



US 301 PROJECT
Maryland / Delaware Line to SR1
South of the C&D Canal
New Castle County, Delaware

US 301 SPUR ROAD 2011 MONITORING REPORT



April 2012



DELAWARE
DEPARTMENT OF
TRANSPORTATION

WILMAPCO



EXECUTIVE SUMMARY

The US301 Spur Road, the subject of this traffic monitoring report, is part of Delaware Department of Transportation's (DelDOT's) US 301 Project (see Figure 1). In November 2007, after nearly four decades of study, a preferred alternative was selected, as described in the US 301 Final Environmental Impact Statement. The Federal Highway Administration subsequently approved the Record of Decision on April 30, 2008 which authorized DelDOT to begin final design on the preferred alternative, known as the "Green North + Spur" alternative. In January 2010, the 145th General Assembly of Delaware passed House Resolution No. 35 directing the Delaware Department of Transportation to "*sit down over the next 6 weeks to develop and negotiate to final resolution a bill to amend the existing epilogue language, with such bill mandating certain trigger mechanisms for the Spur Road.*" As a result of that coordination the US 301 Spur Road Monitoring Program was developed to monitor growth in traffic and land use development, and to evaluate the operational characteristics of key roads and intersections. This monitoring program will provide decision makers with data to make an informed decision on the appropriate timing for the construction of the US 301 Spur Road.

The monitoring program consists of the annual collection and analysis of daily traffic volumes on select roadways, peak period intersection volumes, vehicular delay at unsignalized intersections, crash data, and land use development data. Each year, the data will be analyzed and compared with data and results from prior years. This report represents a summary of the second year of the monitoring program based on data collected in 2011. This report compares the newly collected data with the data collected and summarized in 2010, the first year of the monitoring program. The key findings and data in the report are summarized below:

Land Development:

- There were approximately 16,000 new housing units in various stages of planning in the study area. This represents an increase of 800 units compared to 2010. New Castle County has approved approximately 10,050 of these housing units, of which approximately 1,750 (17.5%) were completed by the end of 2011. This represents an increase of 200 completed units compared to 2010. An additional 5,000 housing units, including approximately 350 units in Cecil County, MD, are part of developments which are still in the earlier planning stages (pending approval). This represents decrease of 1,100 units compared to 2010, attributable partly to an increase in the number of expired applications as well as a shift in the number of units that had previously been planned but were subsequently approved and potentially completed. Lastly, approximately 890 more housing units were proposed in developments in New Castle County for which approval had expired by the end of 2011. This represents an increase of 490 housing units compared to 2010.
- Of the developments described above, there are sixteen (16) residential developments in various stages of completion within the Town of Middletown. Seven of these developments were essentially complete by the end of 2007, with an eighth (Middletown Village) essentially completed by the end of 2010. There were 57 new housing units completed between 2010 and 2011. The 16 developments total 7,728 housing units, including approximately 4,100 single-family detached homes, 500 duplexes, 1,900 townhouses, and 1,200 apartments / condos.
- A total of 2,179 of the proposed 7,728 housing units within the Town of Middletown were constructed by the end of 2007 and 2,951 of the proposed 7,728 housing units were constructed by the end of 2010. A total of 3,008 of the proposed 7,728 housing units within the Town of Middletown had been constructed by the end of 2011. This represents an increase of 829



housing units over the four year period between 2007 and 2011, and includes 57 new units completed between 2010 and 2011.

- The ongoing commercial development within the study area consists of various uses, including office space, retail, and light industrial development (including warehouse space). By the end of 2011, developers had submitted plans for over 8.1 million square feet of commercial space in Southern New Castle County. It should be noted that one significant development not included in the totals is the Amazon.com distribution center, which was approved on January 9, 2012. New Castle County had previously approved approximately 5.8 million square feet of commercial space, with another 2.3 million square feet of commercial space pending approval. Of the approved development, at least 915,000SF (16%) had been constructed by the end of 2011.

Traffic:

- Roadway volumes at seven (7) locations are being monitored and recorded annually.
- Five (5) signalized intersections along the existing US301 Corridor between the Summit Bridge and SR 299 are counted and analyzed annually to monitor the degradation (or improvement) in operation of each intersection. The following trends were observed in 2010 and 2011:
 - US 301 at Old Summit Bridge Road: The intersection operated at LOS A during both the AM and the PM peak hours for 2010 and 2011.
 - US 301 at Old Summit Bridge Road: The intersection operated at LOS A during both the AM and the PM peak hours for 2010 and 2011.
 - US 301 at Armstrong Corner Road / Marl Pit Road: The intersection operated at LOS C during both the AM and the PM peak hours in 2010; however, the intersection operated at LOS D during both the AM and the PM peak hours in 2011. The increase in delay was attributed to a temporary closure of Cedar Lane Road (for bridge maintenance and repair) at the time the intersection turning movement count was taken.
 - US 301 at SR 71: The intersection operated at LOS C during the AM peak hour and LOS D during the PM peak hour for 2010 and 2011.
 - US 301 at SR 299: The intersection operated at LOS D during both the AM and the PM peak hours for 2010 and 2011.
- Three (3) unsignalized intersections are counted and analyzed annually to monitor the degradation (or improvement) in operation of each intersection and the following trends were observed in 2010 and 2011:
 - There was relatively minimal changes in delay at the intersection of US 301 and Old School House Road.
 - Delay increased substantially (by 21 seconds per vehicle) to nearly a minute of delay per vehicle at the intersection of US 301 and Keenan Auto Body. This increase in delay may be attributable to the temporary Cedar Lane Road closure.
 - Delay increased moderately at the intersection of Choptank Road and Clayton Manor Drive (by 8 seconds per vehicle); however, the average delay per vehicle remains fairly low at 18 seconds per vehicle.



Highway Safety:

- Average Accident Rates were calculated for eight (8) roadway segments in the vicinity of the US301 Corridor to provide a relative measure of comparison to the Statewide and New Castle County average crash rates. It should be noted that DeIDOT Safety Section was not able to provide 2011 Statewide and New Castle County crash rates and they will be updated in future reports when the data becomes available.
- In general, the number of crashes has decreased between 2010 and 2011 at most of the locations being monitored. The exceptions were the curve between Summit Bridge and Bethel Church Road, where the number of crashes increased from 2 to 5, Bunker Hill Road between Choptank Road and US 301, where the number of crashes increased from 5 to 7, and SR 1 between Roth Bridge and US 13 / SR 1 Split (Tybouts Corner), where the number of crashes increased from 53 to 69.
- In addition, roadway segments in the project area that are reported by DeIDOT's Hazard Elimination Program (HEP) and High Risk rural Roads Program (HRRRP) will be monitored each year during construction.

Incident Management:

- DeIDOT will track the number of significant incidents that occur each year on several key roads in the Middletown region south of the C&D Canal, and on SR 1 between the Roth Bridge and I-95. Specifically, the monitoring program will identify any incidents that resulted in detours that could have been accommodated more safely and efficiently on the Spur Road rather than on the local road network.
- Since 2004, there have been 56 incidents that have resulted in 170 or more hours of detours that could have utilized the Spur Road as an alternate detour route.

Construction Projects:

- DeIDOT and the Town of Middletown will likely have several other active maintenance and construction projects occurring at various times during the duration of the US 301 Spur Monitoring Program that could affect the traffic data being collected. DeIDOT identified three (3) active construction projects in the US 301 project area in 2011. As part of the monitoring program, DeIDOT will continue to monitor all active roadway construction projects in the US 301 project area from south of Middletown to approximately the Chesapeake and Delaware Canal.



