual construction activities. Once the facility is operating, it will generate approximately 1,686 job-years associated with operation and maintenance related to Project and employee spending.

Table 5-18
Total Economic Impacts of Construction and Operations—Job Years of Work (mid-case estimates)

Phase	***Calvert County***	***Rest of Maryland***
	Mid-case	**Mid-case**
Construction	10,675	4,742
Operations	1,686	1,445
Total	12,361	6,187

Note: A job is defined as one person working one job for one year. (Appendix 5-A)

Table 5-19
Total Economic Impacts of Construction—Job Years of Work (mid-case)

Year	*Calvert County*			*Rest of Maryland*		
	Direct	**Indirect**	**Induced**	**Direct**	**Indirect**	**Induced**
2014	1,855	347	458	216	336	597
2015	2,167	375	527	11	291	499
2016	2,078	360	506	10	279	479
2017	210	33	50	9	35	56
Subtotal	6,310	1,115	1,541	246	941	1,631
Total	8,966			2,818		

Note: A job is defined as one person working one job for one year. (Appendix 5-A)

During 2015, the peak year of construction activities, an estimated 2,167 direct construction-related jobs will be created (Table 5-19). Table 5-20 contains the construction workforce by peak number of workers per quarter for construction activities at the LNG Terminal (this does not include subcontractors). According to the 2007-2011 American Community Survey, the five-county region that falls within 50 miles of DCP (Anne Arundel, Calvert, Charles, Prince George's, and St. Mary's counties) has nearly 73,000 people employed in the construction industry (U.S. Census Bureau, 2011). Given the size of the regional construction workforce, DCP expects that construction workers will come from the general region, but would not necessarily be local hires because of the specialized construction experience required. The number of non-local hires is not known at this time.

Table 5-20
Construction Workforce by Peak Number of Workers per Quarter for the Period of Construction

Quarter	**Cove Point Liquefaction Project**
3rd Q 2014	116
4th Q 2014	155
1st Q 2015	185
2nd Q 2015	717
3rd Q 2015	1441
4th Q 2015	1045
1st Q 2016	1132
2nd Q 2016	1232
3rd Q 2016	793
4th Q 2016	381
1st Q 2017	85
2nd Q 2017	32

The construction labor force will be provided by the building trades with jurisdiction over the Cove Point Liquefaction Facility. The percentage of the workforce local to the area will be dependent on several factors, including, but not limited to:

- Availability of local workers.
- Timing of need for different skilled trades.
- Other ongoing work in the area.

DCP's contractor cannot commit to hiring a certain percentage of local workers, but has made the commitment to work with the local building trades to staff the Project.

The average family size in the U.S. is 3.21 (U.S. Census Bureau, 2011) indicating that any non-local workers relocating to the area on a temporary basis can be anticipated to increase the local population size by an equal amount. Some types of construction jobs and the workers who fill them will change throughout the construction period. The impermanence of some specific construction jobs within the construction period can be expected to limit the in-migration of families.

The proposed Project will be constructed under a Project Labor Agreement (PLA). The contractor is working closely with highly specialized labor unions in Maryland.

Labor income associated with this employment is presented in Table 5-21. The mid-case estimate of total labor income for the entire construction period is over $492 million for Calvert County and over $210 million elsewhere in the State. These values are presented in terms of 2012 dollars. The peak year for labor income associated with facility construction is 2015.

Table 5-21
Economic Impacts of Construction—Labor Income (millions of 2012 dollars)

Year	*Calvert County*			*Rest of Maryland*		
	Low-case	**High-case**	**Mid-case**	**Low-case**	**High-case**	**Mid-case**
2014	$124.1	$155.1	$139.6	$72.3	$90.4	$81.4
2015	$147.0	$183.7	$165.4	$53.8	$67.3	$60.6
2016	$140.2	$175.5	$157.9	$51.5	$64.4	$57.9
2017	$28.1	$31.6	$29.8	$10.0	$11.7	$10.8
Total	$439.4	$545.9	$492.7	$187.6	$233.8	$210.7

Sources: [Dominion, Sage (Appendix 5-A)]

The start of operations is set for June 2017. The following discussion of operational impacts is based on full operations from 2017 through 2040. This approximately 24-year period reflects the long-term relationships that DCP anticipates entering with its customers.

Table 5-22 provides a breakdown of employment impacts associated with proposed Project operations. In the first year of operations in 2017, the equivalent of 76 job-years in the County and another 65 job-years elsewhere in the State will be created. Starting in 2018 and continuing through 2040, 70 job-years in the County and an added 60 job-years in the rest of Maryland will be supported each year. For the total period of analysis, the County will benefit from 1,686 job-years and the rest of the State will experience an additional 1,445 job-years as a consequence of the proposed Project's operations.

Table 5-22
Economic Impacts of Operations—Job Years of Work

Year	*Calvert County*			*Rest of Maryland*		
	Direct	**Indirect**	**Induced**	**Direct**	**Indirect**	**Induced**
2017	24	30	22	5	38	22
	Total: 76			*Total: 65*		
Annually 2018 through 2040	22	28	20	4	36	20
	Total: 70			*Total: 60*		
2017 through 2040	530	674	482	97	866	482
	Total: 1,686			Total: 1,445		

Sources: [Dominion, Sage (Appendix 5-A)]

The annual labor income associated with the employment created by the LNG Terminal is estimated at $8.7 million for the County and another $1.9 million for other Maryland jurisdictions. From 2017 through 2040, total labor income impacts are estimated to be over $209 million for the County and nearly $46 million for the rest of Maryland as shown in Table 5-23.

Table 5-23
Economic Impacts of Operations—Labor Income per Year (millions of 2012 dollars)

Year	Calvert County	Rest of Maryland
2017	$9.4	$2.1
Annually 2018 through 2040	$8.7	$1.9
Total: 2017 through 2040	$209.5	$45.8

Sources: [Dominion, Sage (Appendix 5-A)]

The Cove Point Liquefaction Facility will expand the total number of employees from 107 existing employees to a total of 200 future employees. These employees will be comprised of a mix of office workers contributing to peak commute hours ranging from 6:30 a.m. to 8:30 a.m. and 4:30 p.m. to 5:45 p.m. along Cove Point Road (Appendix 5-B).

5.2.1.2 Pleasant Valley Compressor Station

Upon receipt of authorizations and approvals, construction of the additional compression, new pipelines, and upgrades to the existing M&R site for the Project is proposed to begin in 1st quarter 2016, and operations to begin by June 2017. The construction of the additional compressor units, and instillation of few pipelines, and M&R site upgrades will generate 1,005 job-years. These jobs are temporary in nature and will only be supported during the one-year construction period. The construction workforce by peak number of worker per quarter for the period of construction are listed in Table 5-24. These jobs are temporary in nature and will only be supported during the two-year construction period.

Table 5-24
Construction Workforce by Peak Number of Workers per Quarter for the Period of Construction

Quarter	Pleasant Valley Compressor Station
1st Q 2016	25
2nd Q 2016	75
3rd Q 2016	150
4th Q 2016	150
1st Q 2017	150
2nd Q 2017	150
3rd Q 2017	75
4th Q 2017	10

Given Fairfax County's large population and labor force, Fairfax County has more opportunities to meet the demands of complex projects and as a consequence is more likely to capture the direct impacts of such projects through its (i.e., County-based) labor force. The greater complexity of the Fairfax County economy also means that the local labor force and business community can capture a greater share of the indirect impacts inuring to the supply chain that supports the direct construction activities.

5.2.2 Economic Activity

5.2.2.1 Cove Point Liquefaction Facility

Numerous comments were received during the FERC Pre-filing Process on the economic benefits of the Project in Calvert County. The Project would create permanent and temporary jobs at the LNG Terminal and would increase tax payments to Calvert County. Economic benefits are described in detail below.

The construction of the Cove Point Liquefaction Facility and the temporary use of Offsite Areas will have value impacts due to construction (Table 5-25). The mid-case estimate of these contributions to gross county product totals $617 million for Calvert County and another $318 million for other Maryland jurisdictions. The peak year for these impacts is 2014 when the mid-case value added impact is $182 million for the County and $127 million for the balance of the State.

Table 5-25
Economic Impacts of Construction—Value Added (millions of 2012 dollars)

Year	*Calvert County*			*Rest of Maryland*		
	Low-case	**High-case**	**Mid-case**	**Low-case**	**High-case**	**Mid-case**
2014	$162.2	$202.7	$182.4	$112.5	$140.6	$126.6
2015	$188.3	$235.3	$211.8	$81.7	$102.1	$91.9
2016	$178.7	$223.8	$201.3	$78.1	$97.7	$87.9
2017	$19.1	$23.7	$21.4	$10.2	$12.7	$11.5
Total	$548.3	$685.5	$616.9	$282.5	$353.1	$317.9

Sources: [Dominion, Sage (Appendix 5-A)]

The construction of the Cove Point Liquefaction Facility and the temporary use of the Offsite Areas will generate billions of dollars of business sales for companies in the State. The total business sales impact for the County (mid-case estimate) is nearly $1.2 billion. Another approximately $515 million in business sales will be garnered by other establishments elsewhere in the State. In 2015, when business sales will peak, County businesses are expected to garner approximately $410 million in sales, while businesses in other parts of the State will receive an additional $150 million (Table 5-26). Thus, construction of the Project will significantly improve business outcomes, increase employment and associated labor income.

Table 5-26
Economic Impacts of Construction—Business Sales (millions of 2012 dollars)

Year	*Calvert County*			*Rest of Maryland*		
	Low-case	**High-case**	**Mid-case**	**Low-case**	**High-case**	**Mid-case**
2014	$307.6	$384.4	$346.0	$179.3	$224.1	$201.7
2015	$364.3	$455.4	$409.9	$133.4	$166.8	$150.1
2016	$344.9	$432.3	$388.6	$127.0	$159.0	$143.0
2017	$37.2	$46.0	$41.6	$17.7	$22.0	$19.9
Total	$1,054.0	$1,318.1	$1,186.1	$457.4	$571.9	$514.7

Sources: [Dominion, Sage (Appendix 5-A)]

Value added and business sales associated with the Cove Point Liquefaction Facility operations are summarized in Table 5-27 and 5-28, respectively. For the County, annual value added impacts are estimated at approximately $23 million while for other areas of the State the annual impact is approximately $3 million. Over the total period considered in this analysis, County-level value added impacts are approximately $544 million while impacts for the rest of the State are approximately $75 million. Business sales impacts for the County are estimated at $54 million annually and at $1.3 billion from 2017 through 2040. Elsewhere in Maryland, business sales impacts are estimated at $12 million per year and $79 million for the 2017-2040 period.

Table 5-27
Economic Impacts of Operations—Value Added per Year (millions of 2012 dollars)

Year	Calvert County	Rest of Maryland
2017	$24.5	$3.4
Annually 2018 through 2040	$22.6	$3.1
Total: 2017 through 2040	$544.3	$74.7

Sources: [Dominion, Sage (Appendix 5-A)]

Table 5-28
Economic Impacts of Operations—Business Sales per Year (millions of 2012 dollars)

Year	Calvert County	Rest of Maryland
2017	$58.5	$12.6
Annually 2018 through 2040	$54.0	$11.6
Total: 2017 through 2040	$1,300.5	$279.4

Sources: [Dominion, Sage (Appendix 5-A)]

Economic impacts from construction and operations can be combined to estimate the total impacts of the Calvert County Project areas from the onset of construction in 2014 through more than two decades of operations. As the following tables make clear, the proposed Project is capital intensive (Tables 5-18, 5-29, 5-30, 5-31). The construction phase of a multi-billion dollar facility will create large economic impacts and benefits for Calvert County and the rest of Maryland. Once operations begin, the level of economic activity subsides, but still represents a substantial ongoing contribution to the economy of the County and the State.

Table 5-29
Total Economic Impacts of Construction and Operations—Labor Income (millions)

Phase	*Calvert County*			*Rest of Maryland*		
	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case
Construction	$510.4	$634.7	$572.6	$301.3	$375.9	$338.6
Operations	$210.1	$210.1	$210.1	$45.2	$45.2	$45.2
Total	$720.5	$844.8	$782.7	$346.5	$421.1	$383.8

Sources: [Dominion, Sage (Appendix 5-A)]

Table 5-30
Total Economic Impacts of Construction and Operations—Value Added (millions)

Phase	*Calvert County*			*Rest of Maryland*		
	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case
Construction	$649.7	$812.4	$731.1	$463.3	$579.2	$521.2
Operations	$543.4	$543.4	$543.4	$74.0	$74.0	$74.0
Total	$1,193.1	$1,355.8	$1,274.5	$537.3	$653.2	$595.2

Sources: [Dominion, Sage (Appendix 5-A)]

Table 5-31
Total Economic Impacts of Construction and Operations—Business Sales (millions)

Phase	*Calvert County*			*Rest of Maryland*		
	Low-case	**High-case**	**Mid-case**	**Low-case**	**High-case**	**Mid-case**
Construction	$1,230.1	$1,538.2	$1,384.1	$739.2	$924.2	$831.7
Operations	$1,300.0	$1,300.0	$1,300.0	$279.5	$279.5	$279.5
Total	$2,530.1	$2,838.2	$2,684.1	$1,018.7	$1,203.7	$1,111.2

Sources: [Dominion, Sage (Appendix 5-A)]

Table 5-18 summarizes the employment impacts of the Project's construction and operations. For the County, the mid-case estimate is that 12,361 job-years will be supported. Approximately six of every seven workers are associated with construction. For the rest of Maryland, almost 6,200 job-years are linked to the total Project with approximately three of every four of these jobs occurring during the construction phase.

Labor income for the total Project is summarized in Table 5-29. County-based workers will receive more than $780 million in compensation from 2014 through 2040 with more than 70 percent of this compensation occurring during the construction phase. In the remainder of the State, workers will earn more than $380 million as a result of the Project, with almost 90 percent occurring during the construction phase.

Value-added impacts for the entire Project are listed in Table 5-30. The mid-case estimate of this impact in the County is $1.3 billion, almost 60 percent of which is tied to the construction phase. For the remainder of the State, the mid-case estimate of total value added for the entire Project is $595 million with more than 85 percent of the impact linked to the construction phase.

Finally, the totality of business sales associated with construction and operations is shown in Table 5-31. County-wide business sales supported by the Project will be nearly $2.7 billion (mid-case estimate) with just over half of these sales occurring during the construction phase. In other Maryland jurisdictions, business sales supported by the Project are $1.1 billion with three-quarters of these sales occurring during the construction phase.

5.2.2.2 Pleasant Valley Compressor Station

Table 5-32 summarizes economic impacts of the Pleasant Valley Compressor Station, Pleasant Valley Suction/Discharge Pipelines and Pleasant Valley M&R site in Fairfax County. Local employment would be increased by 1,005 jobs with associated income approaching $57 million. Businesses in Fairfax County would garner $148 million in sales related to the Project directly and secondarily. In this scenario, statewide impacts, including those in Fairfax County, include 1,169 jobs with associated compensation of approximately $66 million and statewide business sales of $173 million.

Table 5-32
Economic Impacts of Construction--Fairfax County

	Direct Impacts	Indirect Impacts	Induced Impacts	Total
Fairfax County				
Jobs (years of work)	682	167	156	1,005
Income (millions)	$36.5	$13.2	$6.9	$56.6
Business sales (millions)	$94.5	$31.1	$22.3	$147.9
Virginia (including Fairfax County)				
Jobs (full- and part-time)	682	216	271	1,169
Income (millions)	$36.5	$17.0	$12.0	$65.5
Business sales (millions)	$94.5	$40.2	$38.8	$173.4

Sources: [Dominion, IMPLAN, Sage (Appendix 5-A)]

These somewhat larger economic impacts give rise to somewhat larger fiscal impacts. As noted in Table 5-33, the total fiscal impact for Fairfax County is estimated at $4.7 million.

Table 5-33
Fiscal Impacts of Construction—Fairfax County (millions)

Type of tax	Value
Sales	$1.0
Income	$1.2
Property	$1.5
All other	$0.9
Total	$4.7

Source: [IMPLAN (Appendix 5-A)]

5.2.3 Construction Payroll and Material Purchases

5.2.3.1 Cove Point Liquefaction Facility

The total construction payroll for construction at the Cove Point Liquefaction Facility and the temporary use of the Offsite Areas are estimated at $3.0 billion (Table 5-34). It is estimated that between $37.5 and $52 million in construction materials will be purchased from southern Maryland and Maryland-area suppliers (Table 5-35). Contractor supplies and material includes material purchased by the contractor and brought to the job. It is expected that construction material purchases and construction payroll dollars spent locally to exhibit a positive impact on the Project communities.

Table 5-34
Mid-range Project Cost Estimate (millions of 2011 dollars)

Cost element	Value
Engineering	$150
Equipment and Materials	$750
Freight	$90
Civil, Mechanical and Structural	$610
Electrical and Instrumentation	$200
Insulation and Coatings	$180
Project Management	$230
Miscellaneous (permitting, inspection, third party engineering, operations support, property, commissioning and start up, legal, geotechnical work, taxes, site utilities, security, road upgrades, etc.)	$790
Total	$3,000

Source: [Dominion, Sage (Appendix 5-A)]

Table 5-35
Estimated Range of Project Costs by Year—2011 to 2017 (millions of 2011 dollars)

Case/Cost Element	2011	2012	2013	2014	2015	2016	2017	Total
Low-case								
Technical Services	$12.50	$181.25	$118.75	$118.75	$25.00	$25.00	$6.25	$487.50
Construction Labor	$0.00	$0.00	$0.00	$250.00	$375.00	$375.00	$37.50	$1,037.50
Equipment	$0.00	$0.00	$437.50	$312.50	$125.00	$62.50	$0.00	$937.50
Material Cost	$0.00	$0.00	$0.00	$6.25	$12.50	$12.50	$6.25	$37.50
Total	$12.50	$181.25	$556.25	$687.50	$537.50	$475.00	$50.00	$2,500.00
High-case								
Technical Services	$18.00	$253.00	$166.00	$166.00	$35.00	$35.00	$8.00	$681.00
Construction Labor	$0.00	$0.00	$0.00	$350.00	$525.00	$525.00	$53.00	$1,453.00
Equipment	$0.00	$0.00	$613.00	$438.00	$175.00	$88.00	$0.00	$1,314.00
Material Cost	$0.00	$0.00	$0.00	$8.00	$18.00	$18.00	$8.00	$52.00
Total	$18.00	$253.00	$779.00	$962.00	$753.00	$666.00	$69.00	$3,500.00

Source: [Sage (Appendix 5-A)]

5.2.3.2 Pleasant Valley Compressor Station

The total construction payroll for the additional compression is estimated at $37 million at the Pleasant Valley Compressor Station, Suction/Discharge Pipelines, and M&R site. It is assumed that construction materials will be purchased from northern Virginia and Virginia-area suppliers.

It is expected that construction material purchases and construction payroll dollars will be spend locally will have a positive impact on the Project communities.

5.2.4 Tax Revenues

5.2.4.1 Cove Point Liquefaction Facility

Numerous comments were received on the potential for positive impacts to tax revenues from the LNG Terminal. Construction activities at the Cove Point Liquefaction Facility and Offsite Areas will generate a total of approximately $11.6 million in income taxes over the life of the Project (Table 5-36). The State of Maryland will collect an estimated $59 million in income and sales taxes during the 2014 though 2040 period (Table 5-37). The operation of the Cove Point Liquefaction Facility is expected to generate revenues of $8.6 million in average income taxes.

Table 5-36
Fiscal Impacts of Construction and Operations, 2014 through 2040—Calvert County Income Taxes (thousands of 2012 dollars)

Year	Low-case	High-case	Mid-case
Construction	$10,372	$12,899	$11,636
Operations	$4,270	$4,270	$4,270
Total	$14,642	$17,169	$15,906

Sources: [Dominion, Maryland Comptroller, Sage (Appendix 5-A)]

Table 5-37
Fiscal Impacts of Construction and Operations, 2014 through 2040 —Maryland Income and Sales Taxes (thousands of 2012 dollars)

Year	*Income taxes*			*Sales taxes*			*Total*		
	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case
Construction	$27,350	$34,053	$30,702	$13,951	$17,371	$15,661	$41,301	$51,424	$46,363
Operations	$8,602	$8,602	$8,602	$4,388	$4,388	$4,388	$12,990	$12,990	$12,990
Total	$35,952	$42,655	$39,304	$18,339	$21,759	$20,049	$54,291	$64,414	$59,353

Sources: [Dominion, Maryland Comptroller, Sage (Appendix 5-A)]

The mid-case estimate of total Calvert County income tax receipts for the construction phase is $10.3 million as shown in Table 5-38. As shown in Table 5-39, Maryland income and sales tax receipts during the construction phase are estimated at $24 million and $12 million, respectively (mid-case). Total income and sales tax receipts are estimated at $36 million during construction.

Table 5-38
Fiscal Impacts of Construction—Calvert County Income Taxes[a] (thousands of 2012 dollars)

Year	Low-case	High-case	Mid-case
2014	$2,588	$3,235	$2,911
2015	$3,066	$3,832	$3,449
2016	$2,925	$3,660	$3,293
2017	$585	$660	$622
Total	$9,164	$11,387	$10,275

[a] Calvert County taxes are estimated on the basis of an effective average income tax rate of approximately 2.1 percent based on actual income tax receipts for the County as reported by the Maryland Comptroller.
Sources: [Dominion, Maryland Comptroller, Sage (Appendix 5-A)]

Table 5-39
Fiscal Impacts of Construction—Maryland Income[a] and Sales[b] Taxes (thousands of 2012 dollars)

Year	*Income taxes*			*Sales taxes*			*Total*		
	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case
2014	$6,792	$8,491	$7,641	$3,465	$4,331	$3,898	$10,257	$12,822	$11,539
2015	$6,945	$8,681	$7,813	$3,543	$4,428	$3,985	$10,487	$13,109	$11,798
2016	$6,630	$8,295	$7,463	$3,382	$4,231	$3,807	$10,012	$12,527	$11,269
2017	$1,315	$1,498	$1,406	$671	$764	$717	$1,985	$2,263	$2,124
Total	$21,682	$26,965	$24,323	$11,061	$13,754	$12,407	$32,743	$40,719	$36,730

[a] State of Maryland taxes are estimated on the basis of an effective average income tax rate of approximately 3.4 percent based on actual income tax receipts for the state as reported by the Maryland Comptroller.
[b] Sales taxes are estimated at roughly 51 percent of state income taxes based on actual sales and income tax receipts for the State as reported by the Maryland Comptroller.
Sources: [Dominion, Maryland Comptroller, Sage (Appendix 5-A)]

Once operations commence, Calvert County will collect income taxes on labor income associated with the operational workers and the multiplier effect of their activities. The annual estimate of these receipts is $177,000. Over the 2017 through 2040 period, total County income tax receipts are estimated at $4.3 million. See Table 5-40 for relevant statistical detail.

Table 5-40
Fiscal Impacts of Operations—Calvert County Income Taxes (thousands of 2012 dollars)

Year	Value
2017	$192
Annually 2018 through 2040	$177
Total: 2017 through 2040	$4,263

Sources: [Dominion, Maryland Comptroller, Sage (Appendix 5-A)]

During the entire operational phase, Maryland income and sales tax receipts will total an estimated $13 million (Table 5-41). Two-thirds of this total will come from income taxes with the remainder from the state sales tax.

Table 5-41
Fiscal Impacts of Operations—Maryland Income and Sales Taxes (thousands of 2012 dollars)

Year	Income Taxes	Sales Taxes	Total
2017	$387	$197	$584
Annually 2018 through 2040	$357	$182	$539
Total: 2017 through 2040	$8,598	$4,383	$12,981

Sources: [Dominion, Maryland Comptroller, Sage (Appendix 5-A)]

Because tax receipts tied to the construction and operational phases are distinct, they can be added to provide an estimate of total receipts over the entirety of construction and operational periods taking place from 2014 through 2040. As indicated by Table 5-42, Calvert County will receive an estimated $16 million in income taxes as a result of the Project (mid-case estimate).

Table 5-42
Fiscal Impacts of Construction and Operations —Calvert County Income Taxes (thousands of 2012 dollars)

Year	Low-case	High-case	Mid-case
Construction	$10,372	$12,899	$11,636
Operations	$4,270	$4,270	$4,270
Total	$14,642	$17,169	$15,906

Sources: [Dominion, Maryland Comptroller, Sage (Appendix 5-A)]

As reflected in Table 5-43, the State of Maryland will collect more than $59 million in income and sales taxes over the entire 2014 through 2040 period. More than 65 percent of these receipts will be income taxes with the remainder taking the form of sales taxes. Calvert County will benefit from income taxes paid by residents as a consequence of the proposed Project. In peak construction years, it is estimated that these receipts will exceed $3 million annually. Once the Project is operational, these income tax receipts will approach $180,000 per annum.

Table 5-43
Fiscal Impacts of Construction and Operations—Maryland Income and Sales Taxes (thousands of 2012 dollars)

Year	*Income taxes*			*Sales taxes*			*Total*		
	Low-case	**High-case**	**Mid-case**	**Low-case**	**High-case**	**Mid-case**	**Low-case**	**High-case**	**Mid-case**
Construction	$27,350	$34,053	$30,702	$13,951	$17,371	$15,661	$41,301	$51,424	$46,363
Operations	$8,602	$8,602	$8,602	$4,388	$4,388	$4,388	$12,990	$12,990	$12,990
Total	$35,952	$42,655	$39,304	$18,339	$21,759	$20,049	$54,291	$64,414	$59,353

Sources: [Dominion, Maryland Comptroller, Sage (Appendix 5-A)]

These fiscal impacts, however, will be minor compared to the property taxes generated by the Cove Point Liquefaction Facility itself. Property values and associated property taxes for major utility facilities such as this Project are much harder to estimate than more typical new real property development.

It is estimated that the gross Calvert County property tax bill for the proposed Project will be approximately $40 million per annum. Property taxes for new major facilities like the proposed Project are often subject to credits and similar measures that reduce payments during the early life of a new facility. In time, however, such reductions expire and the total tax bill is levied each year. Thus, regardless of temporary reductions, the proposed facility will pay an estimated annual property tax bill of $40 million for most of the period discussed in this Report.

It is worth placing $40 million in new property tax revenues in context for Calvert County, one of the smaller counties in the State in terms of population. Property taxes support the general funds of local governments. General funds are in turn devoted to the basic operations of local government—public safety, education, public works, libraries, and similar functions. Table 5-44 provides budgetary detail for three recent Calvert County general fund budgets. The addition of $40 million to the County's general fund would represent a major increase in these budgets. Another perspective on the impact of this increase in property tax revenue can be seen in the estimated $146 million in County property taxes that are expected to support the FY2012 County budget. An additional $40 million would represent an increase of 27 percent over the County's current property tax revenue.

Table 5-44
Recent Calvert County General Fund budgets (millions)

General Fund component	***FY 2011 actual budget***	***FY 2012 adopted budget***	***FY 2013 Staff Recommended budget***
Property tax	$146.8	$146.1	$140.2
Income tax	62.7	61.5	65.0
All other general fund revenue	21.3	24.4	27.1
Total general fund revenue	$230.8	$232.0	$232.3

Source: [Calvert County government (Appendix 5-A)]

Comments were received about impacts to property values from the construction of the LNG Terminal. The LNG Terminal was built in the early 1970s. Therefore, property/residential purchases since that time have been done with real property values reflecting the presence of the gas infrastructure. Measures are being proposed to mitigate potential adverse impacts from noise or air emissions, or other potential environmental impacts. The new facilities will be constructed within the fenced area of the existing industrial area.

5.2.4.2 Pleasant Valley Compressor Station

The investment of $100 million in the new compressor facilities will increase the real property value of DCP's holdings. This increase in property value will trigger an increase in real property tax collections. These new taxes represent an ongoing fiscal benefit to government and are expected to ramp up in a short period of time (2016 to 2017). After that initial period, tax revenues are expected to reach a steady state likely to increase in conjunction with general inflation.

The estimated ongoing property taxes associated with either development scenario are reflected in Table 5-45. Once a steady state is reached, Fairfax County can expect to collect approximately $746,000 in associated property taxes.

Table 5-45
Additional Annual Tax Per Annum (thousands)

	2015	***2016***	***2017 & Future Years***
Fairfax County	$125.3	$708.5	$745.8

Source. [Dominion (Appendix 5-A)]

Numerous comments on property values impacts from the construction of additional compression at the Loudoun Compressor Station were received. DCP was previously considering the addition of compression at the Loudoun Compressor Station, but this is no longer part of the Project. There will be miscellaneous piping and meter upgrades at the Loudoun M&R site adjacent to the Loudoun Compressor Station. The size of the existing compressor units at the Loudoun Compressor Station property will not change with proposed Project.

5.2.5 Housing

5.2.5.1 Cove Point Liquefaction Facility

Section 5.2.1.1 indicated that a portion of the construction workforce is likely to in-migrate to the region on a temporary basis. Construction workers and any associated family members in-migrating to the region will temporarily reside at locations throughout the five-counties within 50 miles of the LNG Terminal. The region has nearly 183,000 occupied rental units and a rental vacancy rate ranging from 5.5 percent in Calvert County to 7.7 percent in Prince George's County (U.S. Census Bureau, 2011). The number of vacant residential rental units within Calvert County and the surrounding areas are expected to be sufficient to house construction crews. This assessment is supported by the success that previous regional projects have had in providing accommodations for high volume of construction travelers.

Formal review of a proposed construction project at the nearby Calvert Cliffs Nuclear Power Plant is not scheduled for completion until 2015 (U.S. Nuclear Regulatory Commission, 2013), and if approved, construction is not expected to begin until 2017. Calvert Cliffs is awaiting approval from the U.S. Army Corps of Engineers (Corps), pending compliance with air conformity regulations. However, even after the Corps makes a permit decision, the project is unable to move forward because it does not have the required U.S. sponsor. Without a U.S. sponsor, the Calvert Cliffs Unit 3 Project is unable to move forward and a schedule for work at the site cannot be determined (Rector, 2012).

The hotels nearest to the LNG Terminal are in and near the tourist destination of Solomons, Maryland. Peak tourist season in this area is during the warm weather months. Depending on the timing of construction activities, use of hotels and motels by construction workers may result in short-term room shortages during tourist seasons.

After construction, the operation of the Cove Point Liquefaction Facility at the LNG Terminal is expected to generate approximately 93 permanent jobs in Calvert County. These permanent jobs are anticipated to have no significant impacts on the county and regional housing market.

5.2.5.2 Pleasant Valley Compressor Station

Construction workers for the created jobs at the Compressor Station will consist of locals and workers that in-migrated to the region. These jobs are only temporary and worker will not need permanent housing. Up to 150 construction workers may be employed as part of the work at the Pleasant Valley Compressor Station, Suction/Discharge Pipelines and M&R site. Non-local construction workers will temporarily reside at various locations throughout Fairfax County. Fairfax County has a total of 20,824 vacant housing units and rental vacancy rates of 4.8 percent in Fairfax County (Table 5-10). There are 67 hotels/motels/bed and breakfasts in Fairfax County (Virginia, 2012).

The majority of the hotels near the Pleasant Valley Compressor Station, Suction/Discharge Pipelines and M&R site are clustered east of Dulles International Airport in Fairfax, Virginia. Tourists in Fairfax County are attracted to Washington, DC, about 18 miles west of the Pleasant Valley Compressor Station, Suction/Discharge Pipelines and M&R site. No permanent jobs are associated with construction at the Pleasant Valley Compressor Station, Suction/Discharge Pipelines and M&R site. Vacant lodging establishments existing within the vicinity of the Pleasant Valley Compressor Station, Suction/Discharge Pipelines and M&R site will be sufficient for the temporary construction crews.

5.2.6 Displacement of Residences or Businesses

5.2.6.1 Cove Point Liquefaction Facility

The construction activities at the Cove Point Liquefaction Facility and Offsite Areas will not displace or remove existing residences or businesses.

5.2.6.2 Pleasant Valley Compressor Station

The expansion of the Pleasant Valley Compressor Station, Suction/Discharge Pipelines and M&R site will not displace or remove existing residences or businesses.

5.2.7 Public Service and Infrastructure

The Project construction may impact public service; however, DCP plans to minimize the impact on fire, rescue, and police through training and close cooperation of DCP contractors. DCP has established a history of assisting fire departments in areas where facilities are located. DCP provides assistance through contributions, training, and general support. DCP will continue this practice with the Cove Point Liquefaction Facility, the Pleasant Valley Compressor Station, the Pleasant Valley Suction/Discharge Pipelines, Pleasant Valley M&R site and the Loudoun M&R site.

DCP expects its contractors to establish similar relationships. The successful contract bidders will contact fire departments and emergency response agencies prior to the start of construction. Through these meetings, the contractor and the emergency response organization will form relationships. This relationship will explore timely response options and facilitate response coverage in case of an accident or injury.

5.2.7.1 Cove Point Liquefaction Facility

Fire service in Calvert County has exceptional response times and rates. DCP works with Calvert County Emergency Management to plan for responses to issues that might arise at the LNG Terminal. DCP meets with the Chief of Solomons Volunteer Fire Department on a regular basis. DCP encourages other fire department personnel in the County to visit the facility. No new training is expected to be required, but DCP will offer to attend and lead drills with each of the three fire departments in the County that may be first responders to the LNG Terminal. Many local volunteer firefighters have joined DCP employees in attending specialized LNG fire schools.

Across the five-county region, there are 124 fire stations, five-county sheriff's offices, two county police departments, at least 19 local police departments, and 10 hospitals with nearly 1,800 beds. It is anticipated that these public services will be adequate to meet the needs of any non-local workers and families relocating to the area on a temporary basis.

During the peak year of construction, a portion of the construction workforce is likely to be made up of non-local construction workers that, along with their families, have in-migrated to the region on a temporary basis. Any in-migration of non-local families is not anticipated to strain local school resources. Region-wide, there are 422 public schools with a total enrollment of about 261,000 students and an additional 398 private schools (Maryland State Department of Education, 2012b). In Calvert County, elementary school enrollment in 2012 is 86 percent of capacity, middle schools are at 77 percent of capacity, and high schools are at 104 percent of capacity (Calvert County, Maryland Department of Planning and Zoning, 2012). One high school in the county, Northern High in the northern part of the county, has enrollment that is 121.4 percent of capacity and is the only school in the county with enrollment that exceeds capacity.

5.2.7.2 Pleasant Valley Compressor Station

The Project will be designed to minimize unfavorable impacts to local socioeconomics including public services and transportation. DCP anticipates the construction and operation of the additional compression at the Pleasant Valley Compressor Station to have a positive socioeconomic impact on Fairfax County. Short-term impacts may include an increased need for public services, such as police (for traffic control) and postal services. The increase in use of public services will be offset by the benefits of revenue stream that the Project will create. During construction, there will be a minor temporary increase in the local population, demand for temporary housing, and use of temporary services. There will also be an increase in expenditures for local goods and services.

Sufficient services exist within Fairfax County to support the needs of the construction crew and other persons associated with the construction of the Pleasant Valley Compressor Station. Fire prevention and control will be incorporated by DCP to minimize a potential increase in demand for local emergency and fire personnel.

The Project will be designed to minimize unfavorable impacts to local socioeconomics including public services and transportation. DCP anticipates the construction and operation of the additional compression at the Pleasant Valley Compressor Station to have a positive socioeconomic impact on Fairfax County. Short-term impacts may include an increased need for public services, such as police (for traffic control) and postal services. The increase in use of public services will be offset by the benefits of revenue stream that the Project will create. During construction, there will be a minor temporary increase in the local population, demand for temporary housing, and use of temporary services. There will also be an increase in expenditures for local goods and services. Sufficient services exist within Fairfax County to support the needs of the construction crew and other persons associated with the construction at the Pleasant Valley Compressor Station. Fire prevention and control will be incorporated by DCP to minimize a potential increase in demand for local emergency and fire personnel.

In Fairfax County, there are 38 fire departments, eight police departments, and two hospitals with about 867-beds (Table 5-14). The public services in Fairfax County is anticipated to be adequate to meet the needs of any non-local workers and families relocating to the area on a temporary basis.

New equipment proposed as part of this Project at the Pleasant Valley Compressor Station would be incorporated into DCP's existing emergency shutdown (ESD) systems. In essence, evacuation of gas from the buildings and yard in the event of emergency would not change. Additional equipment does not equate to additional activations of the ESD system and in turn would not equate to an increase in demand for local emergency and fire personnel.

Operations personnel maintain, inspect, and test the ESD systems as well as other equipment on site. In addition, DCP is required to contact emergency/fire personnel in the event of a fire emergency. Operations personnel interact with local fire companies to share information for pre-planning activity. This includes on site meetings and tours of the facility. Superfund Amendments and Reauthorization Act Title III (Community Right to Know) reporting is also performed for DCP's sites to make emergency responders and the community aware of chemicals stored and utilized at the site. In the past, DCP has conducted on site fire schools for fire personnel.

DCP does not anticipate any change in roles and responsibilities for either operations or public service personnel.

During the peak year of construction, a portion of the construction workforce is likely to be made up of non-local construction workers that, along with their families, have in-migrated to the region on a temporary basis. Any in-migration of non-local families is not anticipated to strain local schools. The Fairfax County Public Schools indicated the construction of four new elementary school and capacity enhancements at 13 elementary schools, two middle schools, and

one high school are budgeted for the FY 2013 – FY 2017 [Fairfax County Public Schools, no date (n.d)].

Construction materials purchased, sales taxes, miscellaneous purchases, labor wages, and construction worker expenditures show signs of positive short-term effects. The amount DCP pays in property tax for the Compressor Station will increase due to improvements at the site, which may positively affect the surrounding communities by stimulating economic growth.

Short-term impacts to the transportation network may result from the construction of Pleasant Valley Compressor Station. The impacts will be brought about by the movement of construction equipment and materials, and daily commuting of workers to and from the job site. These impacts are not expected to be significant.

5.2.8 Land Transportation and Traffic Management

5.2.8.1 Cove Point Liquefaction Facility

Numerous comments were received on the impacts to Cove Point Road and traffic through the surrounding neighborhood. A traffic impact analysis (Appendix 5-B) was completed for the Project, which considered increased traffic volume in the vicinity of the LNG Terminal during construction. Most construction workers will be parking offsite at Offsite Area A and will be transported by bus or shuttle to the site.

Using assumptions from Appendix 5-B of the traffic impact analysis (Appendix D) and the projected peak of 2,167 construction jobs in 2015, it is estimated that nearly 1,100 cars will access Offsite Area A each day during peak construction (Table 5-46). These cars are expected to be coming from all over the five-county region. Additionally, this number of workers would necessitate 43 bus trips to transport workers to DCP each day and another 43 trips to transport them back to Offsite Area A. The number of deliveries will vary during the course of the Project. For estimation purposes, the number of delivery trips per week may be taken as the number of construction workforce divided by 7.5. This is only an approximation and the actual number will vary depending upon the activities underway at different periods of the Project. For example, the construction workforce is expected to peak at about 1,460 employees, which would equate to about 195 deliveries per week during the peak construction period. These values were generated based on the anticipated trip generation for construction, operation, and logistics (Table 5-47 and Table 5-48).

Table 5-46
Existing and Projected Peak Traffic Volumes (Cars, Buses, and Trucks) and Level of Service (LOS) Rating

Morning Peak Hour	Existing Volume	LOS	Projected Volume	LOS	Increase (percent)
MD 2/4 & MD 497 (Cove Point Road)	687	A	1,100	B	60
MD 497 & MD 765 (HG Trueman Road)	647	A	795	A	23
MD 497 & Little Cove Point Road	588	A	718	A	22
MD 497 & LNG Terminal	177	A	270	A	53
Evening Peak Hour					
MD 2/4 & MD 497 (Cove Point Road)	913	A	1,376	D	51
MD 497 & MD 765 (HG Trueman Road)	661	A	833	A	26
MD 497 & Little Cove Point Road	643	A	777	A	21
MD 497 & LNG Terminal	100	A	189	A	89

Table 5-47
Projected Peak Construction Trip Generation Totals

			AM Peak			*PM Peak*		
Location	**Traffic Type**	**No. of Vehicles/Type**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Staging Area	Worker Traffic	750 cars (2 per car)	750	0	750	0	750	750
Staging Area	Truck Traffic	50 trucks	50	50	100	50	50	100
Site	Bus Traffic from Staging Area to Site	30 buses	30	30	60	30	30	60

Table 5-48
Existing and Projected Operation Trip Generation Totals

		AM Peak			*PM Peak*		
Scenario	**Number of Employees**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Existing	107	115	3	118	5	15	20
Projected	200	214	6	220	9	28	37
Net Increase in Employee Trips		99	3	102	4	13	17

During 2011, the AADT data collected by the Maryland SHA indicates that an average of 21,550 vehicles traveled daily in either direction on MD 2/4 at Cove Point Road (Maryland SHA, 2011). Depending on how work shifts are staggered, some localized, temporary traffic increases can be expected to result from this movement of cars and buses.

DCP will implement the recommendations of the Traffic Impact Analysis to add a traffic signal at the intersection of Maryland 2/4 and Cove Point Road/Maryland 497. In addition, DCP will implement the recommendations in Appendix D in Appendix 5-B, Exhibit 10 of the Traffic Impact Analysis to construct and/or modify the turn lanes at this intersection, subject to final SHA approval.

Construction of the Cove Point Liquefaction Facility at the LNG Terminal may result in some minor, short-term impacts on the transportation network in the Project area as existing public roadways will be used to transport construction equipment and materials, and workers to the LNG Terminal. DCP is working with the Maryland SHA to evaluate potential impacts to traffic and will implement traffic mitigation measures as appropriate to ensure public safety. Work at the LNG Terminal may result in some increase in traffic volumes on local public roads; however, construction work is typically scheduled during daylight hours (7:00 a.m. to 6:00 p.m.) six days per week. Workers will park vehicles at Offsite Area A for construction activities at the Cove Point Liquefaction Facility and Offsite Areas. Due to the short-term nature of the construction, traffic flow impacts that do arise are expected to be minor and temporary. Transport of the large equipment would occur at night to minimize potential impacts to traffic by the slow movement of oversize and overweight equipment. The vehicles used to transport this equipment will have noise levels consistent with other large trucks that travel on Route 2/4.

Comments were also received on the impacts of night traffic from Offsite Area B to the Cove Point Liquefaction Facility. DCP will transport large equipment at night to minimize potential impacts to traffic by the slow moving vehicles during transport of oversize and overweight equipment.

The movements of larger and slower moving loads of materials from Offsite Area B to the LNG Terminal will likely require support in the form of an escort to the LNG Terminal. Movement of some of these loads at night benefits the community by not presenting any traffic delays during peak or daytime hours. During the receipt and delivery of heavy haul items from Offsite Area B, the following sequence will be followed:

1. Receiving trucks and support equipment will be staged in the area the night prior to an equipment delivery as to minimize night traffic.
2. Barges with equipment will be brought to the dock and secured.
3. Equipment will be loaded onto heavy haul trailers. Trailers will be loaded by using the built in hydraulic lifting and any support equipment necessary.
4. Trailers will be moved onto land and prepared for over the road travel. This includes trailer preparation (i.e., flags, flashers, etc.), haul permits and informing the authorities of the intent to travel on public roads.
5. Emergency response teams will be notified of intent to travel across roads and will be on call and ready to respond to any safety or logistical problem.
6. Project management team will be notified that there will be a load leaving Offsite Area B.
7. Once trailers are deemed acceptable for over the road travel and emergency response teams have given the go ahead, escorts (both heavy haul and police escorts if necessary) will bring the trailer from Offsite Area B to the LNG Terminal, as required by the Maryland SHA permit.

Construction will occur primarily during daylight hours. Movement of oversized equipment and supplies from Offsite Area B to the Cove Point Liquefaction Facility will probably occur at night to minimize impacts. DCP will make an attempt to arrange construction hours to minimize impacts.

During peak traffic periods, communities may experience minor and temporary negative impacts from delivery trucks and the movement of construction equipment. The current peak hours range from 6:30 a.m. to 8:30 a.m. and 4:30 p.m. to 5:45 p.m. along Cove Point Road (Appendix 5-B). Current operation at the LNG Terminal is 7:00 a.m. to 3:30 p.m. for office/administrative workers and operations staff from 7:00 a.m. to 7:00 p.m. and 7:00 p.m. to 7:00 a.m. Construction traffic is anticipated between 6:00 a.m. and 6:00 p.m. At this time, it is not possible to quantify the number of trips anticipated or determine when deliveries are likely to occur. DCP will attempt to coordinate these activities to minimize the impact on surrounding communities. In addition, if damage occurs to roadways as a result of the Project, DCP will repair those roadways to pre-Project or improved conditions.

The traffic impact analysis provides recommendations that will satisfy the Maryland SHA Guidelines and Adequate Public Facilities Ordinance requirements of Calvert County. The recommendations include installation of a traffic signal at the intersection of Maryland 2/4 and Maryland 497 (Cove Point Road). The traffic impact analysis also recommends the construction of a 200-foot right turn lane with a 150-foot taper along eastbound Maryland 497 at Little Cove Point Road.

A comment was received requesting clarification why the Critical Lane Volume (CLV) and Highway Capacity Software (HCS) methodologies were used to evaluate the increase in traffic volume during operation, but only the CLV analysis was used for construction. The CLV methodology and HCS methodology are two different methodologies for providing LOS projections. The only reason that both methodologies are provided is because the State requires one (i.e., the construction traffic was required to be analyzed by the CLV methodology under the state's jurisdiction) and the County requires the other (i.e., the HCS methodology was conducted in accordance with County requirements).

All intersections were evaluated using the CLV model during the construction period and for the permanent situation after the construction is complete and the facility is operational. The CLV analyses is required by SHA and was based on all proposed improvements being in place before construction started, and these improvements are the reason an acceptable LOS resulted during the construction period.

The HCS methodology is not required for the construction period. The HCS is a very detailed analyses that takes very specific design details and provides reporting on individual turning movements as well as the overall intersection. These details are required by the County in the assessment of the Adequate Public Facilities Ordinance for the permanent operating conditions.

The Traffic Impact Analysis has been approved by the State and County. The CLV results from the Traffic Impact Analysis show that the intersections (with the proposed improvements) are sufficient to carry the construction traffic. As the operating agency in charge of the roadways, the SHA requires the usage of the CLV methodology in the evaluation of the construction and permanent operating conditions. The usage of the CLV methodology is appropriate for the environmental review for construction and permanent conditions as this is the methodology required by the operating agency (i.e., SHA).

There was a comment received related to emergency response on Cove Point Road from construction vehicles. DCP is aware that Cove Point Road is an emergency evacuation route and that it is critical that this route not be obstructed. A traffic impact analysis (Appendix 5-B) was completed for the Project, which considered increased traffic volume in the vicinity of the LNG Terminal during construction.

5.2.8.2 Pleasant Valley Compressor Station

Workers may park vehicles at the DTI Leesburg Contractor Station Contractor Staging Area or the Pleasant Valley Compressor Station for construction activities at the Pleasant Valley Compressor Station, Suction/Discharge Pipelines, and M&R site. Construction will occur primarily during daylight hours; therefore, the peak construction traffic is expected from 6:00 a.m. until 6:00 p.m., Monday through Saturday. DCP will make an attempt to arrange construction hours to minimize impacts to nearby communities.

During peak traffic periods, communities may also experience minor and temporary negative impacts from delivery trucks and the movement of construction equipment. At this time, it is not possible to quantify the number of trips anticipated or determine when deliveries are likely to occur. DCP will make an effort to coordinate these activities to minimize the impact on surrounding communities. In addition, if damage occurs to roadways as a result of the Project, DCP will repair those roadways to previous or improved conditions.

Prior to construction of the Project, public roads will be evaluated to determine if any construction vehicles and associated loads would exceed the weight or size limits of the road. Roads will be bonded and permits will be obtained thru the proper authorities having jurisdiction for overweight/oversize loads. The permits will specify the required safety precautions (i.e., escort) and restrictions (i.e., heavy hauling timeframe to reduce traffic congestion for oversize/overweight hauling). DCP will implement the following procedure when required to move any load considered to be a heavy haul load or oversize load.

1) Notification to the local Emergency Medical Services if the road will be blocked for a long period of time and there is no other access to the residences as needed based on load weight and dimensions.
2) Use of additional escorts as needed based on load weight, dimension, and/or permit specifications.
3) Notification of residents impacted by move as needed based on load weight and dimensions and/or permit specifications.
4) Electronic message board set up on haul road as needed based on load weight and dimensions and/or permit specifications.
5) Use of low trucks for pulling assistance and to prevent delays on the haul roads as needed based on load weight, dimensions, and/or permit specifications. Tree/brush trimming to be done as needed based on load weight, dimensions and/or permit specifications.
6) Tree/brush trimming to be done as needed based on load weight, dimensions and/or permit specifications.
7) Road or culvert work that needs to be completed as needed based on load weight, dimensions, and/or permit specifications.

8) Flaggers to be provided for traffic flow as needed based on load weight, dimensions, and/or permit specifications.
9) Courtesy notification to local Department of Transportation of the timing of the move.

Numerous comments were received on the traffic through the neighborhoods near the Loudoun Compressor Station. Additional compression was considered at the Loudoun Compressor Station, but is no longer part of the Project, only work at the Loudoun M&R site will occur. Construction traffic is not planned to travel through the Greene Mill Preserve. Construction of the Project may result in some minor, short-term impacts on the transportation network in the Project area as existing public roadways will be used to transport construction equipment and materials, and workers to the site. Due to the short-term nature of the construction, traffic flow impacts that do arise are expected to be minor and temporary.

DCP will take initiatives to limit/restrict the traffic through the Greene Mill Preserve with the use of the following:

1) Add wording to the construction contract that will be entered into with the construction contractor stating that the contractor nor his employees, sub-contractors, etc. shall not make use of the roadway thru the Greene Mill Preserve to access the Loudoun M&R site.
2) Use signage, notices, etc. in an effort to limit or eliminate the use of the roadway thru the Greene Mill Preserve to access the Loudoun M&R site.

5.2.9 Removal of agricultural, pasture or timberland from production

5.2.9.1 Cove Point Liquefaction Facility

Construction activities at the Cove Point Liquefaction Facility and Offsite Areas will not impact agricultural, pasture, or timberland areas.

5.2.9.2 Pleasant Valley Compressor Station

No impacts to agricultural, pasture, or timberland areas are expected to occur, since the additional compression construction will be an expansion of the existing Pleasant Valley Compressor Station.

5.3 Environmental Justice

Executive Order 12898 on Environmental Justice requires that each Federal agency address disproportionately high and adverse environmental and human health effects of its programs, policies, and activities on minority and low income populations.

5.3.1 Cove Point Liquefaction Facility

Census data were reviewed for Maryland, Calvert County, and for census tracts in the area of the Cove Point Liquefaction Facility, Offsite Area A, and Offsite Area B (Figure 5-1). These data are summarized in Table 5-49.

Table 5-49
Existing Race, Ethnicity, and Income Characteristics for Calvert County State Area

	Maryland[a]	Calvert County[a]	Census Tract 8609.00[b]	Census Tract 8610.01[b]	Census Tract 8610.04[b]	Block Group Containing Offsite Area A[c]	Block Group Containing Offsite Area B[c]
Race (percent)							
White (Not Hispanic)	61.1	81.7	77.1	86.9	83.5	80.6	86.5
Black	30.0	13.8	21.8	4.4	13.4	16.0	9.4
Asian	5.8	1.5	0.0	8.8	0.0	1.1	1.7
Native Hawaiian and Other Pacific Islander	0.1	0.1	0.0	0.0	0.0	0.0	0.0
American Indian and Alaska Native	0.4	0.4	0.0	0.0	0.0	0.1	0.1
Other	0.0	0.0	0.0	0.0	0.0	0.4	0.8
Two or More Races	25	2.5	1.2	0.0	2.4	1.9	1.5
Ethnicity (percent)							
Hispanic	28.4	2.9	3.3	15.3	1.9	1.3	1.9
Income Characteristic							
Per capita Income (dollars)	35,751	37,321	37,337	43,118	25,486	--	--
Population Below Poverty Level (percent)	9.0	4.6	8.3	2.3	7.3	--	--

Sources:
[a](U.S. Census Bureau, 2013)
[b](U.S. Census Bureau, 2011)
[c](U.S. Census Bureau, 2010)

Given the racial/ethnic composition and income levels in the census tract described in Sections 5.3.1.1 through 5.3.1.2 of the Cove Point Liquefaction Facility and Offsite Areas, it is not anticipated that the Project will have disproportionately high and adverse human health or environmental effects on minority or low income populations.

5.3.1.1 LNG Terminal

The Cove Point Liquefaction Facility is located in Census Tract 8610.01, which has a population that is 86.9 percent white, 4.4 percent black, and 8.8 percent Asian. The Hispanic ethnicity makes up 15.3 percent of the population. Hispanics may be of any race and are included in applicable race categories, so numbers do not add up to 100 percent. Based on 2011 data, census tract 8610.01 has a per-capita income of $43,118, which exceeds the Calvert County per capita

income of $37,321 and Maryland per capita income of $35,751. In Census Tract 8610.01, 2.3 percent of the population is below poverty level, compared to 4.6 percent in the County and 9.0 percent in the State.

5.3.1.2 Offsite Areas

Census tract 8609.00 includes Offsite Area A and Offsite Area B. The percentage of the black population in this census tract is higher than in the County (21.8 percent vs. 13.8 percent for the County), but lower than the statewide percentage of the black population, which is 30.0 percent. Population percentages for other races in this census tract are at the same or lower than for the County as a whole. However, because the Offsite Areas in this census tract are located in two geographically distinct areas (divided by Route 4) more refined, block group data were also examined. The Offsite Areas are only temporarily affected by construction of the Project. Census tract 8609.00 has a per capita income of $37,337, which is slightly above the County and State per capita income, and a poverty rate of 8.3 percent, which is below the State percentages and above the Calvert County percentages.

Offsite Area A

The block group for Offsite Area A has a slightly higher percentage black population than Calvert County (16.0 percent vs. 13.8 percent for the County), but a slightly lower percentage Hispanic population (1.3 percent vs. 2.9 percent for the County). Data related to per capita income and poverty rates are not yet available at the block group level; however, the race data that are available for these block groups suggest that minority communities would not be disproportionately affected by use of Offsite Area A.

Offsite Area B

The block group for Offsite Area B has a population that is 9.4 percent black and 1.9 percent Hispanic, which are both well below statewide averages. Data related to per capita income and poverty rates are not yet available at the block group level; however, the race data that are available for these block groups suggest that minority communities would not be disproportionately affected by use of Offsite Area B.

5.3.2 Pleasant Valley Compressor Station

Census data were reviewed for Virginia, Fairfax County, and for census tract of the existing Pleasant Valley Compressor Station. Census tract 4910.00 includes the Pleasant Valley Compressor Station, the Pleasant Valley Suction/Discharge Pipelines and Pleasant Valley M&R site, in Fairfax, Virginia (Figure 5-2). In 2007-2011, the American Community Survey 5-Year Estimates census recorded a population that was 88.4 percent white and 5.2 percent Asian. The Hispanic or Latino population accounts for 1.3percent of the ethnicity (U.S. Census Bureau 2011).

The per capita income in the Pleasant Valley census tract 4910.00 is $64,562, higher than Fairfax County per capita income of $50,145. The poverty rate within the census tract is 1.1 percent with Fairfax County having a 5.5 percent poverty rate.

Given the racial/ethnic composition and income levels in the census tract 4910.00, for the Pleasant Valley Compressor Station, Suction/Discharge Pipelines and M&R site, it is not anticipated that the Project will have disproportionately high and adverse human health or environmental effects on minority or low income populations.

5.4 Property Values

5.4.1 LNG Terminal

All permanent construction or operation of the aboveground facilities of the Project will occur on land owned by DCP. The Cove Point Liquefaction Facility will be constructed within the existing fenced area, which is generally screened by existing forests and topography. Tree cover between Cove Point Road and the fenced area is not dense enough to prevent views into the LNG Terminal, but the new structures will be consistent with the industrial nature of the existing facility. Additionally, the sound barrier at the LNG Terminal will screen the view of the buildings and be colored to blend into the background to minimize visual impacts. DCP will retain the majority of the natural vegetative barrier at the LNG Terminal and add additional vegetative screening where necessary when developing the station facilities to help conceal the facilities from public view at locations that are directly adjacent to the site.

5.4.2 Pleasant Valley Compressor Station

The additional compression at the Pleasant Valley Compressor Station is proposed to be an expansion of DCP's existing facilities and would be located adjacent to existing compressor units on the Pleasant Valley Compressor Station property. DCP plans to develop approximately 3 acres within the approximate 37-acre Pleasant Valley Compressor Station property and would maintain existing trees and woodlands along the property boundaries. No significant incremental impacts to the visual aspects of the area around the Compressor Station are expected. Additionally, the sound barrier at the Compressor Station will screen the view of the buildings and be colored to blend into the background to minimize visual impacts. DCP will retain the majority of the natural vegetative barrier on the Pleasant Valley Compressor Station, Suction/Discharge Pipelines and M&R site and add additional vegetative screening where necessary when developing the station facilities to help conceal the facilities from public view at locations that are directly adjacent to the site.

Based on this information, these new Project facilities will not significantly alter the existing landscape or result in significant visual impacts to abutting landowners. Further, noise associated with operation of the new Project facilities will be maintained at a maximum "day-night average sound level" of 55 dBA at the nearest noise sensitive receptor (e.g., residence, school) and there will be no measurable increases in noise on adjacent properties as a result of operation of the new facilities at the existing Pleasant Valley Compressor Station. Noise is

discussed in greater detail in Resource Report 9. Overall, property values are not expected to be adversely affected.

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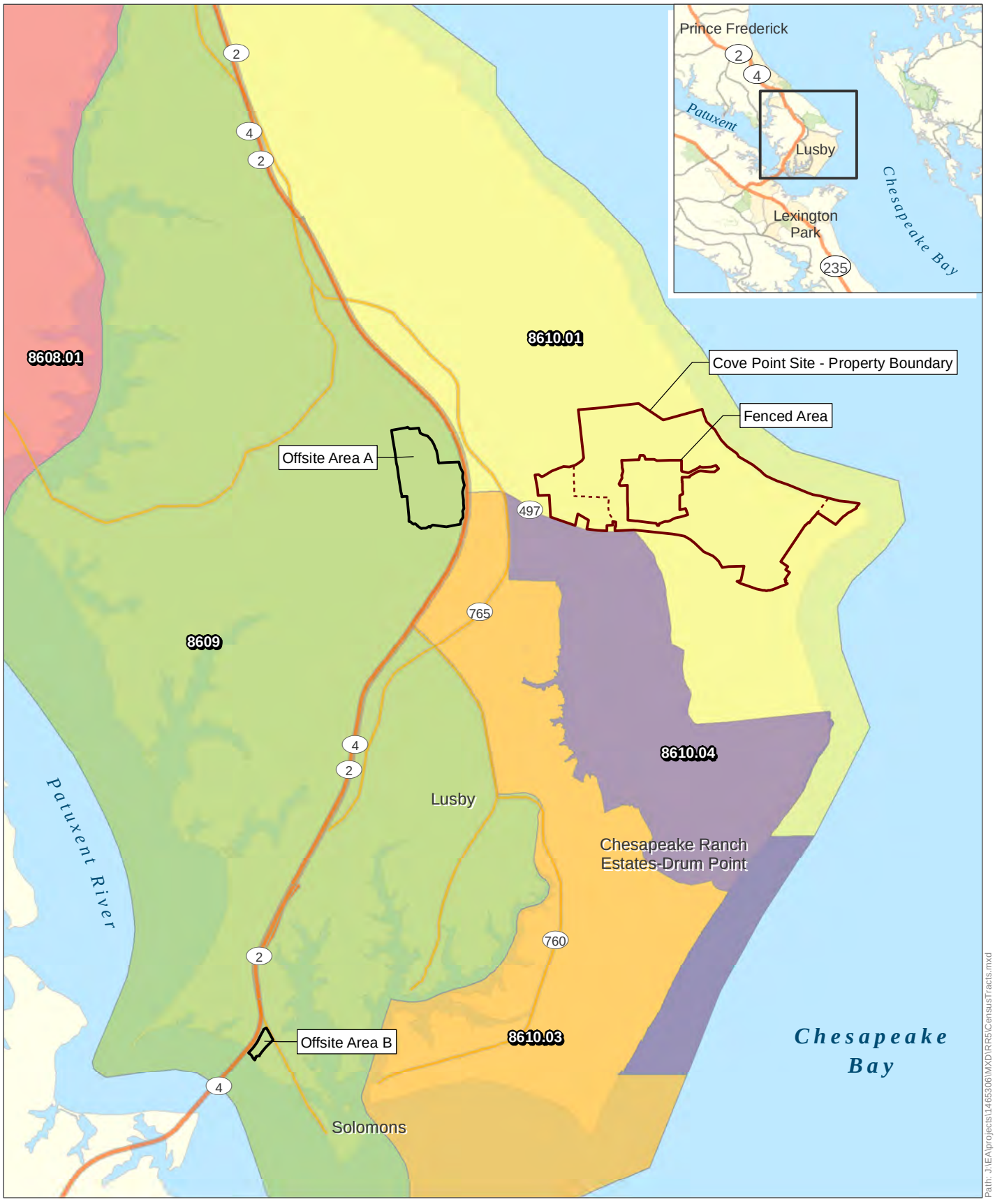

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Date: April 2013

Cove Point Liquefaction Project
Dominion Cove Point LNG, LP

FERC Docket Number: CP13- -000

Figure 5-1
Census Tracts for
Cove Point and Offsite Areas

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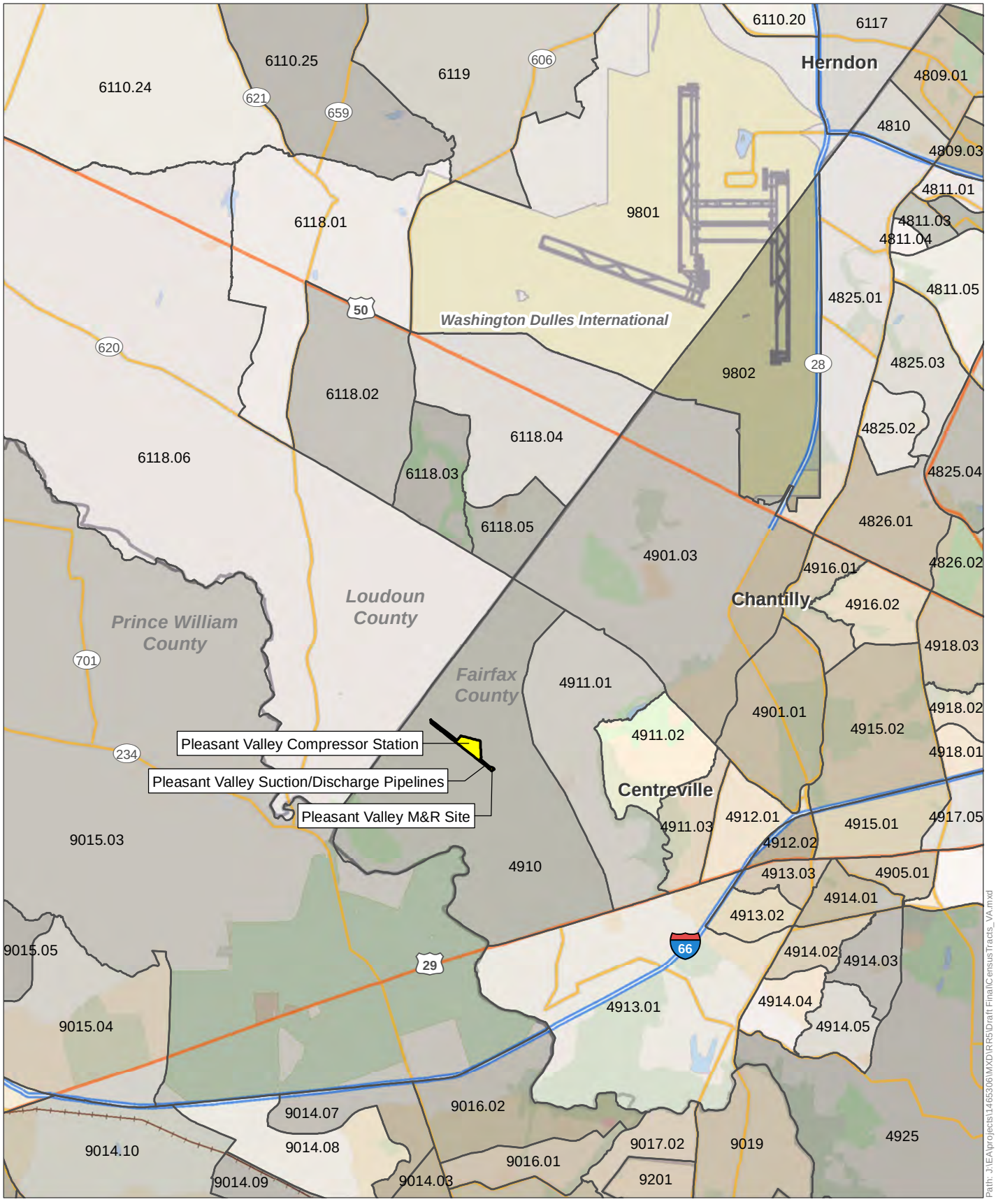

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Date: April 2013

Cove Point Liquefaction Project
Dominion Cove Point LNG, LP

FERC Docket Number: CP13- -000

Figure 5-2
Census Tract for the Pleasant Valley Compressor Station including the Pleasant Valley Suction/Discharge Pipelines and M&R site

APPENDIX 5-A

SAGE REPORT: THE OPPORTUNITIES AT COVE POINT: MARYLAND AS ENERGY EXPORT

Sage Policy Group, Inc.

The Opportunities at Cove Point: MD as Energy Exporter

Submitted by:

Sage Policy Group, Inc.

Submitted to:

Dominion Cove Point LNG

October 2012

Table of Contents

List of Exhibits

Executive Summary

A Major Investment Generating Large Economic and Fiscal Impacts

This Sage Policy Group Inc. report presents the results of an economic and fiscal impact analysis of the creation and operation of a facility to export liquefied natural gas (LNG) from the Dominion Cove Point complex in Calvert County, Maryland. This represents the most recent capital investment in energy handling and distribution capabilities at Cove Point.

The construction of the liquefaction plant at Cove Point is likely to be one of the largest construction projects ever undertaken in Maryland. Total construction costs are currently estimated to be in the range of $2.5 billion to $3.5 billion. For the sake of comparison, the recent project to replace the Woodrow Wilson Bridge over the Potomac River cost $2.5 billion.

It is worth noting that the proposed Cove Point liquefaction facility will have to conform to regulations imposed by a number of Federal laws, including Natural Gas Act, the National Environmental Policy Act, the Clean Water Act, Clean Air Act, Coastal Zone Management Act of 1972, Endangered Species Act of 1973, National Historic Preservation Act of 1966, Archaeological and Historic Act of 1974, Wild and Scenic Rivers Act, National Wilderness Act, National Parks and Recreation Act of 1978, and Magnuson-Stevens Fishery Conservation and Management Act. The facility will benefit from incorporating the latest storage and distribution technologies.

As indicated in Exhibit E1, between the start of the construction phase in 2011 and 2040, this project will support more than 12,000 job-years in Calvert County and an additional 6,000 plus job-years in other Maryland jurisdictions. Labor income associated with the employment created by the total project is expected to exceed $780 million in the county and surpass $380 million elsewhere in the state. See Exhibit E2.

Exhibit E1: Total economic impacts of construction and operations—job years of work (mid-case)

Phase	*Calvert County*	*Rest of Maryland*
	Mid-case	Mid-case
Construction	10,675	4,742
Operations	1,686	1,445
Total	12,361	6,187
Sources: Dominion, ICF, Sage		

Exhibit E2: Total economic impacts of construction and operations—labor income (millions)

Phase	*Calvert County*			*Rest of Maryland*		
	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case
Construction	$510.4	$634.7	$572.6	$301.3	$375.9	$338.6
Operations	$210.1	$210.1	$210.1	$45.2	$45.2	$45.2
Total	$720.5	$844.8	$782.7	$346.5	$421.1	$383.8
Sources: Dominion, ICF, Sage						

The total business sales impact associated with facility construction and operations is shown in Exhibit E3. Countywide business sales supported by the project will exceed $2.6 billion while augmented business sales in other Maryland jurisdictions will top $1.1 billion.

Exhibit E3: Total economic impacts of construction and operations—business sales (millions)

Phase	*Calvert County*			*Rest of Maryland*		
	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case
Construction	$1,230.1	$1,538.2	$1,384.1	$739.2	$924.2	$831.7
Operations	$1,300.0	$1,300.0	$1,300.0	$279.5	$279.5	$279.5
Total	$2,530.0	$2,838.2	$2,684.1	$1,018.8	$1,203.8	$1,111.3
Sources: Dominion, ICF, Sage						

These economic impacts will give rise to a number of new tax revenue streams for Calvert County and the State of Maryland. Income and sales taxes represent key tax handles. As shown in Exhibit E4, Calvert County will receive an estimated $16 million in income taxes over the life of the project. The State of Maryland will collect an estimated $59 million in income and sales taxes during the 2011 through 2040 period. See Exhibit E5.

Exhibit E4: Fiscal impacts of construction and operations,
2011 through 2040—Calvert County income taxes (thousands of 2012 dollars)

Year	*Low-case*	*High-case*	*Mid-case*
Construction	$10,372	$12,899	$11,636
Operations	$4,270	$4,270	$4,270
Total	$14,642	$17,169	$15,905
Sources: Dominion, ICF, Maryland Comptroller, Sage			

Exhibit E5: Fiscal impacts of construction and operations, 2011 through 2040 —Maryland income and sales taxes (thousands of 2012 dollars)

Year	*Income taxes*			*Sales taxes*			*Total*		
	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case
Construction	$27,350	$34,053	$30,702	$13,951	$17,371	$15,661	$41,301	$51,424	$46,363
Operations	$8,602	$8,602	$8,602	$4,388	$4,388	$4,388	$12,990	$12,990	$12,990
Total	$35,952	$42,655	$39,304	$18,339	$21,759	$20,049	$54,291	$64,414	$59,353
Sources: Dominion, ICF, Maryland Comptroller, Sage									

Perhaps most impressive from a fiscal impact perspective, Calvert County will receive roughly $40 million per year in property tax collections, which represents a 27 percent increase over current County property tax revenue. These revenues can be used for a variety of purposes, including in support of K-12 education, public safety, community beautification and post-secondary education.

The LNG terminal would also position Maryland to play its part in helping the nation close its structural trade deficit with the balance of the world. Since shrinking to a decade low in May 2009 due to a decline in aggregate demand (-$24.9 billion for the month), the U.S. trade deficit has since surged and stands at roughly $42 billion/month. Although Maryland's exports have trended higher since 2009, 20011 exports ($10.9 billion) remained below their 2008 level of $11.4 billion. The proposed LNG liquefaction plant would increase Maryland exports by almost $5 billion per year, which means that this single project has the capacity to expand Maryland's global exports by 40 to 50 percent.

In summation, the proposed LNG export terminal at Cove Point represents an investment of approximately $2.5 billion that will allow Calvert County and Maryland to benefit from the rapid expansion of U.S. energy production and exporting. In the process, the project will create quality jobs, including in the construction industry, will support business growth and will generate large fiscal benefits for Calvert County and the State of Maryland.

The Dominion Cove Point facility in Lusby, MD (Calvert County)

I. Introduction

Maryland as Energy Exporter

In this report, Sage Policy Group, Inc. (Sage), an economic and policy consulting firm in Baltimore, MD, presents the results of an economic and fiscal impact analysis prepared on behalf of Dominion Cove Point LNG, LP (DCP). Specifically, Sage has quantified the local economic and fiscal implications associated with the export of liquefied natural gas from the DCP complex in Calvert County, Maryland to countries maintaining free trade agreements with the United States, and countries with which the United States does not prohibit trade

In estimating economic impacts for this analysis, Sage has relied on IMPLAN econometric modeling software that enables estimates of economic multiplier effects specific to the local economy (i.e. Calvert County and Maryland). This estimating process has been buttressed by reviews of previously authored reports focused upon the proposed export facility. Based on the total economic impact of the project and other relevant economic data, this report also estimates net fiscal impacts to county and state governments. These estimates rely on current government-published tax rates and budgetary information.

The existing Cove Point LNG Terminal is connected to the interstate pipeline grid by an 88-mile gas pipeline also owned by DCP. This complex of port, storage facilities, and pipelines creates a bridge between the United States gas market and overseas markets for natural gas.

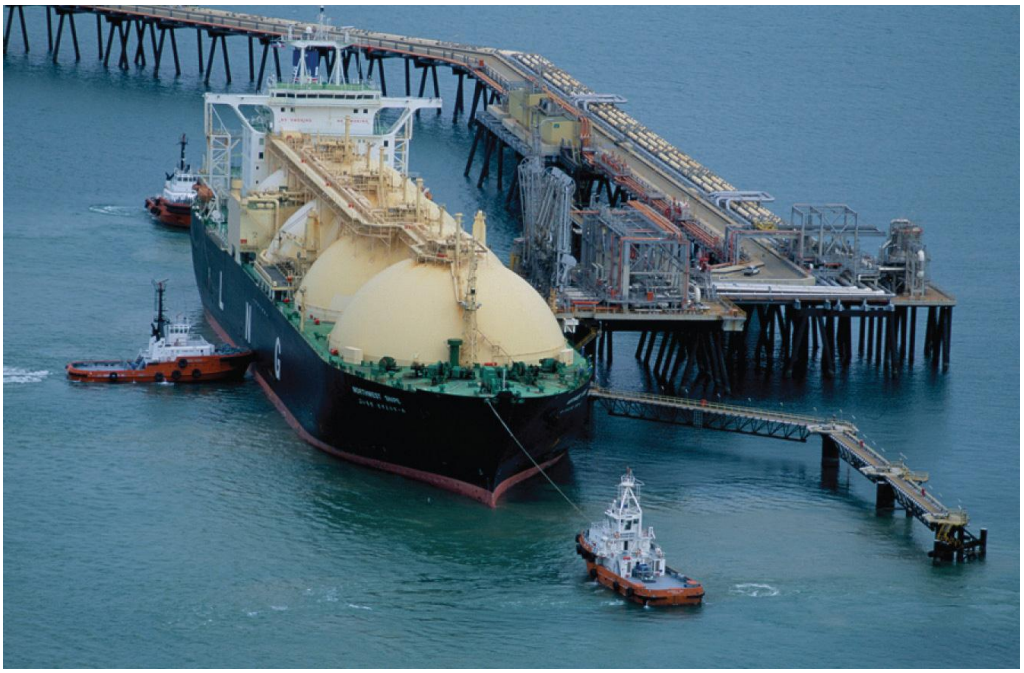
The complex dates back to 1972 when the Federal Energy Regulatory Commission (FERC) authorized initial construction and operations of the Cove Point LNG Terminal and pipeline. Actual shipments of LNG to the Cove Point Terminal began in March 1978, but were then suspended in December 1980 due to then-existing market conditions. In 2001, in response to changes in the market, FERC authorized Terminal reactivation and construction of new facilities that would expand LNG import capacity.[1] In 2006, FERC authorized a virtual doubling of the size of the Terminal while also expanding Cove Point's pipeline capacity. FERC also permitted

[1] Cove Point LNG, LP 97 FERC ¶ 61,043, reh'g, 97 FERC ¶ 61,276 (2001), reh'g, 98 FERC ¶ 61,270 (2002).

new downstream pipeline and storage facilities.[2] In 2009, FERC allowed for enhancements to the complex's existing off-shore pier, enabling the docking of larger LNG vessels.[3]

Unlike all previous capital projects, the primary goal of the proposed project is to enable exports of LNG from the terminal. The construction of the liquefaction plant at Cove Point is likely to be one of the largest construction projects ever undertaken in Maryland. Total construction costs are currently estimated to be in the range of $2.5 billion to $3.5 billion.

The LNG terminal would also position Maryland to play its part in helping the nation close its structural trade deficit with the balance of the world. Since shrinking to a decade low in May 2009 due to a decline in aggregate demand (-$24.9 billion for the month), the U.S. trade deficit has since surged and stands at roughly $42 billion/month. Although Maryland's exports have trended higher since 2009, 20011 exports ($10.9 billion) remained below their 2008 level of $11.4 billion. The proposed LNG liquefaction plant would increase Maryland exports by almost $5 billion per year, which means that this single project has the capacity to expand Maryland's global exports by 40 to 50 percent.



A docked LNG tanker

[2] Dominion Cove Point LNG, LP, 115 FERC ¶ 61,37 (2006), reh'g, 118 FERC ¶ 61,007 (2007), remanded sub nom. Washington Gas Light Co. v. FERC, 532 F.3d 928 (D.C. Cir. 2008), order on remand, 125 FERC ¶ 61,018 (2008), reh'g, 126 FERC ¶ 61,036 (2009).

[3] Dominion Cove Point LNG, LP, 128 FERC ¶ 61,037, reh'g, 129 FERC ¶ 61,137 (2009).

II. Trends in Natural Gas Supply and Demand

America as Producer and Exporter

The DCP proposal to add export capabilities to the Cove Point Terminal complex is one manifestation of some of the most significant changes in domestic energy markets in decades. These changes have reversed trends that have long defined these markets.

Energy production in the United States is undergoing a major transformation as advances in technology are opening up hydrocarbon reserves once considered unrecoverable, including in states proximate to Maryland like Pennsylvania, Ohio and West Virginia. New oil production has created an economic boom in North Dakota, which, not coincidentally, has enjoyed the lowest unemployment rate among states in recent months—just 3.0 percent in the most recent report available from the U.S. Bureau of Labor Statistics.[4] Energy jobs paying $70,000 plus overtime and lunch counter jobs at $15 per hour testify to the power of new energy production as an economic engine.[5]

As a fuel used in electricity production and as a potential feedstock for chemical production (along with its uses by households and businesses), natural gas presents diverse impacts that are expected to greatly affect national and international energy markets. At the same time, natural gas has friendlier environmental implications than many other traditional forms of energy. According to the Environmental Protection Agency, the use of natural gas produces nitrogen oxides and carbon dioxide in lower quantities than burning coal and oil. "Emissions of sulfur dioxide and mercury compounds from burning natural gas are negligible."[6]

The potential economic and fiscal benefits derived from the development of natural gas liquefaction facilities have grown over the past few years as technology available to access supplies has become more sophisticated and effective. There have been a number of studies recently published that detail the growth of recoverable supply.

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[4] Bureau of Labor Statistics, " Unemployment Rates for States: Unemployment Rates for States, Monthly Rankings, Seasonally Adjusted, July 2012[p,"] August 17, 2012. Available at http://www.bls.gov/web/laus/laumstrk.htm/

[5] Blake Ellis, "Double your salary in the middle of nowhere, North Dakota," CNN Money, October 20, 2011 Available at http://money.cnn.com/2011/09/28/pf/north_dakota_jobs/index.htm

[6] www.epa.gov/cleanenergy/energy-and-you/affect/natural-gas.html.

The big picture for American energy is the expectation of increasing reliance on domestic sources and a substantial reduction in the need for imports. Between 2010 and 2035, domestic production as measured by energy content is expected to increase 25 percent while total consumption will increase by 10 percent. While the U.S. may continue to import energy, the trend in imports is expected to be a fairly steady decline accompanied by a significant increase in exports. The result is a 37 percent decrease in net imports of energy from 2010 to 2035. See Exhibit 1 for relevant statistical detail.

The primary reason for this shift in the U.S. energy market is the increased domestic production of natural gas and associated natural gas liquids. By 2035, natural gas will constitute 34 percent of domestic production. From 2010 to 2035, natural gas imports will decrease by 26 percent while natural gas exports will increase 267 percent.[7]

Exhibit 1: Total Energy Supply and Consumption (quadrillion Btu)

Components of energy supply and consumption	*2010*	*2015*	*2020*	*2025*	*2030*	*2035*	*Annual growth rate*
Production							
Crude oil and lease condensate	11.6	13.5	14.5	13.8	13.7	13.2	0.5%
Dry natural gas & natural gas plant liquids	24.9	27.5	29.4	30.3	31.1	32.2	1.0%
Coal	22.1	20.5	21.2	22.5	22.8	23.5	0.3%
Nuclear/uranium	8.4	8.7	9.3	9.6	9.6	9.4	0.4%
Renewable energy	7.9	9.2	10.4	11.8	13.7	15.5	2.7%
Other production	0.6	0.6	0.7	0.8	0.9	0.9	1.3%
Total U.S. Production	75.5	80.0	85.4	88.8	91.7	94.6	0.9%
Consumption							
Imports	29.5	27.2	25.4	24.9	25.1	25.8	-0.5%
Exports	8.1	9.7	10.0	10.8	11.5	12.3	1.7%
Net imports	21.4	17.6	15.4	14.1	13.6	13.5	-1.8%
Total U.S. Consumption	98.2	97.7	100.9	102.9	105.3	108.0	0.4%
Source: Energy Information Administration							

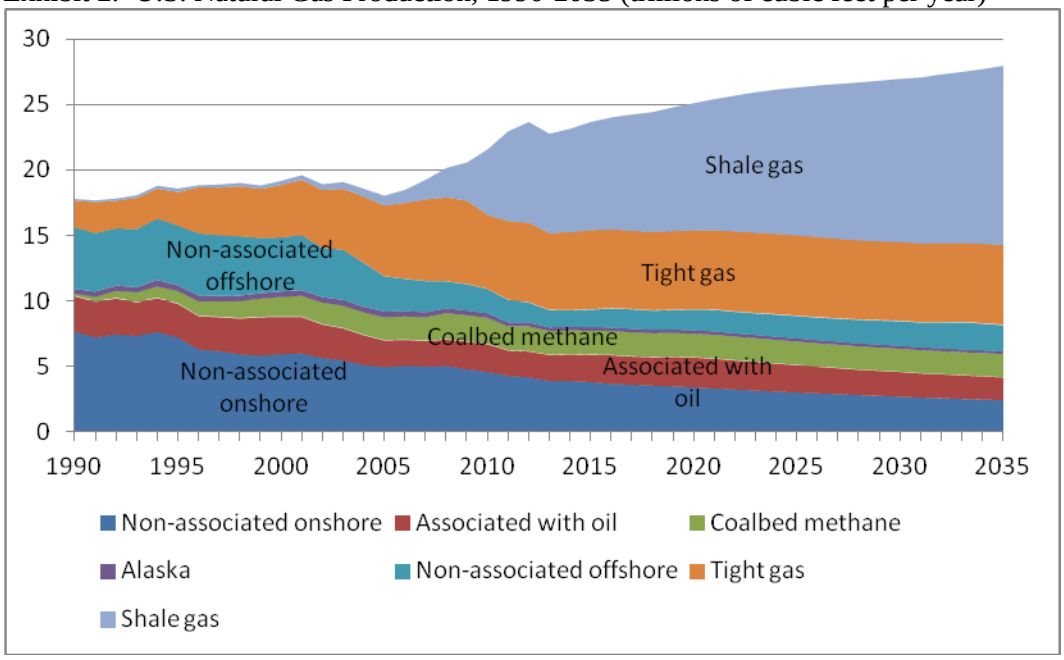
North American Gas Supply and Demand

Data from the Energy Information Administration reflects the anticipated expansion in domestic natural gas production between 1990 and 2035. While much of the focus in recent years has been on shale gas, Exhibit 2 indicates that there are a number of sources of production. As of

[7] Energy Information Administration, "Annual Energy Outlook: Total Energy Supply, Disposition, and Price Summary," available from http://www.eia.gov/oiaf/aeo

2010, tight gas continued to represent a more significant source of natural gas than shale gas (26 percent versus 23 percent).

Exhibit 2: U.S. Natural Gas Production, 1990-2035 (trillions of cubic feet per year)



Source: Energy Information Administration

Exhibit 3: Distribution of U.S. Natural Gas Production, 2000-2035

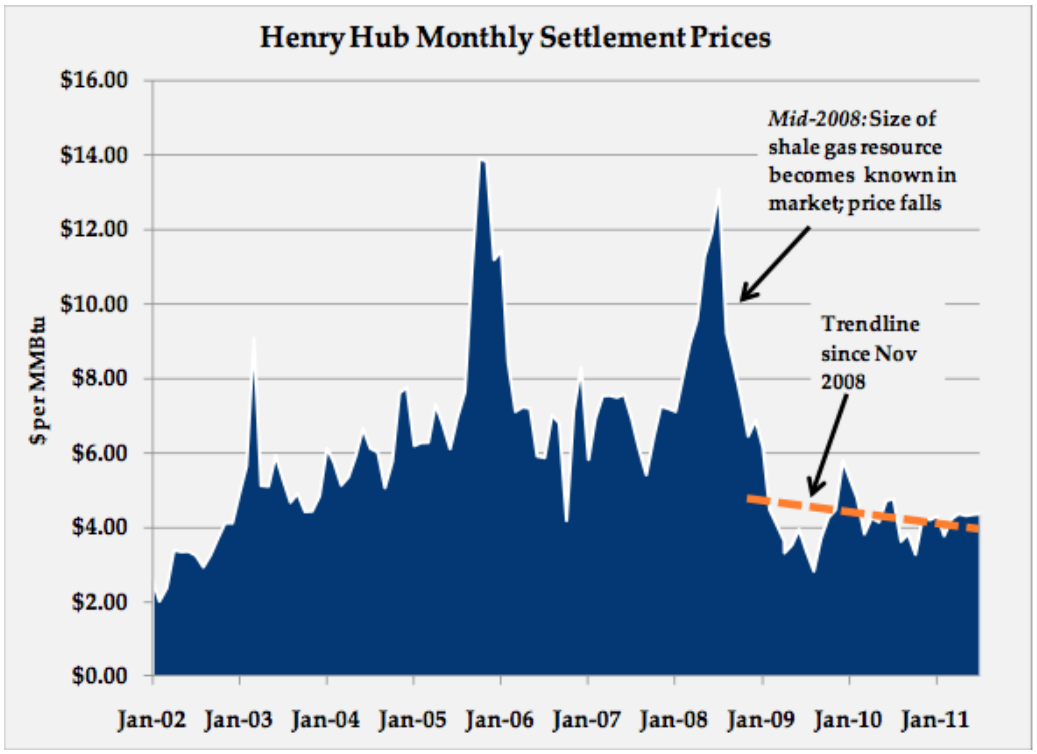
Source of production	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*	*2030*	*2035*
Non-associated onshore	31%	27%	21%	16%	14%	12%	10%	9%
Associated with oil	15%	11%	10%	9%	9%	8%	7%	6%
Coalbed methane	8%	10%	9%	8%	7%	7%	6%	6%
Alaska	2%	3%	2%	1%	1%	1%	1%	1%
Non-associated offshore	21%	15%	9%	6%	6%	7%	7%	7%
Tight gas	21%	30%	26%	26%	24%	23%	23%	22%
Shale gas	2%	4%	23%	35%	39%	43%	46%	49%
Total	100%	100%	100%	100%	100%	100%	100%	100%
Source: Energy Information Administration								

The significance and remarkable scale of U.S. gas production was documented in a 2011 study conducted by Navigant Consulting, Inc., which projected supply and demand for natural gas in the future. That study forecasts U.S. natural gas production to reach 81 billion cubic feet per day (Bcfd) by the year 2040, comprising a vast proportion of the predicted total North American

output of roughly 105 Bcfd that year.[8] Of particular salience to the feasibility of Dominion's proposed liquefaction facility in Calvert County, MD is the fact that the same Navigant study projects that the regional market for natural gas will be a "healthy, stable, long-term" one.

Consistent with the basic laws of supply and demand, the development of new forms of natural gas production has had substantial impacts on price. As recently as 2007-2008, imported supplies of liquefied natural gas (LNG) were believed to be necessary to supplement gas consumption in the United States. Exhibit 4 traces the Henry Hub monthly natural gas price from 2002 to 2011. Because of the importance of this southwestern Louisiana-based hub to the national natural gas pipeline system, this price is used as the basis of futures contracts sold on the New York Mercantile Exchange. In mid-2008, future prices topped $12. Within a year prices had fallen to less than $4 and stayed at that level into 2011.

Exhibit 4: Natural gas prices, 2002-2011



Source: Navigant Consulting, Inc.

A major factor in the decrease in prices has been the development and application of more advanced and effective drilling technologies—particularly, horizontal drilling. These processes

[8] Navigant Consulting, Inc. "North American Gas Supply and Outlook to 2040." September 19, 2011.

allow for more effective and efficient production. In fact, U.S. natural gas production increased more than 20 percent from May 2005 to May 2011 even as the number of gas production rigs fell by nearly 24 percent.[9] The number of horizontal drilling rigs has increased while conventional vertical rigs have declined in number.

From import to export of natural gas

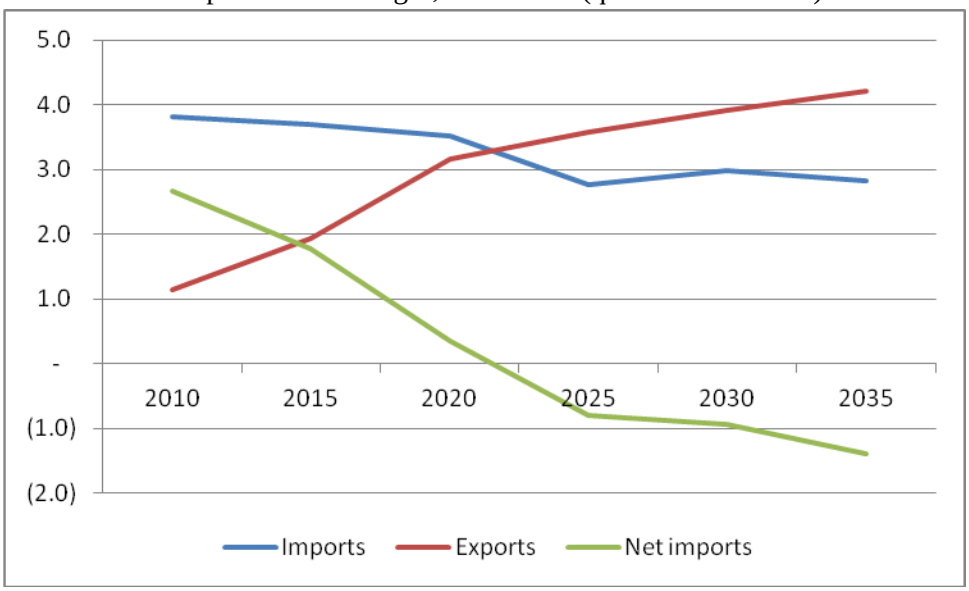
As recently as 2008, conventional wisdom held that U.S. natural gas supplies were not only inadequate to meet domestic demand, but that future production would not keep pace with increasing demand. As a consequence, it was believed that the need to import LNG would continue.[10]

In relatively short order, that conventional wisdom has been turned on its head. By almost all objective measures, the supply of shale gas in North America is now considered to be extremely large and production is expected to grow consistently, even dramatically, as technological advances improve extraction efficacy and efficiency. The Navigant report, citing EIA estimates of 2,543 trillion cubic feet (Tcf) of dry gas resources in the United States,[11] calculates that this volume of natural gas would provide more than 100 years of supply at the 2011 consumption rate of 24 Tcf per year and 83 years of supply using forecasted 2040 consumption rate of 30.7 Tcf per year.

With the rapidly changing volumes of domestically produced natural gas and similarly optimistic estimates of domestic natural gas resources, the U.S. is expected to become a net exporter of natural gas. While there may always be market reasons for importing gas (largely by pipeline from Canada), current EIA projections (see Exhibit 5) show a rapid increase in exports so that by 2025 the U.S. will export more natural gas than it will import. As a result, net imports will become net exports at some point during the next decade.

[9] Navigant Consulting, Inc. "North American Gas Supply and Outlook to 2040." September 19, 2011.
[10] Ibid. p. 2
[11] Newell, EIA, *Shale Gas and the Outlook for U.S. Natural Gas Markets and Global Gas Resources*, presentation to the Organization for Economic Cooperation and Development (OECD), June 21, 2011. http://www.eia.gov/pressroom/presentations/newell_06212011.pdf

Exhibit 5: Net imports of natural gas, 2010-2035 (quadrillions of Btu)



Source: Energy Information Administration

Effect of Exports on Supply, Demand, and Price

The natural gas market's transformation in the U.S. from a net importer to a net exporter raises the question of whether exports will have a significant and negative impact on domestic prices. In theory, by reducing domestic supplies of natural gas, exports could raise domestic prices.

A Navigant study modeled the changes in natural gas supply, demand, and price that might result from Dominion's expansion into export operations. Modeling posited potential future scenarios with increasing volumes of LNG exports. The first export case is the "Cove Point Export Case." It introduces Cove Point exports in the amount of 1.0 Bcfd beginning in 2017. The second case is the "Aggregate Export Case," which introduces two other LNG facilities that have applied for export capabilities—one in Louisiana, the other in Texas. The two additional facilities reach their peak export capacity by mid-2019 and the ultimate total North American output from all of the export facilities is roughly 7.1 Bcfd. The third case modeled in the study is the "Extreme Demand Case." This case assumes that the conditions in the Aggregate Export Case are present, but it also assumes a drastic increase in demand driven by coal-to-gas substitution effects and a marked shift towards natural gas as vehicle fuel.[12]

[12] Ibid., p. 13

Modeling results vary by scenario. In the Cove Point Export case, no significant change in supply, demand, or price was projected. In the Aggregate Export Case, supply and demand experienced little appreciable change; however, prices at Henry Hub (the benchmark for futures contracts) rose by up to 11 percent. In the Extreme Demand Case, supply is significantly higher than in any other modeled case. Supply increases due to higher rates of production to meet the dramatically higher demand. Prices at Henry Hub increase by as much as 17.4 percent, more than in the Aggregate Export case.

At Dominion South Point, a representative price for natural gas in the Northeast, price increases were less significant than those at Henry Hub.[13] In fact, prices at Dominion South Point are consistently below those at Henry Hub in all these scenarios and at each point in time. This difference varies from as little as 1 percent lower to as much as 39 percent lower. The discount for Dominion South Point grows consistently over time. The explanation is the amply available supply of natural gas from Pennsylvania and neighboring states.

Overall the Navigant modeling stands for two propositions. First, operating an LNG export facility at Dominion Cove Point is feasible. Second, exporting natural gas from Maryland will not result in large price increases due to the production capacity available in neighboring Pennsylvania and West Virginia, among others.

As a final point, the proposed Cove Point liquefaction facility will have to conform to regulations imposed by a number of Federal laws, including the Natural Gas Act, National Environmental Policy Act, Clean Water Act, Clean Air Act, Coastal Zone Management Act of 1972, Endangered Species Act of 1973, National Historic Preservation Act of 1966, Archaeological and Historic Act of 1974, Wild and Scenic Rivers Act, National Wilderness Act, National Parks and Recreation Act of 1978, and Magnuson-Stevens Fishery Conservation and Management Act.[14] The facility will benefit from incorporating the latest storage and distribution technologies.

[13] Ibid., pp. 20, 30
[14] "Environmental Considerations." https://www.dom.com/business/gas-transmission/cove-point/liquefaction.jsp

III. Modeling the Cove Point Project

History of the Cove Point Terminal

The history of the Cove Point Terminal on the Chesapeake Bay in Lusby, Maryland dates back to the 1970s when the parent company of what is now Dominion Transmission and the Columbia Gas System created a partnership and built the original complex at Cove Point. The purpose of the complex was to receive, store, and process LNG from Algeria. Once processed, this natural gas entered the domestic distribution system to meet domestic demand that could not be met by domestic production. [15]

For two years from 1978 to 1980, the terminal received and processed LNG. By 1980, domestic production, encouraged by price deregulation, reduced the need for imported LNG. Activity at Cove Point largely ceased.

In 1995, Columbia Gas, the sole owner at that time, reopened Cove Point and devoted it to storage and serving the growing mid-Atlantic region. The terminal's liquefaction capabilities were used to facilitate storage and meet peak regional need for product.

By 2002, Dominion had become sole owner of the terminal as demand increased for natural gas, which was becoming a more significant fuel source for electricity generation. This growing demand led to increased need for imported LNG.

Between 2006 and 2009, following Federal Energy Regulatory Commission approval, Dominion initiated a series of substantial improvements at the terminal. On-site storage almost doubled from 7.8 Bcf to 14.6 Bcf as the total number of storage tanks increased from five to seven. Daily output capacity increased from 1.0 Bcf to 1.8 Bcf. New pipelines were added to Dominion's system along with two new compressor stations. All these improvements added to the facility's ability to deliver natural gas to the Mid-Atlantic region and manage supplies that can be stored in the summer during periods of lower demand and transported in the winter as demand increases.

[15] This discussion of the origins and development of the Cove Point Terminal is derived from "History of Cove Point." https://www.dom.com/business/gas-transmission/cove-point/history-of-cove-point.jsp.

Between 2009 and 2011, Dominion completed another series of capital improvements targeted toward increasing the ability of the facility to accommodate advances in LNG ship technology. These improvements provide greater logistical flexibility, including the ability to serve larger vessels that were being built at the time.

The Cove Point LNG Terminal now has peak daily ability to transport to the Mid-Atlantic region 1.8 Bcf of natural gas and on-site LNG storage capacity of 14.6 Bcf (or 678,900 cubic meters of LNG). The terminal is connected to the Mid-Atlantic region through 88 miles of gas pipeline supported by compressor stations with the capacity to deliver those 1.8 Bcfd to the Mid-Atlantic gas transmission system.

The Proposed $2.5 Billion Investment

The latest Dominion project follows the continuous investment that Dominion has made in the terminal since 2006. Unlike all previous projects, the primary goal of the proposed project is to enable exports of LNG from the terminal. Exporting LNG from Cove Point will reverse the historic direction of the flow of natural gas at the terminal, a reflection of the sea change that has occurred in just a few years in the U.S. natural gas market as shale gas has come online.

The heart of the proposed capital improvements is liquefaction facilities. On average, this equipment is designed to process 750 million cubic feet per day and convert this input gas to LNG. The new liquefaction process will be connected to existing LNG tanks, pumps, piping, and piers. Natural gas will be used to create the refrigerant capacity required by liquefaction and meet all other new power demand of the proposed project.

By integrating the new liquefaction process with existing capabilities and facilities, Dominion will create a bi-directional service that allows for both the import and export of LNG at the Dominion Cove Point LNG Terminal. The entire proposed project will be developed within the confines of current Dominion property.

Project Schedule

Planning has been underway on the proposed liquefaction plant at Cove Point since 2011 in anticipation of construction, which is scheduled to begin in 2014 and finish in early 2017. In 2017, operations are projected to begin and will quickly reach a steady state that is projected to run until at least the year 2040. Major elements of the schedule for the project's construction and operational phases are presented in Exhibit 6.

Exhibit 6: Schedule of construction and operations

Phase/Major activity	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*. . .*	*2040*
Construction phase										
Technical services										
Equipment purchases										
Construction activities										
Operation phase										

Source: Dominion

LNG liquefaction plant in Darwin, Australia (a testament to the global reach of this technology)

IV. Quantifying Economic Impacts

Two Phases – Construction and Operations

Economic impacts associated with the Cove Point project initially derive from construction of the plant. These construction-related impacts are substantial, but time-limited to the period of construction. Once the project becomes operational, an essentially permanent set of economic impacts is created that relates to the ongoing operation of the project.

For both construction-related impacts and operational impacts, there is a multiplier effect that amplifies the direct impacts of construction and operation. That multiplier effect includes the cascading supply-chain-related impacts that occur when goods and services that are required by project construction and operations are purchased (indirect impacts). Also part of the multiplier effect are the impacts that occur when the direct workers and workers in the supply chain spend their paychecks in the local economy on a wide range of consumer goods and services (household spending effects are termed induced impacts).[16]

Estimating construction-related impacts

The construction of the liquefaction plant at Cove Point is likely to be one of the largest construction projects ever undertaken in Maryland. Total construction costs are currently estimated to be in the range of $2.5 billion to $3.5 billion. For the sake of comparison, the recent project to replace the Woodrow Wilson Bridge over the Potomac River cost $2.5 billion.

The impacts of construction on the Maryland economy will be determined by a number of factors including primarily the extent to which labor, materials, equipment, and other goods and services required by the project can be obtained from Maryland's workforce or productive enterprises. The typical method of estimating impacts of construction is to identify the different

[16] The economic impacts of the proposed project have been extensively reviewed and analyzed in "Economic Impact Study of Construction and Operations: A Report Produced to Support the Dominion Cove Point Application for Export of LNG from Cove Point." This October 3, 2011 report was prepared for Dominion Cove Point LNG, LP by ICF International.

types of spending that would occur in Maryland and use state-specific industrial data that allow for measurement of the multiplier effect of this spending.[17]

An estimate in the middle of the range of current project/construction cost estimates is presented in Exhibit 7. This estimate of $3.0 billion is broken down into major cost elements. This breakdown of costs helps to clarify how costs can create impacts in and out of the local economy. For example, a significant fraction of the specialized equipment required for the liquefaction plant will be purchased from sources outside Maryland. On the other hand, other materials and equipment will also be required and can easily be sourced from within Maryland, creating economic impacts and benefits in the state. All on-site construction activities will occur in Calvert County, creating highly localized impacts and benefits.

Exhibit 7: Mid-range project cost estimate (millions of 2011 dollars)

Cost element	*Value*
Engineering	$150
Equipment and Materials	$750
Freight	$90
Civil, Mechanical and Structural	$610
Electrical and Instrumentation	$200
Insulation and Coatings	$180
Project Management	$230
Miscellaneous (permitting, inspection, third party engineering, operations support, property, commissioning and start up, legal, geotechnical work, taxes, site utilities, security, road upgrades, etc.)	$790
Total	$3,000
Source: Dominion, Sage	

A set of low- and high-case estimates of project cost is presented in Exhibit 8. This table provides estimates of costs incurred during each year of construction. The level of expenditures ranges from the minimal expenditures in 2011 through completion in 2017. Exhibit 8 makes clear that the bulk of construction activities will take place between 2014 and 2016.

[17] This analysis uses software and data from IMPLAN a product of the Minnesota IMPLAN Group, Inc. that is considered the industry standard for estimating these types of economic impacts.

Exhibit 8: Estimated range of project costs by year—2011 to 2017 (millions of 2011 dollars)

Case/Cost Element	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*Total*
Low-case								
Technical Services	$12.50	$181.25	$118.75	$118.75	$25.00	$25.00	$6.25	$487.50
Construction Labor	$0.00	$0.00	$0.00	$250.00	$375.00	$375.00	$37.50	$1,037.50
Equipment	$0.00	$0.00	$437.50	$312.50	$125.00	$62.50	$0.00	$937.50
Material Cost	$0.00	$0.00	$0.00	$6.25	$12.50	$12.50	$6.25	$37.50
Total	$12.50	$181.25	$556.25	$687.50	$537.50	$475.00	$50.00	$2,500.00
High-case								
Technical Services	$18.00	$253.00	$166.00	$166.00	$35.00	$35.00	$8.00	$681.00
Construction Labor	$0.00	$0.00	$0.00	$350.00	$525.00	$525.00	$53.00	$1,453.00
Equipment	$0.00	$0.00	$613.00	$438.00	$175.00	$88.00	$0.00	$1,314.00
Material Cost	$0.00	$0.00	$0.00	$8.00	$18.00	$18.00	$8.00	$52.00
Total	$18.00	$253.00	$779.00	$962.00	$753.00	$666.00	$69.00	$3,500.00
Source: Dominion								

Construction Impacts

Estimated impacts are measured along four dimensions. Employment is measured in job-years of work. Labor income, which represents a combination of employee wages, salaries, and proprietor income (e.g., income from self-employment), flows naturally from job impact estimates.

The study team also measured value added. Value added represents the contribution each company or industry makes to gross domestic product and is the difference between the value of goods and services purchased and the value of total sales or gross revenues of a company. The final type of impact measured by the study team is business sales (also known as output). Business sales represent the value of sales by business establishments. Business sales can also be considered the combination of the value of all purchased inputs and the value added to those inputs.