TABLE OF CONTENTS

INTRODUCTION

| | |
|--|---|
| US 301 PROJECT HISTORY..... | 1 |
| MONITORING PROGRAM..... | 2 |
| <i>Annual Monitoring Program</i> | 2 |
| <i>Public Involvement</i> | 3 |
| <i>Annual Report</i> | 3 |

MONITORING PROGRAM

| | |
|---|----|
| LAND DEVELOPMENT | 4 |
| <i>Residential Development</i> | 5 |
| <i>Commercial Development</i> | 6 |
| TRAFFIC | 7 |
| <i>Roadway Volumes</i> | 7 |
| <i>Signalized Intersections</i> | 10 |
| <i>Unsignalized Intersections</i> | 13 |
| HIGHWAY SAFETY | 14 |
| <i>Hazard Elimination Program</i> | 17 |
| <i>Incident Management</i> | 18 |
| CONSTRUCTION PROJECTS | 18 |

TABLES

| | | |
|----------------|---|----|
| <i>Table 1</i> | <i>Average Daily Traffic for Select Roadway Segments along US 301</i> | 8 |
| <i>Table 2</i> | <i>Truck Percentage for Select roadway Segments along US 301</i> | 10 |
| <i>Table 3</i> | <i>Peak Hour LOS at Select Signalized Intersections along US 301</i> | 11 |
| <i>Table 4</i> | <i>Average Accident Rates</i> | 15 |
| <i>Table 5</i> | <i>2010 Hazard Elimination Program Locations</i> | 17 |
| <i>Table 6</i> | <i>2010 High Risk Rural roads Program Locations</i> | 17 |
| <i>Table 7</i> | <i>Projects in the US 301 Project Area</i> | 18 |



TABLE OF CONTENTS

FIGURES

| | | |
|------------------|--|-----------|
| <i>Figure 1</i> | <i>US 301 Project Area Overview.....</i> | <i>3</i> |
| <i>Figure 2</i> | <i>Major Development Location Map.....</i> | <i>5</i> |
| <i>Figure 3</i> | <i>Residential Development in Southern New Castle County.....</i> | <i>5</i> |
| <i>Figure 4</i> | <i>Non-Residential Development in Southern New Castle County.....</i> | <i>7</i> |
| <i>Figure 5</i> | <i>Count Locations.....</i> | <i>8</i> |
| <i>Figure 6</i> | <i>ADT for Summit Bridge (US301)</i> | <i>8</i> |
| <i>Figure 7</i> | <i>ADT for Choptank Road</i> | <i>8</i> |
| <i>Figure 8</i> | <i>ADT for Roth Bridge (SR1).....</i> | <i>9</i> |
| <i>Figure 9</i> | <i>ADT for St. George's Bridge (US13).....</i> | <i>9</i> |
| <i>Figure 10</i> | <i>ADT for Existing US301 (north of Mt. Pleasant)</i> | <i>9</i> |
| <i>Figure 11</i> | <i>ADT for Existing US301 (south of Mt. Pleasant).....</i> | <i>9</i> |
| <i>Figure 12</i> | <i>Total Delay at Select Signalized Intersections during AM Peak</i> | <i>12</i> |
| <i>Figure 13</i> | <i>Total Delay at Select Signalized Intersections during PM Peak</i> | <i>12</i> |
| <i>Figure 14</i> | <i>Total Delay at Select Unsignalized Intersections during PM Peak</i> | <i>14</i> |
| <i>Figure 15</i> | <i>Comparison of Crashes for Select Roadways in US 301 Corridor</i> | <i>16</i> |

APPENDICES

- Appendix A Proposed Development for Southern New Castle County*
- Appendix B Residential Construction in the Town of Middletown*
- Appendix C US 301 Corridor Crash Reports*
- Appendix D Significant Incidents on SR 1 and Other Roadways in the Middletown Region*
- Appendix E Peak Hour Traffic Volume and SYNCHRO Capacity Reports*



INTRODUCTION

The US301 Spur Road, the subject of this traffic monitoring report, is part of Delaware Department of Transportation's (DelDOT's) US 301 Project (see Figure 1). US 301 is a 1,100 mile interstate route stretching between Sarasota, Florida and New Castle County, Delaware. The tolls and congestion on I-95 combined with the comparatively low traffic volumes on US 301, have made US 301 an attractive alternative route for vehicles, including trucks, traveling between Washington D.C. and Wilmington, Delaware. The Delaware Department of Transportation has been studying the US 301 corridor since the 1960's. The need for improved capacity and safety has been heightened over the past two decades by the rapid pace of development throughout the Middletown-Odessa-Townsend area and the resulting transformation of southern New Castle County from rural farmland to growing suburbia.

In November 2007, after nearly four decades of study, a preferred alternative was selected, as described in the US 301 Final Environmental Impact Statement. The Federal Highway Administration subsequently approved the Record of Decision on April 30, 2008 which authorized DelDOT to begin final design on the preferred alternative, known as the "Green North + Spur" alternative. In January 2010, the 145th General Assembly of Delaware passed House Resolution No. 35 directing the Delaware Department of Transportation to "*sit down over the next 6 weeks to develop and negotiate to final resolution a bill to amend the existing epilogue language, with such bill mandating certain trigger mechanisms for the Spur Road.*" As a result of that coordination the US 301 Spur Road Monitoring Program was developed to monitor growth in traffic and land use development, and to evaluate the operational characteristics of key roads and intersections. This monitoring program will provide decision makers with data to make an informed decision on the appropriate timing for the construction of the US 301 Spur Road.

This report represents a summary of the second year of the monitoring program based on data collected in 2011. This report compares the newly collected data with the data collected and summarized in 2010, the first year of the monitoring program. The 2011 report also serves as a basis for comparison with data collected in future years.

US 301 Project History

In the mid-1960's, recognition of the regional significance of the US 301 corridor led the Delaware Department of Transportation (DelDOT) to investigate opportunities to improve mobility in the corridor. An earlier study resulted in the location selection and subsequent construction of the existing Summit Bridge by the US Army Corps of Engineers (ACOE) in the 1950's. Since that time, southern New Castle County has been transformed from a rural and largely agricultural area to a suburban residential area for commuters employed in Newark, Wilmington, Philadelphia, and throughout the I-95 corridor in Delaware, northern Maryland, southern Pennsylvania, and Southern New Jersey. The Levels, southwest of Middletown, once known as Delaware's most productive agricultural area, is currently evolving into the Westown community of Middletown, and job growth is expanding with a full range of commercial and professional employers supporting the influx of new residents in southern New Castle County. As southern New Castle County continued to develop, the solution to improving mobility in the growing region remained elusive.



In 2004, a new phase of the US 301 project planning effort was initiated, which was focused on addressing the safety and mobility needs of the region with consideration of the findings of a prior study conducted in 2000, the *Greater Route 301 Major Investment Study*. A traffic survey conducted in October 2004 showed that approximately sixty-five percent (65%) of all northbound traffic originating south of the C&D Canal is destined for the northeast to Wilmington, Philadelphia, New Jersey, and points beyond. Thirty-Five percent (35%) of the traffic has destinations to the north towards Newark and Pennsylvania. However, the traffic survey, which asked motorists to document their actual travel routes, showed that despite the majority of northbound destinations being to the northeast, approximately sixty percent (60%) of motorists currently continue north on US 301/SR 896 and then east on I-95, rather than using a more direct east-west route south of the canal.

With careful consideration of the local and regional travel patterns, projected land use growth of the region, a wide range of other social and environmental resources, and significant public input (5 rounds of public workshops and more than 100 community meetings with concerned parties), DelDOT performed a detailed evaluation of several alternatives, including a no-build option and a variety of capacity improvement options. Those efforts resulted in the publication of a DEIS and a recommended alternative in November 2006. One year later, in November 2007, after nearly four decades of study, a preferred alternative was selected, as described in the *US 301 Project Development Final Environmental Impact Statement* (FEIS). The Federal Highway Administration subsequently approved the Record of Decision on April 30, 2008 which authorized DelDOT to begin final design on the preferred alternative, known as the “Green North + Spur” alternative.