These four impacts are estimated in two geographic areas. Local impacts are estimated for Calvert County, where the project will be located. As with most projects, impacts are concentrated in the local economy, but spill over to nearby localities. Estimates for other Maryland jurisdictions are labeled as "rest of Maryland." Given the range of possible construction costs, a low- and high-case estimate for each type of impact is calculated. For each category, a mid-case has also been estimated.

Exhibit 9 summarizes the direct, indirect, and induced employment impacts associated with project construction under the mid-case estimate. Over the life of the construction period, almost 10,700 job-years will be created in Calvert County.[18] An additional 4,800 job-years will occur in other jurisdictions in Maryland. The peak year for impacts will be 2015 in the midst of actual construction activities.

Exhibit 9: Economic impacts of construction—job years of work (mid-case)

Year	*Calvert County*			*Rest of Maryland*		
	Direct	Indirect	Induced	Direct	Indirect	Induced
2011	47	12	12	28	18	34
2012	664	164	175	392	253	473
2013	420	104	111	256	165	305
2014	1,855	347	458	216	336	597
2015	2,167	375	527	11	291	499
2016	2,078	360	506	10	279	479
2017	210	33	50	9	35	56
Subtotals	7,441	1,395	1,839	922	1,377	2,443
Total	**10,675**			**4,742**		
Sources: Dominion, ICF, Sage						

Labor income associated with this employment is presented in Exhibit 10. The mid-case estimate of total labor income for the entire construction period is over $570 million for Calvert County and almost $340 million elsewhere in the state. These values are presented in terms of 2012 dollars. The peak year for labor income associated with facility construction is 2015.

Exhibit 10: Economic impacts of construction—labor income (millions of 2012 dollars)

Year	*Calvert County*			*Rest of Maryland*		
	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case
2011	$3.0	$3.7	$3.3	$4.7	$5.9	$5.3
2012	$41.7	$52.1	$46.9	$65.8	$82.3	$74.1
2013	$26.4	$33.0	$29.7	$43.2	$54.0	$48.6
2014	$124.1	$155.1	$139.6	$72.3	$90.4	$81.4
2015	$147.0	$183.7	$165.4	$53.8	$67.3	$60.6
2016	$140.2	$175.5	$157.9	$51.5	$64.4	$57.9
2017	$28.1	$31.6	$29.8	$10.0	$11.7	$10.8
Total	$510.4	$634.7	$572.6	$301.3	$375.9	$338.6
Sources: Dominion, ICF, Sage						

[18] A job is defined as one person working one job for one year.

Value added impacts of construction are presented in Exhibit 11. The mid-case estimate of these contributions to gross county product totals $731 million for Calvert County and another $521 million for other Maryland jurisdictions. The peak year for these impacts is 2014 when the mid-case value added impact is $182 million for the county and $127 million for the balance of the state.

Exhibit 11: Economic impacts of construction—value added (millions of 2012 dollars)

Year	*Calvert County*			*Rest of Maryland*		
	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case
2011	$4.2	$5.3	$4.8	$7.5	$9.4	$8.4
2012	$59.5	$74.4	$67.0	$105.0	$131.3	$118.2
2013	$37.7	$47.1	$42.4	$68.3	$85.3	$76.8
2014	$162.2	$202.7	$182.4	$112.5	$140.6	$126.6
2015	$188.3	$235.3	$211.8	$81.7	$102.1	$91.9
2016	$178.7	$223.8	$201.3	$78.1	$97.7	$87.9
2017	$19.1	$23.7	$21.4	$10.2	$12.7	$11.5
Total	$649.7	$812.4	$731.1	$463.3	$579.2	$521.2
Sources: Dominion, ICF, Sage						

Finally, the construction of the liquefaction plant at Cove Point will generate billions of dollars of business sales for companies in the state. The total business sales impact for the county (mid-case estimate) is nearly $1.4 billion. Another $832 million in business sales will be garnered by other establishments elsewhere in the state. In 2015, when business sales will peak, county businesses are expected to garner $410 million in sales, while businesses in other parts of the state will enjoy an additional $150 million. Thus, construction of the project will significantly improve business outcomes, increase employment and associated labor income.

Exhibit 12: Economic impacts of construction—business sales (millions of 2012 dollars)

Year	*Calvert County*			*Rest of Maryland*		
	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case
2011	$7.4	$9.2	$8.3	$11.6	$14.6	$13.1
2012	$103.3	$129.1	$116.2	$163.1	$204.0	$183.5
2013	$65.4	$81.7	$73.5	$107.1	$133.8	$120.4
2014	$307.6	$384.4	$346.0	$179.3	$224.1	$201.7
2015	$364.3	$455.4	$409.9	$133.4	$166.8	$150.1
2016	$344.9	$432.3	$388.6	$127.0	$159.0	$143.0
2017	$37.2	$46.0	$41.6	$17.7	$22.0	$19.9
Total	$1,230.1	$1,538.2	$1,384.1	$739.2	$924.2	$831.7
Sources: Dominion, ICF, Sage						

Construction impacts by their very nature are transient events. When the construction period is complete, these impacts will no longer occur. This brings us to the quantification of the essentially permanent impacts of the proposed Cove Point project.

Operational Impacts

2017 is scheduled to represent the first full year of operations. Dominion will be entering into 20-year agreements to provide a liquefaction service to its export customers. Contract extensions and/or remarketing of this capacity are expected to occur well beyond the initial 20-year term.

As was true with construction impacts, the operational impacts discussed below represent total impacts. Both direct and indirect impacts are included as are the induced impacts, which are created by the household spending of directly and indirectly impacted workers. These impacts capture the full multiplier effects of the proposed project's operations.

Exhibit 13 provides a breakdown of employment impacts associated with proposed project operations. In the first year of operations in 2017, the equivalent of 76 job-years in the county and another 65 job-years elsewhere in the state will be created. Starting in 2018 and continuing through 2040, 70 job-years in the county and an added 60 job-years in the rest of Maryland will be supported each year. For the total period of analysis, the county will benefit from 1,686 job-years and the rest of the state will experience an additional 1,445 job-years as a consequence of the proposed project's operations.

Exhibit 13: Economic impacts of operations—job years of work

Year	*Calvert County*			*Rest of Maryland*		
	Direct	Indirect	Induced	Direct	Indirect	Induced
2017	24	30	22	5	38	22
	Total: 76			*Total: 65*		
Annually 2018 through 2040	22	28	20	4	36	20
	Total: 70			*Total: 60*		
2017 through 2040	530	674	482	97	866	482
	Total: 1,686			**Total: 1,445**		
Sources: Dominion, ICF, Sage						

The annual labor income associated with the employment created by the proposed liquefaction project is estimated at $8.7 million for the county and another $1.9 million for other Maryland jurisdictions. From 2017 through 2040, total labor income impacts are estimated at $210 million for the county and $45 million for the rest of Maryland as shown in Exhibit 14.

Exhibit 14: Economic impacts of operations—labor income per year (millions of 2012 dollars)

Year	*Calvert County*	*Rest of Maryland*
2017	$9.4	$2.1
Annually 2018 through 2040	$8.7	$1.9
Total: 2017 through 2040	$210.1	$45.2
Sources: Dominion, ICF, Sage		

Value added and business sales associated with project operations are summarized in Exhibits 15 and 16, respectively. For the county, annual value added impacts are estimated at $23 million while for other areas of the state the annual impact is $3 million. Over the total period considered in this analysis, county-level value added impacts are $543 million while impacts for the rest of the state are $74 million. Business sales impacts for the county are estimated at $54 million annually and at $1.3 billion from 2017 through 2040. Elsewhere in Maryland business sales impacts are estimated at $12 million per year and $280 million for the 2017-2040 period.

Exhibit 15: Economic impacts of operations—value added per year (millions of 2012 dollars)

Year	*Calvert County*	*Rest of Maryland*
2017	$24.5	$3.4
Annually 2018 through 2040	$22.6	$3.1
Total: 2017 through 2040	$543.4	$74.0
Sources: Dominion, ICF, Sage		

Exhibit 16: Economic impacts of operations—business sales per year (millions of 2012 dollars)

Year	*Calvert County*	*Rest of Maryland*
2017	$58.5	$12.6
Annually 2018 through 2040	$54.0	$11.6
Total: 2017 through 2040	$1,300.0	$279.5
Sources: Dominion, ICF, Sage		

Total Project-Based Economic Impacts

Economic impacts from construction and operations can be combined to estimate the total impacts of the proposed liquefaction plant at Cove Point from the onset of construction in 2014

through more than two decades of operations. As the following tables make clear, the proposed project is capital intensive. The construction phase of a multi-billion dollar facility will create large economic impacts and benefits for Calvert County and the rest of Maryland. Once operations begin, the level of economic activity subsides, but still represents substantial ongoing contribution to the economy of the county and the state.

Exhibit 17 summarizes the employment impacts of the project's construction and operations. For the county, the mid-case estimate is that approximately 12,360 job-years will be supported. About six of every seven workers are associated with construction. For the rest of Maryland, almost 6,200 job-years are linked to the total project with about three of every four of these jobs occurring during the construction phase.

Exhibit 17: Total economic impacts of construction and operations—job years of work (mid-case estimate)

Phase	*Calvert County*	*Rest of Maryland*
	Mid-case	Mid-case
Construction	10,675	4,742
Operations	1,686	1,445
Total	12,361	6,187
Sources: Dominion, ICF, Sage		

Labor income for the total project is summarized in Exhibit 18. County-based workers will receive more than $780 million in compensation from 2011 through 2040 with more than 70 percent of this compensation occurring during the construction phase. In the remainder of the state, workers will earn more than $380 million as a result of the project, with almost 90 percent occurring during the construction phase.

Exhibit 18: Total economic impacts of construction and operations—labor income (millions)

Phase	*Calvert County*			*Rest of Maryland*		
	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case
Construction	$510.4	$634.7	$572.6	$301.3	$375.9	$338.6
Operations	$210.1	$210.1	$210.1	$45.2	$45.2	$45.2
Total	$720.5	$844.8	$782.7	$346.5	$421.1	$383.8
Sources: Dominion, ICF, Sage						

Value-added impacts for the entire project are listed in Exhibit 19. The mid-case estimate of this impact in the county is $1.3 billion, almost 60 percent of which is tied to the construction phase.

For the remainder of the state, the mid-case estimate of total value added for the entire project is $595 million with more than 85 percent of the impact linked to the construction phase.

Exhibit 19: Total economic impacts of construction and operations—value added (millions)

Phase	*Calvert County*			*Rest of Maryland*		
	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case
Construction	$649.7	$812.4	$731.1	$463.3	$579.2	$521.2
Operations	$543.4	$543.4	$543.4	$74.0	$74.0	$74.0
Total	$1,193.2	$1,355.9	$1,274.5	$537.3	$653.2	$595.3
Sources: Dominion, ICF, Sage						

Finally, the totality of business sales associated with construction and operations is shown in Exhibit 20. Countywide business sales supported by the project will be nearly $2.7 billion (mid-case estimate) with just over half of these sales occurring during the construction phase. In other Maryland jurisdictions, business sales supported by the project are $1.1 billion with three-quarters of these sales occurring during the construction phase.

Exhibit 20: Total economic impacts of construction and operations—business sales (millions)

Phase	*Calvert County*			*Rest of Maryland*		
	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case
Construction	$1,230.1	$1,538.2	$1,384.1	$739.2	$924.2	$831.7
Operations	$1,300.0	$1,300.0	$1,300.0	$279.5	$279.5	$279.5
Total	$2,530.0	$2,838.2	$2,684.1	$1,018.8	$1,203.8	$1,111.3
Sources: Dominion, ICF, Sage						

V. Fiscal Impacts

Fiscal Consequences are Significant for Calvert County and the State of Maryland

Construction and operation of the proposed liquefaction facility will also give rise to new tax revenue streams for Calvert County, other local governments, and the State. The study team has assessed fiscal impacts for both Calvert County and the State of Maryland. The list of taxes/fees that will be generated by the economic activity unleashed by the project is relatively long. However, the bulk of governmental revenue will originate from a handful of key taxes.

The earnings of Calvert County and Maryland residents associated with the proposed project will be subject to income tax rates at the State and county levels. When these wages, salaries, and other forms of income are spent in Maryland for a variety of goods, the State of Maryland collects additional sales taxes. Unless in support of the activities of nonprofit organizations, any project that creates new property value increases the taxable base of the jurisdiction in which it is located. Local property taxes represent a key part of general fund revenue of Maryland counties, with proceeds from local property taxes often used to support public education and public safety. In those rare cases when the developed property is worth billions of dollars, as will be true of the proposed liquefaction project, the new local property tax revenue stream represents a major fiscal event.

Quantification of Future Income and Sales Tax Collections

The mid-case estimate of total Calvert County income tax receipts for the construction phase is $11.9 million as shown in Exhibit 21. As shown in Exhibit 22, Maryland income and sales tax receipts during the construction phase are estimated at $32 million and $16 million, respectively (mid-case). Total income and sales tax receipts are estimated at $48 million during construction.

Once operations commence, Calvert County will collect income taxes on labor income associated with the operational workers and the multiplier effect of their activities. The annual estimate of these receipts is $177,000. Over the 2017 through 2040 period, total County income tax receipts are estimated at $4.3 million. See Exhibit 23 for relevant statistical detail.

Exhibit 21: Fiscal impacts of construction—Calvert County income taxes*
(thousands of 2012 dollars)

Year	*Low-case*	*High-case*	*Mid-case*
2011	$62	$78	$70
2012	$869	$1,086	$978
2013	$550	$688	$619
2014	$2,588	$3,235	$2,911
2015	$3,066	$3,832	$3,449
2016	$2,925	$3,660	$3,293
2017	$585	$660	$622
Total	$10,645	$13,238	$11,942

Note: *Calvert County taxes are estimated on the basis of an effective average income tax rate of approximately 2.1 percent based on actual income tax receipts for the County as reported by the Maryland Comptroller.
Sources: Dominion, ICF, Maryland Comptroller, Sage

Exhibit 22: Fiscal impacts of construction—Maryland income* and sales** taxes
(thousands of 2012 dollars)

Year	*Income taxes*			*Sales taxes*			*Total*		
	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case
2011	$265	$332	$299	$135	$169	$152	$401	$501	$451
2012	$3,717	$4,646	$4,182	$1,896	$2,370	$2,133	$5,613	$7,017	$6,315
2013	$2,406	$3,007	$2,707	$1,227	$1,534	$1,381	$3,633	$4,541	$4,087
2014	$6,792	$8,491	$7,641	$3,465	$4,331	$3,898	$10,257	$12,822	$11,539
2015	$6,945	$8,681	$7,813	$3,543	$4,428	$3,985	$10,487	$13,109	$11,798
2016	$6,630	$8,295	$7,463	$3,382	$4,231	$3,807	$10,012	$12,527	$11,269
2017	$1,315	$1,498	$1,406	$671	$764	$717	$1,985	$2,263	$2,124
Total	$28,070	$34,950	$31,510	$14,319	$17,828	$16,074	$42,389	$52,778	$47,584

Notes: * State of Maryland taxes are estimated on the basis of an effective average income tax rate of approximately 3.4 percent based on actual income tax receipts for the state as reported by the Maryland Comptroller.
** Sales taxes are estimated at roughly 51 percent of state income taxes based on actual sales and income tax receipts for the State as reported by the Maryland Comptroller.
Sources: Dominion, ICF, Maryland Comptroller, Sage

Exhibit 23: Fiscal impacts of operations—Calvert County income taxes
(thousands of 2012 dollars)

Year	*Value*
2017	$192
Annually 2018 through 2040	$177
Total: 2017 through 2040	$4,270

Sources: Dominion, ICF, Maryland Comptroller, Sage

During the entire operational phase addressed by this report, Maryland income and sales tax receipts will total an estimated $13 million. Two-thirds of this total will come from income taxes with the remainder from the State sales tax.

Exhibit 24: Fiscal impacts of operations—Maryland income and sales taxes
(thousands of 2012 dollars)

Year	*Income Taxes*	*Sales Taxes*	*Total*
2017	$387	$197	$584
Annually 2018 through 2040	$357	$182	$539
Total: 2017 through 2040	$8,602	$4,388	$12,990
Sources: Dominion, ICF, Maryland Comptroller, Sage			

Because tax receipts tied to the construction and operational phases are distinct, they can be added to provide an estimate of total receipts over the entirety of construction and operational periods taking place from 2011 through 2040. As indicated by Exhibit 25, Calvert County will receive an estimated $16 million in income taxes as a result of the project (mid-case estimate).

Exhibit 25: Fiscal impacts of construction and operations
—Calvert County income taxes (thousands of 2012 dollars)

Year	*Low-case*	*High*	*Mid-case*
Construction	$10,372	$12,899	$11,636
Operations	$4,270	$4,270	$4,270
Total	$14,642	$17,169	$15,905
Sources: Dominion, ICF, Maryland Comptroller, Sage			

As reflected in Exhibit 26, the State of Maryland will collect more than $59 million in income and sales taxes over the entire 2011 through 2040 period. More than 65 percent of these receipts will be income taxes with the remainder taking the form of sales taxes.

Exhibit 26: Fiscal impacts of construction and operations—Maryland income and sales taxes
(thousands of 2012 dollars)

Year	*Income taxes*			*Sales taxes*			*Total*		
	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case	Low-case	High-case	Mid-case
Construction	$27,350	$34,053	$30,702	$13,951	$17,371	$15,661	$41,301	$51,424	$46,363
Operations	$8,602	$8,602	$8,602	$4,388	$4,388	$4,388	$12,990	$12,990	$12,990
Total	$35,952	$42,655	$39,304	$18,339	$21,759	$20,049	$54,291	$64,414	$59,353
Sources: Dominion, ICF, Maryland Comptroller, Sage									

Large County Property Tax Receipts are Anticipated

Calvert County will benefit handsomely from income taxes paid by residents as a consequence of the proposed project. In peak construction years, the Sage study team estimates that these receipts will exceed $3 million annually. Once the project is operational, these income tax receipts will approach $180,000 per annum.

These fiscal impacts, however, will be dwarfed by the property taxes generated by the liquefaction facility itself. Property values and associated property taxes for major utility facilities such as this project are much harder to estimate than more typical new real property development.

Dominion currently estimates that the gross Calvert County property tax bill for the proposed project will be approximately $40 million per annum. Property taxes for new major facilities like the proposed project are often subject to credits and similar measures that reduce payments during the early life of a new facility. In time, however, any such reductions expire and the total tax bill is levied each year. Thus, regardless of any temporary reductions, the proposed facility will pay an estimated annual property tax bill of $40 million for most of the period discussed in this report.

It is worth placing $40 million in new property tax revenues in context for Calvert County, one of the smaller counties in the state in terms of population. Property taxes support the general funds of local governments. General funds are in turn devoted to the basic operations of local government—public safety, education, public works, libraries, and similar functions.

Exhibit 27 provides budgetary detail for three recent Calvert County general fund budgets. The addition of $40 million to the County's general fund would represent a major increase in any of these budgets. Another perspective on the impact of this increase in property tax revenue can be seen in the estimated $146 million in County property taxes that are expected to support the FY2012 County budget.[19] An additional $40 million would represent an increase of 27 percent over the County's current property tax revenue.

Exhibit 27: Recent Calvert County General Fund budgets

General Fund component	*FY 2011 actual budget*	*FY 2012 adopted budget*	*FY 2013 Staff Recommended budget*
Property tax	$146.8	$146.1	$140.2
Income tax	62.7	61.5	65.0
All other general fund revenue	21.3	24.4	27.1
Total general fund revenue	$230.8	$232.0	$232.3
Source: Calvert County government			

[19] Calvert County Board of Commissioners, "Adopted Budget Fiscal Year 2012" available at http://www.co.cal.md.us/assets/finance/FY2012.pdf

VI. Conclusion

After years of growing energy dependence, American energy production is on the rise again. The growth in production has been particularly noteworthy with respect to natural gas, with the nation steadily approaching net exporter status.

The latest Dominion project at Cove Point in Lusby, Calvert County, MD follows the continuous investment that Dominion has made in the terminal since 2006. Unlike previous capital projects, the primary goal of the proposed project is to enable exports of LNG from the terminal. Exporting LNG from Cove Point will reverse the historic direction of the flow of natural gas at the terminal, a reflection of the sea change in U.S. energy production in just a few years.

The heart of the proposed capital improvements is liquefaction facilities. On average, this equipment is designed to process 750 million cubic feet per day and convert this input gas to LNG. The new liquefaction process will be connected to existing LNG tanks, pumps, piping, and piers. Natural gas will be used to create the refrigerant capacity required by liquefaction and meet all other new power demand of the proposed project.

Construction of the liquefaction plant at Cove Point is likely to be one of the largest construction projects ever undertaken in Maryland. Total construction costs are currently estimated to be in the range of $2.5 billion to $3.5 billion.

This report has quantified the economic and fiscal impacts associated with the proposed investment and ongoing operations. In conducting the analysis, the Sage study team utilized the latest version of IMPLAN modeling software, which incorporates economic multipliers specific to the local economy.

The analysis concludes that:

- Between construction and operations, the export-oriented LNG facility will support nearly 12,400 jobs in Calvert County (measured in job-years of work) between the years 2011-2040 and nearly 6,200 jobs in the balance of Maryland (total Maryland jobs = 18,548 under the mid-case estimate);

- The project will support more than a quarter of a billion dollars in associated labor income (measured in 2012 dollars);
- Business sales in Maryland will be augmented by approximately $3.8 billion during the construction and operating phases;
- Over the lifetime of the project, Calvert County will collect nearly $16 million in local piggyback income tax collections;
- The County will also receive roughly $40 million per year in property tax collections, which represents a 27 percent increase over current County property tax collections;
- State of Maryland income and sales tax collections will approach $60 million over the course of the project under the mid-case estimate.

In summation, the proposed LNG export terminal at Cove Point represents an investment of approximately $2.5 billion that will position Calvert County and Maryland to benefit from the rapid expansion of U.S. energy production and exporting. In the process, the project will create quality jobs, including in the construction industry, will support business growth and will generate large fiscal benefits for Calvert County and the State of Maryland.

Appendix A - Adding Compressors in Virginia – A Source of Additional Economic Impact

This report has focused upon the impacts associated with a proposed export-oriented LNG terminal in Calvert County, MD. This appendix provides information regarding the economic and fiscal consequences associated with the addition of a compressor to Dominion's natural gas infrastructure in Northern Virginia, which is a required aspect of the proposed LNG terminal investment. Two locations for the compressor are presently under consideration, one in Fairfax County and one in Loudoun County.

As is true with the expansion of the Cove Point LNG Terminal, the Northern Virginia compressor project represents a major capital investment. Dominion estimates construction costs of $100 million, which will be associated with significant economic and fiscal impact.

Once constructed, however, the addition of this capacity to Dominion's natural gas infrastructure is not expected to generate any significant operational changes in Northern Virginia. Specifically, no changes in the utility's employment are anticipated as a result of this investment. The investment will increase the real property value of Dominion's holdings, which will translate into increased property tax revenues.

Impacts from the construction phase

Economic impacts would be somewhat different depending upon the chosen county. The variation between the two counties is attributable to the size and complexity of their respective economies. With a 2011 population estimated at 1.1 million, Fairfax County is more than three times the size of Loudoun County with its population of approximately 325,000.[20]

Given its larger population and labor force, Fairfax County has more opportunities to meet the demands of complex projects and as a consequence is more likely to capture the direct impacts of such projects through its (i.e. county-based) labor force. The greater complexity of the Fairfax County economy also means that the local labor force and business community can capture a greater share of the indirect impacts inuring to the supply chain that supports the direct construction activities.

- Impacts if the investment is situated in Loudoun County

Exhibit A1 summarizes the estimated economic impacts of building a $100 million compressor in Loudoun County. As indicated, construction would support 829 jobs (measured in number of jobs). Associated compensation would total $50 million. Countywide business sales would be augmented by $122.8 million over the course of construction. Statewide impacts, which embody

[20] U.S. Bureau of the Census, State & County QuickFacts, available at quickfacts.census.gov/qfd/states

county-based impacts, include more than 1,100 jobs with associated compensation of $63 million. Statewide businesses would enjoy more than $160 million in sales as a result of the project, with most of those sales generated with Loudoun County.

Exhibit A1. Economic impacts of construction--Loudon County

	Direct Impacts	Indirect Impacts	Induced Impacts	Total
Loudoun County				
Jobs (years of work)	568	124	137	829
Income (millions)	$35.5	$8.8	$5.8	$50.0
Business sales (millions)	$84.9	$19.4	$18.4	$122.8
Virginia (including Loudon County)				
Jobs (full- and part-time)	619	216	271	1,106
Income (millions)	$37.9	$14.3	$11.0	$63.2
Business sales (millions)	$91.6	$33.9	$35.2	$160.7
Sources. Dominion, IMPLAN, Sage				

This economic activity will also result in new tax revenue streams for the government of Loudoun County and the Commonwealth of Virginia. Exhibit A2 lists the major categories of taxes including sales, income, and property taxes. The "All other" category encompasses motor vehicle taxes and fees, fines, social insurance, and other government revenue sources. In total, these revenues are estimated at $4.5 million.

Exhibit A2. Fiscal impacts of construction – Loudoun County scenario (millions)

Type of tax	*Value*
Sales	$0.9
Income	$1.1
Property	$1.5
All other	$0.9
Total	$4.5
Source. IMPLAN	

- Impacts if the investment is situated in Fairfax County

Exhibit A3 summarizes economic impacts of the same project were it placed in Fairfax County. Local employment would be increased by 1,005 jobs with associated income approaching $57 million. Businesses in Fairfax County would garner $148 million in sales related to the project directly and secondarily. In this scenario, statewide impacts, including those in Fairfax County, include 1,169 jobs with associated compensation of $66 million and statewide business sales of $173 million.

Exhibit A3. Economic impacts of construction--Fairfax County

	Direct Impacts	Indirect Impacts	Induced Impacts	Total
Fairfax County				
Jobs (years of work)	682	167	156	1,005
Income (millions)	$36.5	$13.2	$6.9	$56.6
Business sales (millions)	$94.5	$31.1	$22.3	$147.9
Virginia (including Fairfax County)				
Jobs (full- and part-time)	682	216	271	1,169
Income (millions)	$36.5	$17.0	$12.0	$65.5
Business sales (millions)	$94.5	$40.2	$38.8	$173.4
Sources. Dominion, IMPLAN, Sage				

These somewhat larger economic impacts give rise to somewhat larger fiscal impacts. As noted in Exhibit A4, the total fiscal impact for the Fairfax County scenario is estimated at $4.7 million, job slightly above the $4.5 million calculated for the Loudoun County scenario.

Exhibit A4. Fiscal impacts of construction—
Fairfax County scenario (millions)

Type of tax	*Value*
Sales	$1.0
Income	$1.2
Property	$1.5
All other	$0.9
Total	$4.7
Source. IMPLAN	

Impacts from the operational phase

The investment of $100 million in the new compressor facility will increase the real property value of Dominion's holdings. This increase in property value will trigger an increase in real property tax collections. These new taxes represent an ongoing fiscal benefit to government and are expected to ramp up in a short period of time (2016 to 2017). After that initial period, tax revenues are expected to reach a steady state likely to increase in conjunction with general inflation.

The estimated ongoing property taxes associated with either development scenario are reflected in Exhibit A5. Once a steady state is reached, Loudoun County can expect to collect nearly $800,000 ($787,200) in associated property taxes. The analogous impact in Fairfax County would be nearly $750,000 ($745,800).

Exhibit A5. Additional Annual Tax Per Annum (thousands)

	2015	*2016*	*2017 & Future Years*
Loudoun County scenario	$132.3	$747.9	$787.2
Fairfax County scenario	$125.3	$708.5	$745.8
Source. Dominion			

Appendix B - IMPLAN

IMPLAN is an economic impact assessment software system. The system was originally developed and is now maintained by the Minnesota IMPLAN Group (MIG). It combines a set of extensive databases concerning economic factors, multipliers and demographic statistics with a highly refined and detailed system of modeling software. IMPLAN allows the user to develop local-level input-output models that can estimate the economic impact of new firms moving into an area as well as the impacts of professional sports teams, recreation and tourism, and residential development. The model accomplishes this by identifying direct impacts by sector, then developing a set of indirect and induced impacts by sector through the use of industry-specific multipliers, local purchase coefficients, income-to-output ratios, and other factors and relationships.

There are two major components to IMPLAN: data files and software. An impact analysis using IMPLAN starts by identifying expenditures in terms of the sectoring scheme for the model. Each spending category becomes a "group" of "events" in IMPLAN, where each event specifies the portion of activity allocated to a specific IMPLAN sector. Groups of events can then be used to run impact analysis individually or can be combined into a project consisting of several groups. Once the direct economic impacts have been identified, IMPLAN can calculate the indirect and induced impacts based on a set of multipliers and additional factors.

Economic benefits principally take the form of new employment opportunities, associated income and augmented business revenues. These economic benefits include both direct benefits, which are closely associated with the activities that take place at Cove Point, and secondary benefits that are associated with foreseeable and calculable multiplier effects.

Secondary benefits can be segmented into two types of impacts, indirect and induced. Indirect benefits are related to the business-to-business transactions that take place due to increased demand for goods and services that accompanies augmented investment and business operations. Impacted businesses sell everything from office furniture and copiers to computer and graphic design services. Induced benefits are created when workers directly or indirectly supported by increased economic activity spend their earnings in the local economy. Indirect and induced benefits together comprise total multiplier effects.

The hallmark of IMPLAN is the specificity of its economic datasets. The database includes information for five-hundred-and-twenty-eight different industries (generally at the three or four digit Standard Industrial Classification level), and twenty-one different economic variables. Along with these data files, national input-output structural matrices detail the interrelationships between and among these sectors. The database also contains a full schedule of Social Accounting Matrix (SAM) data. All of this data is available at the national, state, and county level.

Another strength of the IMPLAN system is its flexibility. It allows the user to augment any of the data or algorithmic relationships within each model in order to more precisely account for regional relationships. This includes inputting different output-to-income ratios for a given industry, different wage rates, and different multipliers where appropriate. IMPLAN also provides the user with a choice of trade-flow assumptions, including the modification of regional purchase coefficients, which determine the mix of goods and services purchased locally with each dollar in each sector. Moreover, the system also allows the user to create custom impact analyses by entering changes in final demand. This flexibility is a critically important feature in terms of the Sage proposed approach. Sage is uniquely qualified to develop data and factors tailored to this project, and, where appropriate, overwrite the default data contained in the IMPLAN database.

A final advantage of IMPLAN is its credibility and acceptance within the profession. There are over five hundred active users of IMPLAN databases and software within the federal and state governments, universities, and among private sector consultants. The following list provides a sampling of IMPLAN users.

Sample of IMPLAN Users:

Academic Institutions

Alabama A&M University
Albany State University
Auburn University
Cornell University
Duke University
Iowa State University
Michigan Tech University
Ohio State
Penn State University
Portland State University
Purdue University
Stanford University
Texas A&M University
University of California – Berkeley
University of Wisconsin
University of Minnesota
Virginia Tech
West Virginia University
Marshall University/College of Business

Federal Government Agencies

Argonne National Lab
Fed. Emergency Man. Agency (FEMA)
US Dep't of Agriculture, Forest Service
US Dep't of Ag., Econ Research Service
US Dep't of Int., Bureau of Land Mgmt.
US Dep't of Int., Fish and Wildlife Serv.
US Dep't of Int., National Parks Service
US Army Corps of Engineers

State Government Agencies

MD Department of Natural Resources
Missouri Department of Economic Development
California Energy Commission
Florida Division of Forestry
Illinois Dep't of Natural Resources
New Mexico Department of Tourism
South Carolina Employment Security
Utah Department of Natural Resources
Wisconsin Department of Transportation

Private Consulting Firms

Coopers & Lybrand
Batelle Pacific NW Laboratories
Boise Cascade Corporation
Charles River Associates
CIC Research
BTG/Delta Research Division
Crestar Bank
Deloitte & Touche
Ernst & Young
Jack Faucett Associates
KPMG Peat Marwick
Price Waterhouse LLP
SMS Research
Economic Research Associates
American Economics Group, Inc.
L.E. Peabody Associates, Inc.
The Kalorama Consulting Group
West Virginia Research League

APPENDIX 5-B

TRAFFIC IMPACT ANALYSIS FOR DOMINION COVE POINT LNG

TRAFFIC IMPACT ANALYSIS

FOR

DOMINION COVE POINT LNG

Prepared for:

Dominion Cove Point LNG

Prepared by:

LENHART TRAFFIC CONSULTING, INC.

TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

June 21, 2012

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Appendices

List of Exhibits

Section 1 Introduction

1.1 Project Description

This Traffic Impact Analysis was prepared for the expansion of Dominion Cove Point LNG Terminal located in Lusby, Maryland on the north side of MD 497 (Cove Point Road) just east of Little Cove Point Road as shown on Exhibit 1.

The project involves the construction of liquefaction facilities for exporting liquefied natural gas at its existing Dominion Cove Point LNG Terminal.

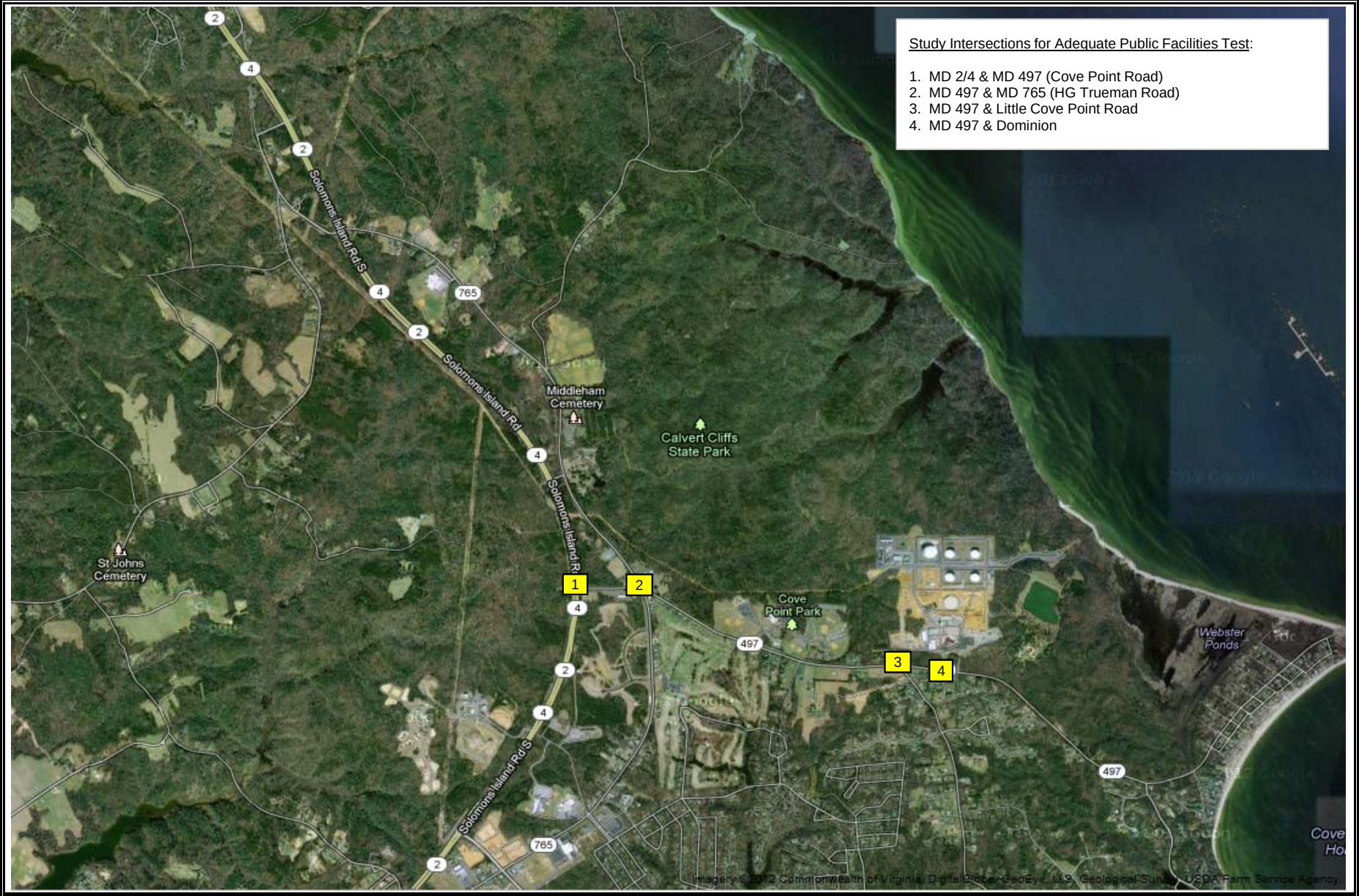
The existing Dominion facility currently employs a total of 107 employees. The employees comprise a mix of office workers with typical office hours of 7:00 AM to 3:30 PM, and operators with two shifts of operations (7:00 AM to 7:00 PM as the day shift and 7:00 PM to 7:00 AM as the night shift).

The expansion of the Dominion Cove Point LNG facility will expand the total number of employees from 107 existing employees to a total of 200 future employees.

1.2 Scope of Study

A Scoping Agreement was coordinated and approved by Calvert County. A copy is included in Appendix A. Article 6-10 of the Calvert County Adequate Public Facilities Ordinance (APFO) requires the analysis of intersections using the Highway Capacity Software (HCS) methodology. Article 6-10.01.C.3 provides that all State roads and intersections operating at a Level of Service (LOS) "D" or better are considered acceptable. It should be noted that the access routes and all study intersections are State roads and intersections, therefore a LOS "D" or better is considered acceptable for APFO analyses.

Appendix D to this report also contains a construction staging report and analysis of the study intersections, in addition to the proposed construction entrance and staging area. Appendix D contains a detailed description of the staging area and proposed construction phasing along with recommendations to accommodate the construction of the liquefaction facilities.



Traffic Impact Analysis	Site Location Map	**Exhibit 1**
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	Obtained from Google Maps	

Section 2 Existing Conditions

2.1 Description of Road Network

The key roads in the study area are as follows:

- MD 2/4 is a four lane divided highway with a posted speed limit of 55 MPH.
- MD 497 is a two lane road with a posted speed limit of 45 MPH.
- MD 765 is a two lane local road that runs north and south parallel to MD 2/4.

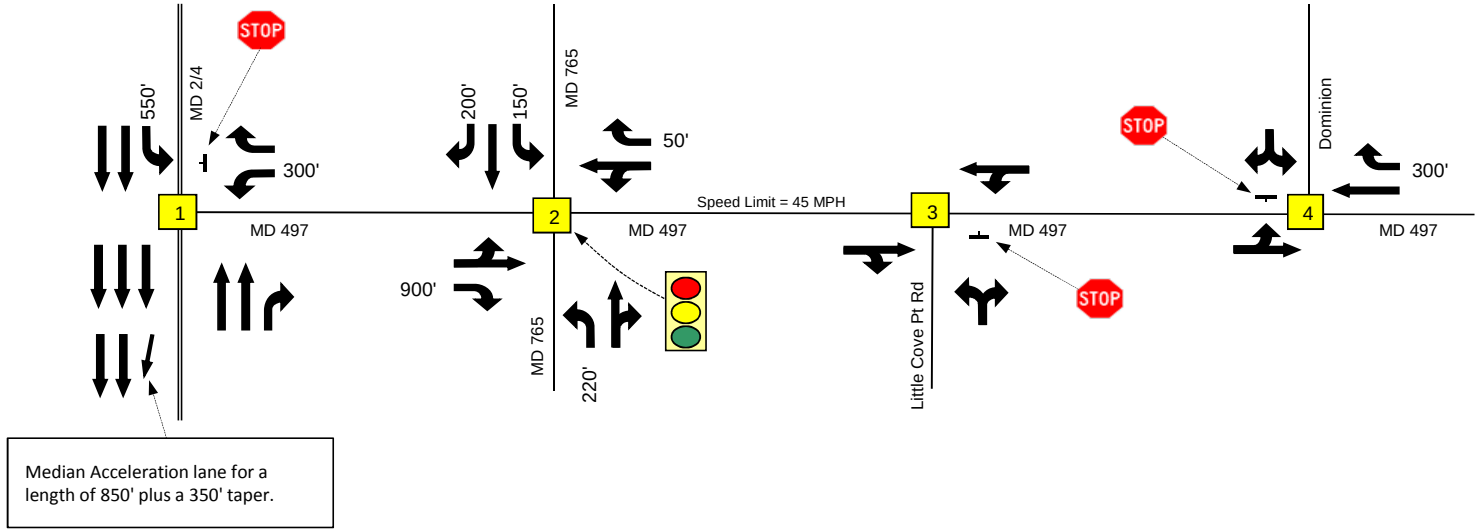
2.2 Existing Lane Configurations

The Existing Lane Use & Traffic Control Devices are shown on Exhibit 2.

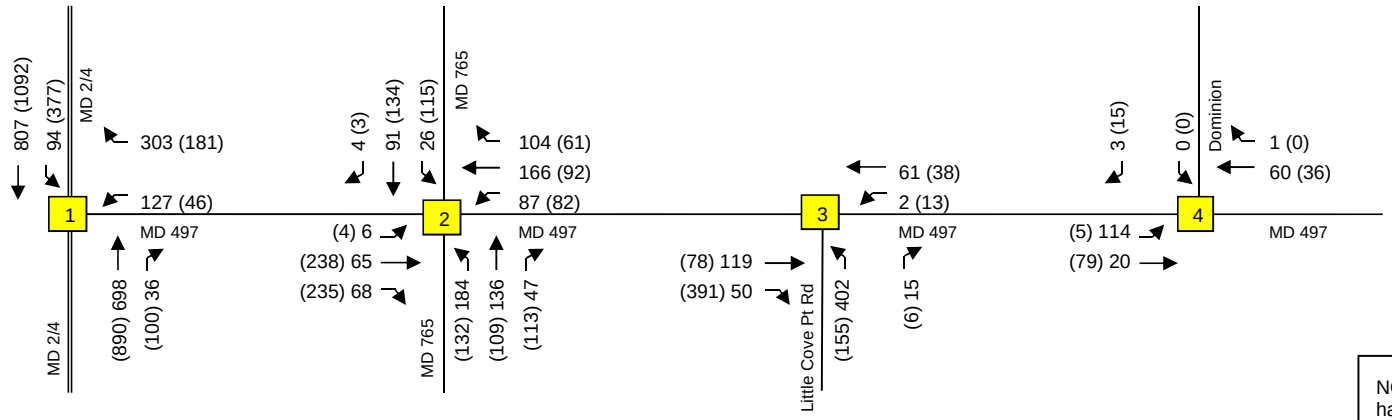
2.3 Existing Traffic Counts

Traffic counts were conducted, and the peak hour traffic volumes are shown on Exhibit 3. The existing intersections were evaluated using the Highway Capacity Software (HCS) as required by the Adequate Public Facilities requirements of Article 6; and the resulting levels of service based on the HCS analyses are shown on Exhibit 10.

The State Highway Administration (SHA) requires the use of the Critical Lane Volume (CLV) methodology for State intersections. The study intersections were also evaluated using the CLV methodology with the results reported on Exhibit 9.



Traffic Impact Analysis	Existing Lane Use & Traffic Controls	**Exhibit 2**
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	Key: xx = AM Peak Vol's (xx) = PM Peak Vol's	



Intersection #1
AM Peak Hr: 6:45-7:45
PM Peak Hr: 4:30-5:30

Intersection #2
AM Peak Hr: 7:30-8:30
PM Peak Hr: 4:30-5:30

Intersection #3
AM Peak Hr: 6:30-7:30
PM Peak Hr: 4:45-5:45

Intersection #4
AM Peak Hr: 6:30-7:30
PM Peak Hr: 4:45-5:45

NOTE: Intersections have different peak hours, therefore the traffic volumes may not appear balanced on this exhibit.

Traffic Impact Analysis

Lenhart Traffic Consulting, Inc.
Traffic Engineering & Transportation Planning

Existing Peak Hour Volumes

Key: xx = AM Peak Vol's (xx) = PM Peak Vol's

Exhibit 3

Section 3 Background Conditions

3.1 Annual Growth

Average Daily Traffic (ADT) volumes along MD 2/4 and MD 497 were evaluated and included in Appendix A. The historical data indicates that the growth in ADT's along MD 2/4 is 1% or less per annum over the past 10 years. The ADT's along MD 497 is 3% per annum over the past 10 years. The project is anticipated to be completed in three (3) years; therefore a 3% growth rate was applied for a three (3) year study period. The base peak hour volume is shown on Exhibit 4.

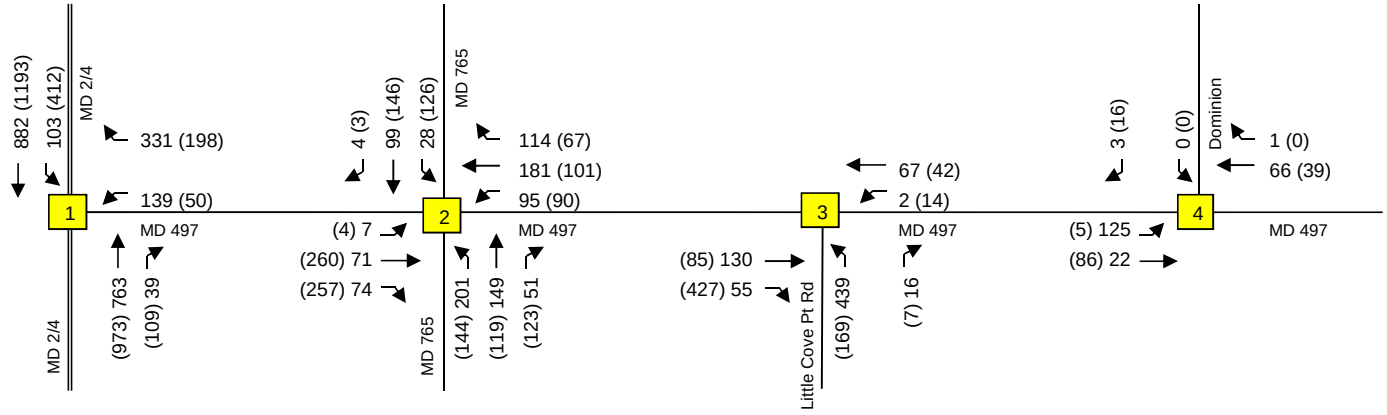
3.2 Approved Background Developments

The Patuxent Business Park was identified as an approved background development in the study area. The trip generation rates and trip assignment is contained in Appendix C.

The base peak hour traffic volumes were combined with the background trips from Appendix C to provide the background peak hour traffic volumes on Exhibit 5.

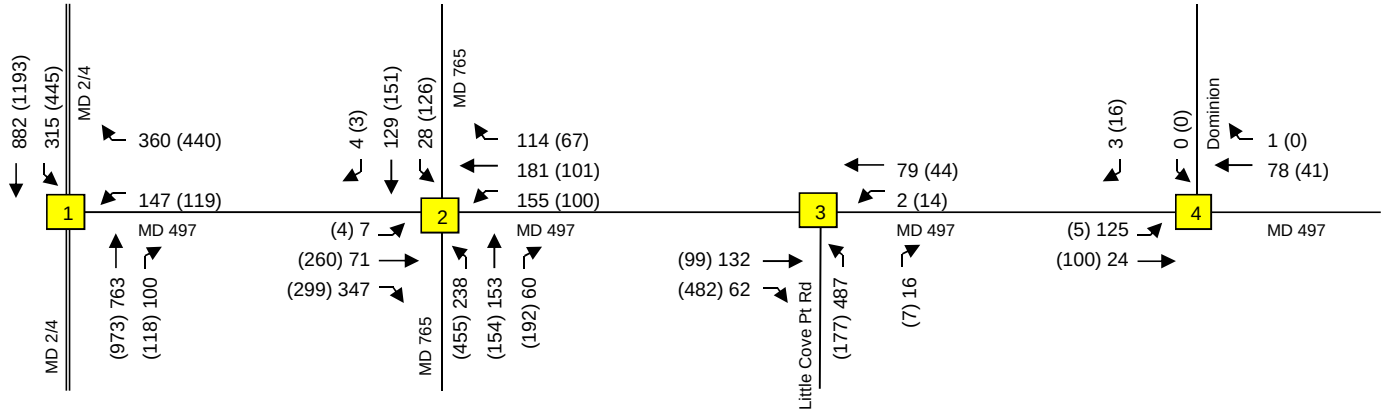
3.3 Background Traffic Volumes

The background traffic volumes shown on Exhibit 5 were evaluated. The CLV results are shown on Exhibit 9 and the HCS results are shown on Exhibit 10.



3% Annual Growth Rate
3 Year Build-out

Traffic Impact Analysis	Base Peak Hour Volumes	**Exhibit 4**
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	Key: xx = AM Peak Vol's (xx) = PM Peak Vol's	



Traffic Impact Analysis	Background Peak Hour Volumes	**Exhibit 5**
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	Key: xx = AM Peak Vol's (xx) = PM Peak Vol's	

Section 4 Projected Conditions with Site

4.1 Site Trip Generation

The existing Dominion facility currently employs a total of 107 employees. The employees comprise a mix of office workers with typical office hours of 7:00 AM to 3:30 PM, and operators with two shifts of operations (7:00 AM to 7:00 PM as the day shift and 7:00 PM to 7:00 AM as the night shift).

The expansion of the Dominion Cove Point LNG facility will expand the total number of employees from 107 existing employees to a total of 200 future employees.

The trip generation for the site is calculated on Exhibit 6. The trip generation is based upon the existing trips generated by 107 employees at the Dominion facility. The net increase in trips generated by the expansion to 200 employees is shown on Exhibit 6.

4.2 Site Trip Distribution & Trip Assignment

The trip assignment for the net increase of employees is shown on Exhibit 7.

4.3 Total Traffic Volumes

The Total Peak Hour Volumes are shown on Exhibit 8.

4.4 Projected Level of Service

The total traffic volumes shown on Exhibit 8 were evaluated. The CLV results are shown on Exhibit 9 and the HCS results are shown on Exhibit 10.

Trip Generaton Rates

Calculation of Existing Trip Generation Rates		AM	PM
Obtained from the AM and PM Peak Hours at the	In:	115	5
Existing Entrance to Dominion Cove Point LNG	Out:	3	15
	Total Existing Peak Hour Trips:	118	20

Dominion Cove Point LNG Trip Generation Rates

Trip Distribution (In/Out)

Morning Trips = 1.10 x (Employees) — 97.5% / 2.5%

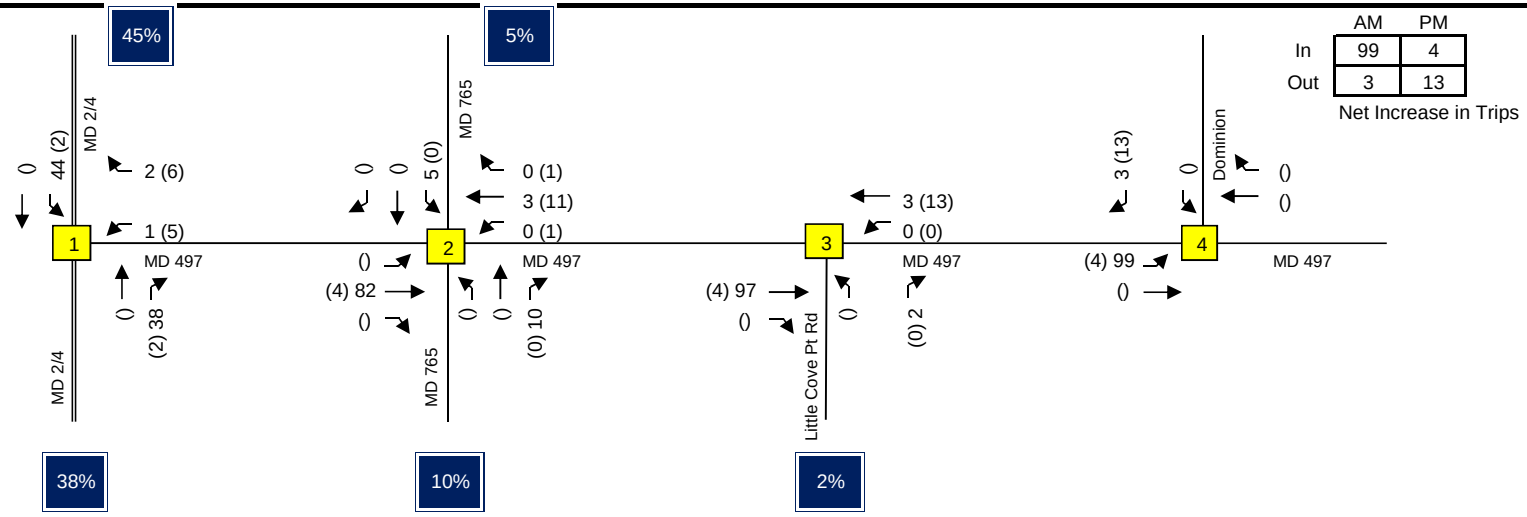
Evening Trips = 0.88 x (Employees) — 25% / 75%

Trip Generaton Totals

			AM Peak			PM Peak		
			In	Out	Total	In	Out	Total
Existing	Dominion Cove Point LNG (Existing Employee Count)	107 Employees	115	3	118	5	15	20
Proposed	Dominion Cove Point LNG (Future Employee Count)	200 Employees	214	6	220	9	28	37
	Net Increase in Employee Trips:		**99**	**3**	**102**	**4**	**13**	**17**

NOTE: Trip Generation Rates calculated based upon actual traffic counts at the existing facility.
The Office/Administrative staff work from 7 AM to 3:30 PM, therefore the PM peak lets out before the 4-6 PM peak period.
The Operations staff work 7:00 to 7:00 shifts.