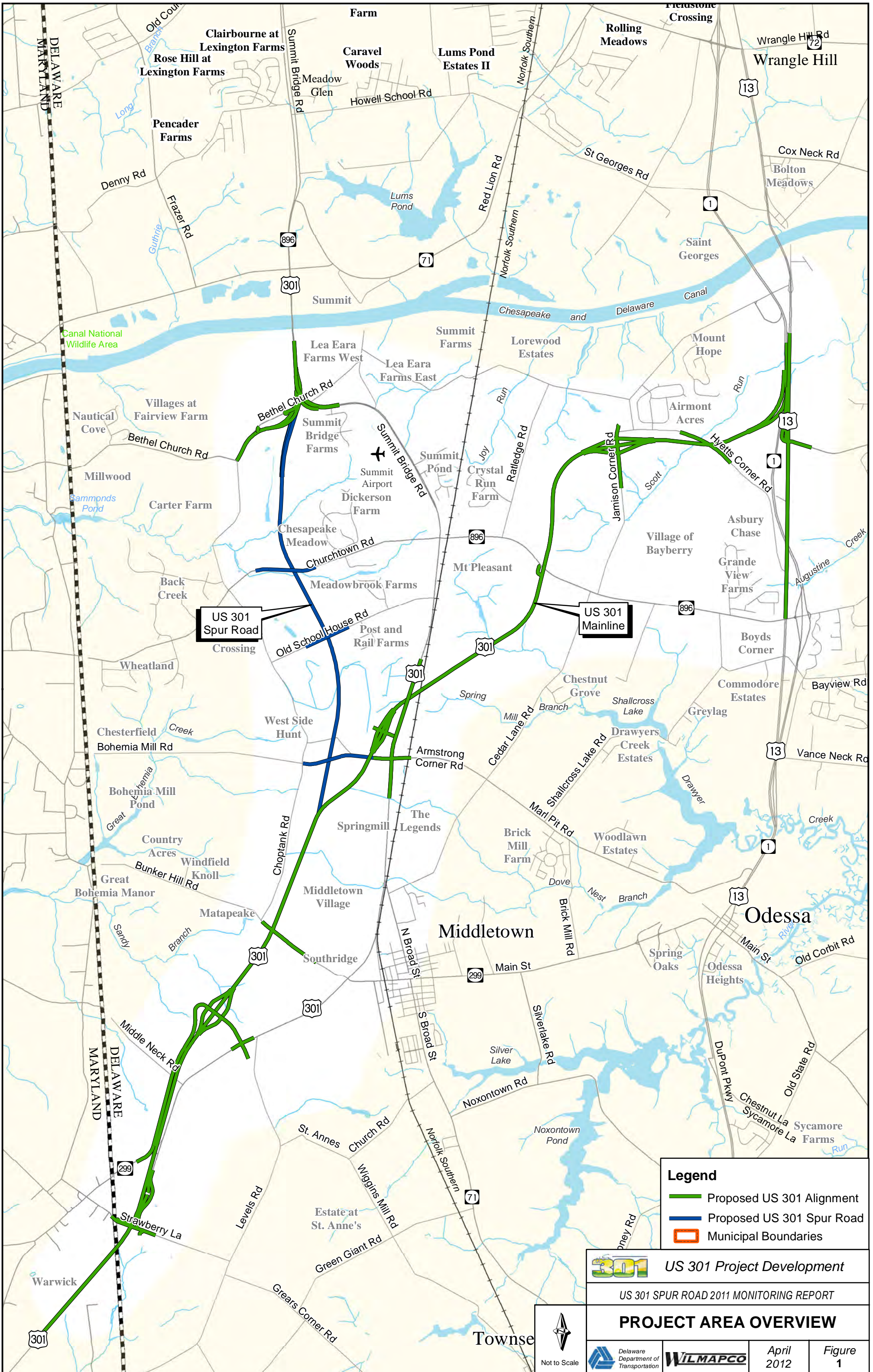
Monitoring Program

In January 2010, the 145th General Assembly of Delaware passed House Resolution No. 35 directing the Delaware Department of Transportation to “sit down over the next 6 weeks to develop and negotiate to final resolution a bill to amend the existing epilogue language, with such bill mandating certain trigger mechanisms for the Spur Road.” As a result of that coordination the US 301 Spur Road Monitoring Program was developed to monitor growth in traffic and land use development, and to evaluate the operational characteristics of key roads and intersections. This monitoring program will provide decision makers with data to make an informed decision on the appropriate timing for the construction of the US 301 Spur Road.

The US 301 Spur Road Monitoring Program consists of three (3) primary components: an Annual Monitoring Program, Public Involvement and the publication of an Annual Summary Report.

Annual Monitoring Program

The US 301 Monitoring Program was created to monitor transportation and land use growth patterns before, during and after construction of the US 301 Mainline Project, as applicable. The monitoring program consists of the annual collection and analysis of daily traffic volumes on select roadways, peak period intersection volumes, vehicular delay at unsignalized intersections, crash data, and land use development data. Each year, the data will be analyzed and compared with data and results from prior years.



US 301
Spur Road
Crossing

US 301
Mainline

Legend

- Proposed US 301 Alignment
- Proposed US 301 Spur Road
- Municipal Boundaries

US 301 Project Development

US 301 SPUR ROAD 2011 MONITORING REPORT

PROJECT AREA OVERVIEW

Not to Scale



Public Involvement

Public involvement has been and continues to be an important part of the US 301 Project. For the US 301 Spur Road Monitoring Program, the annual report will be made publicly available each year, and the updates on the Monitoring Program will be presented annually at a WILMAPCO public meeting. Public Involvement will also be solicited at key decision making points, such as the Secretary of Transportation's decision to recommend that construction of the US 301 Spur Road should begin.

The US 301 Spur Road Monitoring Program was presented at the FY2012 – FY2015 Transportation Improvement Program (TIP) Public Workshop on February 28, 2011 at WILMAPCO, attended by DelDOT staff. The Spur Monitoring Program information was summarized on a large display board that provided an overview of the program including the goals and purpose, and details on the initial data collected on Land Development, Safety, and Traffic.

A US 301 Public Workshop was also held on September 6, 2011 to present updates to the US 301 Project, including the US 301 Spur Road. Information on the workshop can be found on the project web site: www.us301.deldot.gov.

A WILMAPCO Public Workshop was not held in February 2012; therefore, there was not an efficient opportunity to present the key findings of the monitoring in 2011. It should be noted that there was very little change in the data and findings between 2010 and 2011. Next year's updates, will likely be presented along with the 2011 updates at the 2013 WILMAPCO workshop.

Annual Report

This report contains a summary of the most recent data collected and analyzed as part of the US 301 Spur Road Monitoring Program. These reports will continue to be developed on an annual basis before, during and after the construction of the US 301 mainline. DelDOT will present these reports to the General Assembly in April of each year. The reports will provide decision makers, including the Secretary of Transportation, data to make an informed decision on the appropriate timing for the construction of the Spur Road.



MONITORING PROGRAM

Land Development

The explosive growth in housing and retail in southern New Castle County over the past 10 to 15 years has led to increasing congestion on the local road network, including US 301, SR 299, and SR 896. A number of new residential and retail developments have been completed and many others are in varying stages of construction or planning. As these other planned developments come on line, additional demands will be placed on the transportation infrastructure in the Middletown area.

In addition to residential and retail developments, Base Realignment and Closure (BRAC) activities at the Aberdeen Proving Ground in Hartford County, Maryland was completed in September 2011. BRAC relocated six organizations within Army Team C4ISR (Command, Control, Communications, Computer Intelligence, Surveillance and Reconnaissance) from Fort Monmouth, New Jersey to the Aberdeen Proving Ground, added 6,500 net jobs, and renovated space totaling 2.8 million square feet.

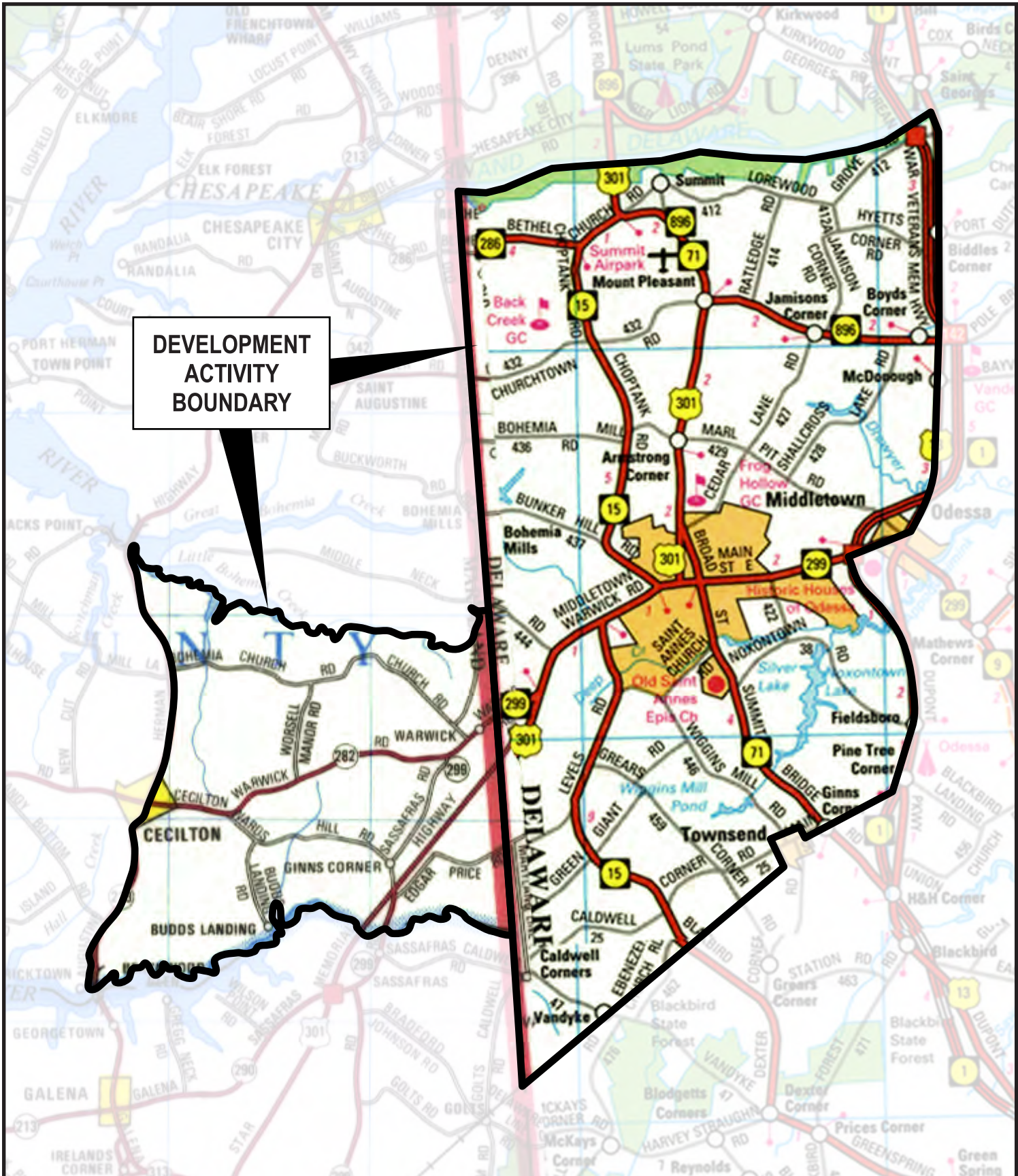
It should also be noted that the Town of Middletown approved the final plans for the proposed Amazon.com distribution center on Monday, January 9, 2011. The proposed 1 million SF distribution center will be constructed on the parcel immediately south of the intersection of US 301 and Merrimac Avenue with a fourth leg to be added to the intersection to provide access to the site. It is anticipated that the new distribution center will add 850 full-time jobs as well as more than 2,000 seasonal jobs for up to three months twice a year.

Development activity in New Castle County is monitored by the New Castle County Department of Land Use, the Wilmington Area Planning Council (WILMAPCO), and DeIDOT. Development activity in Middletown is monitored by the Town of Middletown, WILMAPCO, and DeIDOT. WILMAPCO is also tasked with developing short and long-term land use projections for New Castle County. These projections are constrained on a statewide and countywide basis by the population and employment forecasts provided by the Delaware Population Consortium. WILMAPCO is responsible for projecting how much of that growth will occur in different parts of the county. The primary geographic unit for these projections is the Traffic Analysis Zone (TAZ).

DeIDOT and WILMAPCO have committed to tracking the land development activities in a portion of southern New Castle County and an adjoining portion of Cecil County, Maryland as part of this Monitoring Report. The specific area where development will be tracked annually is depicted in Figure 2. This area represents a total of 34 TAZs in Southern New Castle County and two (2) TAZs in Cecil County, Maryland. Development activity will be monitored in these areas for the length of the project to determine when the surrounding roadway infrastructure may need to be improved based on past, present and near-term development trends.

Summary of Development Activity in Southern New Castle (DE) and Cecil (MD) Counties

WILMAPCO took the lead in coordinating with the various jurisdictions and compiling the land use data for this report. In 2011, a total of sixty-five (65) ongoing commercial and residential developments were in various stages of the planning or building process within the study areas of southern New Castle and Cecil Counties. Fifty-three (53) of these developments are located in southern New Castle County and twelve (12) developments are located in Cecil County, Maryland. For each development, a description of the development proposal, the



**DEVELOPMENT
ACTIVITY
BOUNDARY**



US 301 Project Development

US 301 SPUR ROAD 2011 MONITORING REPORT

MAJOR DEVELOPMENT LOCATION MAP



SCALE IN MILES



As Shown



Delaware
Department of
Transportation

April 2012

Figure
2

current status of the development in the planning process, and what portions (if any) were constructed by the end of 2011 were provided. A full list of the developments can be found in Appendix A. The residential developments range from small subdivision developments with less than 10 homes to major developments with over 1,500 household units planned. The proposed commercial developments range from smaller properties with 15,000 to 20,000 SF to the major commercial centers, such as the 1.7 million SF Scott Run Business Park. A number of proposals call for mixed-use development, combining residential and commercial activities at one site.

Residential Development Summary

The ongoing residential development within the study area consists of a variety of housing types, including single-family detached dwellings, townhomes, and apartments. The various residential developments were classified in differing stages of completion: Built, Approved but Unbuilt, or Pending (includes Exploratory and Expired Proposals). Figure 3 depicts the number of housing units built, approved but unbuilt, and pending at the end of 2010 and 2011.