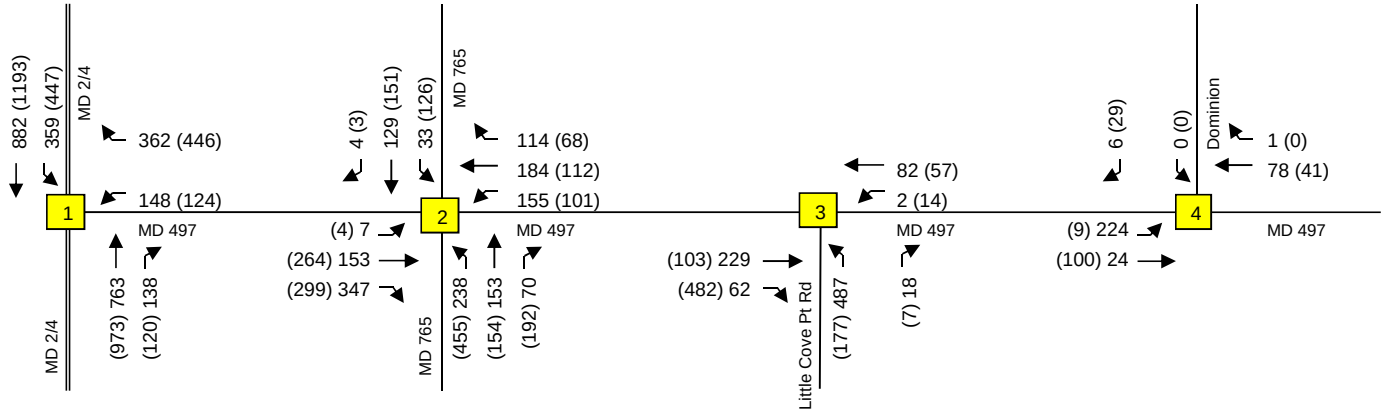
Traffic Impact Analysis	Trip Generation for Site	**Exhibit 6**
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning		



	AM	PM
In	99	4
Out	3	13

Net Increase in Trips

Traffic Impact Analysis	Trip Assignment for Added Employees for Dominion Cove Point LNG	**Exhibit 7**
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	Key: xx = AM Peak Vol's (xx) = PM Peak Vol's	



Traffic Impact Analysis	Total Peak Hour Volumes	**Exhibit 8**
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	Key: xx = AM Peak Vol's (xx) = PM Peak Vol's	

Section 5 Conclusions / Recommendations

5.1 Results of Analysis

This Traffic Impact Analysis was prepared for the expansion of Dominion Cove Point LNG Terminal located in Lusby, Maryland on the north side of MD 497 (Cove Point Road) just east of Little Cove Point Road as shown on Exhibit 1.

The project involves the construction of liquefaction facilities for exporting liquefied natural gas at its existing Dominion Cove Point LNG Terminal.

The existing Dominion facility currently employs a total of 107 employees. The employees comprise a mix of office workers with typical office hours of 7:00 AM to 3:30 PM, and operators with two shifts of operations (7:00 AM to 7:00 PM as the day shift and 7:00 PM to 7:00 AM as the night shift).

The expansion of the Dominion Cove Point LNG facility will expand the total number of employees from 107 existing employees to a total of 200 future employees.

Based on the information and analyses contained in this report:

- The study intersections will all operate at a LOS "B" or better using the SHA's Critical Lane Volume (CLV) methodology. Level of Service "D" or better is considered acceptable.

- The intersection of MD 2/4 & MD 497 is currently unsignalized. The HCS unsignalized analyses indicate that the left turn from MD 497 to southbound MD 2/4 is currently operating at unacceptable levels of service and will continue to operate at unacceptable levels of service with or without the expansion of the Dominion Cove Point LNG facility. Furthermore, the left turn from southbound MD 2/4 to eastbound MD 497 will also operate at unacceptable levels of service with or without the expansion of the Dominion Cove Point LNG facility. If the intersection is signalized, the intersection will operate at a LOS "D" or better using both the HCS and the CLV methodologies.

- The intersection of MD 497 at Little Cove Point Road will operate at a LOS "A" using the CLV methodology; however, the HCS methodology indicates that the northbound Little Cove Point Road approach will

operate with delays commensurate with a LOS “E” in the future conditions. The construction of a right turn lane from eastbound MD 497 to southbound Little Cove Point Road will improve the intersection so all movements operate at a LOS “D” or better.

It is recommended that the project be approved with conditions as noted below:

1. Install a traffic signal at the intersection of MD 2/4 & MD 497. We have included a 13 hour traffic count conducted by SHA in April of 2011 that indicates that a combination of the minor street left turns and southbound MD 2/4 left turns are currently sufficient enough to satisfy Warrant #1 (Eight Hour Warrants). The intersection is recommended to be signalized in the construction phase of the project with a full traffic signal as detailed in Appendix D.
2. Construct a 200’ right turn lane with a 150’ taper along eastbound MD 497 at Little Cove Point Road.

In light of the results of this study and the recommendations noted above, this project will satisfy the MD SHA Guidelines and the APFO requirements of Calvert County and all study intersections and movements will operate at a LOS “D” or better. In summary, as a result of these improvements, the proposed expansion of the Dominion Cove Point LNG facility will satisfy the APFO requirements of Calvert County, and should be approved.

Critical Lane Volume (CLV) Results

Morning Peak Hour	Existing CLV	Background CLV	Total CLV	LOS D or better?
1). MD 2/4 & MD 497 (Cove Point Road)	A / 687	A / 882	A / 927	Y
2). MD 497 & MD 765 (HG Trueman Rd)	A / 647	A / 979	A / 982	Y
3). MD 497 & Little Cove Point Road	A / 588	A / 699	A / 798	Y
-With 200' Right Turn Lane + 150' Taper	n/a	n/a	A / 736	Y
4). MD 497 & Dominion Cove Point LNG	A / 177	A / 206	A / 308	Y
Evening Peak Hour	**Existing CLV**	**Background CLV**	**Total CLV**	**LOS D or better?**
1). MD 2/4 & MD 497 (Cove Point Road)	A / 913	B / 1099	B / 1106	Y
2). MD 497 & MD 765 (HG Trueman Rd)	A / 661	A / 978	A / 992	Y
3). MD 497 & Little Cove Point Road	A / 643	A / 779	A / 783	Y
-With 200' Right Turn Lane + 150' Taper	n/a	n/a	A / 496	Y
4). MD 497 & Dominion Cove Point LNG	A / 100	A / 122	A / 139	Y

NOTES:

1. All intersections satisfy Calvert County and MD SHA Guidelines of LOS "D" or better.
2. Article 6-10.01.C.2 & 6-10.01.C.3 of the Zoning Ordinance APFO Requirements specify a LOS "D" or better as acceptable for all State roadways.

Traffic Impact Analysis	Results of SHA's Critical Lane Volume (CLV) Analyses	**Exhibit 9**
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning		

Highway Capacity Software (HCS) Results

Morning Peak Hour	Existing CLV	Background CLV	Total CLV	LOS D or better?
1). MD 2/4 & MD 497 (Cove Point Road)				
-Southbound MD 2/4 Left Turn (Unsignalized)	B / 10	B / 14.5	C / 16.7	
-Westbound MD 497 Left Turn (Unsignalized)	C / 23.9	F / 138	F / 247	
-Overall Intersection (If signalized)[1]	n/a	n/a	C / 32.5	Y
2). MD 497 & MD 765 (HG Trueman Rd)				
-Overall Intersection (Signalized)	C / 24.3	C / 27.7	C / 27.9	Y
3). MD 497 & Little Cove Point Road				
-Northbound Little Cove Pt Rd (Unsignalized)	C / 16.5	C / 24.4	E / 40.7	
-With 200' Right Turn Lane + 150' Taper	n/a	n/a	D / 34.4	Y
4). MD 497 & Dominion Cove Point LNG				
-Southbound Dominion (Unsignalized)	A / 8.7	A / 8.8	A / 8.8	Y

Evening Peak Hour	Existing CLV	Background CLV	Total CLV	LOS D or better?
1). MD 2/4 & MD 497 (Cove Point Road)				
-Southbound MD 2/4 Left Turn (Unsignalized)	C / 20.4	E / 36.3	E / 36.9	
-Westbound MD 497 Left Turn (Unsignalized)	F / 77.4	F / 1246	F / 1345	
-Overall Intersection (If signalized)[1]	n/a	n/a	D / 36.9	Y
2). MD 497 & MD 765 (HG Trueman Rd)				
-Overall Intersection (Signalized)	C / 24.8	C / 28.8	C / 29.6	Y
3). MD 497 & Little Cove Point Road				
-Northbound Little Cove Pt Rd (Unsignalized)	B / 13.2	C / 15.4	C / 15.8	
-With 200' Right Turn Lane + 150' Taper	n/a	n/a	B / 11.4	Y
4). MD 497 & Dominion Cove Point LNG				
-Southbound Dominion (Unsignalized)	A / 8.5	B / 8.6	B / 8.6	Y

NOTES:

1. Signalized intersections reported in terms of overall intersection level of service. All individual turning movements will operate at a LOS "D" or better.
2. Article 6-10.01.C.2 & 6-10.01.C.3 of the Zoning Ordinance APFO Requirements specify a LOS "D" or better as acceptable for all State roadways.

Traffic Impact Analysis	Results of Highway Capacity Software (HCS) Analyses	**Exhibit 10**
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning		

Maryland State Highway Administration 95th %-ile Queuing Analysis for Left Turn Lanes

1. MD 2/4 & MD 497	Available Queue (Ft)	Maximum Queue (ft)	Max. Veh / Hour	Lane Use Factor	Cycle Length (seconds)	Seconds / Hour	Feet / Vehicle	Surge Factor
Westbound MD 497 Left Turn:	**300'**	173	148	1	120	3600	25	1.4
Southbound MD 2/4 Left Turn:	**550'**	522	447	1	120	3600	25	1.4
2. MD 497 & MD 765	**Available Queue**	**Maximum Queue (ft)**	**Veh / Hour**	**Lane Use Factor**	**Cycle Length (unsignalized)**	**Seconds / Hour**	**Feet / Vehicle**	**Surge Factor**
Northbound MD 765 Left Turn:	**220' (See Note 4)**	442	455	1	100	3600	25	1.4
Southbound MD 765 Left Turn:	**150'**	123	126	1	100	3600	25	1.4

NOTES:

1. Lane Use Factor applied as follows: 1 indicates single turn lane, 0.6 indicates a double left turn lane.
2. Available queues were measured in field and does not include available taper area that may be used for storage. Available queue's for double left turn lanes are based on the average storage of the two lanes combined.
3. Maximum Queue (Ft) = $\frac{\text{Turning Volume (veh per hour) x Lane Use Factor x Cycle Length (Seconds)}}{\text{3600 (Seconds per hour)}}$ x 25 Feet/Vehicle x 1.4 Surge Factor
4. Northbound MD 765 approaching MD 497 has a 220' painted left turn lane plus an additional 500' of painted gore area for left turn storage. (See aerial photo)
5. Queuing analysis only conducted for left turn lanes. Not conducted on through or right turn lanes or shared lanes.

Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	MD SHA 95th % QUEUING ANALYSIS FOR LEFT TURN LANES	**EXHIBIT 11**

Apppendix A

Supplemental Information
Condition Diagrams
Turning Movement Counts

CALVERT COUNTY DEPARTMENT OF PUBLIC WORKS
TRAFFIC IMPACT ANALYSIS (TIA) REQUIREMENTS

SUBDIVISION/ SITE PLAN NO.:_____ APPLICANT ENGINEER: Mike Lenhart
SUBDIVISION/ SITE PLAN NAME:Dominion DATE: 4-26-2012

The Calvert County Road Ordinance requires that any existing and all proposed roadways and streets adequately accommodate the vehicular traffic predicted or projected by any proposed development or site plan as determined under the Road Ordinance Traffic Impact Analysis, Appendix 20-1.

To be "adequate", the County road(s) and intersection(s) within the study area shall maintain a LOS "C" after full project development except for Town Centers where a LOS "D" is acceptable. All State roads and intersections shall maintain a minimum LOS "D."

The following data will aid the Department of Public Works to determine the need and scope for a TIA. This form shall be submitted prior to preliminary subdivision/site plan submittal to determine the need for a TIA. If a TIA is required, it shall be submitted with the preliminary subdivision/site plan submittal.

List the existing roads and intersections within the study area that are directly affected by the proposed development, as requested in the Road Ordinance Traffic Impact Analysis, Appendix 20-1. Developments/sites that develop 400 ADT will require a TIA. An existing roadway which has a width of less than 18 feet from edge of surface to edge of surface is not considered adequate for any new or additional development whether a TIA is required or not.

Provide road descriptions within the study area, which will be impacted:

ACCESS ROAD & EXISTING INTERSECTING ROADS	NO. LANES	ROAD WIDTH	ROAD SURFACE TYPE	SHOULDER TYPE & WIDTH
1). MD 2/4 & Cove Point Rd	4 Ln	+/- 105'	Asphalt	10' asphalt
2). MD 765 & Cove Point Rd	2 Ln	+/- 44'	Asphalt	8-10' asphalt
3). Cove Pt Rd & Little Cove Pt Rd	2 Ln	20-22'	Asphalt	n/a
4). Cove Point Rd & Site Access	2 Ln	20-22'	Asphalt	n/a

ITE Trip Generation Rates:

								Trips Generated				
Use Code ITE-710	Description	#Units	AM/PH Generator	AM/PH Adj St.	PM/PH Generator	PM/PH Adj St.	ADT	AM/PH Generator	AM/PH Adj St.	PM/PH Generator	PM/PH Adj St.	ADT
Existing	Employees	107		0.48		0.46	3.32		51		49	355
Proposed	Employees	200		0.48		0.46	3.32		96		92	664
TOTAL PROJECTED TRIPS:												

Specify any proposed/future improvements to the public facility that would reduce the traffic impact of the proposed development:
1). Traffic counts will be conducted at the site access to confirm the trip generation for the use.
2). The 4 study intersections are noted above.

SIGNATURE OF DPW REVIEW ENGINEER

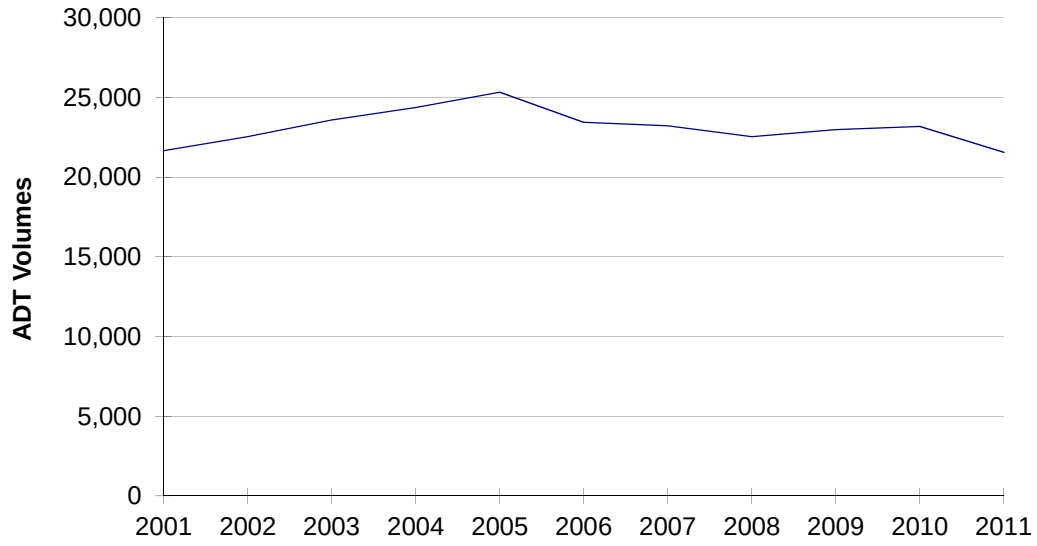
DATE: 5/9/12

( ) NO TRAFFIC IMPACT ANALYSIS REQUIRED
( ) NO TIA WITH PROPOSED IMPROVEMENTS
(✓) TIA REQUIRED; SCHEDULE MEETING

TRAFFIC GROWTH PROJECTION

LOCATION: **MD 2/4 North of MD 497**
REPORT DATE: 06-Jun-12
AVERAGE GROWTH: 0.05%
MATHEMATICAL GROWTH: -0.05%

Year	ADT Volume	Vol. increase	% increase	Average %
2001	21,650			
2002	22,525	875	4.04%	4.04%
2003	23,575	1,050	4.66%	4.35%
2004	24,350	775	3.29%	4.00%
2005	25,325	975	4.00%	4.00%
2006	23,440	-1,885	-7.44%	1.71%
2007	23,211	-229	-0.98%	1.26%
2008	22,530	-681	-2.93%	0.66%
2009	22,981	451	2.00%	0.83%
2010	23,172	191	0.83%	0.83%
2011	21,550	-1,622	-7.00%	0.05%



TRAFFIC GROWTH
MD 2/4 North of MD 497

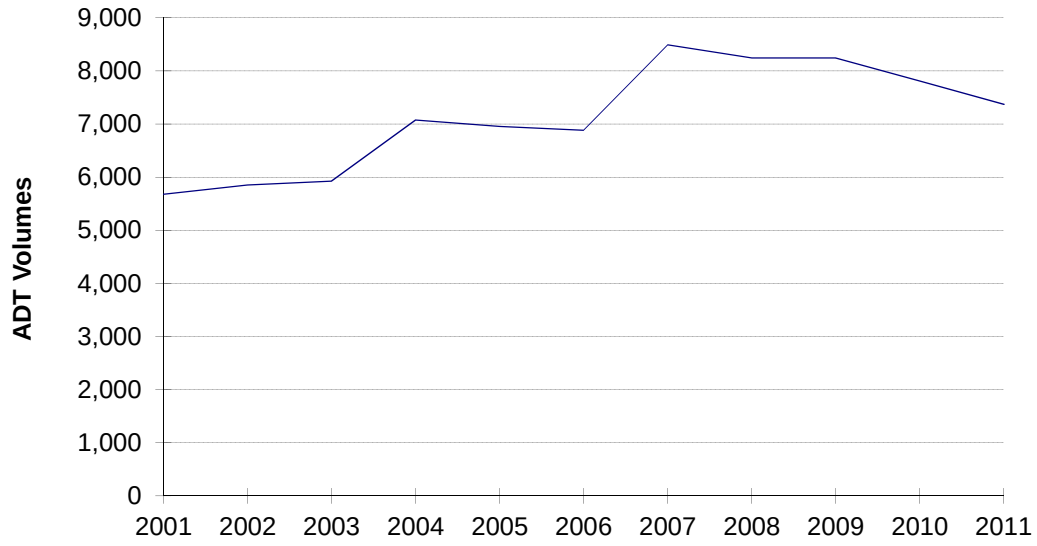
TRAFFIC GROWTH PROJECTION

LOCATION: MD 497 East of MD 765

REPORT DATE: 06-Jun-12

AVERAGE GROWTH:	3.06%
MATHEMATICAL GROWTH:	2.65%

Year	ADT Volume	Vol. increase	% increase	Average %
2001	5,675			
2002	5,850	175	3.08%	3.08%
2003	5,925	75	1.28%	2.18%
2004	7,075	1,150	19.41%	7.93%
2005	6,950	-125	-1.77%	5.50%
2006	6,882	-68	-0.98%	4.21%
2007	8,490	1,608	23.37%	7.40%
2008	8,241	-249	-2.93%	5.92%
2009	8,242	1	0.01%	5.18%
2010	7,810	-432	-5.24%	4.03%
2011	7,370	-440	-5.63%	3.06%



TRAFFIC GROWTH
MD 497 East of MD 765

Weekday Morning Peak Hour (6:30 am - 9:30 am)

	MD 2/4 Northbound			MD 2/4 Southbound			MD 497 Eastbound			MD 497 Westbound			
Time:	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
6:30-6:45		167	11	23	164					23		106	494
6:45-7:00		179	16	21	211					21		91	539
7:00-7:15		171	9	26	189					34		76	505
7:15-7:30		181	4	18	206					41		75	525
7:30-7:45		167	7	29	201					31		61	496
7:45-8:00		182	6	25	229					26		57	525
8:00-8:15		166	5	24	194					22		67	478
8:15-8:30		147	9	23	167					29		61	436
8:30-8:45		159	4	19	174					21		49	426
8:45-9:00		146	6	25	146					19		57	399
9:00-9:15		137	13	29	131					14		32	356
9:15-9:30		133	9	24	136					16		34	352
Hourly Totals													
6:30-7:30	0	698	40	88	770	0	0	0	0	119	0	348	2063
6:45-7:45	0	698	36	94	807	0	0	0	0	127	0	303	2065
7:00-8:00	0	701	26	98	825	0	0	0	0	132	0	269	2051
7:15-8:15	0	696	22	96	830	0	0	0	0	120	0	260	2024
7:30-8:30	0	662	27	101	791	0	0	0	0	108	0	246	1935
7:45-8:45	0	654	24	91	764	0	0	0	0	98	0	234	1865
8:00-9:00	0	618	24	91	681	0	0	0	0	91	0	234	1739
8:15-9:15	0	589	32	96	618	0	0	0	0	83	0	199	1617
8:30-9:30	0	575	32	97	587	0	0	0	0	70	0	172	1533

AM	Northbound			Southbound			Eastbound			Westbound			
Peak Hour	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
6:45-7:45	**0**	**698**	**36**	**94**	**807**	**0**	**0**	**0**	**0**	**127**	**0**	**303**	**2065**

AM PHF = 0.96

Weekday Evening Peak Hour (4 pm - 7 pm)

	MD 2/4 Northbound			MD 2/4 Southbound			MD 497 Eastbound			MD 497 Westbound			
Time:	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
4:00-4:15		221	19	71	195					9		45	560
4:15-4:30		249	26	67	249					6		41	638
4:30-4:45		253	24	86	279					13		39	694
4:45-5:00		237	29	89	282					15		49	701
5:00-5:15		197	21	97	264					11		52	642
5:15-5:30		203	26	105	267					7		41	649
5:30-5:45		189	27	96	261					12		37	622
5:45-6:00		179	29	101	257					16		46	628
6:00-6:15		167	24	89	221					12		34	547
6:15-6:30		159	25	85	189					11		40	509
6:30-6:45		142	19	64	177					8		28	438
6:45-7:00		134	12	59	164					6		25	400
Hourly Totals													
4:00-5:00	0	960	98	313	1005	0	0	0	0	43	0	174	2593
4:15-5:15	0	936	100	339	1074	0	0	0	0	45	0	181	2675
4:30-5:30	0	890	100	377	1092	0	0	0	0	46	0	181	2686
4:45-5:45	0	826	103	387	1074	0	0	0	0	45	0	179	2614
5:00-6:00	0	768	103	399	1049	0	0	0	0	46	0	176	2541
5:15-6:15	0	738	106	391	1006	0	0	0	0	47	0	158	2446
5:30-6:30	0	694	105	371	928	0	0	0	0	51	0	157	2306
5:45-6:45	0	647	97	339	844	0	0	0	0	47	0	148	2122
6:00-7:00	0	602	80	297	751	0	0	0	0	37	0	127	1894

PM	Northbound			Southbound			Eastbound			Westbound			
Peak Hour	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
4:30-5:30	**0**	**890**	**100**	**377**	**1092**	**0**	**0**	**0**	**0**	**46**	**0**	**181**	**2686**

PM PHF = 0.96

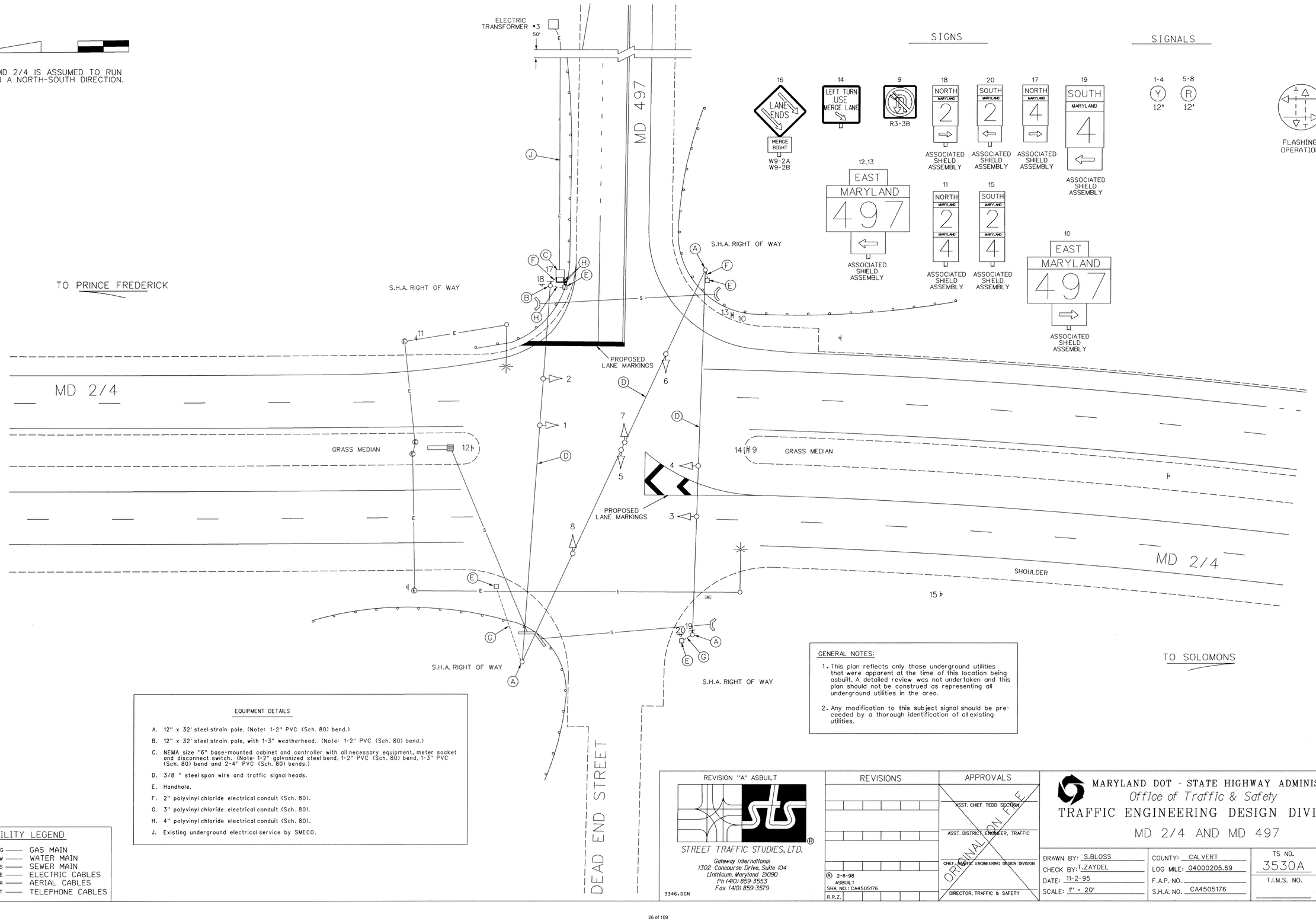
Peak Hour
Turning Movement Count

Lenhart Traffic Consulting, Inc.
Traffic Engineering & Transportation Planning

Intersection: MD 2/4 & MD 497

Count by: Video (& Recount by tl)
Count Day/Date: Wednesday, May 09, 2012
County: Calvert

MD 2/4 IS ASSUMED TO RUN
IN A NORTH-SOUTH DIRECTION.



SIGNS

16 LANE ENDS — MERGE RIGHT — W9-2A W9-2B

14 LEFT TURN USE MERGE LANE

9 R3-3B

18 NORTH MARYLAND 2 — ASSOCIATED SHIELD ASSEMBLY

20 SOUTH MARYLAND 2 — ASSOCIATED SHIELD ASSEMBLY

17 NORTH MARYLAND 4 — ASSOCIATED SHIELD ASSEMBLY

19 SOUTH MARYLAND 4 — ASSOCIATED SHIELD ASSEMBLY

12,13 EAST MARYLAND 497 — ASSOCIATED SHIELD ASSEMBLY

11 NORTH MARYLAND 2 MARYLAND 4 — ASSOCIATED SHIELD ASSEMBLY

15 SOUTH MARYLAND 2 MARYLAND 4 — ASSOCIATED SHIELD ASSEMBLY

10 EAST MARYLAND 497 — ASSOCIATED SHIELD ASSEMBLY

SIGNALS

1-4 (Y) 12"

5-8 (R) 12"

FLASHING OPERATION

EQUIPMENT DETAILS

A. 12" x 32' steel strain pole. (Note: 1-2" PVC (Sch. 80) bend.)

B. 12" x 32' steel strain pole, with 1-3" weatherhead. (Note: 1-2" PVC (Sch. 80) bend.)

C. NEMA size "6" base-mounted cabinet and controller with all necessary equipment, meter socket and disconnect switch. (Note: 1-2" galvanized steel bend, 1-2" PVC (Sch. 80) bend, 1-3" PVC (Sch. 80) bend and 2-4" PVC (Sch. 80) bends.)

D. 3/8 " steel span wire and traffic signal heads.

E. Handhole.

F. 2" polyvinyl chloride electrical conduit (Sch. 80).

G. 3" polyvinyl chloride electrical conduit (Sch. 80).

H. 4" polyvinyl chloride electrical conduit (Sch. 80).

J. Existing underground electrical service by SMECO.

GENERAL NOTES:

1. This plan reflects only those underground utilities that were apparent at the time of this location being asbuilt. A detailed review was not undertaken and this plan should not be construed as representing all underground utilities in the area.

2. Any modification to this subject signal should be preceeded by a thorough identification of all existing utilities.

UTILITY LEGEND

G — G	GAS MAIN
W — W	WATER MAIN
S — S	SEWER MAIN
E — E	ELECTRIC CABLES
A — A	AERIAL CABLES
T — T	TELEPHONE CABLES

REVISION "A" ASBUILT

STREET TRAFFIC STUDIES, LTD.

Gateway International
1302 Concourse Drive, Suite 104
Linthicum, Maryland 21090
Ph (410) 859-3553
Fax (410) 859-3579

3346.DGN

REVISIONS

Ⓐ 2-6-98
ASBUILT
SHA NO.: CA4505176
R.R.Z.

APPROVALS

ASST. CHIEF TEDD SECTION

ASST. DISTRICT ENGINEER, TRAFFIC

CHIEF, TRAFFIC ENGINEERING DESIGN DIVISION

DIRECTOR, TRAFFIC & SAFETY

ORIGINAL ON FILE

MARYLAND DOT - STATE HIGHWAY ADMINISTRATION
Office of Traffic & Safety
TRAFFIC ENGINEERING DESIGN DIVISION
MD 2/4 AND MD 497

DRAWN BY: S.BLOSS	COUNTY: CALVERT	TS NO. 3530A	SHEET NO. 1 OF 1
CHECK BY: T.ZAYDEL	LOG MILE: 04000205.69	T.I.M.S. NO.	
DATE: 11-2-95	F.A.P. NO.		
SCALE: 1" = 20'	S.H.A. NO. CA4505176		

Weekday Morning Peak Hour (6:30 am - 9:30 am)

	MD 765 Northbound			MD 765 Southbound			MD 497 Eastbound			MD 497 Westbound			
Time:	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
6:30-6:45	31	13	8	5	8	1	0	26	8	21	97	16	234
6:45-7:00	46	26	5	3	12	0	0	30	7	18	66	27	240
7:00-7:15	39	21	11	4	13	2	1	22	12	23	69	22	239
7:15-7:30	42	18	11	2	16	0	0	9	13	23	74	25	233
7:30-7:45	51	35	19	6	19	1	2	20	14	14	40	29	250
7:45-8:00	53	37	9	8	21	1	1	11	19	18	29	31	238
8:00-8:15	42	31	12	8	26	2	0	18	18	21	45	28	251
8:15-8:30	38	33	7	4	25	0	3	16	17	34	52	16	245
8:30-8:45	31	29	13	6	23	3	0	12	11	31	36	18	213
8:45-9:00	35	28	11	9	21	2	2	12	17	21	39	15	212
9:00-9:15	29	24	9	11	16	2	1	21	20	19	15	17	184
9:15-9:30	24	30	8	3	23	3	0	21	12	23	23	11	181
Hourly Totals													
6:30-7:30	158	78	35	14	49	3	1	87	40	85	306	90	946
6:45-7:45	178	100	46	15	60	3	3	81	46	78	249	103	962
7:00-8:00	185	111	50	20	69	4	4	62	58	78	212	107	960
7:15-8:15	188	121	51	24	82	4	3	58	64	76	188	113	972
7:30-8:30	184	136	47	26	91	4	6	65	68	87	166	104	984
7:45-8:45	164	130	41	26	95	6	4	57	65	104	162	93	947
8:00-9:00	146	121	43	27	95	7	5	58	63	107	172	77	921
8:15-9:15	133	114	40	30	85	7	6	61	65	105	142	66	854
8:30-9:30	119	111	41	29	83	10	3	66	60	94	113	61	790

AM	**Northbound**			**Southbound**			**Eastbound**			**Westbound**			
Peak Hour	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Total**
7:30-8:30	**184**	**136**	**47**	**26**	**91**	**4**	**6**	**65**	**68**	**87**	**166**	**104**	**984**

AM PHF = 0.98

Weekday Evening Peak Hour (4 pm - 7 pm)

	MD 765 Northbound			MD 765 Southbound			MD 497 Eastbound			MD 497 Westbound			
Time:	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
4:00-4:15	26	15	33	17	33	1	0	17	73	23	27	7	272
4:15-4:30	34	24	31	19	27	1	1	31	61	26	12	13	280
4:30-4:45	31	29	39	22	28	0	2	46	62	19	21	11	310
4:45-5:00	39	30	26	29	37	1	0	55	63	21	24	17	342
5:00-5:15	32	24	27	33	35	2	1	60	57	24	29	14	338
5:15-5:30	30	26	21	31	34	0	1	77	53	18	18	19	328
5:30-5:45	24	31	20	25	22	0	0	72	51	23	25	14	307
5:45-6:00	27	22	19	26	29	1	0	81	49	24	34	10	322
6:00-6:15	24	17	21	19	23	0	1	59	53	16	22	11	266
6:15-6:30	29	19	16	19	22	1	2	61	47	18	21	7	262
6:30-6:45	31	14	15	26	16	0	1	33	49	14	5	8	212
6:45-7:00	14	20	11	14	19	2	2	26	43	16	15	8	190
Hourly Totals													
4:00-5:00	130	98	129	87	125	3	3	149	259	89	84	48	1204
4:15-5:15	136	107	123	103	127	4	4	192	243	90	86	55	1270
4:30-5:30	132	109	113	115	134	3	4	238	235	82	92	61	1318
4:45-5:45	125	111	94	118	128	3	2	264	224	86	96	64	1315
5:00-6:00	113	103	87	115	120	3	2	290	210	89	106	57	1295
5:15-6:15	105	96	81	101	108	1	2	289	206	81	99	54	1223
5:30-6:30	104	89	76	89	96	2	3	273	200	81	102	42	1157
5:45-6:45	111	72	71	90	90	2	4	234	198	72	82	36	1062
6:00-7:00	98	70	63	78	80	3	6	179	192	64	63	34	930

PM	**Northbound**			**Southbound**			**Eastbound**			**Westbound**			
Peak Hour	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Total**
4:30-5:30	**132**	**109**	**113**	**115**	**134**	**3**	**4**	**238**	**235**	**82**	**92**	**61**	**1318**

PM PHF = 0.96

Peak Hour
Turning Movement Count

Intersection: MD 497 & MD 765

Count by: tl

Count Day/Date: Wednesday, May 09, 2012

County: Calvert

Lenhart Traffic Consulting, Inc.
Traffic Engineering & Transportation Planning

DRILL HOLES

BORDER REV: DATE: June 1, 2004

DRILL HOLES

DRILL HOLES

MD. 765 IS ASSUMED TO TRAVEL IN A NORTH-SOUTH DIRECTION.

GENERAL NOTES

1. VIDEO CAMERA LOCATION / ALIGNING SHALL BE COORDINATED WITH THE SHA ENGINEER.
2. THE CONTRACTOR SHALL CONTACT SHA TO SCHEDULE RETROFITTING OF THE CONTROLLER EQUIPMENT IN ORDER TO OPERATE VIDEO DETECTION EQUIPMENT.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TERMINATING ALL VIDEO DETECTION CAMERA CABLES TO THE APPROPRIATE TERMINALS AND PROPERLY LABEL EACH CABLE SO THAT SHA FORCES CAN MAKE THE FINAL CONNECTIONS.
4. THE INSTALLATION OF PROPOSED VIDEO DETECTION EQUIPMENT SHALL NECESSITATE THE REMOVAL OF EXISTING CABLES ASSOCIATED WITH THE PRESENCE LOOP DETECTORS BEING REPLACED BY VIDEO DETECTION.
5. ALL UNUSED SIGNAL CABLES SHALL BE REMOVED AND DISPOSED.
6. ALL PAVEMENT MARKINGS DTAILED ARE PROPOSED AND ARE TO BE INSTALLED IN ACCORDANCE WITH SHA STANDARDS.

EXISTING SIGNS

12

ONLY

EXISTING SIGNS TO BE REMOVED

10,11,13

LEFT TURN YIELD ON GREEN

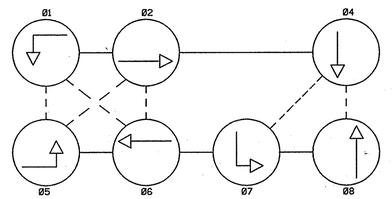
R 10-12
36"X42"

EXISTING SIGNALS

1,3,7 — 12"

2,4,5, 6,8,9 — 12"

NEMA PHASING



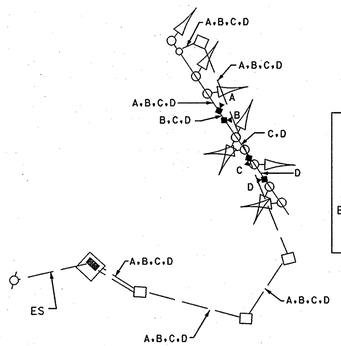
NEMA NOTES
1. PHASES ASSOCIATED BY A DASHED LINE WILL OPERATE CONCURRENTLY.
2. PHASES ASSOCIATED BY A SOLID LINE WILL NOT OPERATE CONCURRENTLY.

PROJECT DESCRIPTION

I. GENERAL

This project involves the modification of an existing Traffic Control Signal at the intersection of MD 765Q (HG Trueman Rd) and MD 497 (Cove Pt Rd) in Calvert County. The existing loop detection shall be replaced by video dectector cameras.

WIRING DIAGRAM



WIRING KEY

A, B, C, D } VIDEO CONTROL CABLE, 500'

ES- EXISTING UNDERGROUND SERVICE TO BE MAINTAINED BY SMECO

PROPOSED CAMERAS

■◂ – VIDEO DETECTION CAMERA (a-d)

CONSTRUCTION DETAILS

A. Install video detector camera onto existing mast arm as shown.
B. Install 24" white, heat applied permanent preformed thermoplastic pavement marking. (stopline)
C. Remove 50' of existing double yellow centerline pavement marking.
D. Remove existing stopline.
E. Remove 50' of existing white lane line pavement marking.
F. Disconnect and abandon existing loops
G. Use existing handhole.
H. Use existng conduit.
J. Use existing cabinet. Video interface and 4-channel detector rack with power supply shall be installed into existing base-mounted cabinet and controller by SHA Forces. Loop detector amplifiers shall be removed by SHA Forces.
K. Use existing handhole. Disconnect and abandon existing loops.
L. Proposed video detection area.
M. Existing underground electrical service to be maintained by SMECO.
N. Remove existing sign

GEOMETRIC LEGEND

PROPOSED
EXISTING

LEGEND OF UNDERGROUND AND OVERHEAD UTILITIES

AERIAL CABLE	A
ELECTRIC	E
TELEPHONE	T
GAS	G
SEWER	S
WATER	W
CABLE TV	TV

EQUIPMENT LIST

A. EQUIPMENT TO BE SUPPLIED BY S.H.A..

ITEM NO.	DESCRIPTION	QUANTITY
9001	Detector rack power supply (To be instaled by SHA forces)	1 EA
9046	Detector rack retrofit. (To be instaled by SHA forces)	1 EA
9086	Video detection interface equipment: 1-4 cameras (To be installed by signal shop).	1 EA

EQUIPMENT LIST (CONT.)

B. EQUIPMENT TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR

ITEM NO.	DESCRIPTION	QUANTITY
1001	Maintenance of traffic per assignment.	1 EA
5001	Removal of existing permanent pavement line markings any width.	175 L.F.
5002	24" white heat applied permanent preformed thermoplastic pavement marking.	25 L.F.
8004	Remove and dispose of existing material and equipment per assignment.	1 EA
8026	Video detection camera	4 EA
8028	Control cable, 500', video detection camera to controller	4 EA

STREET TRAFFIC STUDIES, LTD.®
400 Crain Hwy.,NW.
Glen Burnie,MD 21061
Ph (410) 590-5500
Fax (410) 590-5637

5236.DGN

APPROVALS

TEAM LEADER
ASST. DIV. CHIEF
DIVISION CHIEF
OFFICE DIRECTOR

ORIGINAL ON FILE

REVISIONS

B	Install video detection & reloc MD 765 S/B stopbar AT1246185	10/24	JWA
A	AS-BUILT AND ADDING AN E/P LT TO WB MD 497 SHA* AW2795B5	9/97	EMM

TOD NO: AT724-14
SHA No.: CA339A52/B52
MD 765 @ MD 497

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

MD 765 (H G TRUEMAN RD) AND MD 497 (COVE PT RD)

TRAFFIC SIGNAL PLAN

SCALE 1"= 20' DATE _____ CONTRACT NO. _____

DESIGNED BY _____ COUNTY CALVERT
DRAWN BY W. MALCOM LOGMILE 04049700.25
CHECKED BY D. DODA TIMS NO. 1077
F.A.P. NO. _____ TOD NO. _____

TS NO. 3541B | DRAWING NO. 1 OF 1 | SHEET NO. OF

PLOTTED: TUESDAY, DECEMBER 05, 2006 AT 2:44:57 PM
FILE: 5236.DGN

Weekday Morning Peak Hour (6:30 am - 9:30 am)

	Little Cove Point Road Northbound			Southbound			MD 497 Eastbound			MD 497 Westbound			
Time:	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
6:30-6:45	101		4					51	9	0	15		180
6:45-7:00	99		6					43	11	1	19		179
7:00-7:15	111		4					21	12	1	13		162
7:15-7:30	91		1					4	18	0	14		128
7:30-7:45	83		0					2	31	1	17		134
7:45-8:00	77		1					6	22	0	19		125
8:00-8:15	72		1					9	17	1	14		114
8:15-8:30	67		1					1	15	0	10		94
8:30-8:45	55		0					10	16	1	10		92
8:45-9:00	59		0					13	19	0	11		102
9:00-9:15	51		0					11	13	1	13		89
9:15-9:30	48		0					14	13	0	12		87
Hourly Totals													
6:30-7:30	402	0	15	0	0	0	0	119	50	2	61	0	649
6:45-7:45	384	0	11	0	0	0	0	70	72	3	63	0	603
7:00-8:00	362	0	6	0	0	0	0	33	83	2	63	0	549
7:15-8:15	323	0	3	0	0	0	0	21	88	2	64	0	501
7:30-8:30	299	0	3	0	0	0	0	18	85	2	60	0	467
7:45-8:45	271	0	3	0	0	0	0	26	70	2	53	0	425
8:00-9:00	253	0	2	0	0	0	0	33	67	2	45	0	402
8:15-9:15	232	0	1	0	0	0	0	35	63	2	44	0	377
8:30-9:30	213	0	0	0	0	0	0	48	61	2	46	0	370

AM	Northbound			Southbound			Eastbound			Westbound			
Peak Hour	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Total**
6:30-7:30	**402**	**0**	**15**	**0**	**0**	**0**	**0**	**119**	**50**	**2**	**61**	**0**	**649**

AM PHF = 0.90

Weekday Evening Peak Hour (4 pm - 7 pm)

	Little Cove Point Road Northbound			Southbound			MD 497 Eastbound			MD 497 Westbound			
Time:	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
4:00-4:15	34		2					9	70	3	17		135
4:15-4:30	31		4					13	92	2	15		157
4:30-4:45	38		3					9	88	5	17		160
4:45-5:00	38		1					20	93	4	10		166
5:00-5:15	39		2					17	108	4	7		177
5:15-5:30	36		2					22	99	5	6		170
5:30-5:45	42		1					19	91	0	15		168
5:45-6:00	36		3					12	88	1	12		152
6:00-6:15	29		0					16	75	4	16		140
6:15-6:30	24		0					18	72	2	11		127
6:30-6:45	20		1					21	76	3	8		129
6:45-7:00	22		1					15	61	1	9		109
Hourly Totals													
4:00-5:00	141	0	10	0	0	0	0	51	343	14	59	0	618
4:15-5:15	146	0	10	0	0	0	0	59	381	15	49	0	660
4:30-5:30	151	0	8	0	0	0	0	68	388	18	40	0	673
4:45-5:45	155	0	6	0	0	0	0	78	391	13	38	0	681
5:00-6:00	153	0	8	0	0	0	0	70	386	10	40	0	667
5:15-6:15	143	0	6	0	0	0	0	69	353	10	49	0	630
5:30-6:30	131	0	4	0	0	0	0	65	326	7	54	0	587
5:45-6:45	109	0	4	0	0	0	0	67	311	10	47	0	548
6:00-7:00	95	0	2	0	0	0	0	70	284	10	44	0	505

PM	Northbound			Southbound			Eastbound			Westbound			
Peak Hour	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Total**
4:45-5:45	**155**	**0**	**6**	**0**	**0**	**0**	**0**	**78**	**391**	**13**	**38**	**0**	**681**

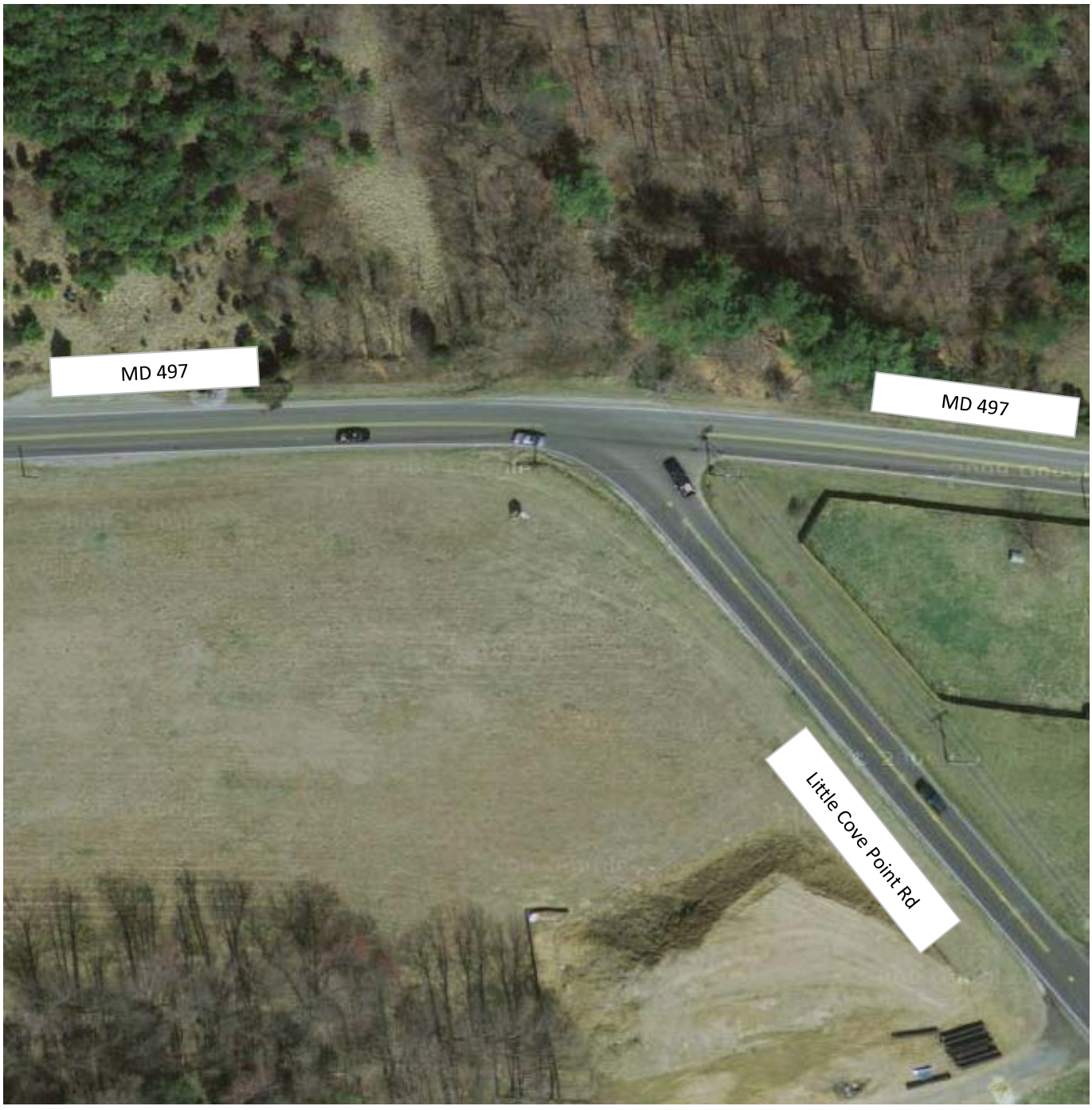
PM PHF = 0.96

Peak Hour
Turning Movement Count

Lenhart Traffic Consulting, Inc.
Traffic Engineering & Transportation Planning

Intersection: MD 497 & Little Cove Point Rd

Count by: ml
Count Day/Date: Tuesday, May 08, 2012
County: Calvert



Peak Hour Turning Movement Count	**Intersection:** MD 497 & Little Cove Pt Rd
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	**County:** Calvert

Weekday Morning Peak Hour (6:30 am - 9:30 am)