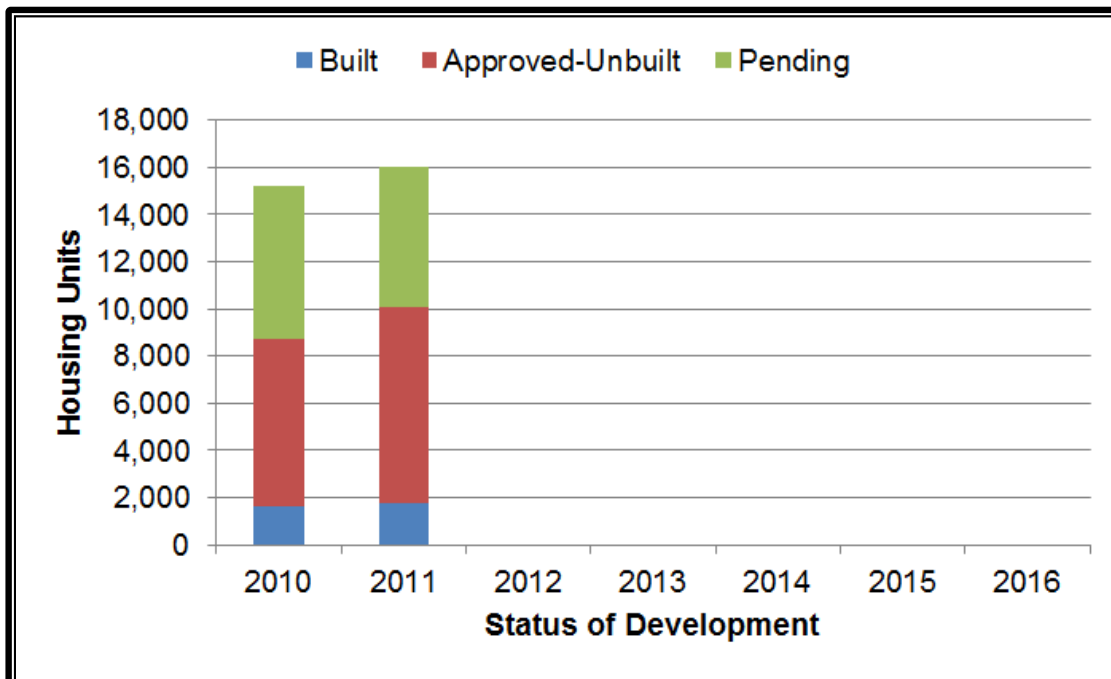


Figure 3: Residential Development in Study Area

As shown in Figure 3, at the end of 2011, there were approximately 16,000 new housing units in various stages of planning in the study area. This represents an increase of 800 units compared to 2010. New Castle County has approved approximately 10,050 of these housing units, of which approximately 1,750 (17.5%) were completed by the end of 2011. This represents an increase of 200 units compared to 2010. An additional 5,000 housing units, including approximately 350 units in Cecil County, MD, are part of developments which are still in the earlier planning stages (pending approval). This represents decrease of 1,100 units compared to 2010, attributable partly to an increase in the number of expired applications as well as a shift in the number of units that had previously been planned but were subsequently approved and potentially completed. Lastly, approximately 890 more housing units were proposed in developments in New Castle County for which approval had expired by the end of 2011. This represents an increase of 490 housing units compared to 2010.



Snapshot - Residential Construction in the Town of Middletown: Of the developments described above, there are sixteen (16) residential developments in various stages of completion within the Town of Middletown. Seven of these developments were essentially completed by the end of 2007, with an eighth (Middletown Village) essentially completed by the end of 2010. There were 57 new housing units completed between 2010 and 2011. The 16 developments include a total of 7,728 housing units, including approximately 4,100 single-family detached homes, 500 duplexes, 1,900 townhouses, and 1,200 apartments / condos. WILMAPCO was able to provide data on the number of units built within each of these residential developments between 2007 and 2011:

- By the end of 2007, a total of 2,179 (28%) of the proposed 7,728 housing units within the Town of Middletown had been constructed.
- By the end of 2010, a total of 2,951 (38%) of the proposed 7,728 housing units within the Town of Middletown had been constructed.
- By the end of 2011, a total of 3,008 (39%) of the proposed 7,728 housing units within the Town of Middletown had been constructed.
- This represents an increase of 829 housing units over the four year period between 2007 and 2011 and includes 57 new units completed between 2010 and 2011.

Appendix B lists respectively the number of apartments, duplexes, townhouses, and single family homes that have been built and remain to be built in the Town of Middletown.

Commercial (Non-Residential) Development

The ongoing commercial development within the study area consists of various uses, including office space, retail, and light industrial development (including warehouse space). The commercial developments were divided into Approved and Pending (Exploratory) categories. By the end of 2011, developers had submitted plans for over 8.1 million square feet of non-residential space in southern New Castle County. It should be noted that one significant development not included in these total is the Amazon.com distribution center, which was approved on January 9, 2012. This represents an increase of 1.3 million square feet, compared to 2010 and does not include the newly proposed Amazon.com distribution center. The County had previously approved approximately 5.8 million square feet, with another 2.3 million square feet pending approval. Of the approved development, at least 915,000 SF (16%) had been constructed by the end of 2011. This included the 415,000 SF expansion of the distribution center for Johnson Controls, Inc., which is located in the Westown Business Park. Currently, no non-residential developments are proposed in the two (2) TAZs in Cecil County that are included in the study area. Figure 4 depicts and approved and pending commercial development in the study area.

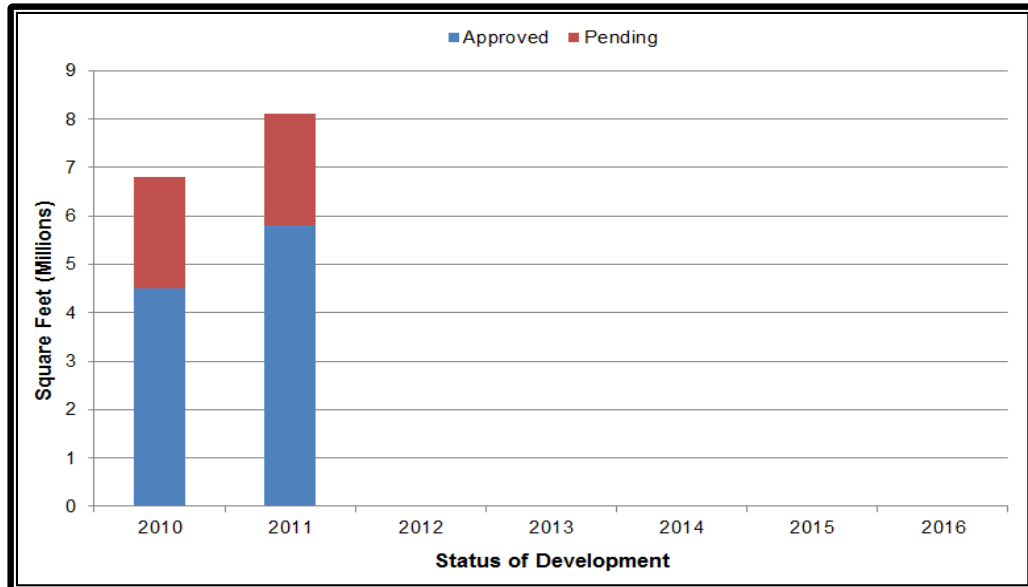


Figure 4: Non-Residential Development in Study Area

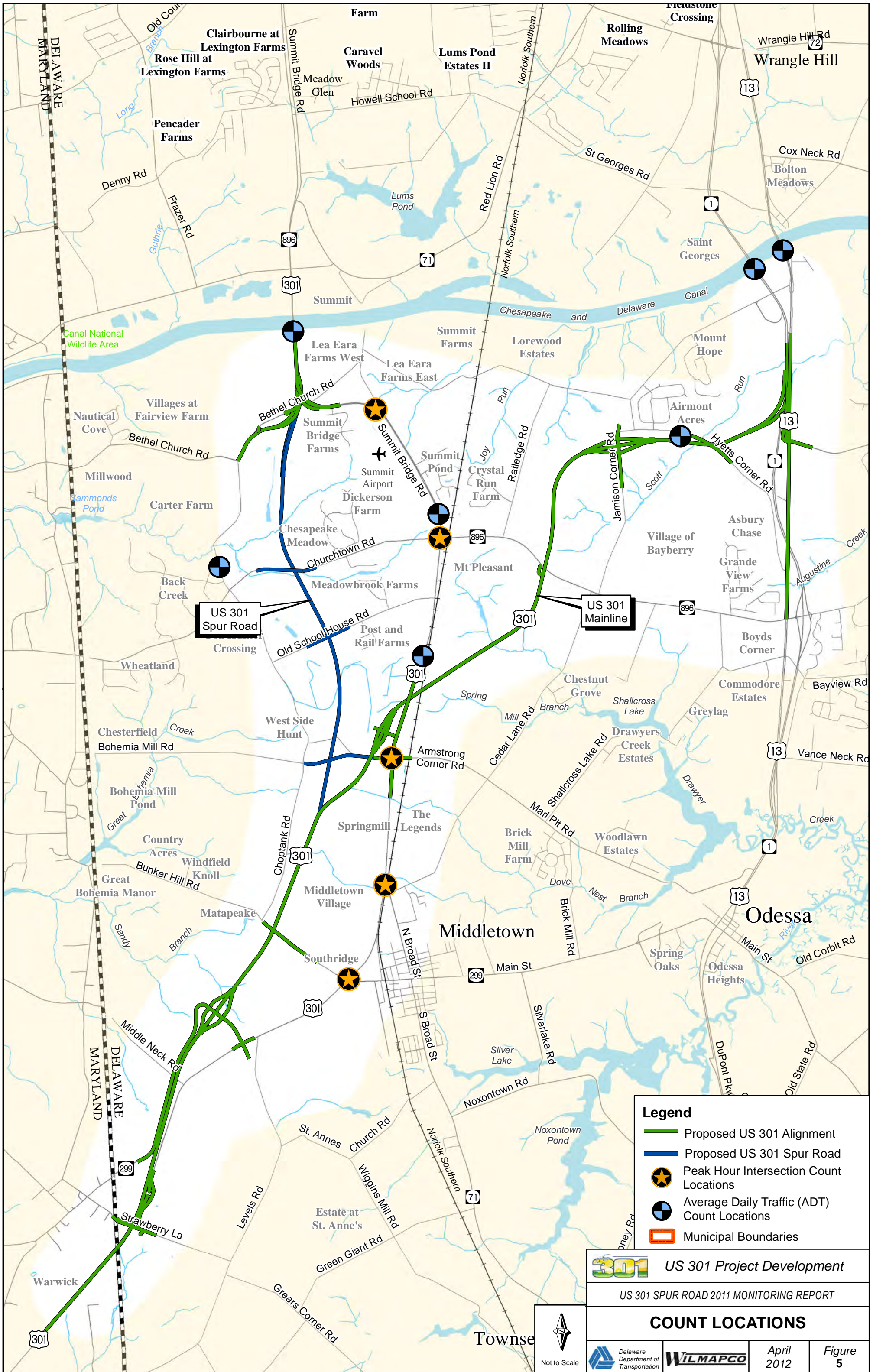
Traffic

Traffic is an important part of the US 301 Spur Road Monitoring Program. The US 301 project team will gather a variety of traffic data annually on key roads within the project corridor to determine the current level of traffic on these roads and to track growth trends throughout the region. Specifically, the following traffic data is being collected each year: mainline roadway volume counts, intersection turning movement counts, and vehicular delays at unsignalized intersections. The data collected in 2010 serves as the base year data for the US 301 Spur Road Monitoring Program. Intersection turning movement counts and mainline volume counts will be performed at each location shown in Figure 5 every year during the construction of the new US 301 alignment from the MD/DE state line to SR 1. This annual traffic monitoring will show how traffic volumes change over time as new development continues to occur.

Roadway Volumes

Mainline volume counts were collected along six (6) key roadways within the US 301 project area during October 2011 (see Figure 5). Automatic traffic recording equipment, commonly called “tube counters”, were used to record the volume and classification of vehicles that pass over the equipment in each direction. This data is used to determine the Average Daily Traffic (ADT) and percentage of trucks travelling on each roadway segment (see Tables 1 and 2). In general, daily traffic volumes have increased modestly at all but one of the locations studied between 2010 and 2011. The two locations with the largest increase were US 301 at the Summit Bridge (a 17% increase) and on SR 1 at the Roth Bridge (a 7% increase). Peak hour volumes exhibited similar trends.

It should be noted that there was a roadway closure on Cedar Lane Road between Marl Pit Road and SR 71 when the counts were taken. The closure was necessary to repair the Cedar Lane Bridge, which is located on Cedar Lane Road north of SR 71 and may have affected traffic volume on US 301 between SR 896 and SR 71.



Legend

- Proposed US 301 Alignment
- Proposed US 301 Spur Road
- ★ Peak Hour Intersection Count Locations
- Average Daily Traffic (ADT) Count Locations
- Municipal Boundaries

US 301 Project Development

US 301 SPUR ROAD 2011 MONITORING REPORT

COUNT LOCATIONS

Not to Scale



**US 301 Spur Road
2011 Monitoring Report**

April 2012

**Table 1:
Average Daily Traffic for Select Roadway Segments along US 301**

| Roadway Link | 2010 ADT* | 2011 ADT | 2012 ADT | 2013 ADT | 2014 ADT | 2015 ADT | 2016 ADT |
|---|-----------|----------|----------|----------|----------|----------|----------|
| Summit Bridge (US 301) | 27,660 | 32,360 | | | | | |
| Choptank Rd, North of Churchtown Rd | 3,990 | 4,090 | | | | | |
| SR 1 at Roth Bridge | 73,690 | 78,740 | | | | | |
| US 13 at St. Georges Bridge | 10,600 | 9,070 | | | | | |
| US 301/SR 896, North of Mt. Pleasant | 23,450 | 23,810 | | | | | |
| US 301, between Armstrong Corner Rd and Mt. Pleasant | 21,830 | 22,460 | | | | | |
| US 301 Bypass | - | - | | | | | |

*Data was collected for a seven (7) day period in October 2011. Seasonal Adjustments were not made to these volumes because: a) October/November volumes are typically representative of the annual average volumes, and b) because volumes will be collected during the same months in subsequent years.

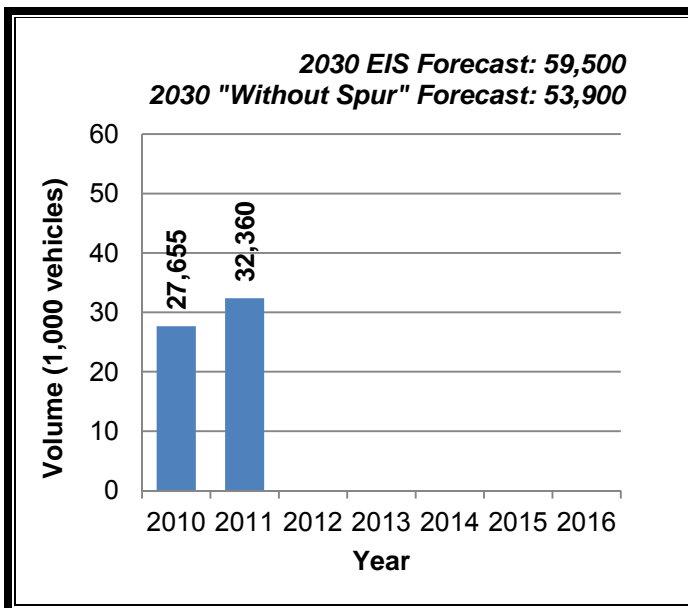


Figure 6: Average Daily Traffic (ADT) for Summit Bridge (US 301)