	Northbound			Dominion Driveway Southbound			MD 497 Eastbound			MD 497 Westbound			
Time:	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
6:30-6:45				0		0	51	4			15	0	70
6:45-7:00				0		1	42	7			19	1	70
7:00-7:15				0		2	19	6			12	0	39
7:15-7:30				0		0	2	3			14	0	19
7:30-7:45				0		2	0	2			16	0	20
7:45-8:00				0		0	2	5			19	0	26
8:00-8:15				0		1	1	9			14	0	25
8:15-8:30				0		0	0	2			10	0	12
8:30-8:45				0		0	2	8			11	0	21
8:45-9:00				1		2	1	12			9	0	25
9:00-9:15				0		1	2	9			13	0	25
9:15-9:30				0		1	0	14			11	0	26
Hourly Totals													
6:30-7:30	0	0	0	0	0	3	114	20	0	0	60	1	198
6:45-7:45	0	0	0	0	0	5	63	18	0	0	61	1	148
7:00-8:00	0	0	0	0	0	4	23	16	0	0	61	0	104
7:15-8:15	0	0	0	0	0	3	5	19	0	0	63	0	90
7:30-8:30	0	0	0	0	0	3	3	18	0	0	59	0	83
7:45-8:45	0	0	0	0	0	1	5	24	0	0	54	0	84
8:00-9:00	0	0	0	1	0	3	4	31	0	0	44	0	83
8:15-9:15	0	0	0	1	0	3	5	31	0	0	43	0	83
8:30-9:30	0	0	0	1	0	4	5	43	0	0	44	0	97

AM	Northbound			Southbound			Eastbound			Westbound			
Peak Hour	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
6:30-7:30	**0**	**0**	**0**	**0**	**0**	**3**	**114**	**20**	**0**	**0**	**60**	**1**	**198**

AM PHF = 0.71

Weekday Evening Peak Hour (4 pm - 7 pm)

	Northbound			Dominion Driveway Southbound			MD 497 Eastbound			MD 497 Westbound			
Time:	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
4:00-4:15				0		11	2	9			9	0	31
4:15-4:30				0		9	1	16			8	0	34
4:30-4:45				0		10	0	12			12	0	34
4:45-5:00				0		6	1	20			8	0	35
5:00-5:15				0		1	0	19			10	0	30
5:15-5:30				0		0	1	23			11	0	35
5:30-5:45				0		8	3	17			7	0	35
5:45-6:00				0		1	0	15			12	0	28
6:00-6:15				0		6	2	14			14	0	36
6:15-6:30				0		5	4	14			8	1	32
6:30-6:45				1		5	6	16			6	0	34
6:45-7:00				0		2	8	8			8	0	26
Hourly Totals													
4:00-5:00	0	0	0	0	0	36	4	57	0	0	37	0	134
4:15-5:15	0	0	0	0	0	26	2	67	0	0	38	0	133
4:30-5:30	0	0	0	0	0	17	2	74	0	0	41	0	134
4:45-5:45	0	0	0	0	0	15	5	79	0	0	36	0	135
5:00-6:00	0	0	0	0	0	10	4	74	0	0	40	0	128
5:15-6:15	0	0	0	0	0	15	6	69	0	0	44	0	134
5:30-6:30	0	0	0	0	0	20	9	60	0	0	41	1	131
5:45-6:45	0	0	0	1	0	17	12	59	0	0	40	1	130
6:00-7:00	0	0	0	1	0	18	20	52	0	0	36	1	128

PM	Northbound			Southbound			Eastbound			Westbound			
Peak Hour	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
4:45-5:45	**0**	**0**	**0**	**0**	**0**	**15**	**5**	**79**	**0**	**0**	**36**	**0**	**135**

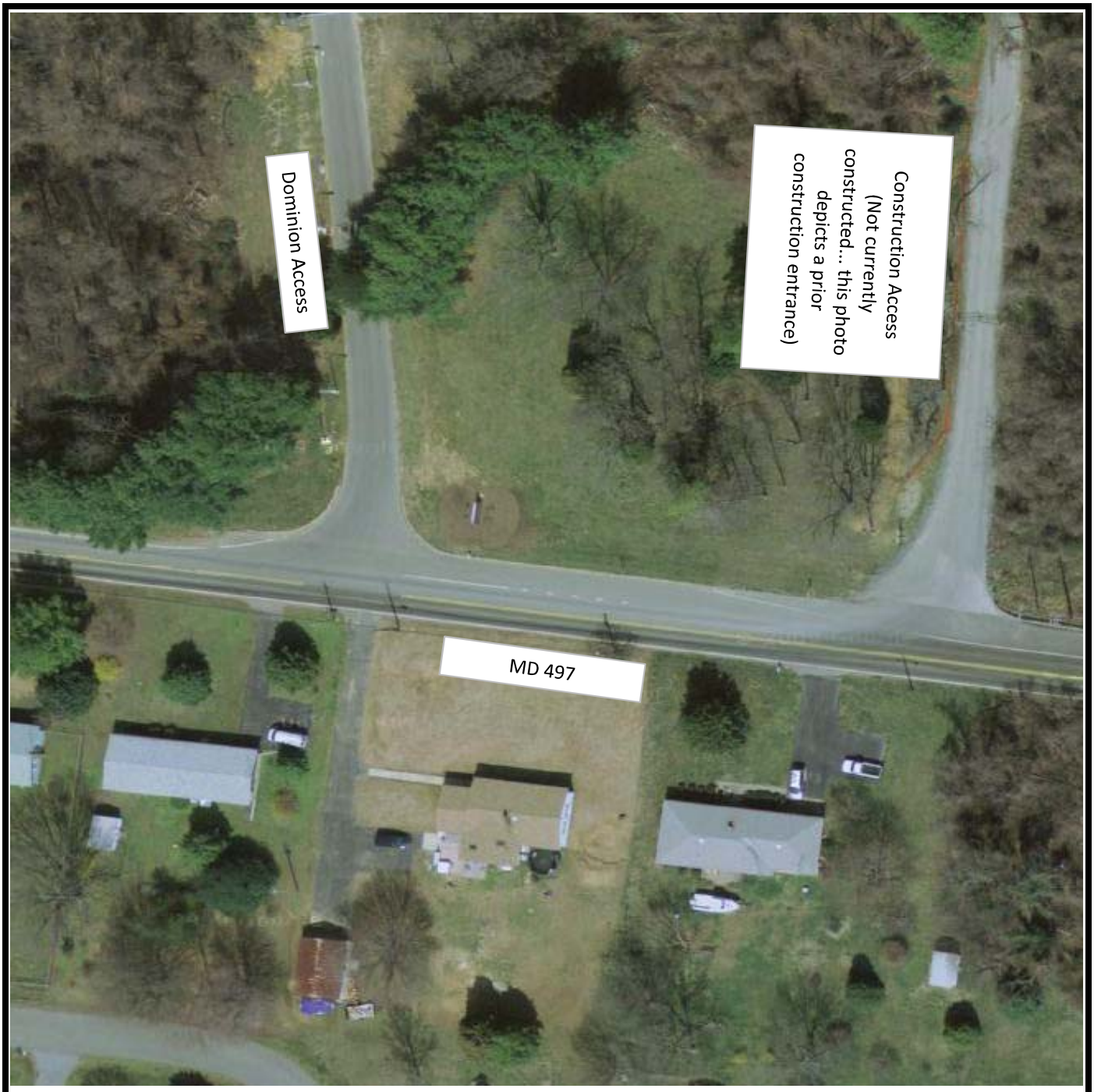
PM PHF = 0.96

Peak Hour
Turning Movement Count

Lenhart Traffic Consulting, Inc.
Traffic Engineering & Transportation Planning

Intersection: MD 497 & Dominion Driveway

Count by: ml
Count Day/Date: Tuesday, May 08, 2012
County: Calvert



Peak Hour Turning Movement Count	**Intersection:** MD 497 & Dominion
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	**County:** Calvert

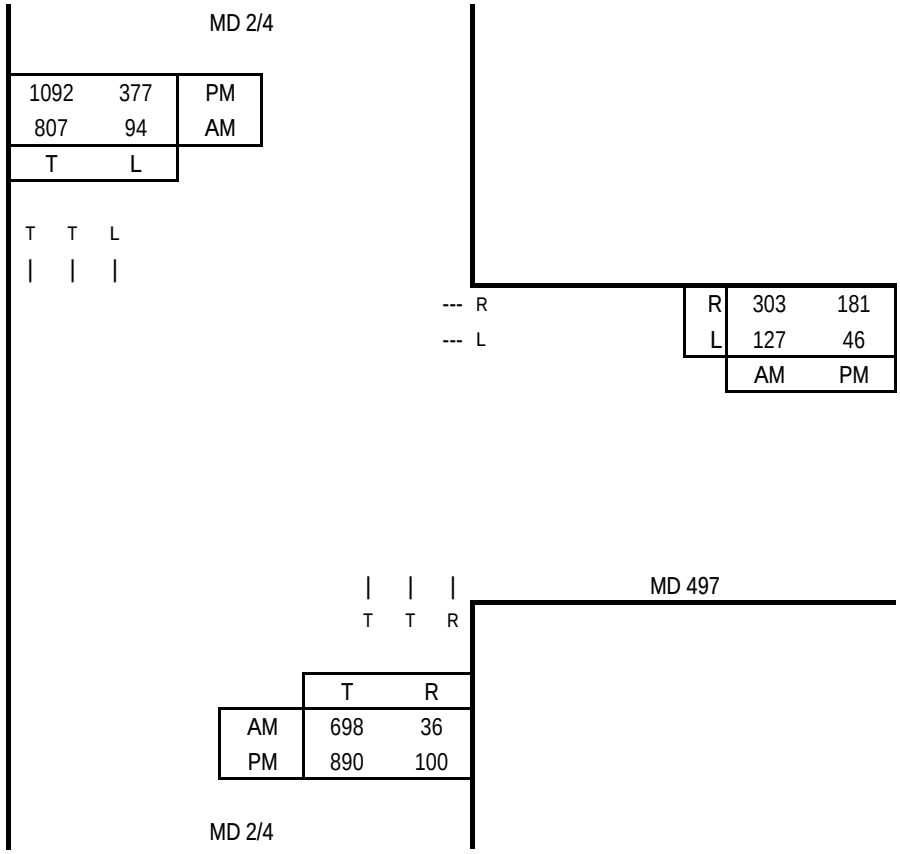
Apppendix B

Level of Service (LOS) Worksheets for APFO Analyses

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Intersection of: MD 2/4
and: MD 497
Conditions: Existing Traffic **Analyst:** ml

Lane Use + Traffic Volumes



Capacity Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
WB	209	1.00	209				209
NB	698	0.55	384	94	1.00	94	478
SB	807	0.55	444				
			CLV TOTAL=				687
			Level of Service (LOS)=				A

Evening Peak Hour

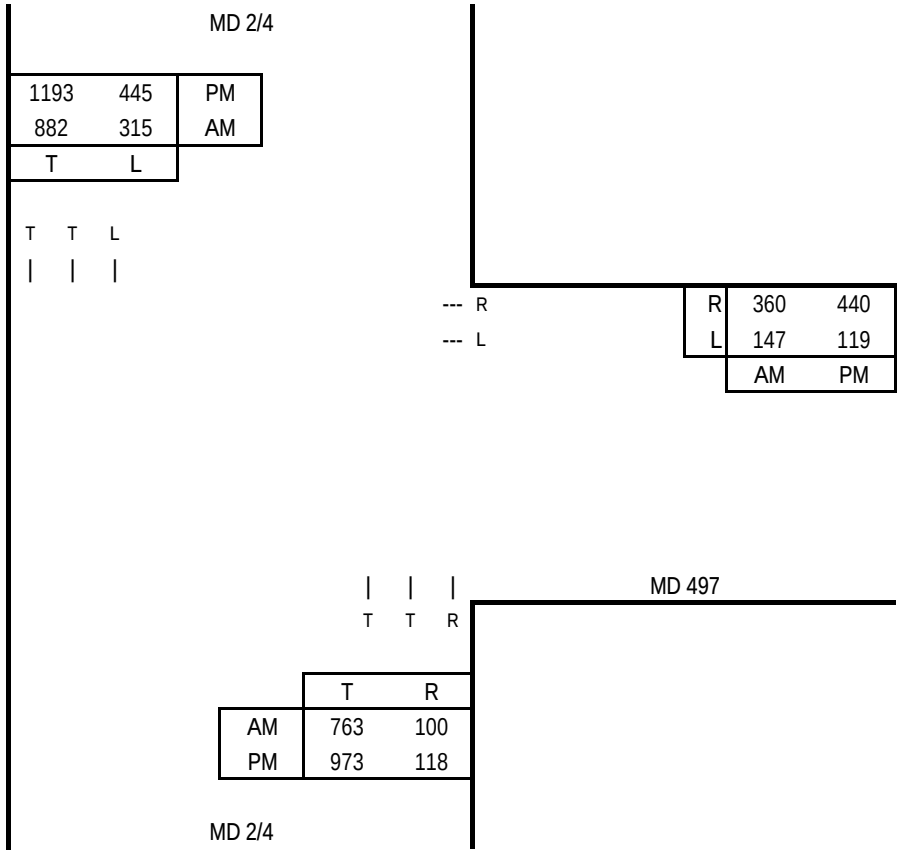
Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
WB	46	1.00	46				46
NB	890	0.55	490	377	1.00	377	867
SB	1092	0.55	601				
			CLV TOTAL=				913
			Level of Service (LOS)=				A

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	N	MD 2/4 & MD 497 (Existing Traffic)	**Intersection** **1**

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Intersection of: MD 2/4
and: MD 497
Conditions: Background Traffic **Analyst:** ml

Lane Use + Traffic Volumes



Capacity Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
WB	147	1.00	147				147
NB	763	0.55	420	315	1.00	315	735
SB	882	0.55	485				

CLV TOTAL= 882
Level of Service (LOS)= A

Evening Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
WB	119	1.00	119				119
NB	973	0.55	535	445	1.00	445	980
SB	1193	0.55	656				

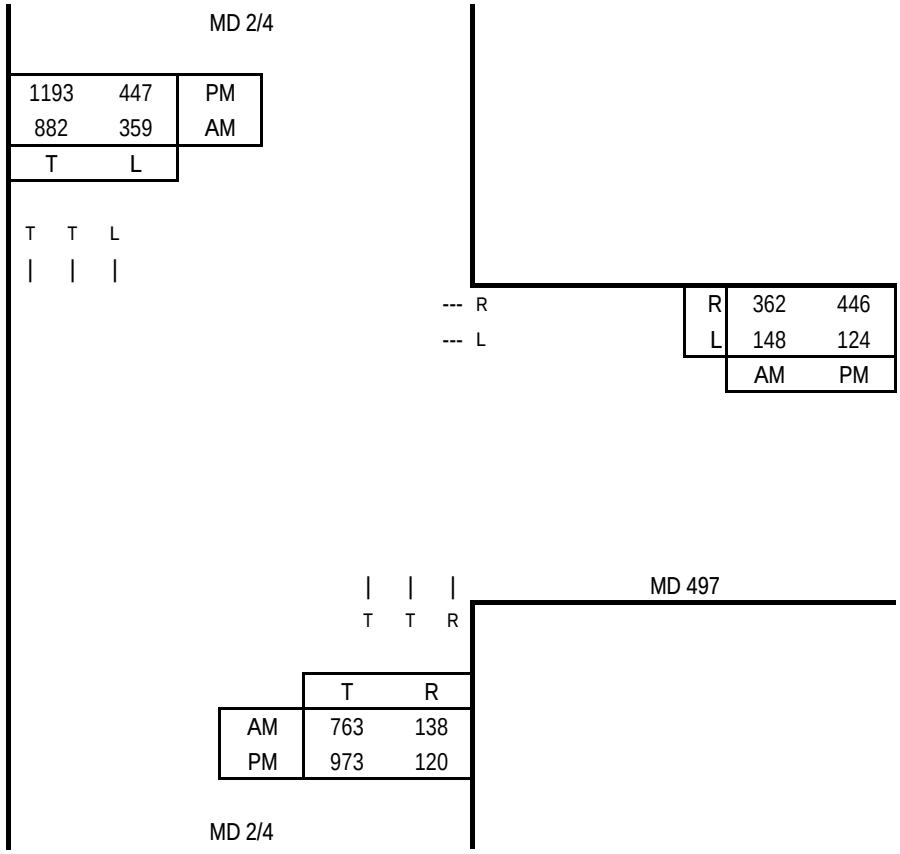
CLV TOTAL= 1099
Level of Service (LOS)= B

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	N	MD 2/4 & MD 497 (Background Traffic)	**Intersection** **1**

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Intersection of: MD 2/4
and: MD 497
Conditions: Total Traffic **Analyst:** ml
With partial traffic signal stopping only northbound MD 2/4 if required

Lane Use + Traffic Volumes



Capacity Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
WB	148	1.00	148				148
NB	763	0.55	420	359	1.00	359	779
SB	882	0.55	485				
						CLV TOTAL=	927
						Level of Service (LOS)=	A

Evening Peak Hour

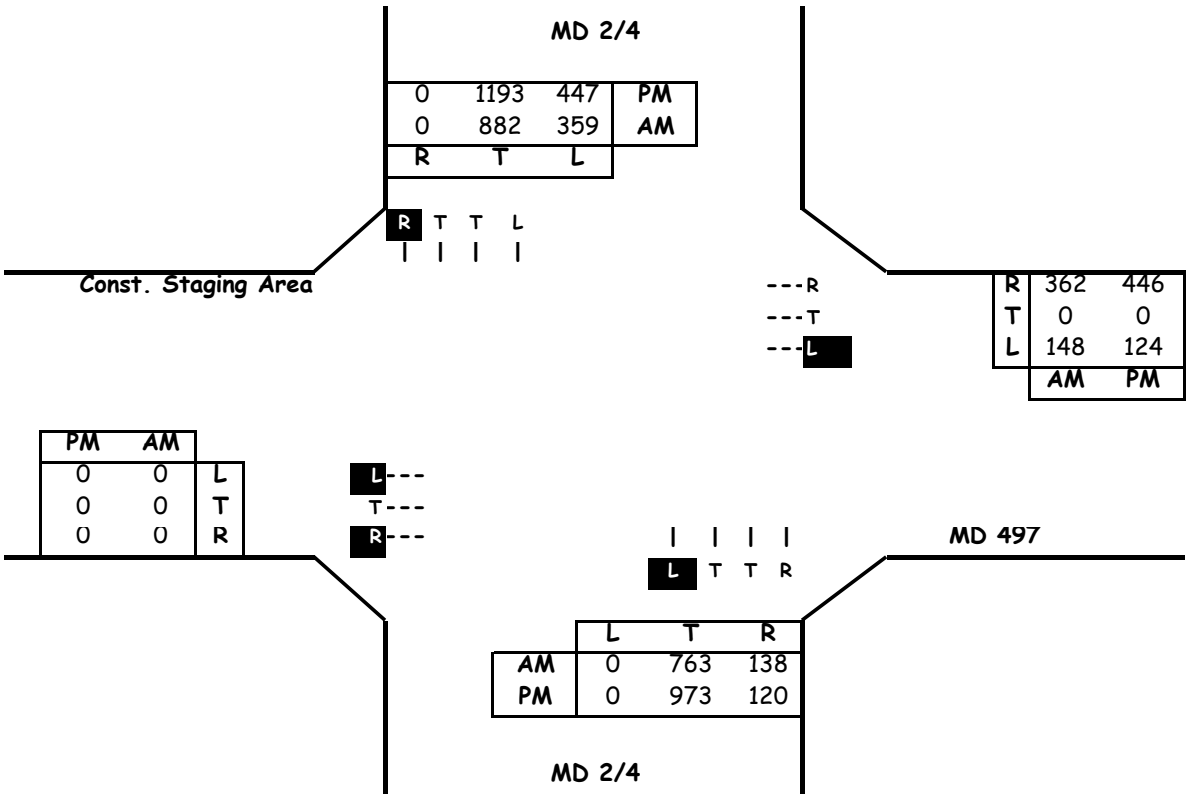
Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
WB	124	1.00	124				124
NB	973	0.55	535	447	1.00	447	982
SB	1193	0.55	656				
						CLV TOTAL=	1106
						Level of Service (LOS)=	B

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	N	MD 2/4 & MD 497 (Total Traffic)	**Intersection** **1**

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Main Line: MD 2/4
Minor Street: MD 497 **Analyst:** ml
Study Period: TOTAL TRAFFIC
With Improvements from Construction Phase if retained

Lane Use + Traffic Volumes



Critical Lane Volume Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
NB	763	0.55	420	359	1	359	779
SB	882	0.55	485	0	1	0	
EB	0	1	0	148	1	148	148
WB	3	1	3	0	1	0	

CLV TOTAL= **927**
Level of Service (LOS)= **A**

Evening Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
NB	973	0.55	535	447	1	447	982
SB	1193	0.55	656	0	1	0	
EB	0	1	0	124	1	124	124
WB	0	1	0	0	1	0	

CLV TOTAL= **1106**
Level of Service (LOS)= **B**

Critical Lane Volume Analysis		MD 2/4 & MD 497 (TOTAL TRAFFIC)	**Intersection 1**
Lenhart Traffic Consulting Traffic Engineering & Transportation Planning			

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*ml*	Intersection	*1*
Agency/Co.		Jurisdiction	
Date Performed	*6/10/2012*	Analysis Year	*Existing*
Analysis Time Period	*AM*		

Project Description *Median Accel on SB MD 2/4. Remove SB Thru Vol's*

East/West Street: *MD 497* | North/South Street: *MD 2/4*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*698*	*36*	*94*	*0*	
Peak-Hour Factor, PHF	*1.00*	*0.90*	*0.90*	*0.90*	*0.90*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*775*	*40*	*104*	*0*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Raised curb*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*1*	*1*	*2*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*127*		*303*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.90*	*1.00*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*141*	*0*	*336*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (veh/h)		*104*	*141*		*336*			
C (m) (veh/h)		*821*	*329*		*665*			
v/c		*0.13*	*0.43*		*0.51*			
95% queue length		*0.43*	*2.07*		*2.86*			
Control Delay (s/veh)		*10.0*	*23.9*		*15.8*			
LOS		*B*	*C*		*C*			
Approach Delay (s/veh)	--	--	*18.2*					
Approach LOS	--	--	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*ml*	Intersection	*1*
Agency/Co.		Jurisdiction	
Date Performed	*6/10/2012*	Analysis Year	*Background*
Analysis Time Period	*AM*		

Project Description *Median Accel on SB MD 2/4. Remove SB Thru Vol's*

East/West Street: *MD 497* | North/South Street: *MD 2/4*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*763*	*100*	*315*	*0*	
Peak-Hour Factor, PHF	*1.00*	*0.90*	*0.90*	*0.90*	*0.90*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*847*	*111*	*350*	*0*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Raised curb*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*1*	*1*	*2*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*147*		*360*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.90*	*1.00*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*163*	*0*	*400*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (veh/h)		*350*	*163*		*400*			
C (m) (veh/h)		*726*	*158*		*634*			
v/c		*0.48*	*1.03*		*0.63*			
95% queue length		*2.64*	*8.14*		*4.45*			
Control Delay (s/veh)		*14.5*	*138.0*		*19.9*			
LOS		*B*	*F*		*C*			
Approach Delay (s/veh)	--	--	*54.1*					
Approach LOS	--	--	*F*					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*ml*	Intersection	*1*
Agency/Co.		Jurisdiction	
Date Performed	*6/10/2012*	Analysis Year	*Total*
Analysis Time Period	*AM*		

Project Description *Median Accel on SB MD 2/4. Remove SB Thru Vol's*

East/West Street: *MD 497* | North/South Street: *MD 2/4*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*763*	*138*	*359*	*0*	
Peak-Hour Factor, PHF	*1.00*	*0.90*	*0.90*	*0.90*	*0.90*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*847*	*153*	*398*	*0*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Raised curb*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*1*	*1*	*2*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*148*		*362*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.90*	*1.00*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*164*	*0*	*402*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (veh/h)		*398*	*164*		*402*			
C (m) (veh/h)		*700*	*126*		*634*			
v/c		*0.57*	*1.30*		*0.63*			
95% queue length		*3.61*	*10.57*		*4.50*			
Control Delay (s/veh)		*16.7*	*247.5*		*20.0*			
LOS		*C*	*F*		*C*			
Approach Delay (s/veh)	--	--	*85.9*					
Approach LOS	--	--	*F*					

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HCS2000™ DETAILED REPORT

General Information		***Site Information***	
Analyst	*ml*	Intersection	*1*
Agency or Co.		Area Type	*All other areas*
Date Performed	*6/10/2012*	Jurisdiction	
Time Period	*AM*	Analysis Year	*Total*
		Project ID	*With Signal*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	*0*	*0*	*0*	*1*	*0*	*1*	*0*	*2*	*1*	*1*	*0*	*0*
Lane group				*L*		*R*		*T*	*R*	*L*		
Volume, V (vph)				*148*		*362*		*763*	*138*	*359*		
% Heavy vehicles, %HV				*0*		*0*		*0*	*0*	*0*		
Peak-hour factor, PHF				*0.90*		*0.90*		*0.90*	*0.90*	*0.90*		
Pretimed (P) or actuated (A)				*A*		*A*		*A*	*A*	*A*		
Start-up lost time, l_1				*2.0*		*2.0*		*2.0*	*2.0*	*2.0*		
Extension of effective green, e				*2.0*		*2.0*		*2.0*	*2.0*	*2.0*		
Arrival type, AT				*3*		*3*		*3*	*3*	*3*		
Unit extension, UE				*3.0*		*3.0*		*3.0*	*3.0*	*3.0*		
Filtering/metering, I				*1.000*	*1.000*	*1.000*		*1.000*	*1.000*	*1.000*	*1.000*	
Initial unmet demand, Q_b				*0.0*		*0.0*		*0.0*	*0.0*	*0.0*		
Ped / Bike / RTOR volumes	*0*			*0*		*0*	*0*		*0*			
Lane width				*12.0*		*12.0*		*12.0*	*12.0*	*12.0*		
Parking / Grade / Parking	*N*		*N*	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*
Parking maneuvers, N_m												
Buses stopping, N_B				*0*		*0*		*0*	*0*	*0*		
Min. time for pedestrians, G_p	*3.2*			*3.2*			*3.2*					

Phasing	WB Only	02	03	04	SB Only	NB Only	07	08
Timing	G = *18.0*	G =	G =	G =	G = *33.0*	G = *50.0*	G =	G =
	Y = *6*	Y =	Y =	Y =	Y = *6*	Y = *7*	Y =	Y =
Duration of Analysis, T = *0.25*						Cycle Length, C = *120.0*		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v				*164*		*402*		*848*	*153*	*399*		
Lane group capacity, c				*271*		*767*		*1504*	*673*	*496*		
v/c ratio, X				*0.61*		*0.52*		*0.56*	*0.23*	*0.80*		
Total green ratio, g/C				*0.15*		*0.47*		*0.42*	*0.42*	*0.28*		
Uniform delay, d_1				*47.7*		*22.0*		*26.7*	*22.6*	*40.5*		
				1.000		*1.000*		*1.000*	*1.000*	*1.000*		

Progression factor, PF												
Delay calibration, k				*0.19*		*0.13*		*0.16*	*0.11*	*0.35*		
Incremental delay, d_2				*3.8*		*0.7*		*0.5*	*0.2*	*9.4*		
Initial queue delay, d_3												
Control delay				*51.5*		*22.7*		*27.2*	*22.7*	*49.9*		
Lane group LOS				*D*		*C*		*C*	*C*	*D*		
Approach delay				*31.0*			*26.5*			*49.9*		
Approach LOS				*C*			*C*			*D*		
Intersection delay	*32.5*						Intersection LOS			*C*		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*ml*	Intersection	*1*
Agency/Co.		Jurisdiction	
Date Performed	*6/10/2012*	Analysis Year	*Existing*
Analysis Time Period	*PM*		

Project Description *Median Accel on SB MD 2/4. Remove SB Thru Vol's*

East/West Street: *MD 497* | North/South Street: *MD 2/4*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*890*	*100*	*377*	*0*	
Peak-Hour Factor, PHF	*1.00*	*0.90*	*0.90*	*0.90*	*0.90*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*988*	*111*	*418*	*0*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Raised curb*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*1*	*1*	*2*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*46*		*181*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.90*	*1.00*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*51*	*0*	*201*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (veh/h)		*418*	*51*		*201*			
C (m) (veh/h)		*643*	*97*		*579*			
v/c		*0.65*	*0.53*		*0.35*			
95% queue length		*4.77*	*2.36*		*1.54*			
Control Delay (s/veh)		*20.4*	*77.4*		*14.5*			
LOS		*C*	*F*		*B*			
Approach Delay (s/veh)	--	--	*27.2*					
Approach LOS	--	--	*D*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ml*
Agency/Co.	
Date Performed	*6/10/2012*
Analysis Time Period	*PM*

Site Information

Intersection	*1*
Jurisdiction	
Analysis Year	*Background*

Project Description *Median Accel on SB MD 2/4. Remove SB Thru Vol's*

East/West Street: *MD 497* | North/South Street: *MD 2/4*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*973*	*118*	*445*	*0*	
Peak-Hour Factor, PHF	*1.00*	*0.90*	*0.90*	*0.90*	*0.90*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*1081*	*131*	*494*	*0*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Raised curb*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*1*	*1*	*2*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*119*		*440*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.90*	*1.00*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*132*	*0*	*488*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (veh/h)		*494*	*132*		*488*			
C (m) (veh/h)		*583*	*40*		*546*			
v/c		*0.85*	*3.30*		*0.89*			
95% queue length		*9.14*	*14.84*		*10.38*			
Control Delay (s/veh)		*36.3*	*1246*		*44.5*			
LOS		*E*	*F*		*E*			
Approach Delay (s/veh)	--	--	*300.3*					
Approach LOS	--	--	*F*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ml*
Agency/Co.	
Date Performed	*6/10/2012*
Analysis Time Period	*PM*

Site Information

Intersection	*1*
Jurisdiction	
Analysis Year	*Total*

Project Description *Median Accel on SB MD 2/4. Remove SB Thru Vol's*

East/West Street: *MD 497* | North/South Street: *MD 2/4*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*973*	*120*	*447*	*0*	
Peak-Hour Factor, PHF	*1.00*	*0.90*	*0.90*	*0.90*	*0.90*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*1081*	*133*	*496*	*0*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Raised curb*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*1*	*1*	*2*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*124*		*446*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.90*	*1.00*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*137*	*0*	*495*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (veh/h)		*496*	*137*		*495*			
C (m) (veh/h)		*582*	*39*		*546*			
v/c		*0.85*	*3.51*		*0.91*			
95% queue length		*9.28*	*15.55*		*10.80*			
Control Delay (s/veh)		*36.9*	*1345*		*46.5*			
LOS		*E*	*F*		*E*			
Approach Delay (s/veh)	--	--	*328.0*					
Approach LOS	--	--	*F*					

HCS+™ Version 5.6

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HCS2000™ DETAILED REPORT

General Information		***Site Information***	
Analyst	*ml*	Intersection	*1*
Agency or Co.		Area Type	*All other areas*
Date Performed	*6/10/2012*	Jurisdiction	
Time Period	*PM*	Analysis Year	*Total*
		Project ID	*With Signal*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	*0*	*0*	*0*	*1*	*0*	*1*	*0*	*2*	*1*	*1*	*0*	*0*
Lane group				*L*		*R*		*T*	*R*	*L*		
Volume, V (vph)				*124*		*446*		*973*	*120*	*447*		
% Heavy vehicles, %HV				*0*		*0*		*0*	*0*	*0*		
Peak-hour factor, PHF				*0.90*		*0.90*		*0.90*	*0.90*	*0.90*		
Pretimed (P) or actuated (A)				*A*		*A*		*A*	*A*	*A*		
Start-up lost time, l_1				*2.0*		*2.0*		*2.0*	*2.0*	*2.0*		
Extension of effective green, e				*2.0*		*2.0*		*2.0*	*2.0*	*2.0*		
Arrival type, AT				*3*		*3*		*3*	*3*	*3*		
Unit extension, UE				*3.0*		*3.0*		*3.0*	*3.0*	*3.0*		
Filtering/metering, I				*1.000*	*1.000*	*1.000*		*1.000*	*1.000*	*1.000*	*1.000*	
Initial unmet demand, Q_b				*0.0*		*0.0*		*0.0*	*0.0*	*0.0*		
Ped / Bike / RTOR volumes	*0*			*0*		*0*	*0*		*0*			
Lane width				*12.0*		*12.0*		*12.0*	*12.0*	*12.0*		
Parking / Grade / Parking	*N*		*N*	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*
Parking maneuvers, N_m												
Buses stopping, N_B				*0*		*0*		*0*	*0*	*0*		
Min. time for pedestrians, G_p	*3.2*			*3.2*			*3.2*					

Phasing	WB Only	02	03	04	SB Only	NB Only	07	08
Timing	G = *18.0*	G =	G =	G =	G = *38.0*	G = *45.0*	G =	G =
	Y = *6*	Y =	Y =	Y =	Y = *6*	Y = *7*	Y =	Y =
Duration of Analysis, T = *0.25*						Cycle Length, C = *120.0*		

Lane Group Capacity, Control Delay, and LOS Determination

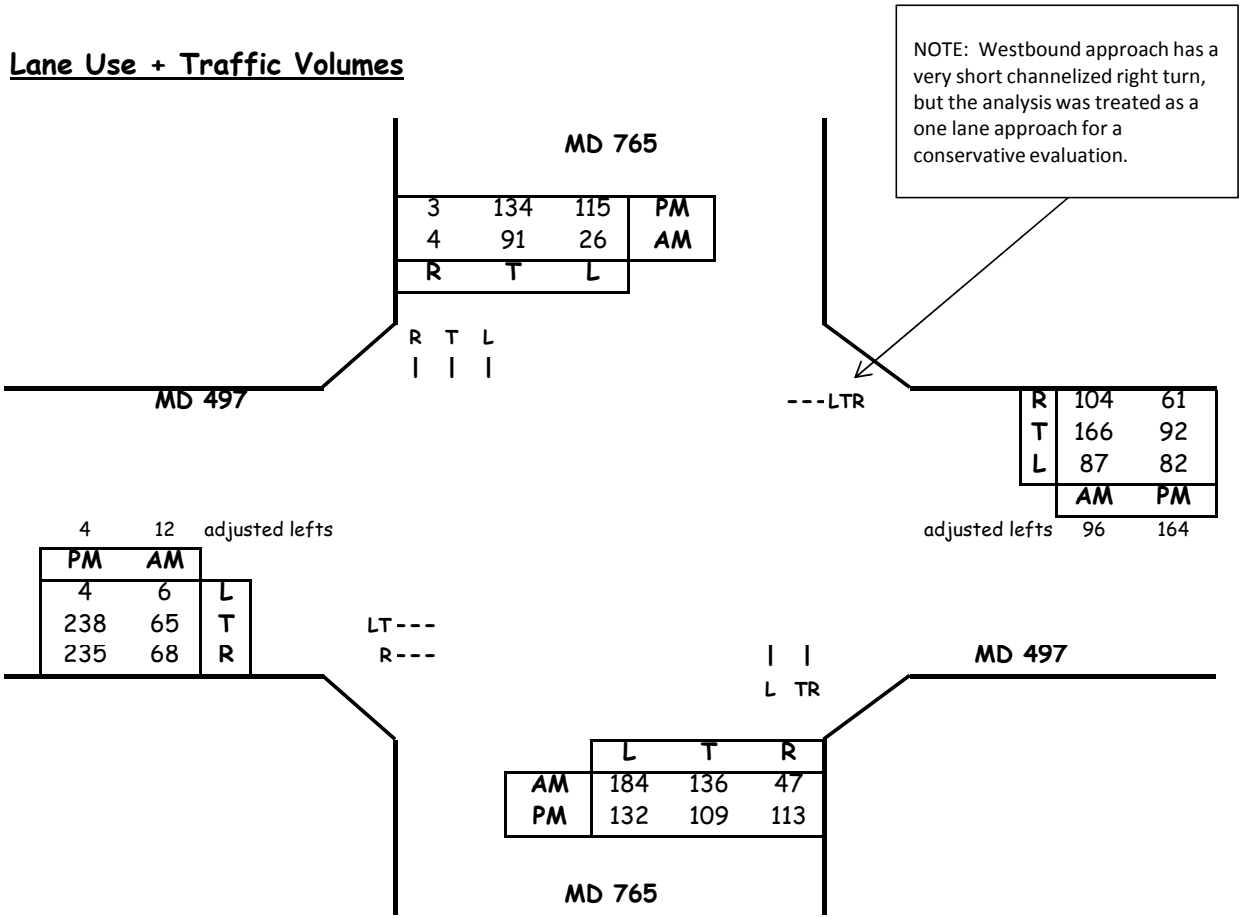
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v				*138*		*496*		*1081*	*133*	*497*		
Lane group capacity, c				*271*		*834*		*1354*	*606*	*572*		
v/c ratio, X				*0.51*		*0.59*		*0.80*	*0.22*	*0.87*		
Total green ratio, g/C				*0.15*		*0.52*		*0.38*	*0.38*	*0.32*		
Uniform delay, d_1				*46.9*		*20.2*		*33.5*	*25.5*	*38.7*		
				1.000		*1.000*		*1.000*	*1.000*	*1.000*		

Progression factor, PF												
Delay calibration, k				*0.12*		*0.18*		*0.34*	*0.11*	*0.40*		
Incremental delay, d_2				*1.6*		*1.2*		*3.5*	*0.2*	*13.5*		
Initial queue delay, d_3												
Control delay				*48.5*		*21.4*		*36.9*	*25.7*	*52.2*		
Lane group LOS				*D*		*C*		*D*	*C*	*D*		
Approach delay				*27.3*			*35.7*			*52.2*		
Approach LOS				*C*			*D*			*D*		
Intersection delay	*36.9*						Intersection LOS			*D*		

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Main Line: MD 765
Minor Street: MD 497 **Analyst:** ml
Study Period: EXISTING TRAFFIC

Lane Use + Traffic Volumes



Critical Lane Volume Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
NB	183	1.00	183	26	1	26	275
SB	91	1.00	91	184	1	184	
EB	77	1	77	87	1	87	372
WB	366	1	366	6	1	6	

CLV TOTAL= **647**
Level of Service (LOS)= **A**

Evening Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
NB	222	1.00	222	115	1	115	337
SB	134	1.00	134	132	1	132	
EB	242	1	242	82	1	82	324
WB	317	1	317	4	1	4	

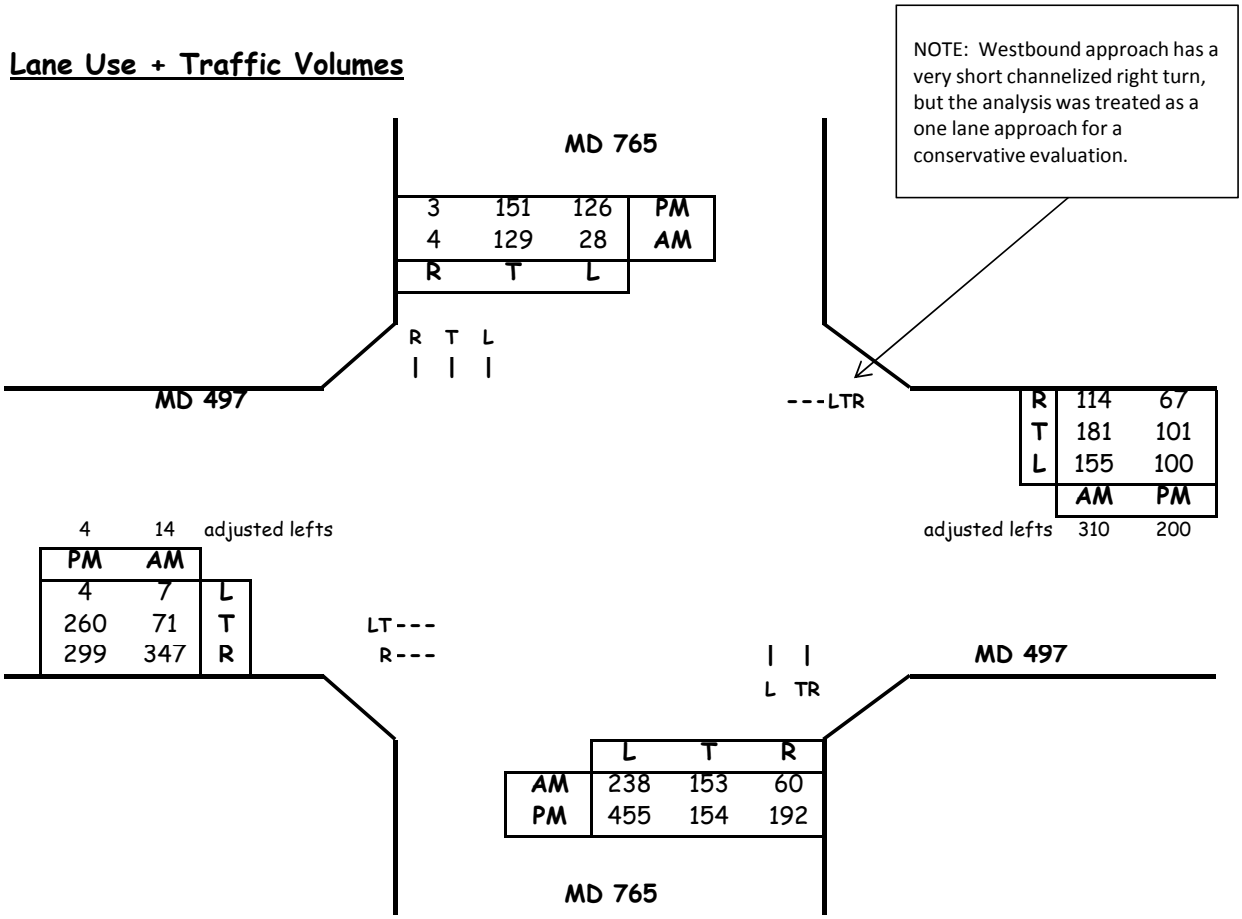
CLV TOTAL= **661**
Level of Service (LOS)= **A**

Critical Lane Volume Analysis		MD 765 & MD 497 (EXISTING TRAFFIC)	**Intersection 2**
Lenhart Traffic Consulting Traffic Engineering & Transportation Planning			

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Main Line: MD 765
Minor Street: MD 497 **Analyst:** ml
Study Period: BACKGROUND TRAFFIC

Lane Use + Traffic Volumes



Critical Lane Volume Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
NB	213	1.00	213	28	1	28	367
SB	129	1.00	129	238	1	238	
EB	109	1	109	155	1	155	612
WB	605	1	605	7	1	7	

CLV TOTAL= **979**
Level of Service (LOS)= **A**

Evening Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
NB	346	1.00	346	126	1	126	606
SB	151	1.00	151	455	1	455	
EB	264	1	264	100	1	100	372
WB	368	1	368	4	1	4	

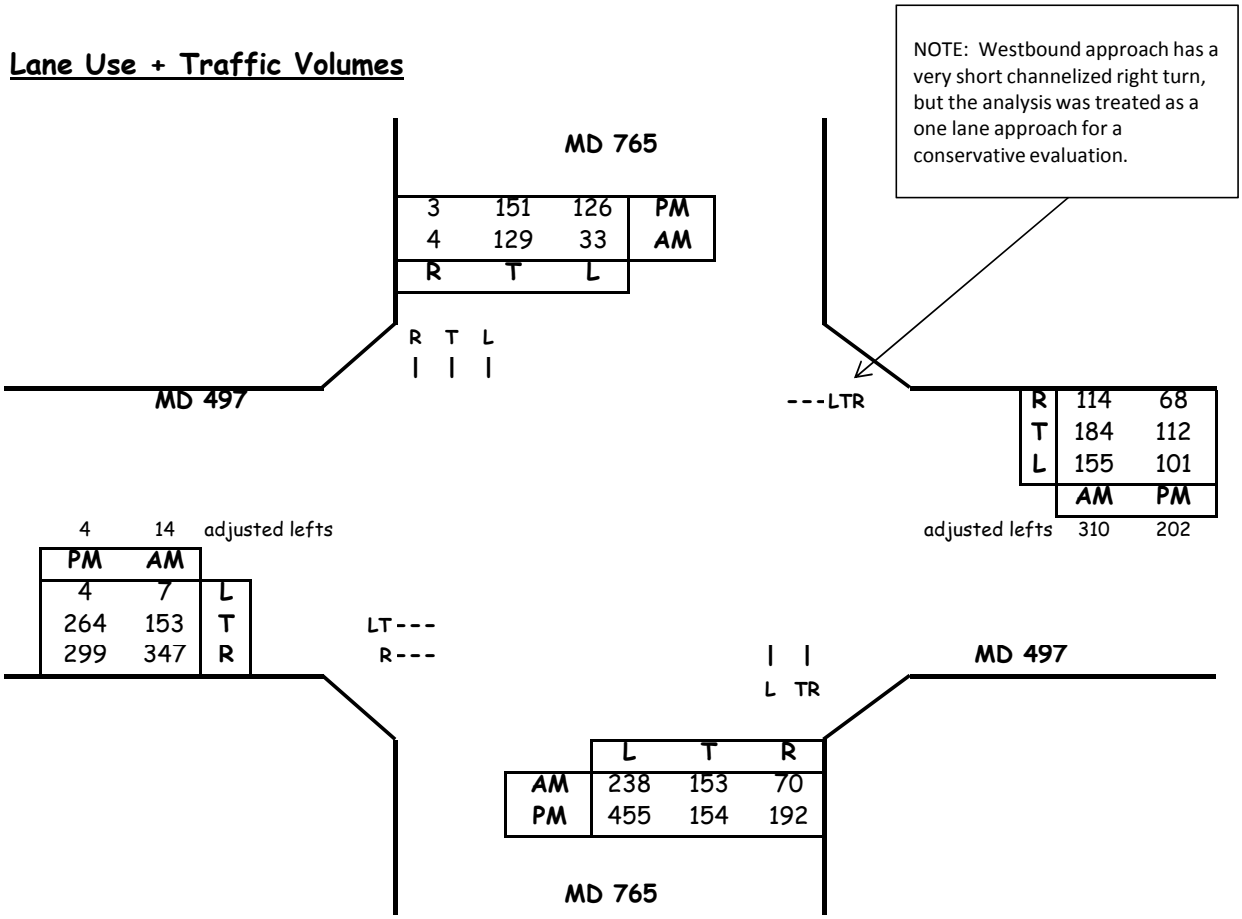
CLV TOTAL= **978**
Level of Service (LOS)= **A**

Critical Lane Volume Analysis		MD 765 & MD 497 (BACKGROUND TRAFFIC)	**Intersection 2**
Lenhart Traffic Consulting Traffic Engineering & Transportation Planning			

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Main Line: MD 765
Minor Street: MD 497 **Analyst:** ml
Study Period: TOTAL TRAFFIC

Lane Use + Traffic Volumes



Critical Lane Volume Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
NB	223	1.00	223	33	1	33	367
SB	129	1.00	129	238	1	238	
EB	167	1	167	155	1	155	615
WB	608	1	608	7	1	7	

CLV TOTAL= **982**
Level of Service (LOS)= **A**

Evening Peak Hour

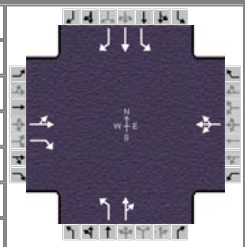
Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
NB	346	1.00	346	126	1	126	606
SB	151	1.00	151	455	1	455	
EB	268	1	268	101	1	101	386
WB	382	1	382	4	1	4	

CLV TOTAL= **992**
Level of Service (LOS)= **A**

Critical Lane Volume Analysis		MD 765 & MD 497 (TOTAL TRAFFIC)	**Intersection 2**
Lenhart Traffic Consulting Traffic Engineering & Transportation Planning			

2010 HCS Signalized Intersection Results Summary

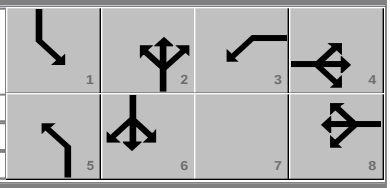
General Information				Intersection Information	
Agency	LTC			Duration, h	0.25
Analyst	ml	Analysis Date	Jun 10, 2012	Area Type	Other
Jurisdiction	Calvert	Time Period	AM	PHF	0.90
Intersection	Int 2: MD 765 & MD 497	Analysis Year	Existing	Analysis Period	1> 7:00
File Name	2-A-E.xus				
Project Description	AM-Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	6	65	68	87	166	104	184	136	47	26	91	4

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	2.6	4.4	40.5	5.0	17.4	0.0	
Yellow	4.0	0.0	4.0	4.0	4.0	0.0	
Red	1.0	0.0	1.0	1.0	1.0	0.0	



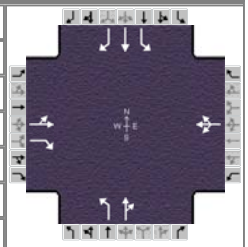
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	4	4	8	8	5	2	1	6
Case Number	7.3	7.3	14.0	14.0	1.1	4.0	1.1	3.0
Phase Duration, s	22.4	22.4	32.4	32.4	12.0	50.0	7.6	45.5
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway *(MAH)*, s	3.1	3.1	3.1	3.1	3.1	0.0	3.1	0.0
Queue Clearance Time *(g_s)*, s	5.6	5.6	26.4	26.4	6.8		2.8	
Green Extension Time *(g_e)*, s	1.1	1.1	1.0	1.0	0.3	0.0	0.0	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.99		0.51	
Max Out Probability	0.00	0.00	0.00	0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	79	0	76	397	0	0	204	0	203	29	101	4
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1801	0	1579	1404	0	0	1774	0	1780	1774	1863	1579
Queue Service time *(g_s)*, s	0.0	0.0	3.6	5.0	0.0	0.0	4.8	0.0	5.8	0.8	2.8	0.1
Cycle Queue Clearance Time *(g_c)*, s	3.2	0.0	3.6	24.4	0.0	0.0	4.8	0.0	5.8	0.8	2.8	0.1
Capacity *(c)*, veh/h	392		305	435			759		891	643	840	712
Volume-to-Capacity Ratio *(X)*	0.201	0.000	0.247	0.913	0.000	0.000	0.269	0.000	0.228	0.045	0.120	0.006
Available Capacity *(c_a)*, veh/h	702		614	692			1066		891	1038	840	712
Back of Queue *(Q)*, veh/ln	1.4		1.3	9.5			1.6		2.2	0.3	1.2	0.0
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh	30.6		30.7	31.1			8.9		12.7	12.4	14.4	13.6
Incremental Delay *(d_2)*, s/veh	0.1	0.0	0.2	7.8	0.0	0.0	0.1	0.0	0.6	0.0	0.3	0.0
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	30.7		30.9	38.9			8.9		13.3	12.4	14.6	13.6
Level of Service (LOS)	C		C	D			A		B	B	B	B
Approach Delay, s/veh / LOS	30.8	C		38.9	D		11.1	B		14.1	B	
Intersection Delay s/veh / LOS	24.3						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.1	B	2.3	B
Bicycle LOS Score / LOS	0.7	A	1.1	A	1.2	A	0.7	A

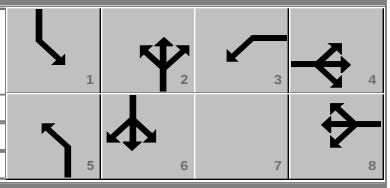
2010 HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	LTC			Duration, h	0.25
Analyst	ml	Analysis Date	Jun 10, 2012	Area Type	Other
Jurisdiction	Calvert	Time Period	AM	PHF	0.90
Intersection	Int 2: MD 765 & MD 497	Analysis Year	Background	Analysis Period	1> 7:00
File Name	2-A-B.xus				
Project Description	AM-Background				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	7	71	347	155	181	114	238	153	60	28	129	4

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
				Green	2.7	2.2	26.4	5.0	28.8	0.0		
				Yellow	4.0	4.0	4.0	4.0	4.0	0.0		
				Red	1.0	1.0	1.0	1.0	1.0	0.0		