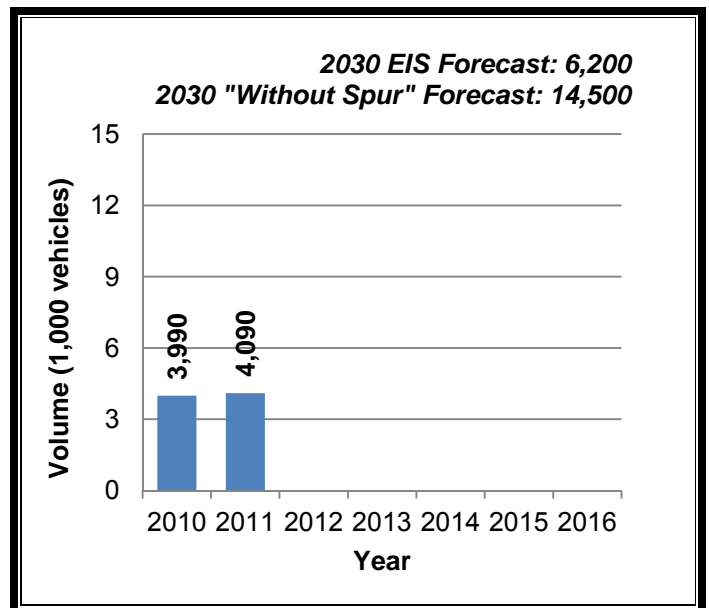


Figure 7: Average Daily Traffic (ADT) for Choptank Rd, North of Churchtown Rd

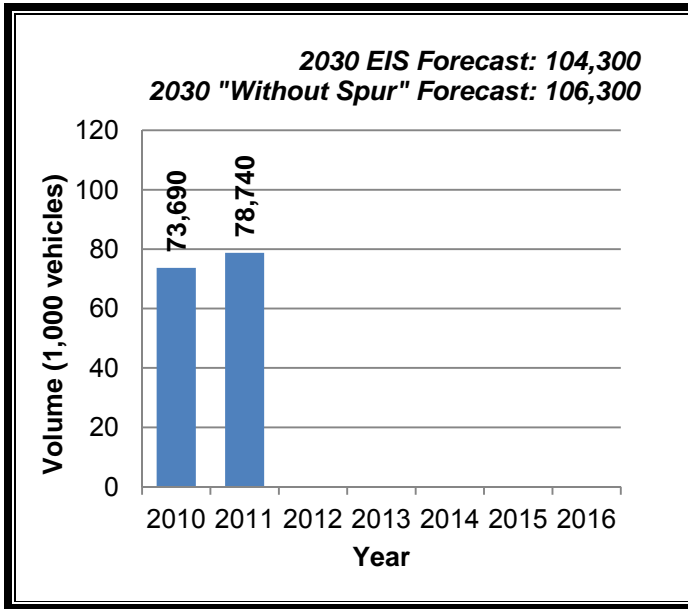


Figure 8: Average Daily Traffic (ADT) for Roth Bridge (SR 1)

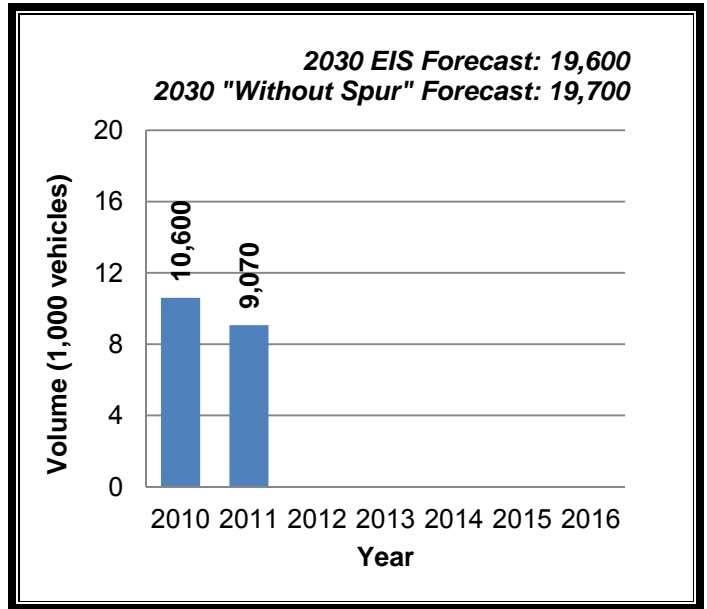


Figure 9: Average Daily Traffic (ADT) for St. George's Bridge (US 13)

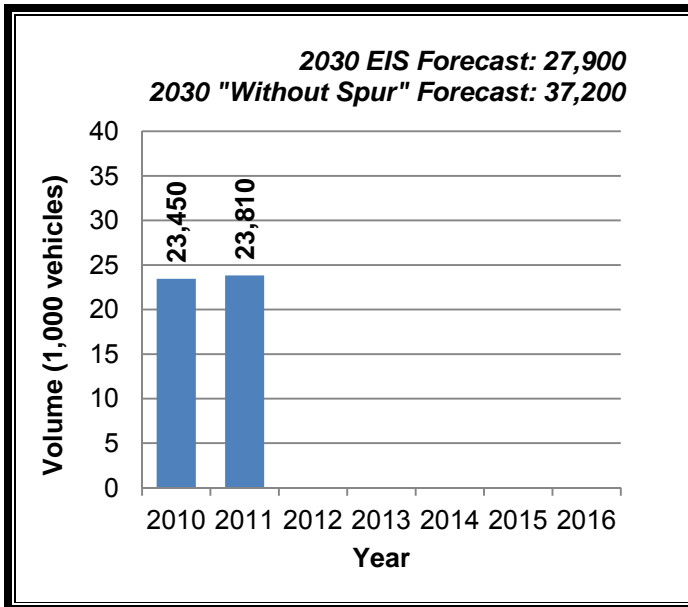


Figure 10: Average Daily Traffic (ADT) for Existing US 301 North of Mt. Pleasant

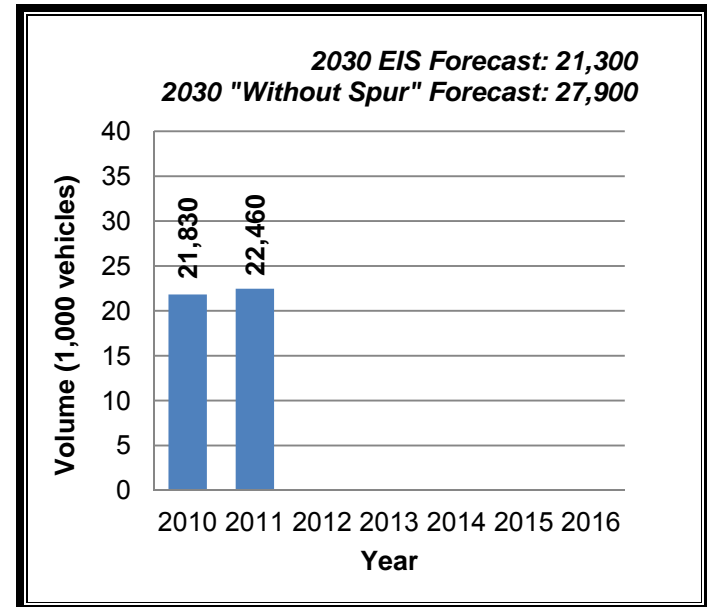


Figure 11: Average Daily Traffic (ADT) for Existing US 301, between Armstrong Corner Rd and Mt. Pleasant



| US 301 Spur Road 2011 Monitoring Report | | | | | | | | | | | | | | April 2012 | |
|--|--------|----------|--------|----------|--------|----------|--------|----------|--------|----------|--------|----------|--------|------------|--|
| Table 2: Average Daily Truck Volume and Average Daily Truck Percentage* on Select Roadway Segments along US 301 | | | | | | | | | | | | | | | |
| Roadway Link | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | | |
| | Volume | % Trucks | Volume | % Trucks | Volume | % Trucks | Volume | % Trucks | Volume | % Trucks | Volume | % Trucks | Volume | % Trucks | |
| Summit Bridge (US 301) | 2,210 | 8 | 3,100 | 10 | | | | | | | | | | | |
| Choptank Rd, North of Churchtown Rd | 490 | 12 | 560 | 14 | | | | | | | | | | | |
| SR 1 at Roth Bridge | 7,860 | 11 | 9,020 | 11 | | | | | | | | | | | |
| US 13 at St. Georges Bridge | 570 | 5 | 440 | 5 | | | | | | | | | | | |
| US 301/SR 896, North of Mt. Pleasant | 1,970 | 8 | 1,840 | 8 | | | | | | | | | | | |
| US 301, between Armstrong Corner Rd and Mt. Pleasant | 2,910 | 13 | 3,000 | 13 | | | | | | | | | | | |
| US 301 Bypass | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |

*Trucks include FHWA Class 5-13, representing all trucks larger than and including two-axle single unit trucks, such as UPS delivery trucks and DART Paratransit buses.