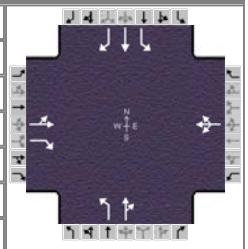
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	4	4	8	8	5	2	1	6
Case Number	7.3	7.3	14.0	14.0	1.1	4.0	1.1	3.0
Phase Duration, s	33.8	33.8	43.8	43.8	14.9	38.5	7.7	31.4
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway *(MAH)*, s	3.2	3.2	3.2	3.2	3.1	0.0	3.1	0.0
Queue Clearance Time *(g_s)*, s	21.8	21.8	37.2	37.2	9.8		3.1	
Green Extension Time *(g_e)*, s	1.9	1.9	1.6	1.6	0.1	0.0	0.0	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.54	
Max Out Probability	0.04	0.04	0.22	0.22	1.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	87	0	386	500	0	0	264	0	237	31	143	4
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1742	0	1579	1269	0	0	1774	0	1773	1774	1863	1579
Queue Service time *(g_s)*, s	0.0	0.0	19.8	5.0	0.0	0.0	7.8	0.0	8.7	1.1	5.3	0.2
Cycle Queue Clearance Time *(g_c)*, s	3.0	0.0	19.8	35.2	0.0	0.0	7.8	0.0	8.7	1.1	5.3	0.2
Capacity *(c)*, veh/h	600		504	561			565		661	448	546	463
Volume-to-Capacity Ratio *(X)*	0.144	0.000	0.765	0.891	0.000	0.000	0.468	0.000	0.358	0.070	0.263	0.010
Available Capacity *(c_a)*, veh/h	707		614	644			592		661	616	546	463
Back of Queue *(Q)*, veh/ln	1.3		7.5	11.8			2.8		3.6	0.4	2.4	0.1
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh	21.9		27.6	24.4			14.5		20.4	21.0	24.4	22.6
Incremental Delay *(d_2)*, s/veh	0.0	0.0	3.5	12.4	0.0	0.0	0.2	0.0	1.5	0.0	1.2	0.0
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	21.9		31.1	36.8			14.7		21.9	21.0	25.5	22.6
Level of Service (LOS)	C		C	D			B		C	C	C	C
Approach Delay, s/veh / LOS	29.4	C		36.8	D		18.1	B		24.7	C	
Intersection Delay s/veh / LOS	27.7						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.1	B	2.3	B
Bicycle LOS Score / LOS	1.3	A	1.3	A	1.3	A	0.8	A

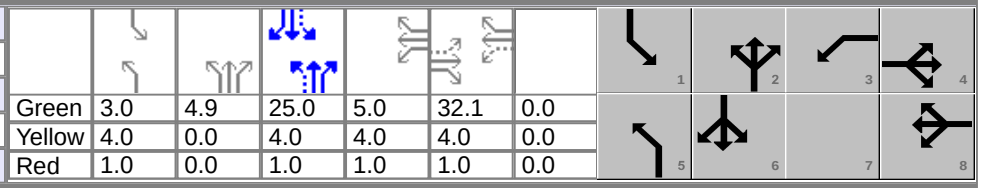
2010 HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	LTC			Duration, h	0.25
Analyst	ml	Analysis Date	Jun 10, 2012	Area Type	Other
Jurisdiction	Calvert	Time Period	AM	PHF	0.90
Intersection	Int 2: MD 765 & MD 497	Analysis Year	Total	Analysis Period	1> 7:00
File Name	2-A-T.xus				
Project Description	AM-Total				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	7	153	347	155	184	114	238	153	70	33	129	4

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	3.0	4.9	25.0	5.0	32.1	0.0
Yellow	4.0	0.0	4.0	4.0	4.0	0.0
Red	1.0	0.0	1.0	1.0	1.0	0.0

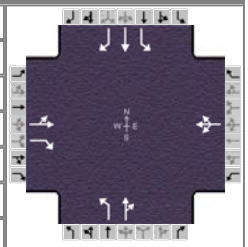
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	4	4	8	8	5	2	1	6
Case Number	7.3	7.3	14.0	14.0	1.1	4.0	1.1	3.0
Phase Duration, s	37.1	37.1	47.1	47.1	12.9	34.9	8.0	30.0
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway *(MAH)*, s	3.2	3.2	3.2	3.2	3.1	0.0	3.1	0.0
Queue Clearance Time *(g_s)*, s	20.7	20.7	40.9	40.9	9.9		3.3	
Green Extension Time *(g_e)*, s	2.2	2.2	1.2	1.2	0.0	0.0	0.0	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.60	
Max Out Probability	0.04	0.04	0.77	0.77	1.00		0.06	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	178	0	386	503	0	0	264	0	248	37	143	4
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1823	0	1579	1162	0	0	1774	0	1763	1774	1863	1579
Queue Service time *(g_s)*, s	0.0	0.0	18.7	5.0	0.0	0.0	7.9	0.0	9.8	1.3	5.4	0.2
Cycle Queue Clearance Time *(g_c)*, s	6.1	0.0	18.7	38.9	0.0	0.0	7.9	0.0	9.8	1.3	5.4	0.2
Capacity *(c)*, veh/h	692		563	562			505		586	390	518	439
Volume-to-Capacity Ratio *(X)*	0.257	0.000	0.685	0.896	0.000	0.000	0.524	0.000	0.423	0.094	0.277	0.010
Available Capacity *(c_a)*, veh/h	747		614	599			505		586	487	518	439
Back of Queue *(Q)*, veh/ln	2.5		6.8	12.1			3.4		4.2	0.5	2.5	0.1
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh	20.6		24.6	23.1			18.5		23.4	21.9	25.4	23.5
Incremental Delay *(d_2)*, s/veh	0.1	0.0	2.2	14.8	0.0	0.0	0.5	0.0	2.2	0.0	1.3	0.0
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	20.7		26.8	37.9			19.0		25.6	22.0	26.7	23.6
Level of Service (LOS)	C		C	D			B		C	C	C	C
Approach Delay, s/veh / LOS	24.9	C		37.9	D		22.2	C		25.7	C	
Intersection Delay s/veh / LOS	27.9						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.1	B	2.3	B
Bicycle LOS Score / LOS	1.4	A	1.3	A	1.3	A	0.8	A

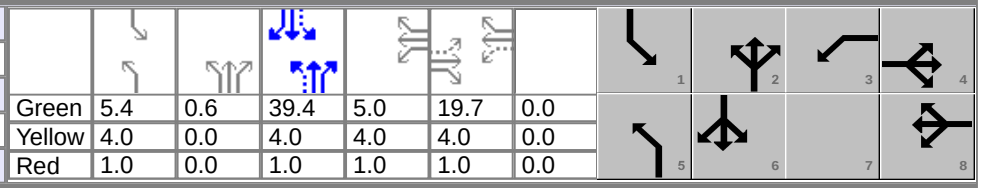
2010 HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	LTC			Duration, h	0.25
Analyst	ml	Analysis Date	Jun 10, 2012	Area Type	Other
Jurisdiction	Calvert	Time Period	PM	PHF	0.90
Intersection	Int 2: MD 765 & MD 497	Analysis Year	Existing	Analysis Period	1> 7:00
File Name	2-P-E.xus				
Project Description	PM-Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	4	238	235	82	92	61	132	109	113	115	134	3

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.4	0.6	39.4	5.0	19.7	0.0		
Yellow	4.0	0.0	4.0	4.0	4.0	0.0		
Red	1.0	0.0	1.0	1.0	1.0	0.0		

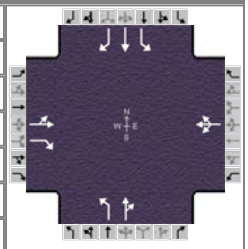
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	4	4	8	8	5	2	1	6
Case Number	7.3	7.3	14.0	14.0	1.1	4.0	1.1	3.0
Phase Duration, s	24.7	24.7	34.7	34.7	11.0	44.9	10.4	44.4
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway *(MAH)*, s	3.2	3.2	3.2	3.2	3.1	0.0	3.1	0.0
Queue Clearance Time *(g_s)*, s	15.9	15.9	28.1	28.1	6.0		5.5	
Green Extension Time *(g_e)*, s	1.5	1.5	1.5	1.5	0.2	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.97		0.96	
Max Out Probability	0.01	0.01	0.03	0.03	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	269	0	261	261	0	0	147	0	247	128	149	3
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1853	0	1579	898	0	0	1774	0	1706	1774	1863	1579
Queue Service time *(g_s)*, s	0.0	0.0	13.9	5.0	0.0	0.0	4.0	0.0	8.5	3.5	4.4	0.1
Cycle Queue Clearance Time *(g_c)*, s	11.9	0.0	13.9	26.1	0.0	0.0	4.0	0.0	8.5	3.5	4.4	0.1
Capacity *(c)*, veh/h	447		346	324			676		755	581	813	689
Volume-to-Capacity Ratio *(X)*	0.601	0.000	0.754	0.805	0.000	0.000	0.217	0.000	0.327	0.220	0.183	0.005
Available Capacity *(c_a)*, veh/h	653		526	450			858		755	773	813	689
Back of Queue *(Q)*, veh/ln	5.1		5.2	4.8			1.4		3.3	1.3	1.9	0.0
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh	32.0		32.9	27.5			12.0		16.3	12.7	15.5	14.3
Incremental Delay *(d_2)*, s/veh	0.5	0.0	1.3	4.9	0.0	0.0	0.1	0.0	1.2	0.1	0.5	0.0
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	32.5		34.1	32.4			12.0		17.5	12.7	16.0	14.3
Level of Service (LOS)	C		C	C			B		B	B	B	B
Approach Delay, s/veh / LOS	33.3	C		32.4	C		15.5	B		14.5	B	
Intersection Delay s/veh / LOS	24.8						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.1	B	2.3	B
Bicycle LOS Score / LOS	1.4	A	0.9	A	1.1	A	0.9	A

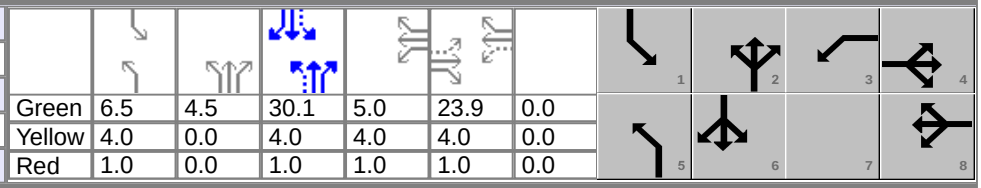
2010 HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	LTC			Duration, h	0.25
Analyst	ml	Analysis Date	Jun 10, 2012	Area Type	Other
Jurisdiction	Calvert	Time Period	PM	PHF	0.90
Intersection	Int 2: MD 765 & MD 497	Analysis Year	Background	Analysis Period	1> 7:00
File Name	2-P-B.xus				
Project Description	PM-Background				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	4	260	299	100	101	67	455	154	192	126	151	3

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.5	4.5	30.1	5.0	23.9	0.0
Yellow	4.0	0.0	4.0	4.0	4.0	0.0
Red	1.0	0.0	1.0	1.0	1.0	0.0

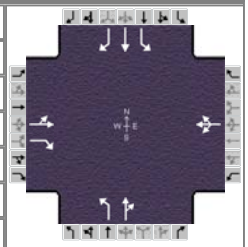
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	4	4	8	8	5	2	1	6
Case Number	7.3	7.3	14.0	14.0	1.1	4.0	1.1	3.0
Phase Duration, s	28.9	28.9	38.9	38.9	16.0	39.6	11.5	35.1
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway *(MAH)*, s	3.2	3.2	3.2	3.2	3.1	0.0	3.1	0.0
Queue Clearance Time *(g_s)*, s	19.6	19.6	32.4	32.4	12.9		6.6	
Green Extension Time *(g_e)*, s	1.7	1.7	1.5	1.5	0.0	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.97	
Max Out Probability	0.08	0.08	0.22	0.22	1.00		0.19	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	293	0	332	298	0	0	506	0	384	140	168	3
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1854	0	1579	879	0	0	1774	0	1694	1774	1863	1579
Queue Service time *(g_s)*, s	0.0	0.0	17.6	5.0	0.0	0.0	10.9	0.0	16.3	4.6	5.9	0.1
Cycle Queue Clearance Time *(g_c)*, s	12.3	0.0	17.6	30.4	0.0	0.0	10.9	0.0	16.3	4.6	5.9	0.1
Capacity *(c)*, veh/h	535		421	361			619		650	409	623	528
Volume-to-Capacity Ratio *(X)*	0.549	0.000	0.790	0.826	0.000	0.000	0.817	0.000	0.591	0.343	0.269	0.006
Available Capacity *(c_a)*, veh/h	656		526	432			619		650	496	623	528
Back of Queue *(Q)*, veh/ln	5.3		6.9	7.1			10.5		6.7	1.8	2.6	0.0
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh	28.7		30.7	26.0			19.8		22.1	18.1	21.9	20.0
Incremental Delay *(d_2)*, s/veh	0.3	0.0	4.9	9.1	0.0	0.0	7.8	0.0	3.9	0.2	1.1	0.0
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	29.1		35.6	35.1			27.6		26.0	18.3	23.0	20.0
Level of Service (LOS)	C		D	D			C		C	B	C	C
Approach Delay, s/veh / LOS	32.5	C		35.1	D		26.9	C		20.9	C	
Intersection Delay s/veh / LOS	28.8						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.1	B	2.3	B
Bicycle LOS Score / LOS	1.5	A	1.0	A	2.0	A	1.0	A

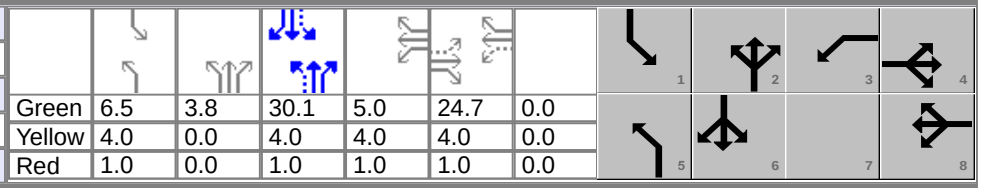
2010 HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	LTC			Duration, h	0.25
Analyst	ml	Analysis Date	Jun 10, 2012	Area Type	Other
Jurisdiction	Calvert	Time Period	PM	PHF	0.90
Intersection	Int 2: MD 765 & MD 497	Analysis Year	Total	Analysis Period	1> 7:00
File Name	2-P-T.xus				
Project Description	PM-Total				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	4	264	299	101	112	68	455	154	192	126	151	3

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.5	3.8	30.1	5.0	24.7	0.0
Yellow	4.0	0.0	4.0	4.0	4.0	0.0
Red	1.0	0.0	1.0	1.0	1.0	0.0

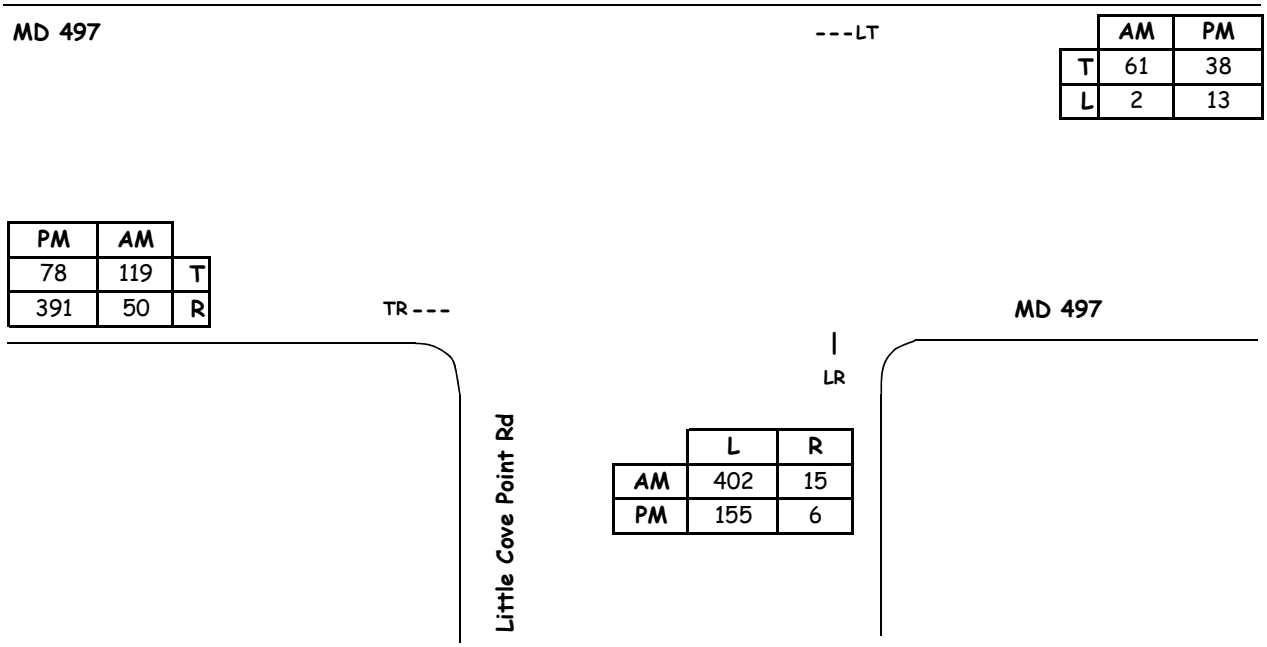
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	4	4	8	8	5	2	1	6
Case Number	7.3	7.3	14.0	14.0	1.1	4.0	1.1	3.0
Phase Duration, s	29.7	29.7	39.7	39.7	15.3	38.9	11.5	35.1
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway *(MAH)*, s	3.2	3.2	3.2	3.2	3.1	0.0	3.1	0.0
Queue Clearance Time *(g_s)*, s	19.4	19.4	33.2	33.2	12.2		6.6	
Green Extension Time *(g_e)*, s	1.7	1.7	1.4	1.4	0.0	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.97	
Max Out Probability	0.08	0.08	0.30	0.30	1.00		0.46	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	298	0	332	312	0	0	506	0	384	140	168	3
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1854	0	1579	899	0	0	1774	0	1694	1774	1863	1579
Queue Service time *(g_s)*, s	0.0	0.0	17.4	5.0	0.0	0.0	10.2	0.0	16.5	4.6	5.9	0.1
Cycle Queue Clearance Time *(g_c)*, s	12.4	0.0	17.4	31.2	0.0	0.0	10.2	0.0	16.5	4.6	5.9	0.1
Capacity *(c)*, veh/h	550		433	374			605		637	398	623	528
Volume-to-Capacity Ratio *(X)*	0.542	0.000	0.767	0.835	0.000	0.000	0.835	0.000	0.604	0.352	0.270	0.006
Available Capacity *(c_a)*, veh/h	656		526	438			605		637	472	623	528
Back of Queue *(Q)*, veh/ln	5.3		6.7	7.5			11.0		6.8	1.8	2.6	0.0
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh	28.2		30.0	25.8			21.5		22.7	18.3	21.9	20.0
Incremental Delay *(d_2)*, s/veh	0.3	0.0	4.2	10.1	0.0	0.0	9.3	0.0	4.2	0.2	1.1	0.0
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	28.5		34.2	35.9			30.9		26.9	18.5	23.0	20.0
Level of Service (LOS)	C		C	D			C		C	B	C	C
Approach Delay, s/veh / LOS	31.5	C		35.9	D		29.2	C		20.9	C	
Intersection Delay s/veh / LOS	29.6						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.1	B	2.3	B
Bicycle LOS Score / LOS	1.5	A	1.0	A	2.0	A	1.0	A

Critical Lane Volume (CLV) Methodology

Main Line: MD 497
Minor Street: Little Cove Point Rd **Analyst:** ml
Study Period: Existing Traffic



Critical Lane Volume Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
NB	417	1.00	417				417
EB	169	1.00	169	2	1.00	2	171
WB	63	1.00	63				
						CLV TOTAL=	**588**
						Level of Service (LOS)=	**A**

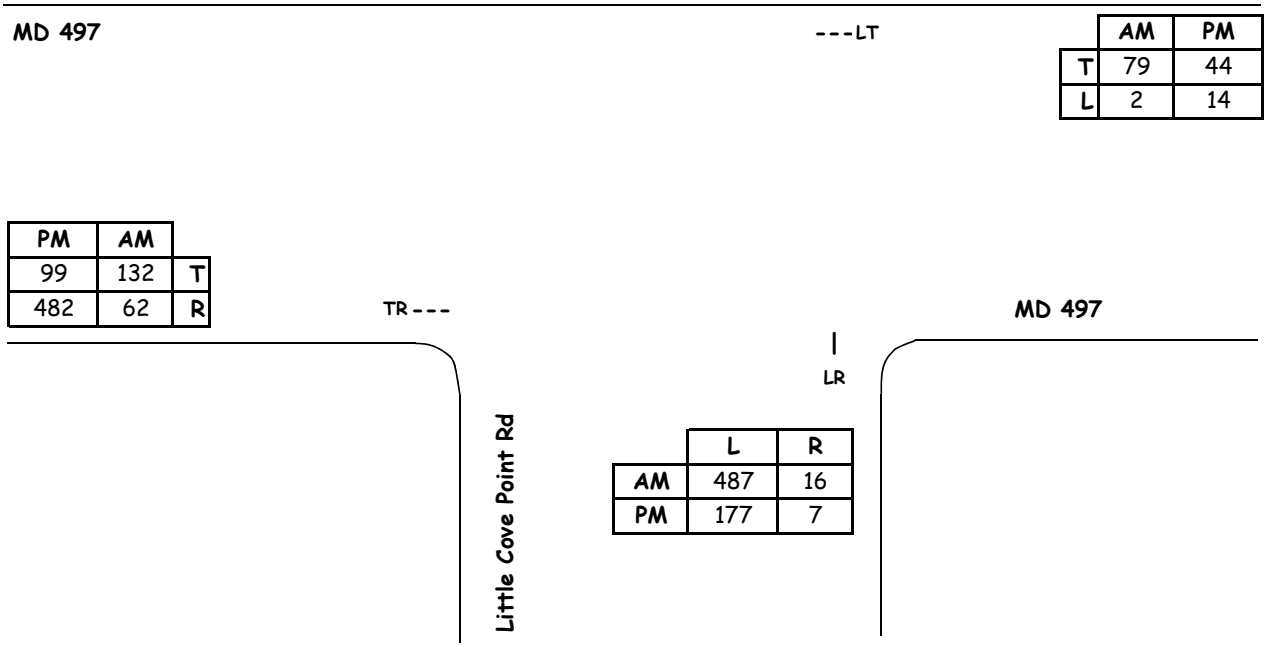
Evening Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
NB	161	1.00	161				161
EB	469	1.00	469	13	1.00	13	482
WB	51	1.00	51				
						CLV TOTAL=	**643**
						Level of Service (LOS)=	**A**

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning		MD 497 & Little Cove Point Rd (Existing Traffic)	**Intersection** **3**

Critical Lane Volume (CLV) Methodology

Main Line: MD 497
Minor Street: Little Cove Point Rd **Analyst:** ml
Study Period: Background Traffic



Critical Lane Volume Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
NB	503	1.00	503				503
EB	194	1.00	194	2	1.00	2	196
WB	81	1.00	81				
						CLV TOTAL=	**699**
						Level of Service (LOS)=	**A**

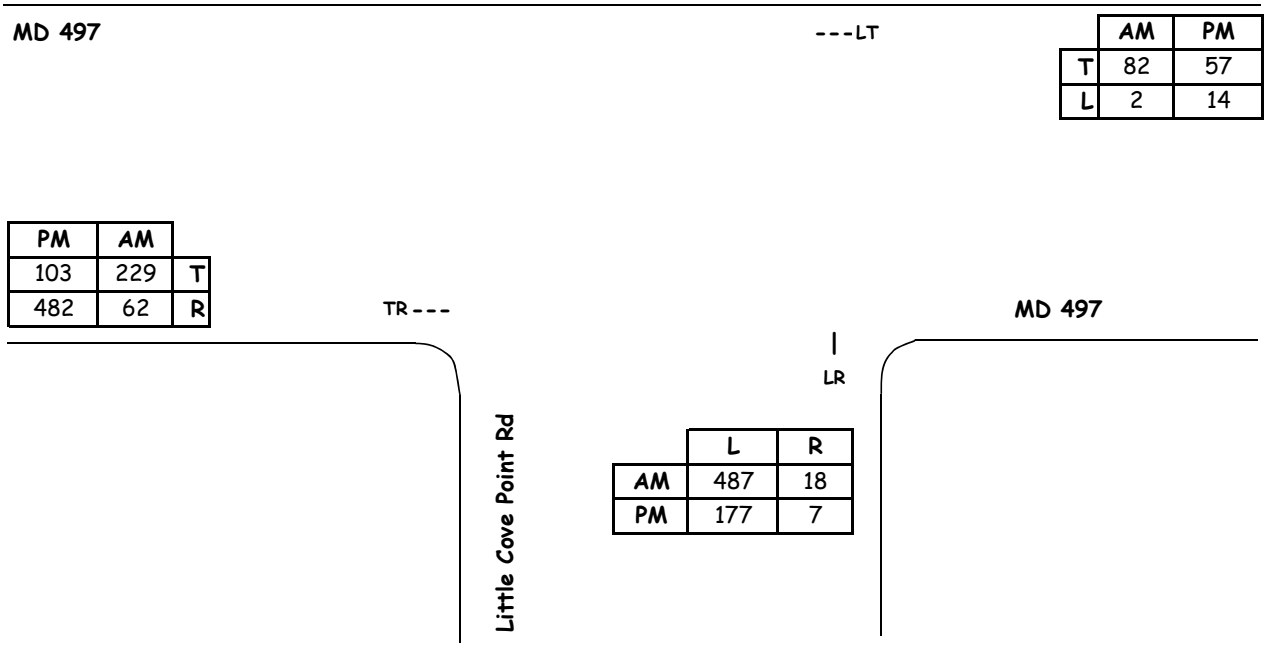
Evening Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
NB	184	1.00	184				184
EB	581	1.00	581	14	1.00	14	595
WB	58	1.00	58				
						CLV TOTAL=	**779**
						Level of Service (LOS)=	**A**

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning		MD 497 & Little Cove Point Rd (Background Traffic)	**Intersection** **3**

Critical Lane Volume (CLV) Methodology

Main Line: MD 497
Minor Street: Little Cove Point Rd **Analyst:** ml
Study Period: Total Traffic



Critical Lane Volume Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
NB	505	1.00	505				505
EB	291	1.00	291	2	1.00	2	293
WB	84	1.00	84				
						CLV TOTAL=	**798**
						Level of Service (LOS)=	**A**

Evening Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
NB	184	1.00	184				184
EB	585	1.00	585	14	1.00	14	599
WB	71	1.00	71				
						CLV TOTAL=	**783**
						Level of Service (LOS)=	**A**

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning		MD 497 & Little Cove Point Rd (Total Traffic)	**Intersection** **3**

Critical Lane Volume (CLV) Methodology

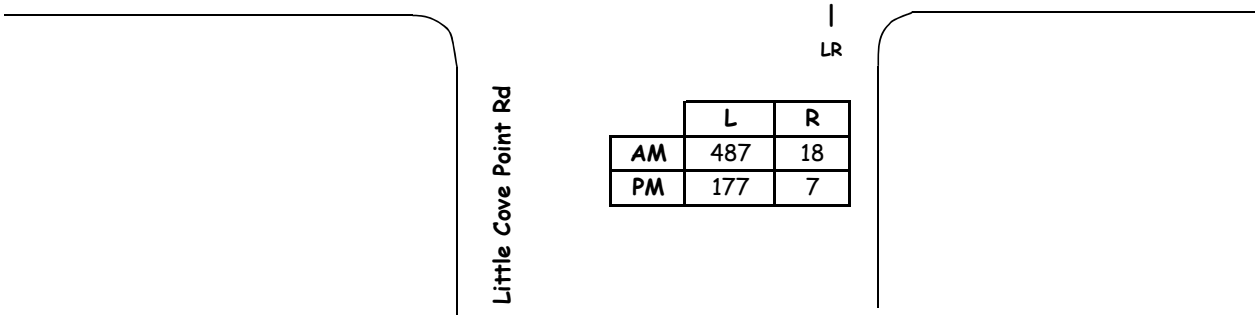
Main Line: **MD 497**
Minor Street: **Little Cove Point Rd** **Analyst:** ml
Study Period: **Total Traffic**
With 200' Right turn lane and 150' taper

MD 497 ---LT

	AM	PM
T	82	57
L	2	14

PM	AM	
103	229	T
482	62	R

T---
R---



	L	R
AM	487	18
PM	177	7

Critical Lane Volume Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
NB	505	1.00	505				505
EB	229	1.00	229	2	1.00	2	231
WB	84	1.00	84				
					CLV TOTAL=		**736**
					Level of Service (LOS)=		**A**

Evening Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
NB	184	1.00	184				184
EB	298	1.00	298	14	1.00	14	312
WB	71	1.00	71				
					CLV TOTAL=		**496**
					Level of Service (LOS)=		**A**

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning		MD 497 & Little Cove Point Rd (Total Traffic)	**Intersection** **3**

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ml*
Agency/Co.	
Date Performed	*6/10/2012*
Analysis Time Period	*AM*

Site Information

Intersection	*3*
Jurisdiction	
Analysis Year	*Existing*

Project Description

East/West Street: *MD 497* | North/South Street: *Little Cove Pt Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*119*	*50*	*1*	*61*	
Peak-Hour Factor, PHF	*1.00*	*0.90*	*0.90*	*0.90*	*0.90*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*132*	*55*	*1*	*67*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*402*		*15*			
Peak-Hour Factor, PHF	*0.90*	*1.00*	*0.90*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*446*	*0*	*16*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*1*		*462*				
C (m) (veh/h)		*1399*		*767*				
v/c		*0.00*		*0.60*				
95% queue length		*0.00*		*4.10*				
Control Delay (s/veh)		*7.6*		*16.5*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--		*16.5*				
Approach LOS	--	--		*C*				

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*ml*	Intersection	*3*
Agency/Co.		Jurisdiction	
Date Performed	*6/10/2012*	Analysis Year	*Background*
Analysis Time Period	*AM*		

Project Description

East/West Street: *MD 497*	North/South Street: *Little Cove Pt Rd*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*132*	*62*	*2*	*79*	
Peak-Hour Factor, PHF	*1.00*	*0.90*	*0.90*	*0.90*	*0.90*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*146*	*68*	*2*	*87*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*487*		*16*			
Peak-Hour Factor, PHF	*0.90*	*1.00*	*0.90*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*541*	*0*	*17*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*2*		*558*				
C (m) (veh/h)		*1368*		*726*				
v/c		*0.00*		*0.77*				
95% queue length		*0.00*		*7.37*				
Control Delay (s/veh)		*7.6*		*24.4*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--		*24.4*				
Approach LOS	--	--		*C*				

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ml*
Agency/Co.	
Date Performed	*6/10/2012*
Analysis Time Period	*AM*

Site Information

Intersection	*3*
Jurisdiction	
Analysis Year	*Total*

Project Description

East/West Street: *MD 497* | North/South Street: *Little Cove Pt Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*229*	*62*	*2*	*82*	
Peak-Hour Factor, PHF	*1.00*	*0.90*	*0.90*	*0.90*	*0.90*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*254*	*68*	*2*	*91*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*487*		*18*			
Peak-Hour Factor, PHF	*0.90*	*1.00*	*0.90*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*541*	*0*	*20*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*2*		*561*				
C (m) (veh/h)		*1249*		*627*				
v/c		*0.00*		*0.89*				
95% queue length		*0.00*		*10.95*				
Control Delay (s/veh)		*7.9*		*40.7*				
LOS		*A*		*E*				
Approach Delay (s/veh)	--	--		*40.7*				
Approach LOS	--	--		*E*				

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ml*
Agency/Co.	
Date Performed	*6/10/2012*
Analysis Time Period	*AM*

Site Information

Intersection	*3*
Jurisdiction	
Analysis Year	*Total*

Project Description *Install 200' right turn lane + 150' taper*

East/West Street: *MD 497* | North/South Street: *Little Cove Pt Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*229*	*62*	*2*	*82*	
Peak-Hour Factor, PHF	*1.00*	*0.90*	*0.90*	*0.90*	*0.90*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*254*	*68*	*2*	*91*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*487*		*18*			
Peak-Hour Factor, PHF	*0.90*	*1.00*	*0.90*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*541*	*0*	*20*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*2*		*561*				
C (m) (veh/h)		*1249*		*655*				
v/c		*0.00*		*0.86*				
95% queue length		*0.00*		*9.77*				
Control Delay (s/veh)		*7.9*		*34.4*				
LOS		*A*		*D*				
Approach Delay (s/veh)	--	--		*34.4*				
Approach LOS	--	--		*D*				

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*ml*	Intersection	*3*
Agency/Co.		Jurisdiction	
Date Performed	*6/10/2012*	Analysis Year	*Existing*
Analysis Time Period	*PM*		

Project Description

East/West Street: *MD 497*	North/South Street: *Little Cove Pt Rd*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*78*	*391*	*13*	*38*	
Peak-Hour Factor, PHF	*1.00*	*0.88*	*0.88*	*0.88*	*0.88*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*88*	*444*	*14*	*43*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*155*		*6*			
Peak-Hour Factor, PHF	*0.88*	*1.00*	*0.88*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*176*	*0*	*6*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*14*		*182*				
C (m) (veh/h)		*1046*		*620*				
v/c		*0.01*		*0.29*				
95% queue length		*0.04*		*1.22*				
Control Delay (s/veh)		*8.5*		*13.2*				
LOS		*A*		*B*				
Approach Delay (s/veh)	--	--	*13.2*					
Approach LOS	--	--	*B*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ml*
Agency/Co.	
Date Performed	*6/10/2012*
Analysis Time Period	*PM*

Site Information

Intersection	*3*
Jurisdiction	
Analysis Year	*Background*

Project Description

East/West Street: *MD 497* | North/South Street: *Little Cove Pt Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*99*	*482*	*14*	*44*	
Peak-Hour Factor, PHF	*1.00*	*0.88*	*0.88*	*0.88*	*0.88*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*112*	*547*	*15*	*50*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*177*		*7*			
Peak-Hour Factor, PHF	*0.88*	*1.00*	*0.88*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*201*	*0*	*7*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*15*		*208*				
C (m) (veh/h)		*939*		*553*				
v/c		*0.02*		*0.38*				
95% queue length		*0.05*		*1.74*				
Control Delay (s/veh)		*8.9*		*15.4*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*15.4*					
Approach LOS	--	--	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ml*
Agency/Co.	
Date Performed	*6/10/2012*
Analysis Time Period	*PM*

Site Information

Intersection	*3*
Jurisdiction	
Analysis Year	*Total*

Project Description

East/West Street: *MD 497* | North/South Street: *Little Cove Pt Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*103*	*482*	*14*	*57*	
Peak-Hour Factor, PHF	*1.00*	*0.88*	*0.88*	*0.88*	*0.88*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*117*	*547*	*15*	*64*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*177*		*7*			
Peak-Hour Factor, PHF	*0.88*	*1.00*	*0.88*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*201*	*0*	*7*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*15*		*208*				
C (m) (veh/h)		*935*		*539*				
v/c		*0.02*		*0.39*				
95% queue length		*0.05*		*1.81*				
Control Delay (s/veh)		*8.9*		*15.8*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*15.8*					
Approach LOS	--	--	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ml*
Agency/Co.	
Date Performed	*6/10/2012*
Analysis Time Period	*PM*

Site Information

Intersection	*3*
Jurisdiction	
Analysis Year	*Total*

Project Description With 200' RTL

East/West Street: *MD 497*

North/South Street: *Little Cove Pt Rd*

Intersection Orientation: *East-West*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*103*	*482*	*14*	*57*	
Peak-Hour Factor, PHF	*1.00*	*0.88*	*0.88*	*0.88*	*0.88*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*117*	*547*	*15*	*64*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*177*		*7*			
Peak-Hour Factor, PHF	*0.88*	*1.00*	*0.88*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*201*	*0*	*7*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*15*		*208*				
C (m) (veh/h)		*935*		*774*				
v/c		*0.02*		*0.27*				
95% queue length		*0.05*		*1.09*				
Control Delay (s/veh)		*8.9*		*11.4*				
LOS		*A*		*B*				
Approach Delay (s/veh)	--	--		*11.4*				
Approach LOS	--	--		*B*				

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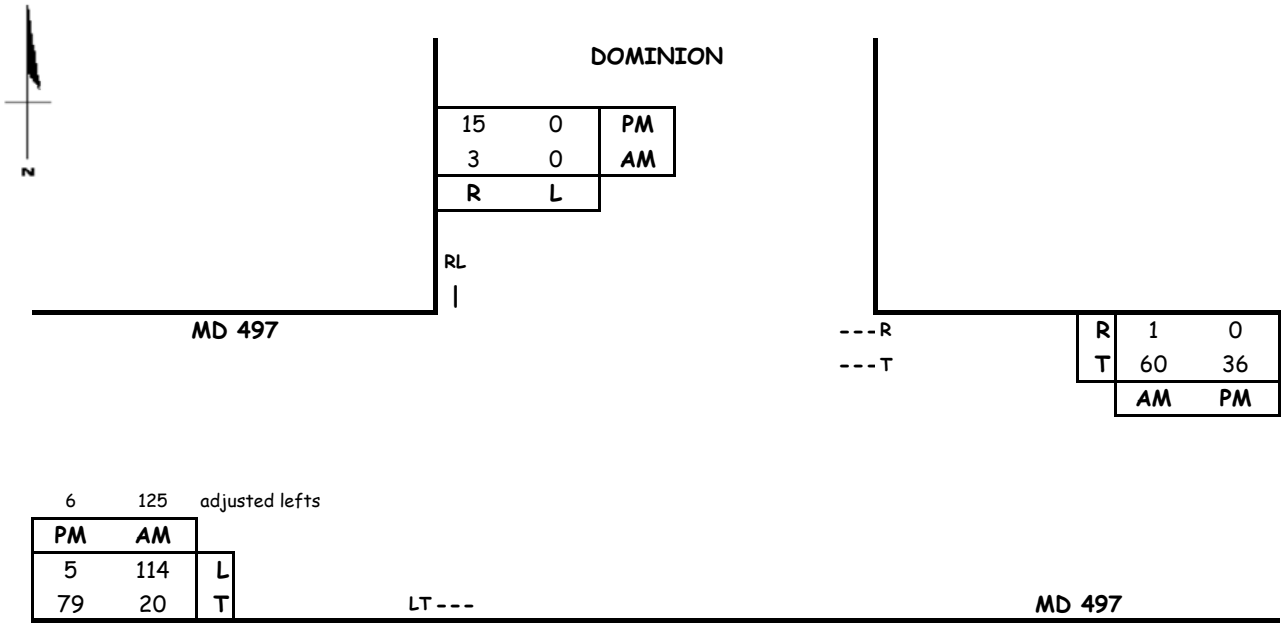
CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Intersection of: MD 497
and: Dominion
Conditions: Existing Traffic **Analyst:** ml

Lane Use + Traffic Volumes



Capacity Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
SB	3	1.00	3				3
EB	145	1.00	145				174
WB	60	1.00	60	114	1.00	114	
						CLV TOTAL=	**177**
						Level of Service (LOS)=	**A**

Evening Peak Hour

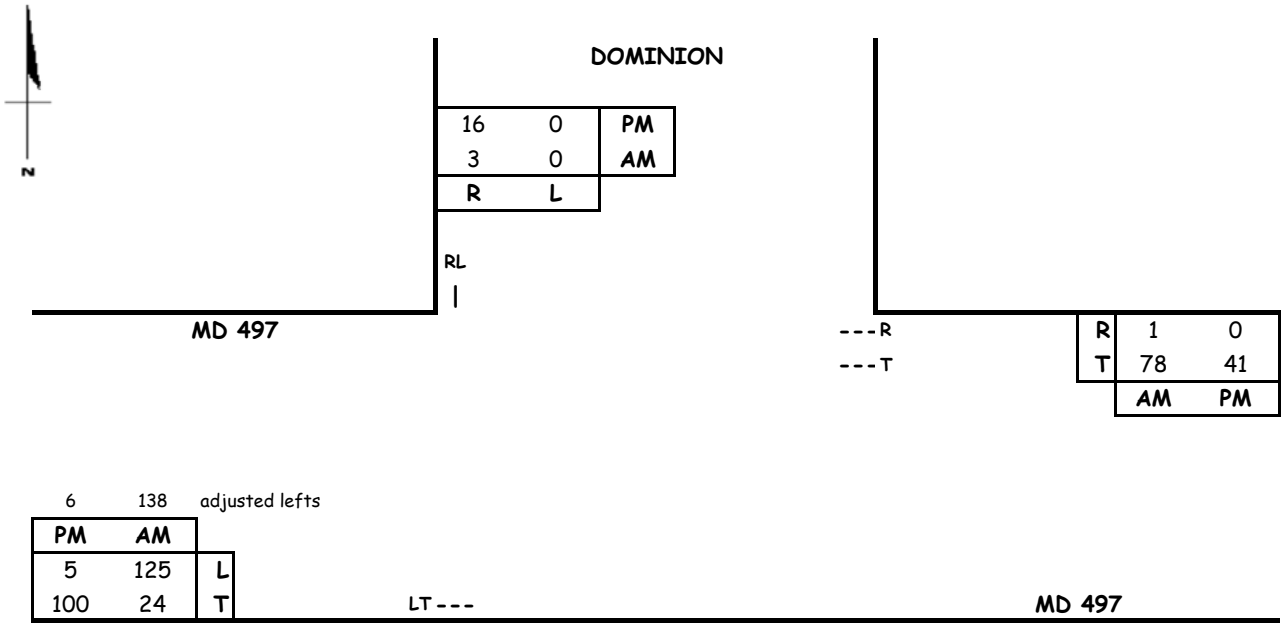
Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
SB	15	1.00	15				15
EB	85	1.00	85				85
WB	36	1.00	36	5	1.00	5	
						CLV TOTAL=	**100**
						Level of Service (LOS)=	**A**

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning		MD 497 & Dominion (Existing Traffic)	**Intersection** **4**

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Intersection of: MD 497
and: Dominion
Conditions: Background Traffic **Analyst:** ml

Lane Use + Traffic Volumes



Capacity Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
SB	3	1.00	3				3
EB	162	1.00	162				203
WB	78	1.00	78	125	1.00	125	
						CLV TOTAL=	**206**
						Level of Service (LOS)=	**A**

Evening Peak Hour

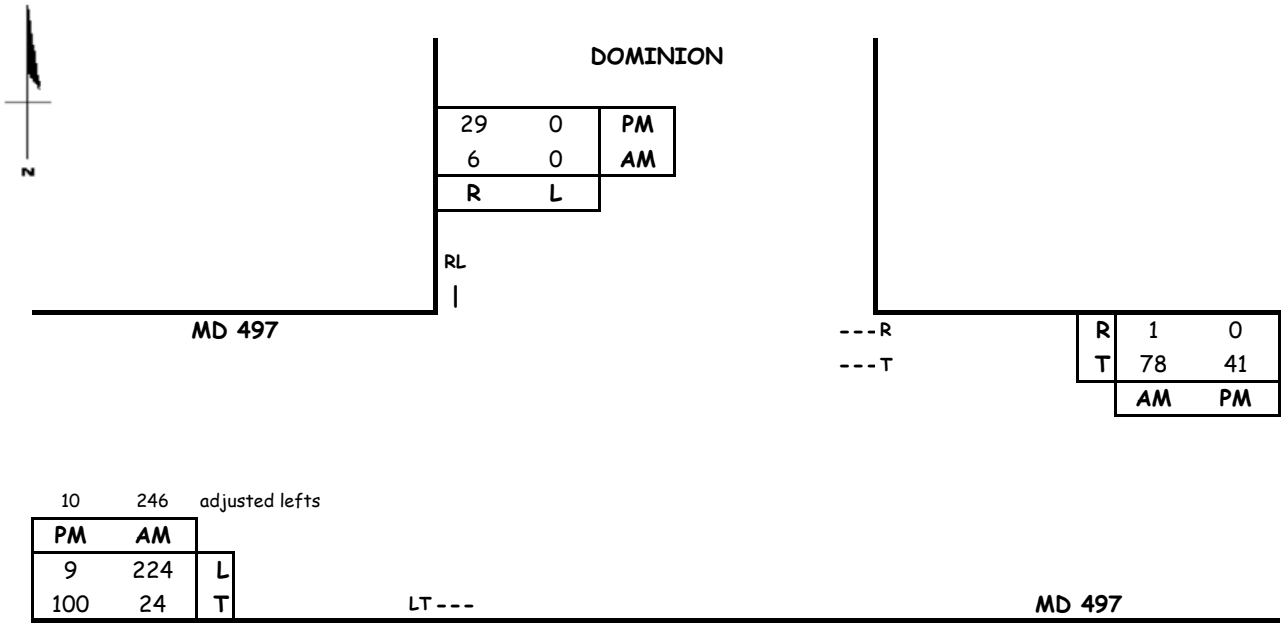
Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
SB	16	1.00	16				16
EB	106	1.00	106				106
WB	41	1.00	41	5	1.00	5	
						CLV TOTAL=	**122**
						Level of Service (LOS)=	**A**

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning		MD 497 & Dominion (Background Traffic)	**Intersection** **4**

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Intersection of: MD 497
and: Dominion
Conditions: Total Traffic **Analyst:** ml

Lane Use + Traffic Volumes



Capacity Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
SB	6	1.00	6				6
EB	270	1.00	270				302
WB	78	1.00	78	224	1.00	224	
					CLV TOTAL=		**308**
					Level of Service (LOS)=		**A**

Evening Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
SB	29	1.00	29				29
EB	110	1.00	110				110
WB	41	1.00	41	9	1.00	9	
					CLV TOTAL=		**139**
					Level of Service (LOS)=		**A**

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning		MD 497 & Dominion (Total Traffic)	**Intersection** **4**

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ml*
Agency/Co.	
Date Performed	*6/10/2012*
Analysis Time Period	*AM*

Site Information

Intersection	*4*
Jurisdiction	
Analysis Year	*Existing*

Project Description

East/West Street: *MD 497* | North/South Street: *Dominion*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*114*	*20*			*60*	*1*
Peak-Hour Factor, PHF	*0.71*	*0.71*	*1.00*	*1.00*	*0.71*	*0.71*
Hourly Flow Rate, HFR (veh/h)	*160*	*28*	*0*	*0*	*84*	*1*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*1*
Configuration	*LT*				*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*0*		*3*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.71*	*1.00*	*0.71*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*0*	*0*	*4*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*160*						*4*	
C (m) (veh/h)	*1524*						*981*	
v/c	*0.10*						*0.00*	
95% queue length	*0.35*						*0.01*	
Control Delay (s/veh)	*7.6*						*8.7*	
LOS	*A*						*A*	
Approach Delay (s/veh)	--	--					*8.7*	
Approach LOS	--	--					*A*	

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ml*
Agency/Co.	
Date Performed	*6/10/2012*
Analysis Time Period	*AM*

Site Information

Intersection	*4*
Jurisdiction	
Analysis Year	*Background*

Project Description

East/West Street: *MD 497* | North/South Street: *Dominion*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*125*	*24*			*78*	*1*
Peak-Hour Factor, PHF	*0.71*	*0.71*	*1.00*	*1.00*	*0.71*	*0.71*
Hourly Flow Rate, HFR (veh/h)	*176*	*33*	*0*	*0*	*109*	*1*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*1*
Configuration	*LT*				*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*0*		*3*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.71*	*1.00*	*0.71*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*0*	*0*	*4*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*176*						*4*	
C (m) (veh/h)	*1493*						*950*	
v/c	*0.12*						*0.00*	
95% queue length	*0.40*						*0.01*	
Control Delay (s/veh)	*7.7*						*8.8*	
LOS	*A*						*A*	
Approach Delay (s/veh)	--	--					*8.8*	
Approach LOS	--	--					*A*	

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ml*
Agency/Co.	
Date Performed	*6/10/2012*
Analysis Time Period	*AM*

Site Information

Intersection	*4*
Jurisdiction	
Analysis Year	*Total*

Project Description

East/West Street: *MD 497*

North/South Street: *Dominion*

Intersection Orientation: *East-West*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*224*	*24*			*78*	*1*
Peak-Hour Factor, PHF	*0.71*	*0.71*	*1.00*	*1.00*	*0.71*	*0.71*
Hourly Flow Rate, HFR (veh/h)	*315*	*33*	*0*	*0*	*109*	*1*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*1*
Configuration	*LT*				*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*0*		*6*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.71*	*1.00*	*0.71*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*0*	*0*	*8*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*315*						*8*	
C (m) (veh/h)	*1493*						*950*	
v/c	*0.21*						*0.01*	
95% queue length	*0.80*						*0.03*	
Control Delay (s/veh)	*8.1*						*8.8*	
LOS	*A*						*A*	
Approach Delay (s/veh)	--	--					*8.8*	
Approach LOS	--	--					*A*	

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*ml*	Intersection	*4*
Agency/Co.		Jurisdiction	
Date Performed	*6/10/2012*	Analysis Year	*Existing*
Analysis Time Period	*PM*		

Project Description

East/West Street: *MD 497*	North/South Street: *Dominion*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*79*			*36*	*0*
Peak-Hour Factor, PHF	*0.82*	*0.82*	*1.00*	*1.00*	*0.82*	*0.82*
Hourly Flow Rate, HFR (veh/h)	*6*	*96*	*0*	*0*	*43*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*1*
Configuration	*LT*				*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*0*		*15*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.82*	*1.00*	*0.82*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*0*	*0*	*18*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*6*						*18*	
C (m) (veh/h)	*1579*						*1033*	
v/c	*0.00*						*0.02*	
95% queue length	*0.01*						*0.05*	
Control Delay (s/veh)	*7.3*						*8.5*	
LOS	*A*						*A*	
Approach Delay (s/veh)	--	--					*8.5*	
Approach LOS	--	--					*A*	

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ml*
Agency/Co.	
Date Performed	*6/10/2012*
Analysis Time Period	*PM*

Site Information

Intersection	*4*
Jurisdiction	
Analysis Year	*Background*

Project Description

East/West Street: *MD 497* North/South Street: *Dominion*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*100*			*41*	*0*
Peak-Hour Factor, PHF	*0.82*	*0.82*	*1.00*	*1.00*	*0.82*	*0.82*
Hourly Flow Rate, HFR (veh/h)	*6*	*121*	*0*	*0*	*50*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*1*
Configuration	*LT*				*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*0*		*16*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.82*	*1.00*	*0.82*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*0*	*0*	*19*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*6*						*19*	
C (m) (veh/h)	*1570*						*1024*	
v/c	*0.00*						*0.02*	
95% queue length	*0.01*						*0.06*	
Control Delay (s/veh)	*7.3*						*8.6*	
LOS	*A*						*A*	
Approach Delay (s/veh)	--	--				*8.6*		
Approach LOS	--	--				*A*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*ml*	Intersection	*4*
Agency/Co.		Jurisdiction	
Date Performed	*6/10/2012*	Analysis Year	*Total*
Analysis Time Period	*PM*		

Project Description

East/West Street: *MD 497*	North/South Street: *Dominion*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*9*	*100*			*41*	*0*
Peak-Hour Factor, PHF	*0.82*	*0.82*	*1.00*	*1.00*	*0.82*	*0.82*
Hourly Flow Rate, HFR (veh/h)	*10*	*121*	*0*	*0*	*50*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*1*
Configuration	*LT*				*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*0*		*29*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.82*	*1.00*	*0.82*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*0*	*0*	*35*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*10*						*35*	
C (m) (veh/h)	*1570*						*1024*	
v/c	*0.01*						*0.03*	
95% queue length	*0.02*						*0.11*	
Control Delay (s/veh)	*7.3*						*8.6*	
LOS	*A*						*A*	
Approach Delay (s/veh)	--	--					*8.6*	
Approach LOS	--	--					*A*	

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Apppendix C

Background Developments

Trip Generaton Rates

General Light Industrial (ksf, ITE - 110)

Morning Trips = 1.18 x ksf - 89.28

Evening Trips = 1.43 x ksf - 157.36

Trip Distribution (In/Out)

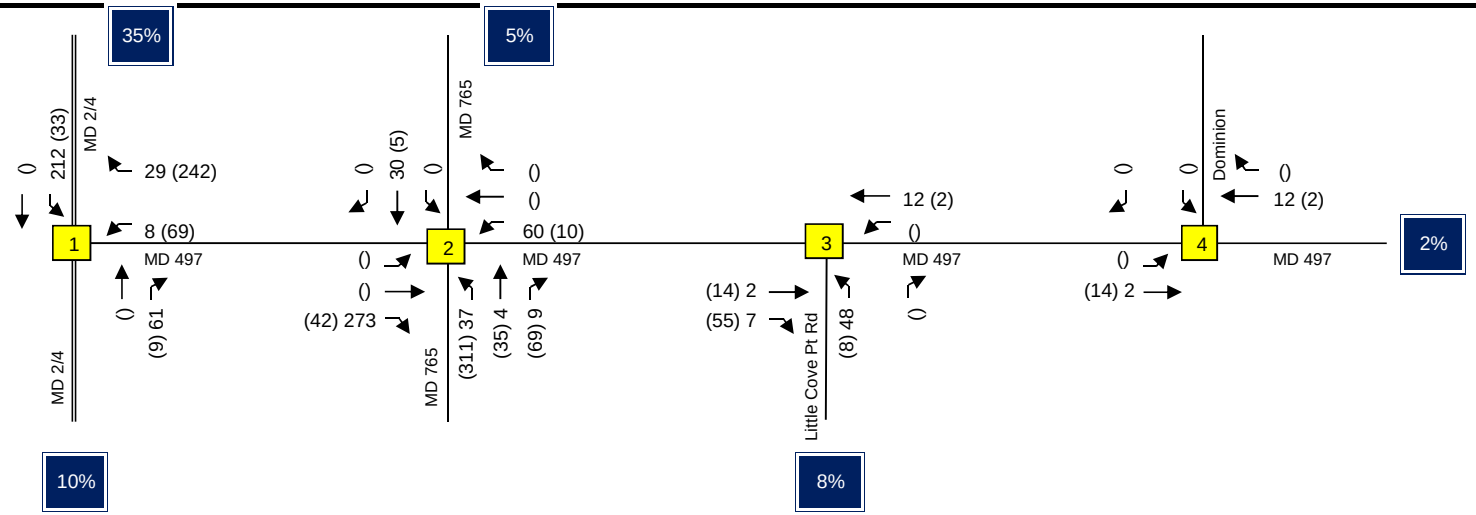
88/12

12/88

Trip Generaton Totals

				AM Peak			PM Peak		
				In	Out	Total	In	Out	Total
Patuxent Busines Park (I-1 Zone)	General Light Industrial (ksf, ITE - 110)	658,650	sq.ft.	605	83	688	94	691	785
			Total:	**605**	**83**	**688**	**94**	**691**	**785**

NOTE: Trip Generation Rates obtained from the ITE Trip Generation Manual, 8th Edition



40% of the site traffic for Patuxent Buisness Park is estimated to go south on MD 765 toward Lusby.

Traffic Impact Analysis

Lenhart Traffic Consulting, Inc.
Traffic Engineering & Transportation Planning

Trip Assignment for Patuxent Business Park

Key: xx = AM Peak Vol's (xx) = PM Peak Vol's

Appendix C-2

Apppendix D

Construction Staging Report & Analyses

Lenhart Traffic Consulting, Inc.
Traffic Engineering & Transportation Planning

June 21, 2012

Maryland State Highway Administration
717 N. Calvert St.
Baltimore, MD 21202

RE: Dominion Cove Point LNG
Construction Phasing Analysis

Appendix D to this report has been prepared to assess the traffic impacts through the construction phase of this expansion to determine if any temporary improvements are required.

The construction phase of the project is not subject to Adequate Public Facilities tests but it is important to assess construction activity to ensure that there will not be any operational or safety problems during the construction of the expansion.

It is anticipated that the construction phase will take several years to complete. It is further understood that the number of construction workers will vary over the course of construction. The number of workers may start with several hundred workers in the first few months and then increase to 500 to 1,000 workers through various phases, and may peak up to 1,500 workers for short periods of time. For the purposes of this construction phasing report, we have utilized the peak levels of 1,500 workers to assess the traffic impacts during construction.

The following exhibits and analyses have been provided to investigate the traffic patterns and ensure traffic safety throughout the construction phase of the project.

Exhibit D-1 Shows the Site location map. The location map shows the location of the proposed construction staging area, which is located on the west side of MD 2/4 at MD 497. Exhibit 1 also shows the proposed construction entrance

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331 Redwood Grove Court
Millersville, MD 21108
Phone (410) 987-3888
Fax (443) 782-2288
email: mlenhart@lenharttraffic.com

(Intersection #5) to the Dominion facility which is located several hundred feet east of the existing entrance to the facility.

Exhibit D-2 Provides the existing lane use & traffic controls.

Exhibit D-3 Details the existing peak hour traffic volumes at the study intersections.

Exhibit D-4 Shows the background peak hour traffic volumes assuming a 3% annual growth rate.

Exhibit D-5 Shows the trip generation for the construction activity at the staging area and the Dominion site.

Exhibit D-6a-c Provides the trip assignment for the construction workers, construction trucks, and the buses that transport the workers between the staging area and the site.

Exhibit D-7 Shows the total traffic volumes in consideration of the peak construction activity at the site.

Exhibit D-8 Shows the resulting Critical Lane Volumes (CLV) at each of the study intersections during the peak construction activity.

Exhibit D-9 Provides a table showing the SHA's 95th percentile queue analysis for all of the left turn lanes at the study intersections.

Exhibit D-10 Shows the recommended lane use and intersection improvements to be incorporated through the construction activities.

In conclusion, the improvements identified on Exhibit D-10 will provide acceptable traffic operations throughout the construction phase of the project. It is recommended that the following improvements be implemented for the construction phase, as shown on Exhibit 10.

Recommendations:

1. MD 2/4 & MD 497
    a. Install a full traffic signal at MD 2/4 & MD 497.
    b. Lengthen the southbound left turn lane at MD 2/4 & MD 497 to provide 650 feet of queue area.
    c. Install a 600’ left turn lane on northbound MD 2/4.
    d. Improve the west leg of the intersection to provide a separate left, thru, and right turn lane.
    e. Improve the east leg of the intersection (MD 497) to provide a 225’ left turn lane in addition to a thru and right turn lane.
2. MD 497 & Little Cove Point Road
    a. Construct a 200’ right turn lane plus a 150’ taper on eastbound MD 497 at Little Cove Point Road.
3. MD 497 & Temporary Construction Entrance at Dominion LNG
    a. Construct a temporary construction entrance as shown on Exhibit D-10 (Int #5) to the east of the existing entrance to Dominion. The temporary construction entrance should be removed upon completion of the construction.

The implementation of the improvements above will achieve acceptable levels of service and will satisfy all SHA queuing requirements.

Should you have any questions or comments regarding this information, please do not hesitate to contact me.

Sincerely,

Michael M. Lenhart, P.E., P.T.O.E.
President – Lenhart Traffic Consulting, Inc.

Lenhart Traffic Consulting, Inc.
331 Redwood Grove Court
Millersville, MD 21108

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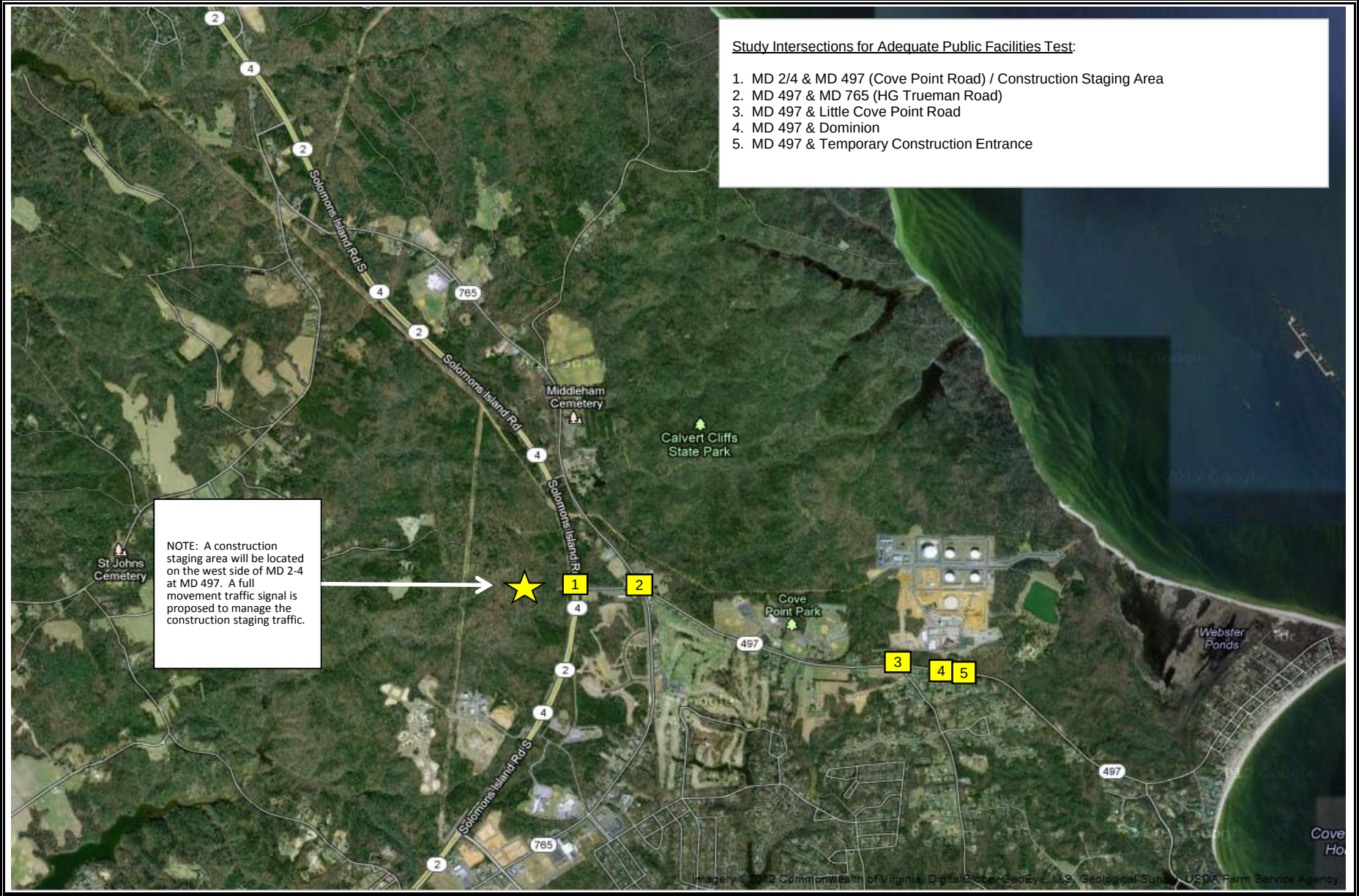
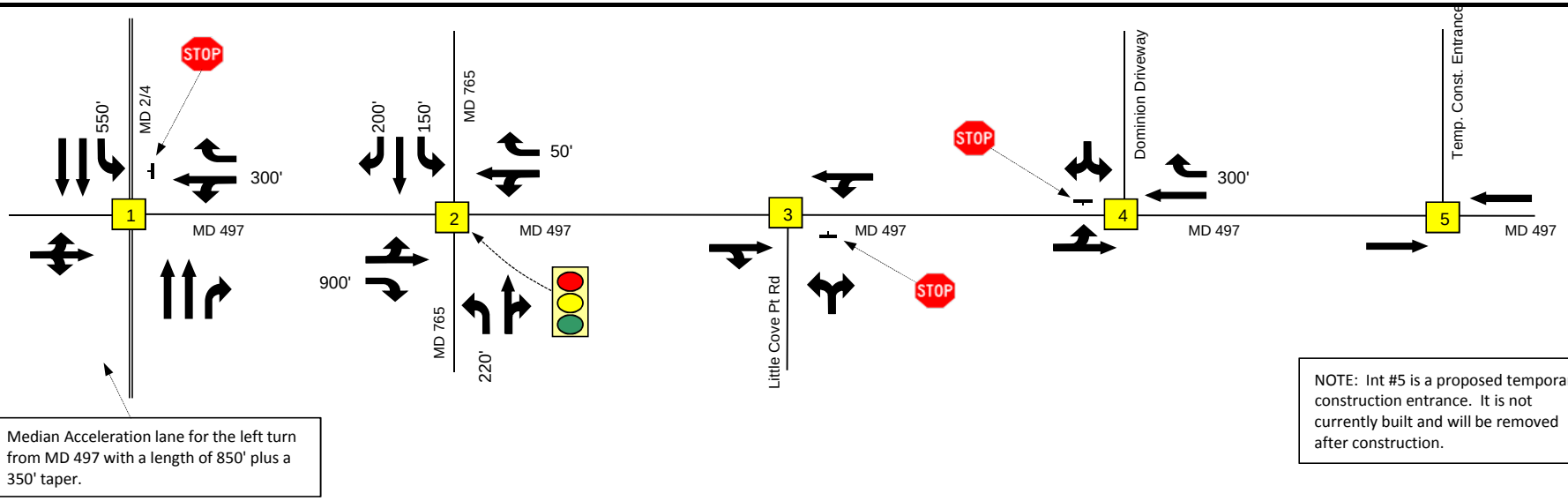
email: mlenhart@lenharttraffic.com



Traffic Impact Analysis	Site Location Map	**Appendix D Ex-1**
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	Obtained from Google Maps	



Median Acceleration lane for the left turn from MD 497 with a length of 850' plus a 350' taper.

NOTE: Int #5 is a proposed temporary construction entrance. It is not currently built and will be removed after construction.

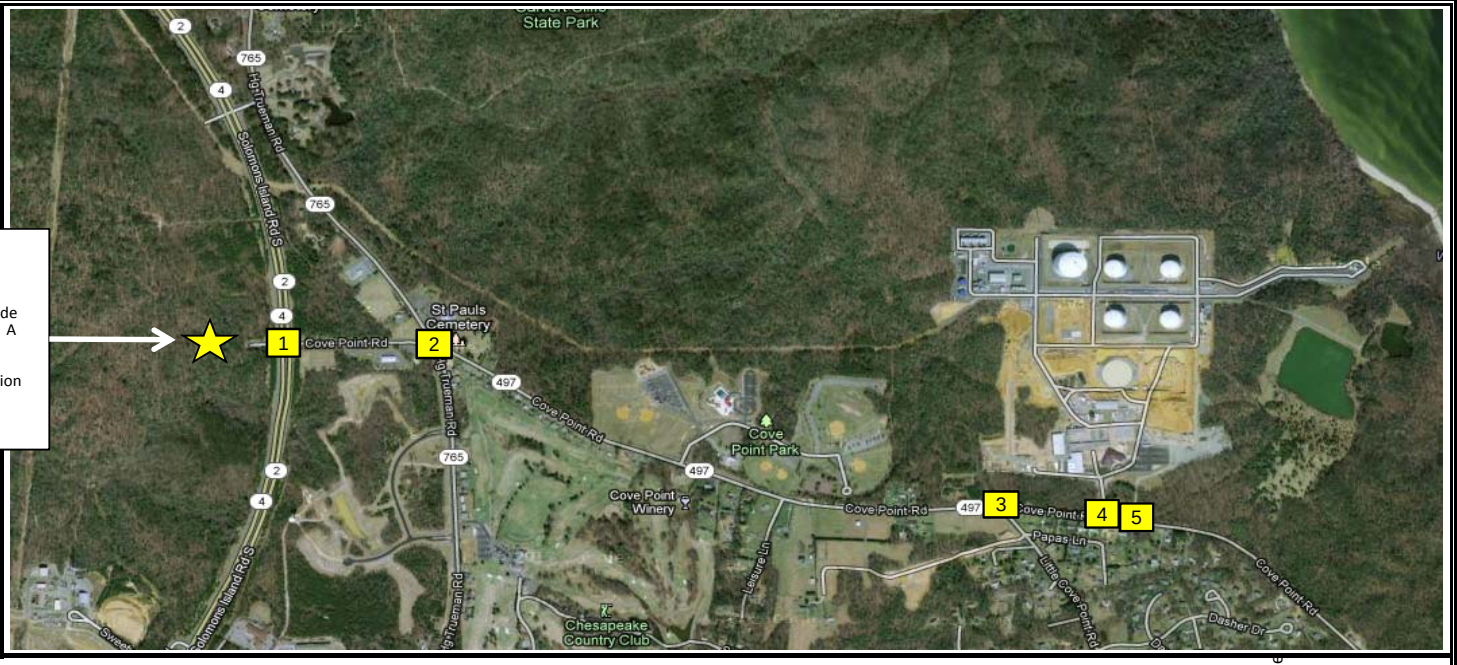
Traffic Impact Analysis

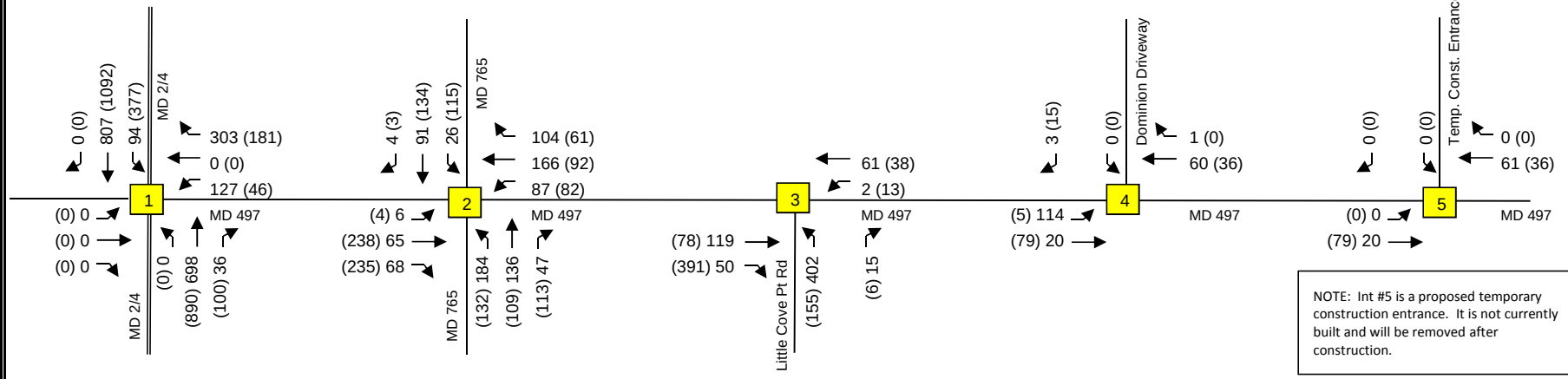
Lenhart Traffic Consulting, Inc.
Traffic Engineering & Transportation Planning

Existing Lane Use & Traffic Controls

Key: xx = AM Peak Vol's (xx) = PM Peak Vol's

Appendix D
Ex-2





NOTE: Int #5 is a proposed temporary construction entrance. It is not currently built and will be removed after construction.

Intersection #1	Intersection #2	Intersection #3	Intersection #4	Intersection #5
AM Peak Hr: 6:45-7:45	AM Peak Hr: 7:30-8:30	AM Peak Hr: 6:30-7:30	AM Peak Hr: 6:30-7:30	AM Peak Hr: 6:30-7:30
PM Peak Hr: 4:30-5:30	PM Peak Hr: 4:30-5:30	PM Peak Hr: 4:45-5:45	PM Peak Hr: 4:45-5:45	PM Peak Hr: 4:45-5:45
				** Flowed from Int #4

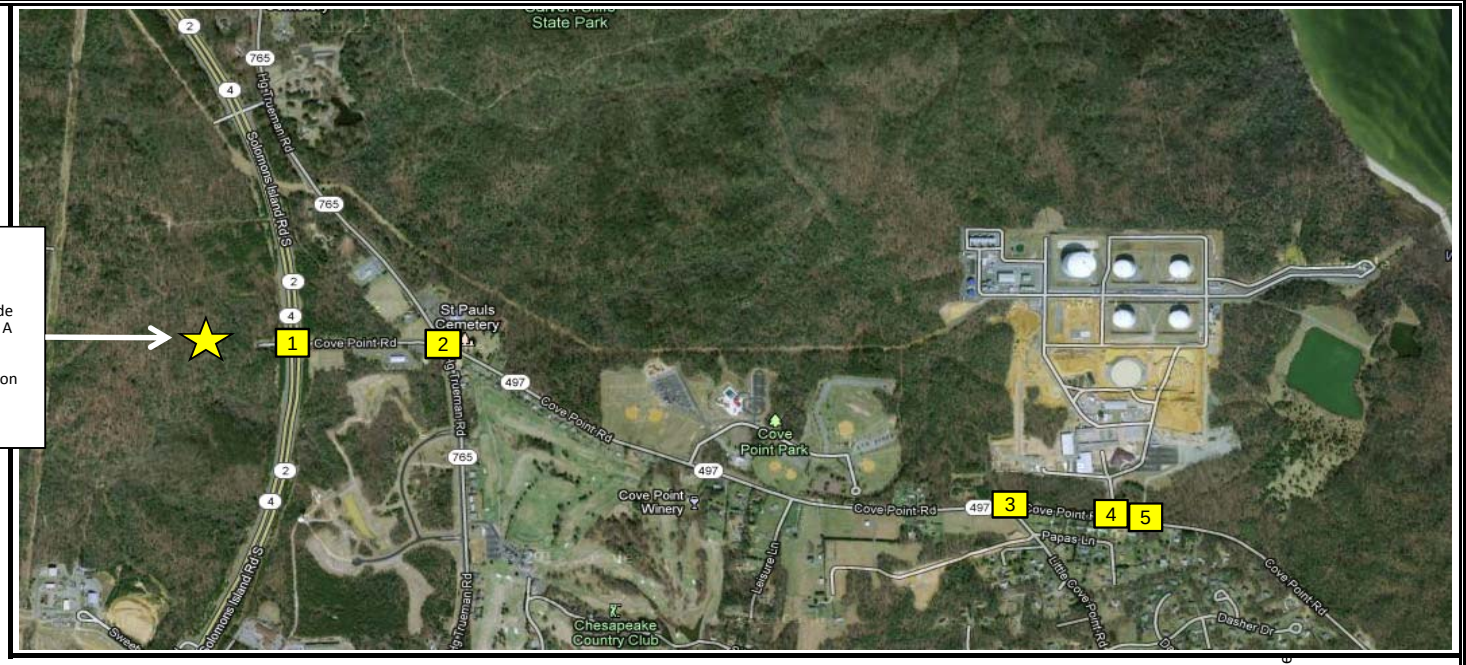
Traffic Impact Analysis

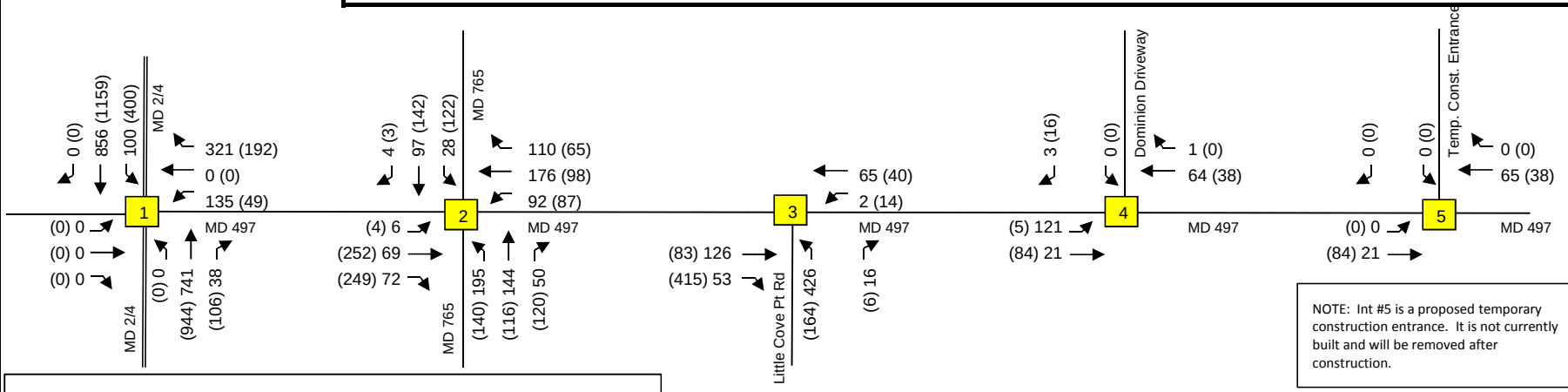
Lenhart Traffic Consulting, Inc.
Traffic Engineering & Transportation Planning

Existing Peak Hour Volumes

Key: xx = AM Peak Vol's (xx) = PM Peak Vol's

Appendix D
Ex-3





NOTE: No background developments were included. It is anticipated that there will not be any substantive development beyond regular growth rate that would occur before construction is complete.

3% Annual Growth
2 Year Construction Period

Traffic Impact Analysis

Lenhart Traffic Consulting, Inc.
Traffic Engineering & Transportation Planning

Background Peak Hour Volumes

Key: xx = AM Peak Vol's (xx) = PM Peak Vol's

Appendix D
Ex-4

Trip Generaton Rates

	Number of Workers	# Buses to Service	Est. Workers per Carpool	# Cars Arriving or Departing
Estimated Loads for Various Levels of Construction Activity	500 workers	10	2	250
	1,000 workers	20	2	500
	1,500 workers	30	2	750

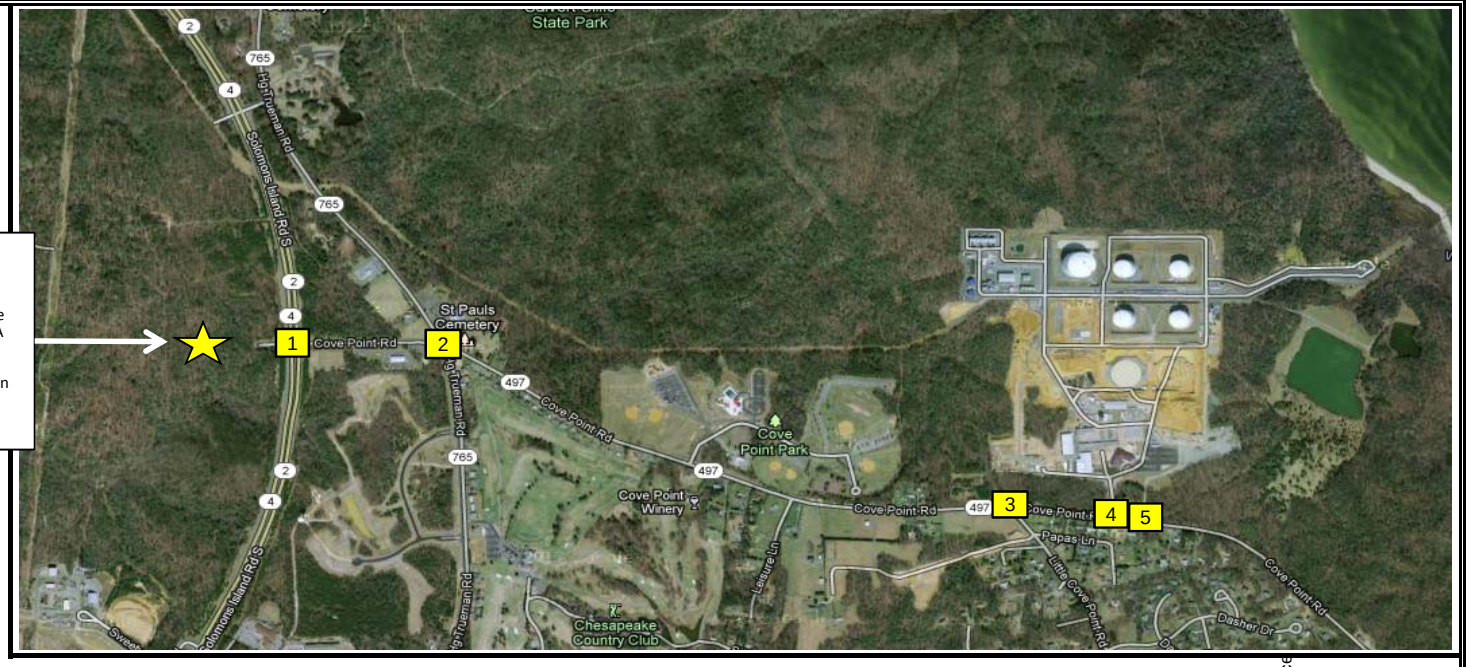
NOTES: It is estimated that construction workers may peak at 1,500 people for short durations throughout the construction sequence.
It is estimated that buses will be able to carry 50 people per bus between the staging area and the Dominion site.
It is estimated that the staging area may receive a maximum of 300-400 trucks per day at the peak levels of construction. Assume an maximum of +/- 50 trucks per hour.
Truck trips from the staging area to the site can be scheduled as needed.

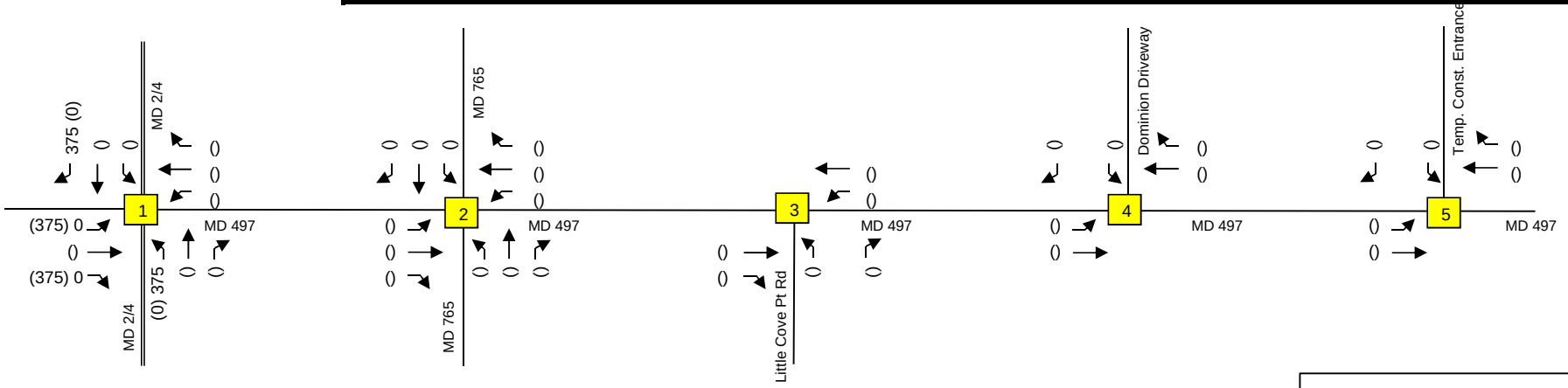
Trip Generaton Totals

			AM Peak			PM Peak		
			In	Out	Total	In	Out	Total
Staging Area	Workers Entering/Exiting (Based on maximum of 1,500 workers)	750 cars	750	0	750	0	750	750
Staging Area	Truck Traffic	50 trucks	50	50	100	50	50	100
Site	Bus Traffic from Staging Area to Site	30 buses	30	30	60	30	30	60

NOTE: The trip generation totals is based on the peak level of construction activity of 1,500 workers.

NOTE: Trip Generation based upon input from Dominion Cove Point LNG as it relates to anticipated construction and logistics.

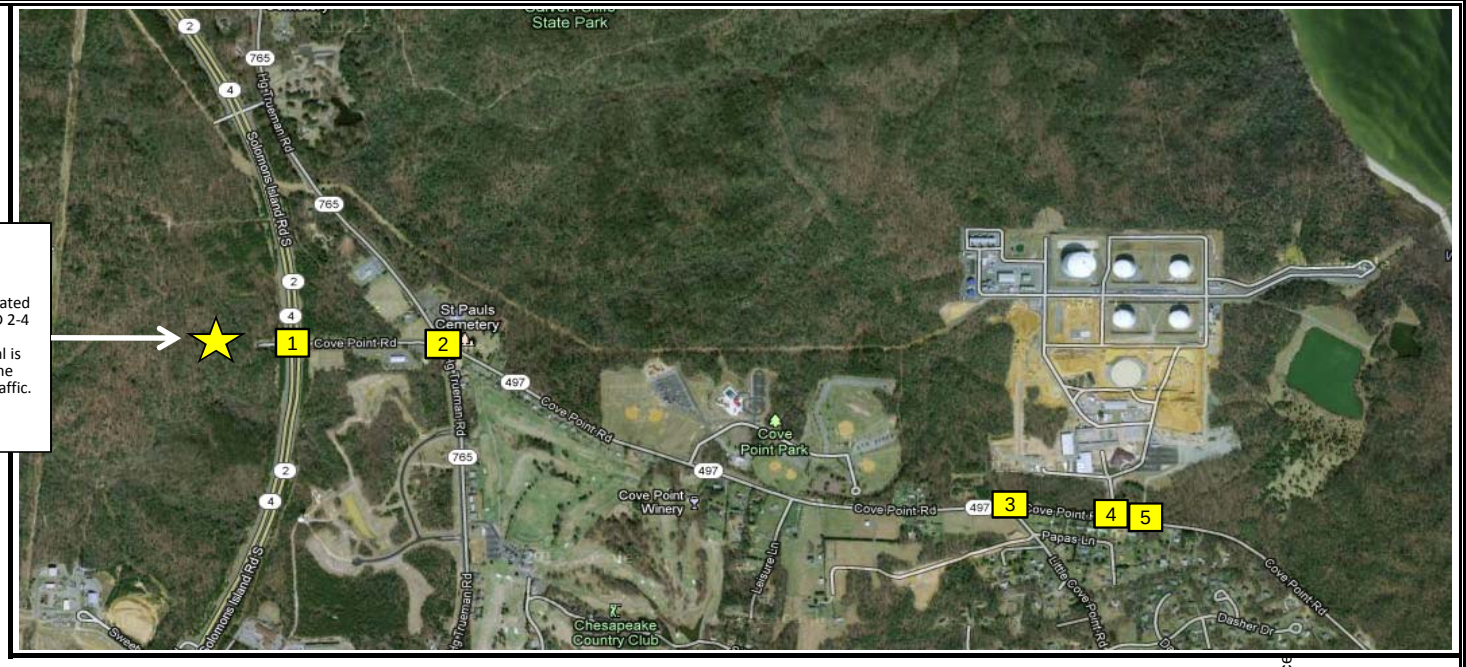


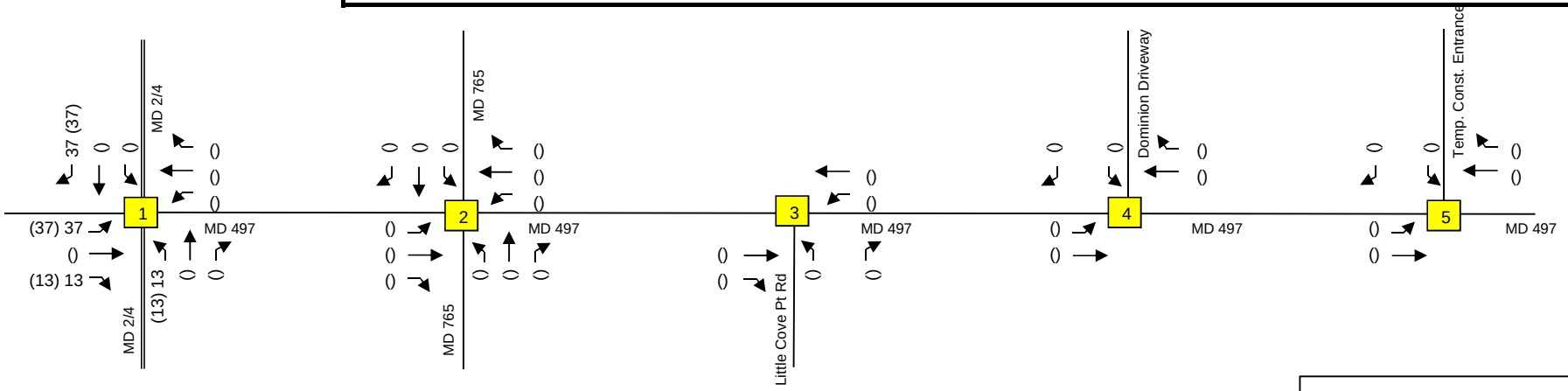


NOTE: Int #5 is a proposed temporary construction entrance. It is not currently built and will be removed after construction.

Note: It is assumed that 50% of the workers will be to/from the north and the remainder to/from the south.

Traffic Impact Analysis	Trip Assignment for Construction Workers Arriving/Departing Staging Area	**Appendix D Ex-6a**
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	Key: xx = AM Peak Vol's (xx) = PM Peak Vol's	

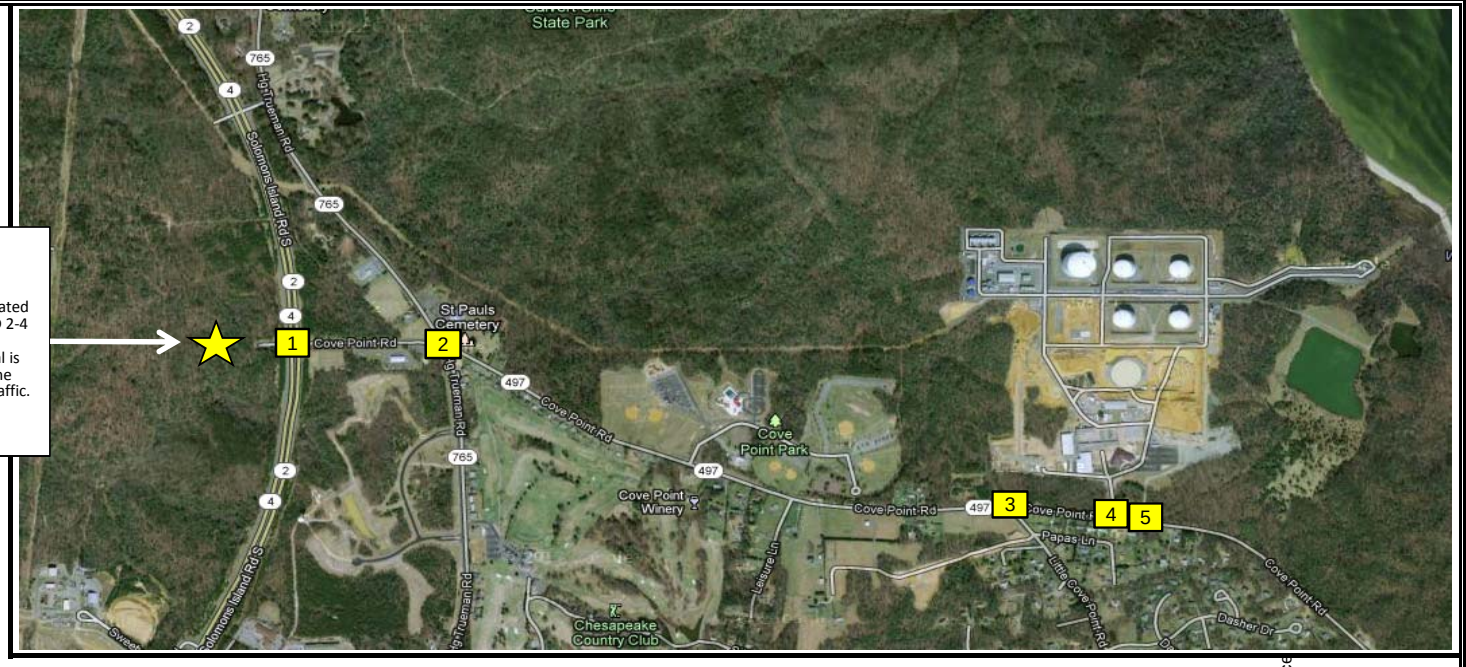


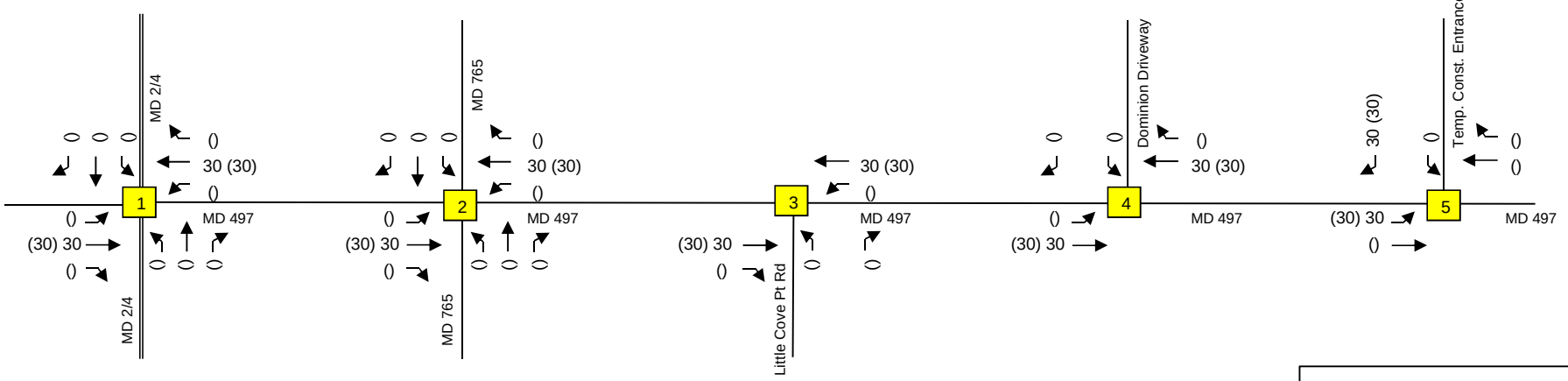


NOTE: Int #5 is a proposed temporary construction entrance. It is not currently built and will be removed after construction.

Note: It is assumed that 25% of the trucks will be to/from the south and the remainder to/from the north.

Traffic Impact Analysis	Trip Assignment for Construction Trucks Delivering to the Staging Area	**Appendix D Ex-6b**
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	Key: xx = AM Peak Vol's (xx) = PM Peak Vol's	





NOTE: Int #5 is a proposed temporary construction entrance. It is not currently built and will be removed after construction.

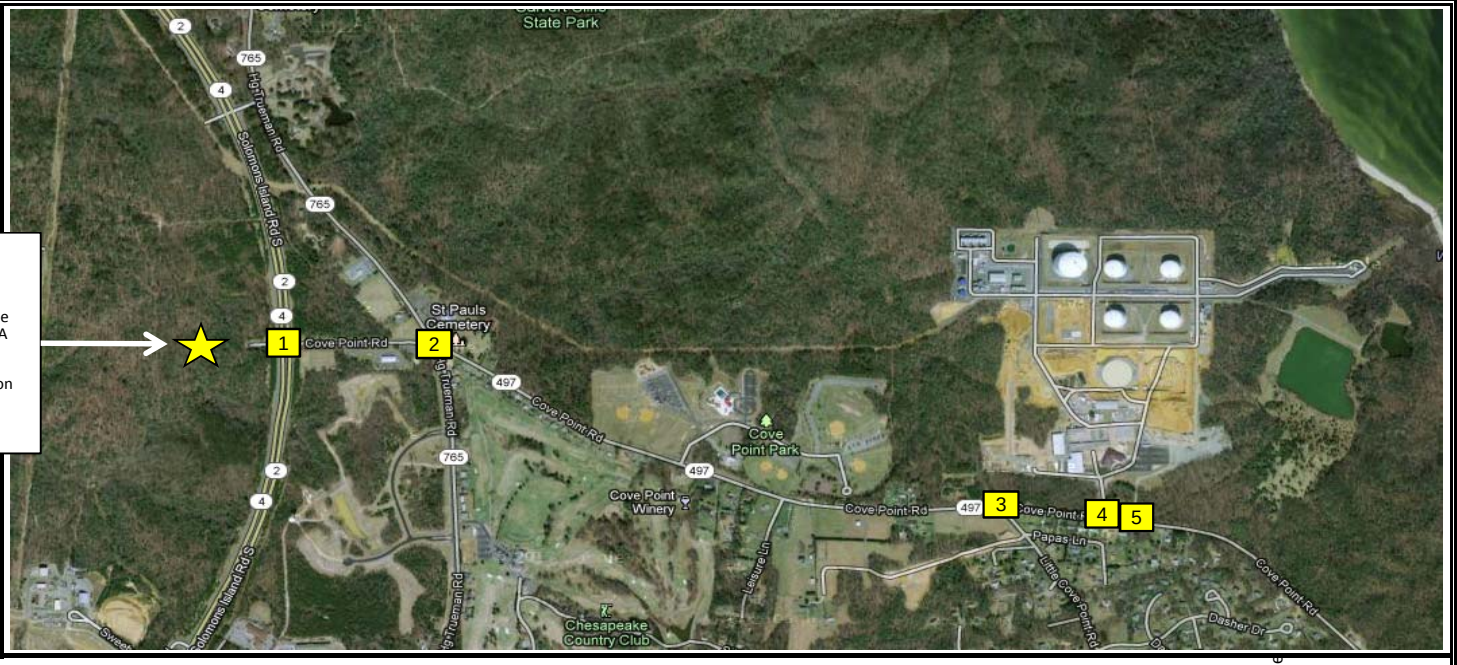
Traffic Impact Analysis

Lenhart Traffic Consulting, Inc.
Traffic Engineering & Transportation Planning

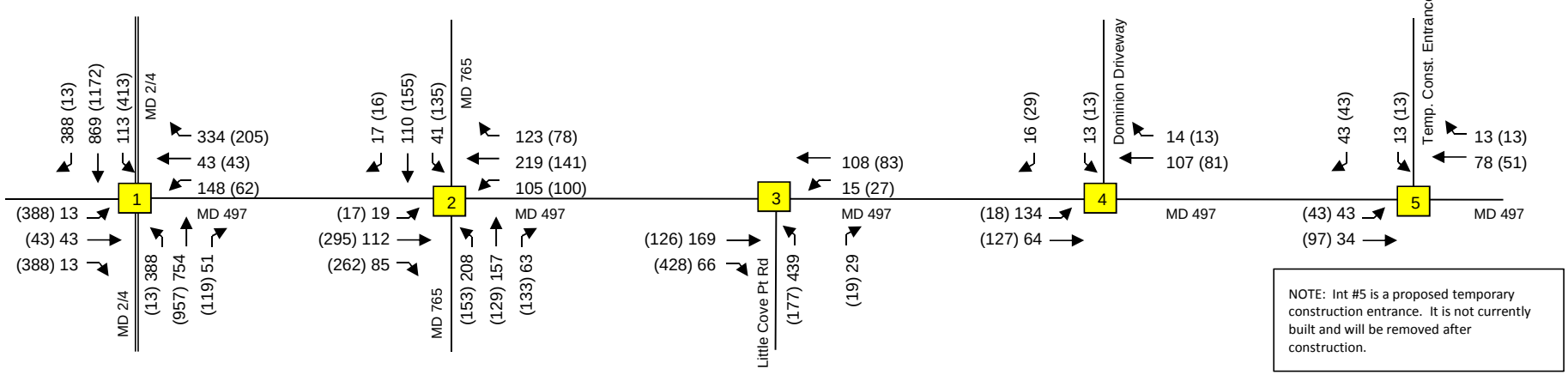
Trip Assignment for Buses Transporting Workers between the Site and the Staging Area

Key: xx = AM Peak Vol's (xx) = PM Peak Vol's

Appendix D
Ex-6c



NOTE: A construction staging area will be located on the west side of MD 2-4 at MD 497. A full movement traffic signal is proposed to manage the construction staging traffic.



NOTE: Int #5 is a proposed temporary construction entrance. It is not currently built and will be removed after construction.

Traffic Impact Analysis

Lenhart Traffic Consulting, Inc.
Traffic Engineering & Transportation Planning

Total Peak Hour Volumes

Key: xx = AM Peak Vol's (xx) = PM Peak Vol's

Appendix D
Ex-7

Critical Lane Volume (CLV) Results

Morning Peak Hour	Existing CLV	Background CLV	Total CLV	LOS D or better?
1). MD 2/4 & MD 497 (Cove Point Road)	A / 687	A / 729	B / 1100	Y
2). MD 497 & MD 765 (HG Trueman Rd)	A / 647	A / 685	A / 795	Y
3). MD 497 & Little Cove Point Road	A / 588	A / 623	A / 718	Y
4). MD 497 & Dominion Cove Point LNG	A / 177	A / 188	A / 270	Y
5). MD 497 & Dominion Construction Access	n/a	n/a	A / 190	Y
Evening Peak Hour	**Existing CLV**	**Background CLV**	**Total CLV**	**LOS D or better?**
1). MD 2/4 & MD 497 (Cove Point Road)	A / 913	A / 968	D / 1376	Y
2). MD 497 & MD 765 (HG Trueman Rd)	A / 661	A / 701	A / 833	Y
3). MD 497 & Little Cove Point Road	A / 643	A / 682	A / 777	Y
4). MD 497 & Dominion Cove Point LNG	A / 100	A / 106	A / 189	Y
5). MD 497 & Dominion Construction Access	n/a	n/a	A / 200	Y

NOTES:

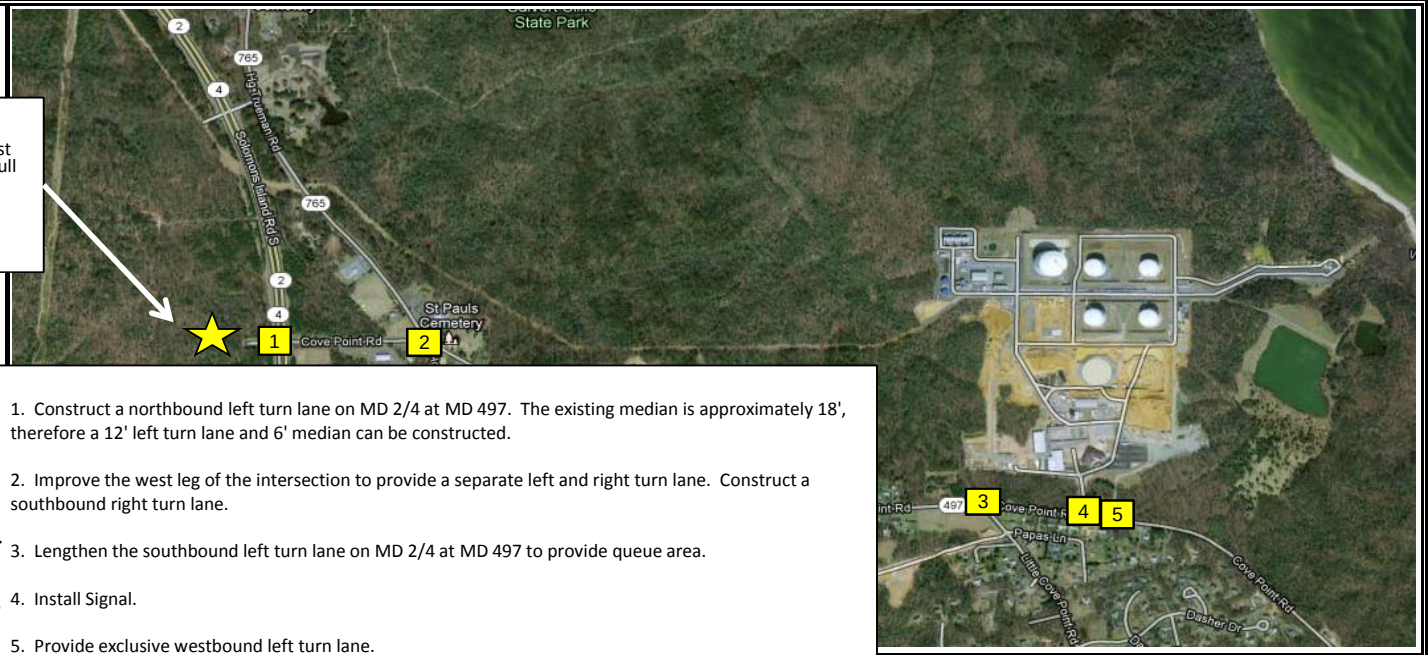
1. All intersections satisfy MD SHA Guidelines of LOS "D" or better.
2. This analysis is not an Adequate Public Facilities Test.
3. These levels of service are an assessment of the construction phasing plan, and account for the peak anticipated levels of construction.
4. Intersections #5 and #6 are for construction staging and access only. Once the construction is complete, these access points will be removed and returned to existing conditions.

Maryland State Highway Administration 95th %-ile Queuing Analysis for Left Turn Lanes

1. MD 2/4 & MD 497	Available Queue (Ft)	Maximum Queue (ft)	Max. Veh / Hour	Lane Use Factor	Cycle Length (seconds)	Seconds / Hour	Feet / Vehicle	Surge Factor
Westbound MD 497 Left Turn:	**300'**	216	148	1	150	3600	25	1.4
Northbound MD 2/4 Left Turn:	**Not Existing**	566	388	1	150	3600	25	1.4
Southbound MD 2/4 Left Turn:	**550'**	602	413	1	150	3600	25	1.4
2. MD 497 & MD 765	Available Queue	Maximum Queue (ft)	Veh / Hour	Lane Use Factor	Cycle Length (unsignalized)	Seconds / Hour	Feet / Vehicle	Surge Factor
Northbound MD 765 Left Turn:	**220' (See Note 4)**	442	455	1	100	3600	25	1.4
Southbound MD 765 Left Turn:	**150'**	123	126	1	100	3600	25	1.4
6. MD 2/4 & Staging Area	Available Queue	Maximum Queue (ft)	Veh / Hour	Lane Use Factor	Cycle Length (unsignalized)	Seconds / Hour	Feet / Vehicle	Surge Factor
Northbound MD 2/4 Left Turn:	**Not Existing**	13	13	1	100	3600	25	1.4

NOTES:

1. Lane Use Factor applied as follows: 1 indicates single turn lane, 0.6 indicates a double left turn lane.
2. Available queues were measured in field and does not include available taper area that may be used for storage. Available queue's for double left turn lanes are based on the average storage of the two lanes combined.
3. Maximum Queue (Ft) = $\frac{\text{Turning Volume (veh per hour) x Lane Use Factor x Cycle Length (Seconds)}}{\text{3600 (Seconds per hour)}}$ x 25 Feet/Vehicle x 1.4 Surge Factor
4. Northbound MD 765 approaching MD 497 has a 220' painted left turn lane plus an additional 500' of painted gore area for left turn storage. (See aerial photo)
5. Queuing analysis only conducted for left turn lanes. Not conducted on through or right turn lanes or shared lanes.
6. Cycle length for Int #1 is only 120 sec's for the APFO analysis. A 150 second cycle length was assumed here for conservative purposes.



NOTE: A construction staging area will be located on the west side of MD 2-4 at MD 497. A full movement traffic signal is proposed to manage the construction staging traffic.

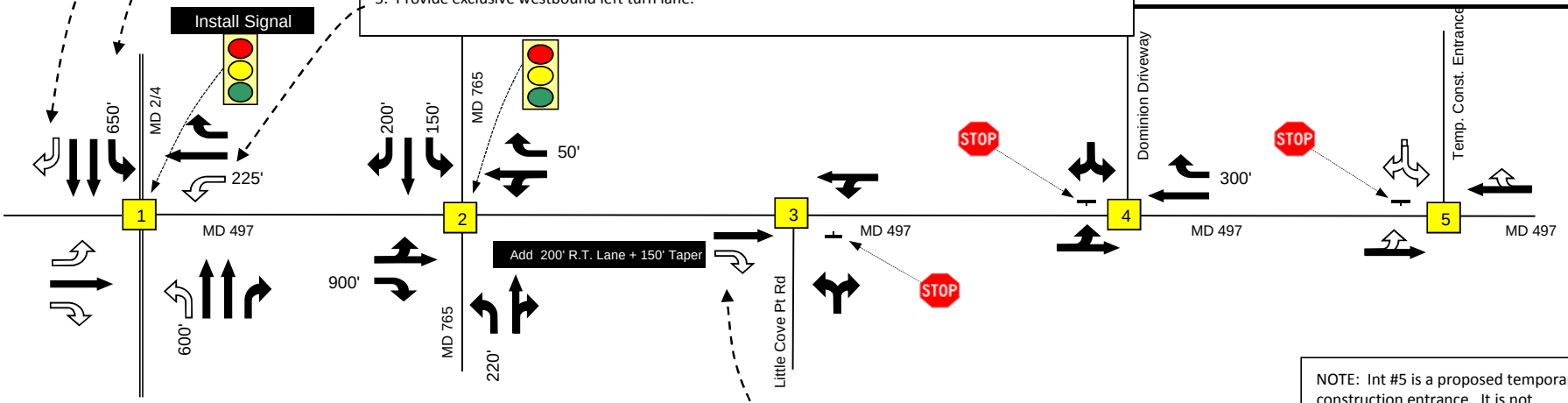
1. Construct a northbound left turn lane on MD 2/4 at MD 497. The existing median is approximately 18', therefore a 12' left turn lane and 6' median can be constructed.

2. Improve the west leg of the intersection to provide a separate left and right turn lane. Construct a southbound right turn lane.

3. Lengthen the southbound left turn lane on MD 2/4 at MD 497 to provide queue area.

4. Install Signal.

5. Provide exclusive westbound left turn lane.



1. Built 200' right turn lane with 150' taper. This improvement is recommended for APFO and should be installed for construction phase as well.

NOTE: Int #5 is a proposed temporary construction entrance. It is not currently built and will be removed after construction.

Traffic Impact Analysis

Lenhart Traffic Consulting, Inc.
Traffic Engineering & Transportation Planning

Recommended Lane Use & Traffic Controls for Construction Phase Only

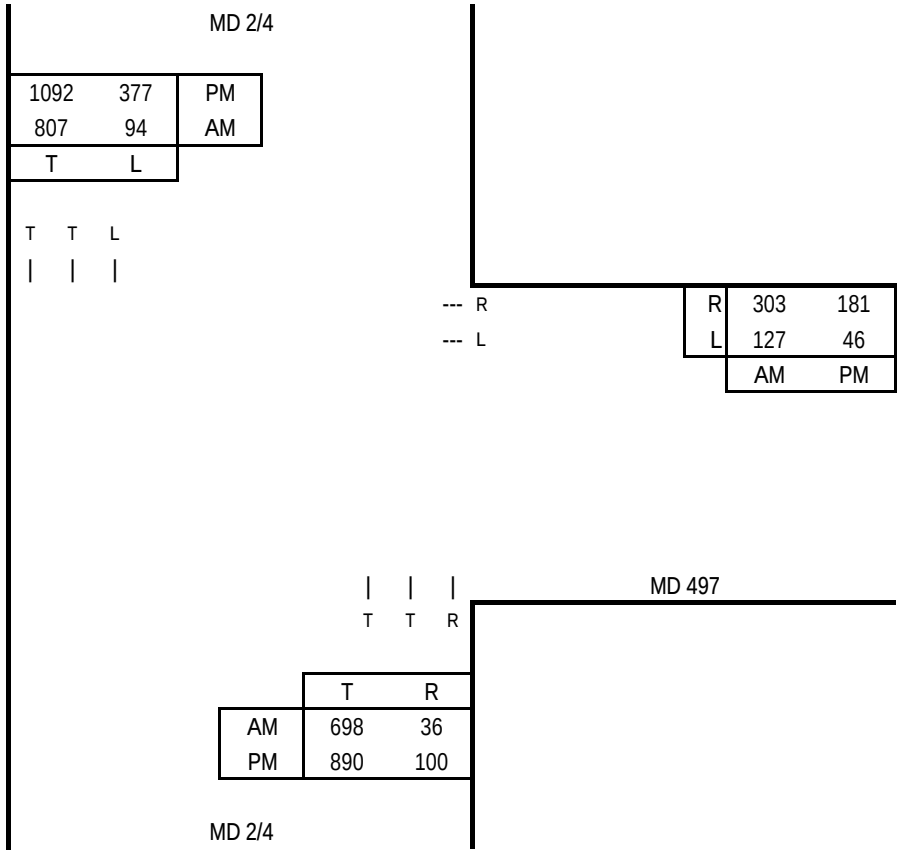
Key: xx = AM Peak Vol's (xx) = PM Peak Vol's

Appendix D
Ex-10

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Intersection of: MD 2/4
and: MD 497
Conditions: Existing Traffic **Analyst:** ml

Lane Use + Traffic Volumes



Capacity Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
WB	209	1.00	209				209
NB	698	0.55	384	94	1.00	94	478
SB	807	0.55	444				
			CLV TOTAL=				687
			Level of Service (LOS)=				A

Evening Peak Hour

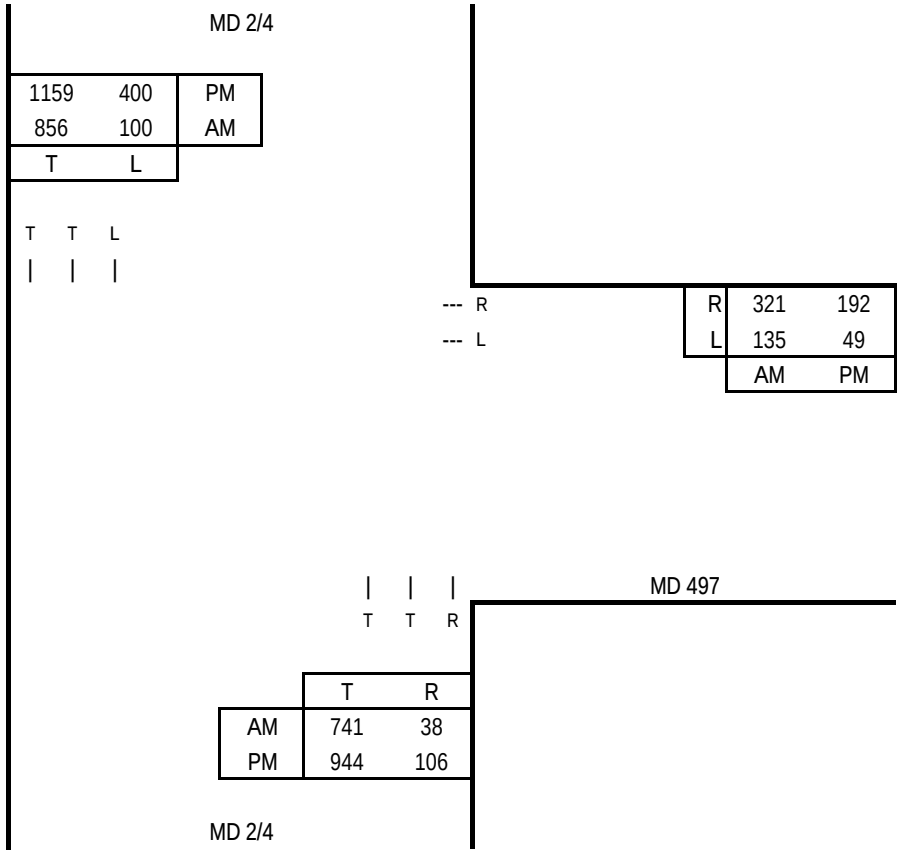
Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
WB	46	1.00	46				46
NB	890	0.55	490	377	1.00	377	867
SB	1092	0.55	601				
			CLV TOTAL=				913
			Level of Service (LOS)=				A

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	N	MD 2/4 & MD 497 (Existing Traffic)	**Intersection** **1**

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Intersection of: MD 2/4
and: MD 497
Conditions: Background Traffic **Analyst:** ml

Lane Use + Traffic Volumes



Capacity Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
WB	221	1.00	221				221
NB	741	0.55	408	100	1.00	100	508
SB	856	0.55	471				
						CLV TOTAL=	729
						Level of Service (LOS)=	A

Evening Peak Hour

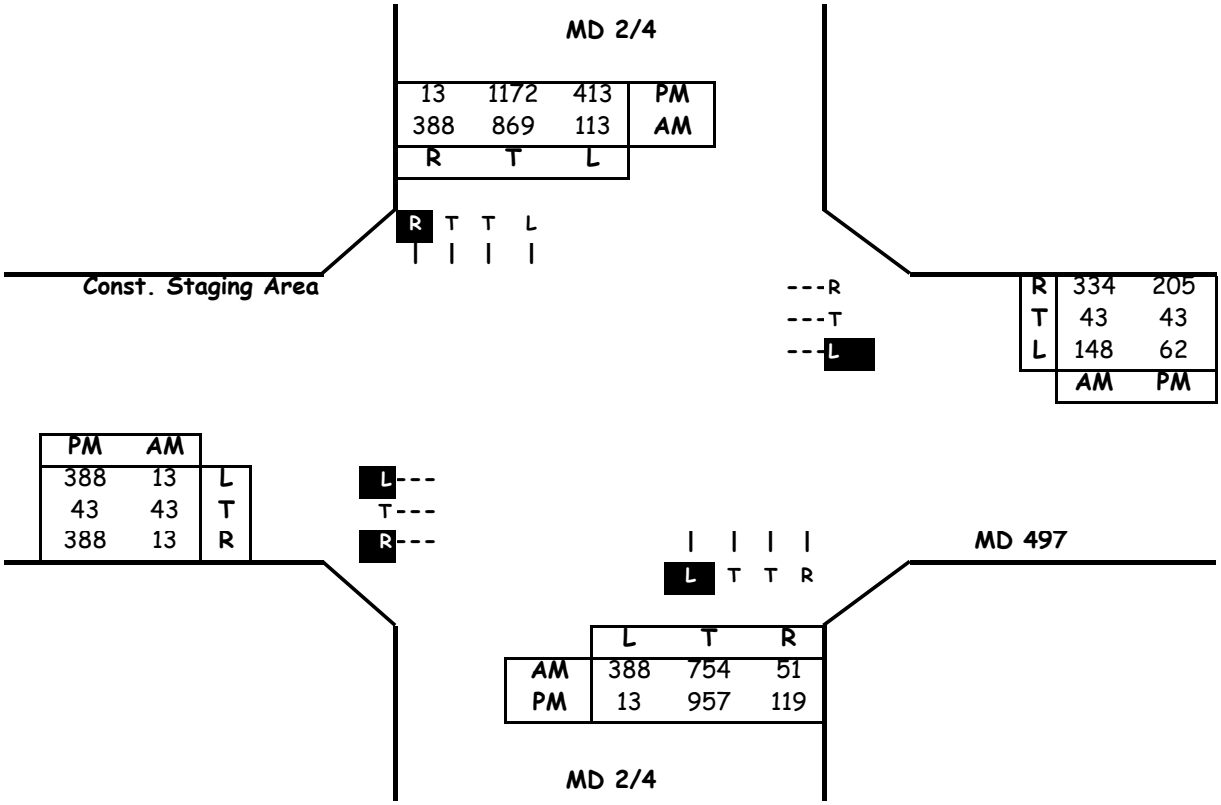
Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
WB	49	1.00	49				49
NB	944	0.55	519	400	1.00	400	919
SB	1159	0.55	637				
						CLV TOTAL=	968
						Level of Service (LOS)=	A

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	N	MD 2/4 & MD 497 (Background Traffic)	**Intersection** **1**

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Main Line: MD 2/4
Minor Street: MD 497 **Analyst:** ml
Study Period: TOTAL TRAFFIC

Lane Use + Traffic Volumes



Critical Lane Volume Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
NB	754	0.55	415	113	1	113	866
SB	869	0.55	478	388	1	388	
EB	43	1	43	148	1	148	234
WB	221	1	221	13	1	13	

CLV TOTAL= **1100**
Level of Service (LOS)= **B**

Evening Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
NB	957	0.55	526	413	1	413	939
SB	1172	0.55	645	13	1	13	
EB	375	1	375	62	1	62	437
WB	43	1	43	388	1	388	

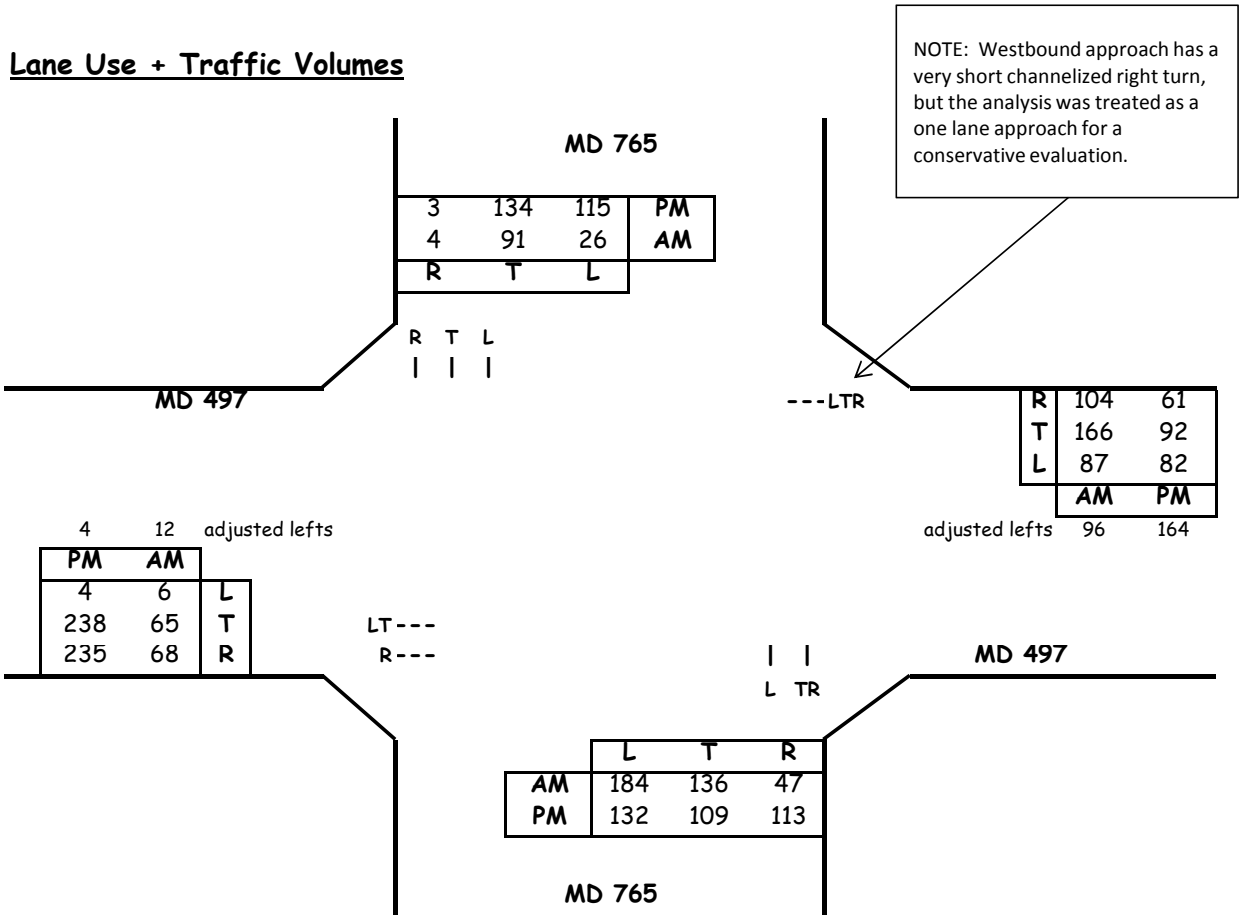
CLV TOTAL= **1376**
Level of Service (LOS)= **D**

Critical Lane Volume Analysis		MD 2/4 & MD 497 (TOTAL TRAFFIC)	**Intersection 1**
Lenhart Traffic Consulting Traffic Engineering & Transportation Planning			

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Main Line: MD 765
Minor Street: MD 497 **Analyst:** ml
Study Period: EXISTING TRAFFIC

Lane Use + Traffic Volumes



Critical Lane Volume Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
NB	183	1.00	183	26	1	26	275
SB	91	1.00	91	184	1	184	
EB	77	1	77	87	1	87	372
WB	366	1	366	6	1	6	

CLV TOTAL= **647**
Level of Service (LOS)= **A**

Evening Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
NB	222	1.00	222	115	1	115	337
SB	134	1.00	134	132	1	132	
EB	242	1	242	82	1	82	324
WB	317	1	317	4	1	4	

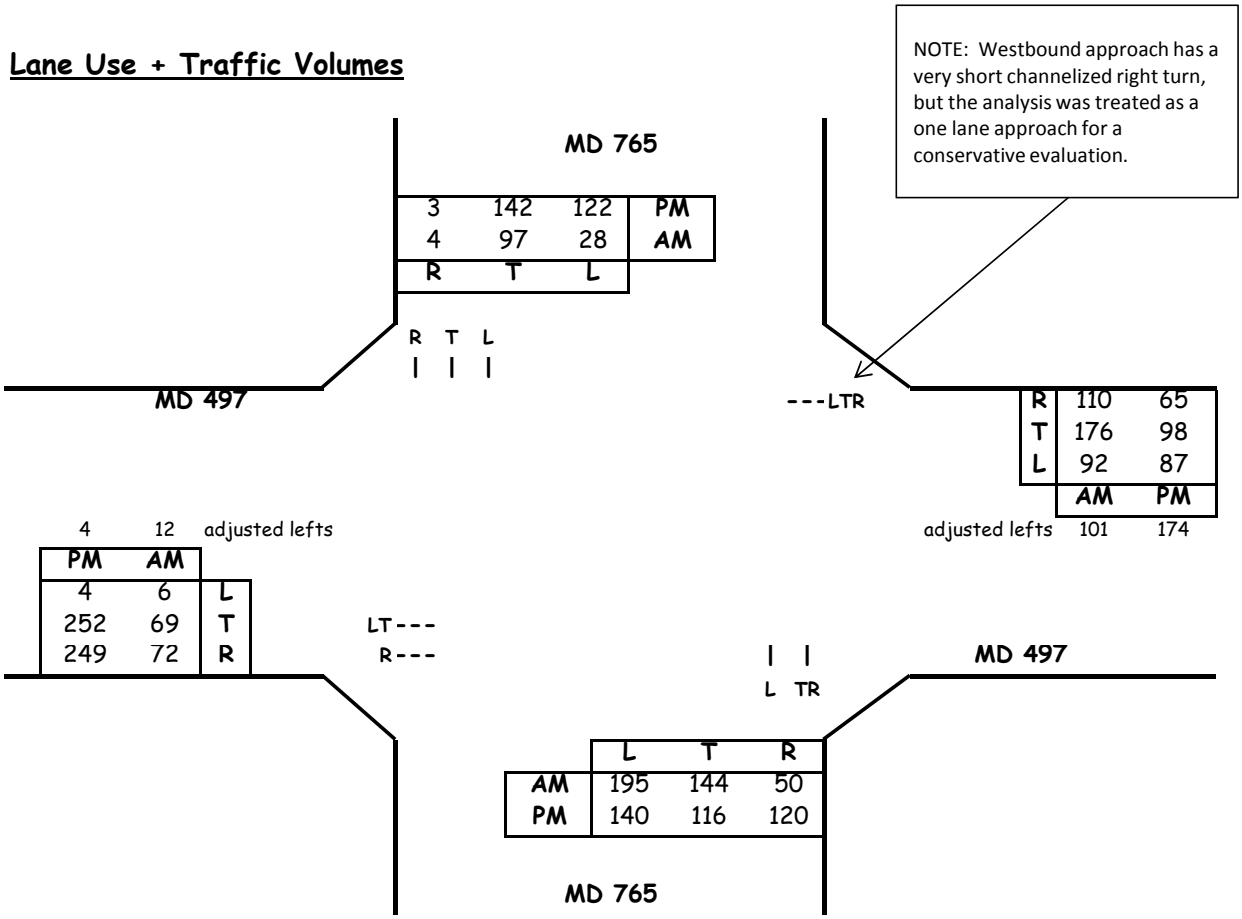
CLV TOTAL= **661**
Level of Service (LOS)= **A**

Critical Lane Volume Analysis		MD 765 & MD 497 (EXISTING TRAFFIC)	**Intersection 2**
Lenhart Traffic Consulting Traffic Engineering & Transportation Planning			

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Main Line: MD 765
Minor Street: MD 497 **Analyst:** ml
Study Period: BACKGROUND TRAFFIC

Lane Use + Traffic Volumes



Critical Lane Volume Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
NB	194	1.00	194	28	1	28	292
SB	97	1.00	97	195	1	195	
EB	81	1	81	92	1	92	393
WB	387	1	387	6	1	6	

CLV TOTAL= **685**
Level of Service (LOS)= **A**

Evening Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
NB	236	1.00	236	122	1	122	358
SB	142	1.00	142	140	1	140	
EB	256	1	256	87	1	87	343
WB	337	1	337	4	1	4	

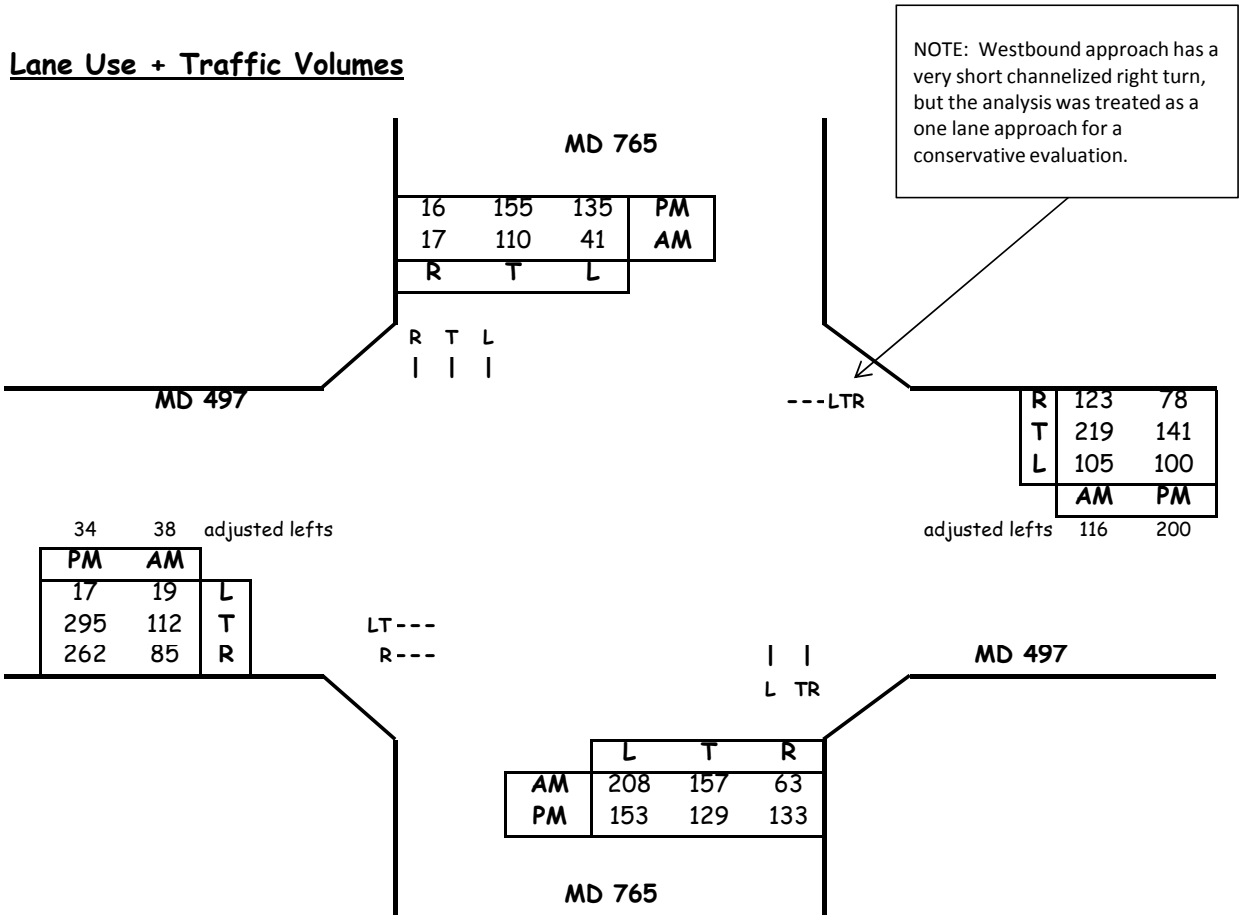
CLV TOTAL= **701**
Level of Service (LOS)= **A**

Critical Lane Volume Analysis		MD 765 & MD 497 (BACKGROUND TRAFFIC)	**Intersection 2**
Lenhart Traffic Consulting Traffic Engineering & Transportation Planning			

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Main Line: MD 765
Minor Street: MD 497 **Analyst:** ml
Study Period: TOTAL TRAFFIC

Lane Use + Traffic Volumes



Critical Lane Volume Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
NB	220	1.00	220	41	1	41	318
SB	110	1.00	110	208	1	208	
EB	150	1	150	105	1	105	477
WB	458	1	458	19	1	19	

CLV TOTAL= **795**
Level of Service (LOS)= **A**

Evening Peak Hour

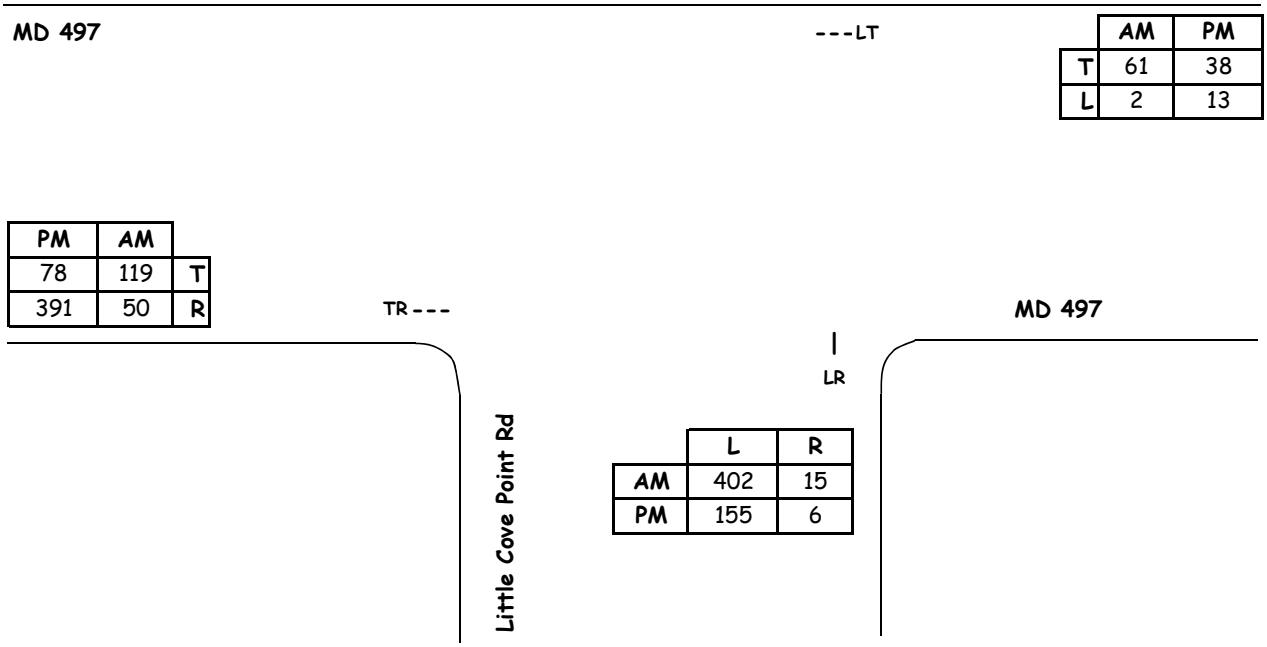
Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
NB	262	1.00	262	135	1	135	397
SB	155	1.00	155	153	1	153	
EB	329	1	329	100	1	100	436
WB	419	1	419	17	1	17	

CLV TOTAL= **833**
Level of Service (LOS)= **A**

Critical Lane Volume Analysis		MD 765 & MD 497 (TOTAL TRAFFIC)	**Intersection 2**
Lenhart Traffic Consulting Traffic Engineering & Transportation Planning			

Critical Lane Volume (CLV) Methodology

Main Line: MD 497
Minor Street: Little Cove Point Rd **Analyst:** ml
Study Period: Existing Traffic



Critical Lane Volume Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
NB	417	1.00	417				417
EB	169	1.00	169	2	1.00	2	171
WB	63	1.00	63				
						CLV TOTAL=	**588**
						Level of Service (LOS)=	**A**

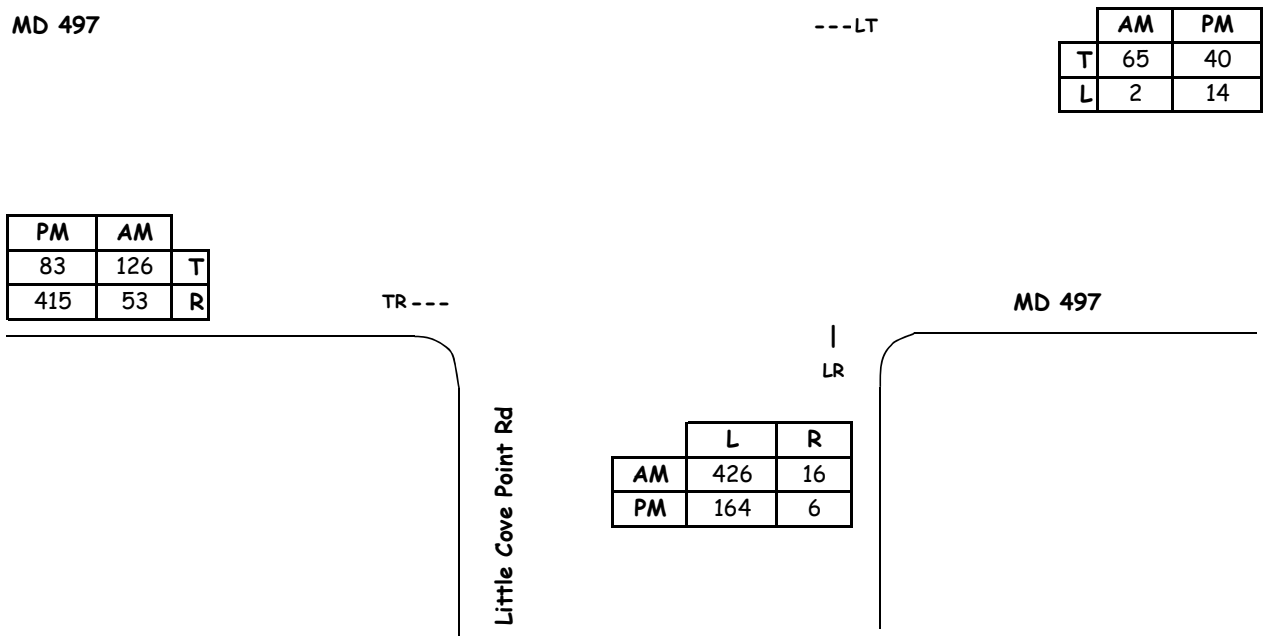
Evening Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
NB	161	1.00	161				161
EB	469	1.00	469	13	1.00	13	482
WB	51	1.00	51				
						CLV TOTAL=	**643**
						Level of Service (LOS)=	**A**

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning		MD 497 & Little Cove Point Rd (Existing Traffic)	**Intersection** **3**

Critical Lane Volume (CLV) Methodology

Main Line: MD 497
Minor Street: Little Cove Point Rd **Analyst:** ml
Study Period: Background Traffic



	AM	PM
T	65	40
L	2	14

PM	AM	
83	126	T
415	53	R

	L	R
AM	426	16
PM	164	6

Critical Lane Volume Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
NB	442	1.00	442				442
EB	179	1.00	179	2	1.00	2	181
WB	67	1.00	67				
						CLV TOTAL=	**623**
						Level of Service (LOS)=	**A**

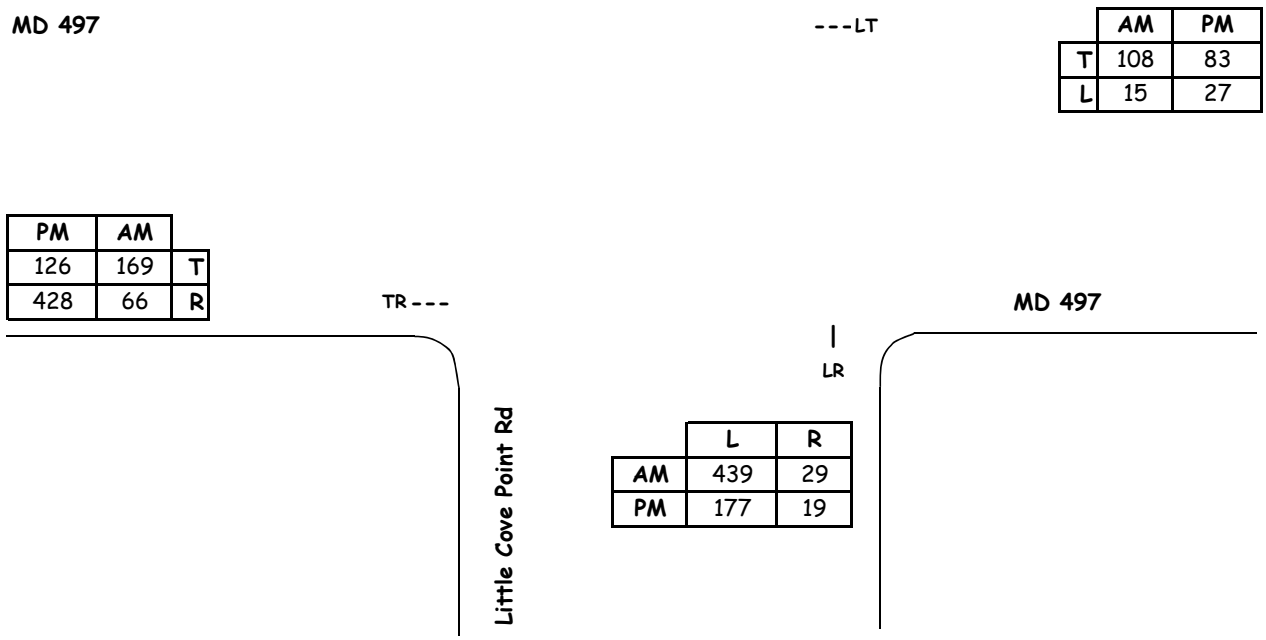
Evening Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
NB	170	1.00	170				170
EB	498	1.00	498	14	1.00	14	512
WB	54	1.00	54				
						CLV TOTAL=	**682**
						Level of Service (LOS)=	**A**

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning		MD 497 & Little Cove Point Rd (Background Traffic)	**Intersection** **3**

Critical Lane Volume (CLV) Methodology

Main Line: MD 497
Minor Street: Little Cove Point Rd **Analyst:** ml
Study Period: Total Traffic



	AM	PM
T	108	83
L	15	27

PM	AM	
126	169	T
428	66	R

	L	R
AM	439	29
PM	177	19

Critical Lane Volume Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
NB	468	1.00	468				468
EB	235	1.00	235	15	1.00	15	250
WB	123	1.00	123				
						CLV TOTAL=	**718**
						Level of Service (LOS)=	**A**

Evening Peak Hour

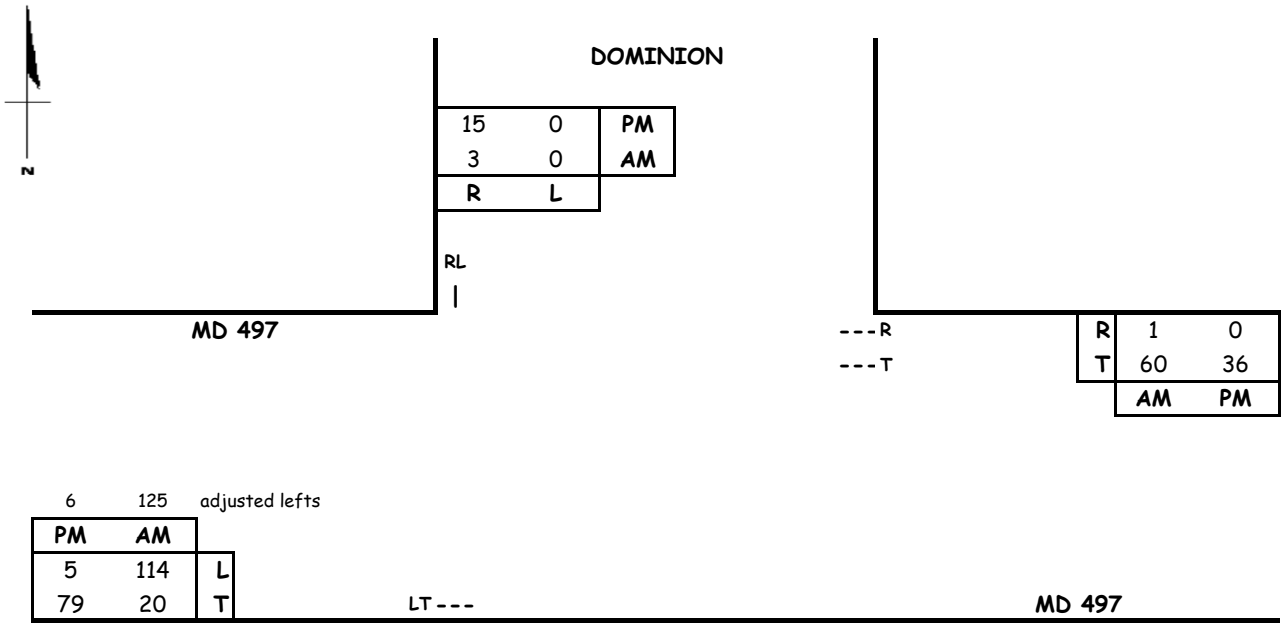
Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
NB	196	1.00	196				196
EB	554	1.00	554	27	1.00	27	581
WB	110	1.00	110				
						CLV TOTAL=	**777**
						Level of Service (LOS)=	**A**

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning		MD 497 & Little Cove Point Rd (Total Traffic)	**Intersection** **3**

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Intersection of: MD 497
and: Dominion
Conditions: Existing Traffic **Analyst:** ml

Lane Use + Traffic Volumes



Capacity Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
SB	3	1.00	3				3
EB	145	1.00	145				174
WB	60	1.00	60	114	1.00	114	
						CLV TOTAL=	**177**
						Level of Service (LOS)=	**A**

Evening Peak Hour

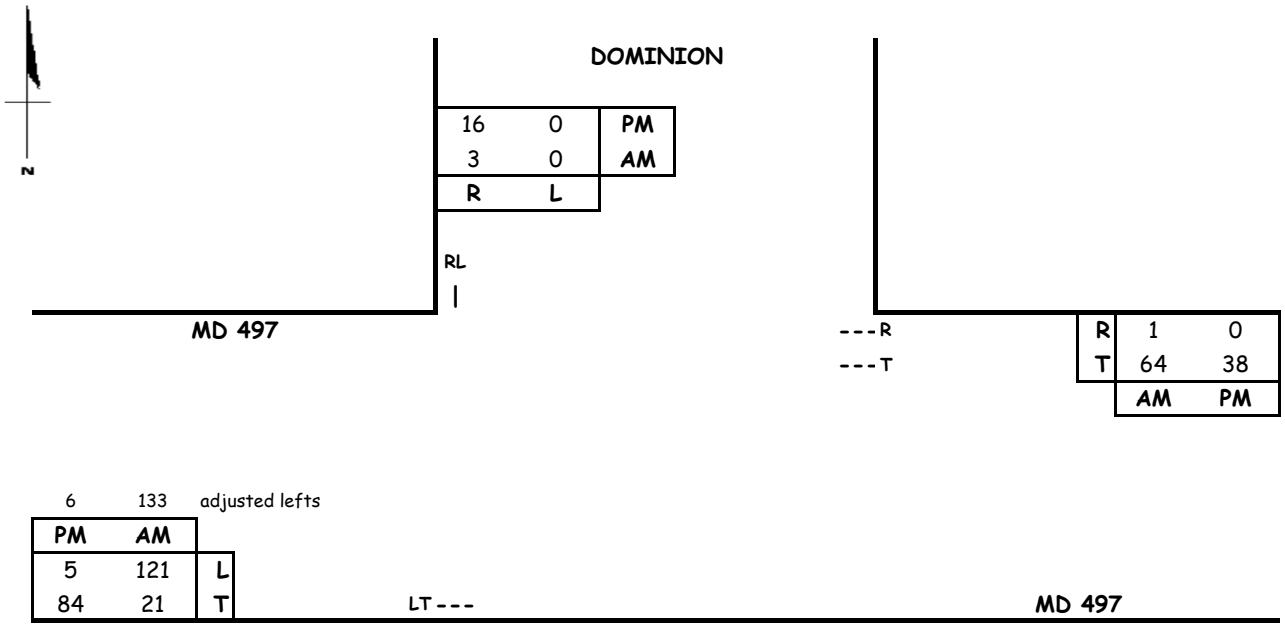
Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
SB	15	1.00	15				15
EB	85	1.00	85				85
WB	36	1.00	36	5	1.00	5	
						CLV TOTAL=	**100**
						Level of Service (LOS)=	**A**

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning		MD 497 & Dominion (Existing Traffic)	**Intersection** **4**

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Intersection of: MD 497
and: Dominion
Conditions: Background Traffic **Analyst:** ml

Lane Use + Traffic Volumes



Capacity Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
SB	3	1.00	3				3
EB	154	1.00	154				185
WB	64	1.00	64	121	1.00	121	
						CLV TOTAL=	**188**
						Level of Service (LOS)=	**A**

Evening Peak Hour

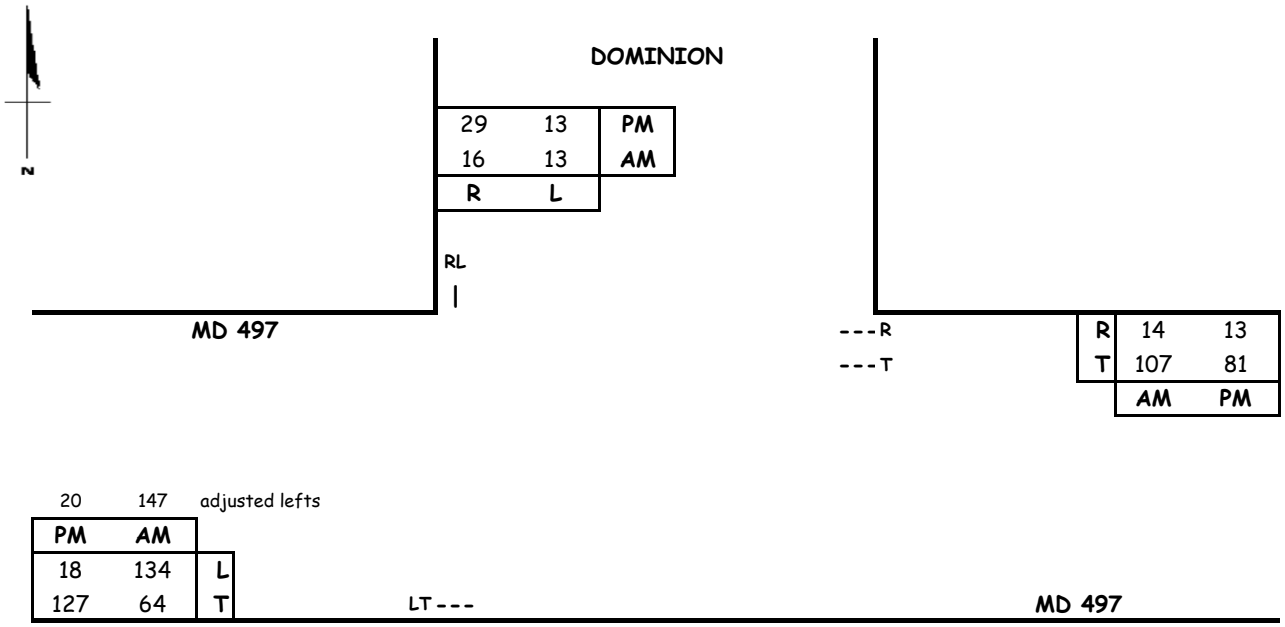
Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
SB	16	1.00	16				16
EB	90	1.00	90				90
WB	38	1.00	38	5	1.00	5	
						CLV TOTAL=	**106**
						Level of Service (LOS)=	**A**

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning		MD 497 & Dominion (Background Traffic)	**Intersection** **4**

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Intersection of: MD 497
and: Dominion
Conditions: Total Traffic **Analyst:** ml

Lane Use + Traffic Volumes



Capacity Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
SB	29	1.00	29				29
EB	211	1.00	211				241
WB	107	1.00	107	134	1.00	134	
						CLV TOTAL=	**270**
						Level of Service (LOS)=	**A**

Evening Peak Hour

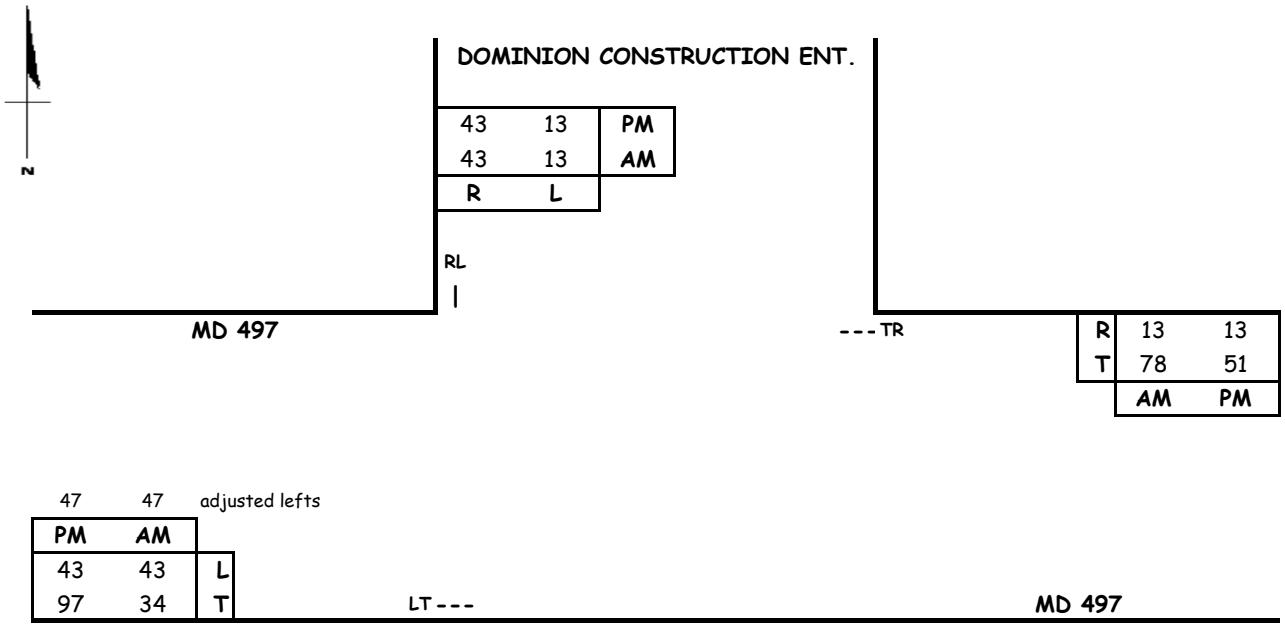
Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
SB	42	1.00	42				42
EB	147	1.00	147				147
WB	81	1.00	81	18	1.00	18	
						CLV TOTAL=	**189**
						Level of Service (LOS)=	**A**

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	MD 497 & Dominion (Total Traffic)	**Intersection** **4**

CRITICAL LANE VOLUME (CLV) METHODOLOGY
for MSHA

Intersection of: MD 497
and: Dominion Construction Ent.
Conditions: Total Traffic **Analyst:** ml

Lane Use + Traffic Volumes



Capacity Analysis

Morning Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	AM CLV
SB	56	1.00	56				56
EB	81	1.00	81				134
WB	91	1.00	91	43	1.00	43	

CLV TOTAL= **190**
Level of Service (LOS)= **A**

Evening Peak Hour

Dir	Thru Volumes VOL	x LUF	= Total	+ Opposing Lefts VOL	x LUF	= Total	PM CLV
SB	56	1.00	56				56
EB	144	1.00	144				144
WB	64	1.00	64	43	1.00	43	

CLV TOTAL= **200**
Level of Service (LOS)= **A**

Critical Lane Volume Analysis Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning		MD 497 & Dominion Construction Ent. (Total Traffic)

Intersection
5