Signalized Intersections

Peak period turning movement counts are being collected on an annual basis at five (5) key signalized intersections in the project area. These five (5) locations, which are all located along the existing US 301 Corridor between Middletown (SR 299) and the Summit Bridge, will be analyzed annually to monitor the degradation (or improvement) in operation of each intersection. The five (5) locations, summarized in Figure 5, and Table 3, are the signalized intersections of existing US 301 / SR 896 at Old Summit Bridge Road, Boyds Corner Road, Armstrong Corner Road, North Broad Street, and Bunker Hill Road. Peak hour turning movement counts were performed at these intersections during October 2011. This data was used to create a model of the corridor using Synchro (Version 8.0.801.563), a macroscopic traffic analysis software application used to evaluate the operational performance characteristics of signalized and unsignalized intersections. The results of these analyses are summarized in Table 3 and Figures 12 and 13.

For this monitoring report, the operational performance of signalized intersections is presented in terms of average delay per vehicle and a corresponding letter grade, typically referred to as “Level of Service” (LOS). Level of Service “A” (delay ≤ 10 sec/vehicle) represents the best possible operating conditions, whereas LOS “F” (delay > 80 sec/veh) represents congested conditions corresponding with traffic that has reached or exceeded available



intersection capacity, resulting in relatively high average delay per vehicle and higher likelihood that vehicles will take more than one signal cycle to clear the intersection.

The results of the 2010 and 2011 intersection capacity analyses are summarized in Table 3 and the following trends were observed between 2010 and 2011:

- US 301 at Old Summit Bridge Road: The intersection operated at LOS A during both the AM and the PM peak hours for 2010 and 2011. No significant changes were observed.
- US 301 at SR 896: The intersection operated at LOS C during both the AM and the PM peak hours and no significant changes observed. No significant changes were observed.
- US 301 at Armstrong Corner Road / Marl Pit Road: The intersection operated at LOS C during both the AM and the PM peak hours in 2010; however, the intersection operated at LOS D during both the AM and the PM peak hours in 2011. The increase in delay was attributed to the Cedar Lane Road closure in effect during the intersection turning movement count. The closure was needed to repair the Cedar Lane Bridge, which is located on Cedar Lane Road south of SR 896 and increased traffic traveling through the intersection of US 301 and Armstrong Corner Road / Marl Pit Road.
- US 301 at SR 71: The intersection operated at LOS C during the AM peak hour and LOS D during the PM peak hour for 2010 and 2011. No significant changes were observed.
- US 301 at SR 299: The intersection operated at LOS D during both the AM and the PM peak hours for 2010 and 2011 with no significant changes observed.

| US 301 Spur Road 2011 Monitoring Report | | | | | | | | | | | | | | April 2012 | |
|---|------|----|------|----|------|----|------|----|------|----|------|----|------|------------|--|
| Table 3: Peak Hour LOS at Selected Signalized Intersections along US 301 | | | | | | | | | | | | | | | |
| Site | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | | |
| | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | |
| US 301 at Old Summit Bridge Rd | A | A | A | A | | | | | | | | | | | |
| US 301 at SR 896 | C | C | C | C | | | | | | | | | | | |
| US 301 at Armstrong Corner Rd | C | C | D | D | | | | | | | | | | | |
| Existing US 301 at SR 71 | C | D | C | D | | | | | | | | | | | |
| Existing US 301 at SR 299 | D | D | D | D | | | | | | | | | | | |

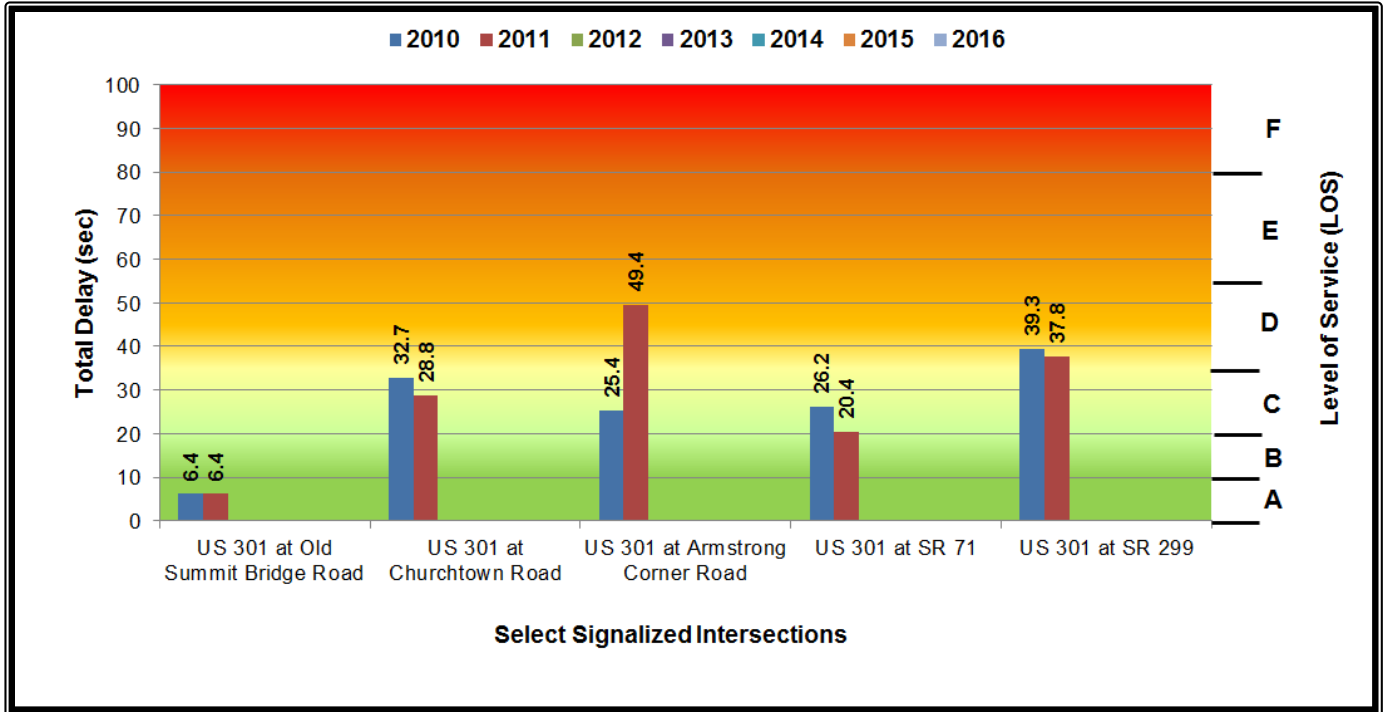


Figure 12: Total Delay and Corresponding Level of Service (LOS) at Select Signalized Intersections along US 301 during the AM Peak Hour

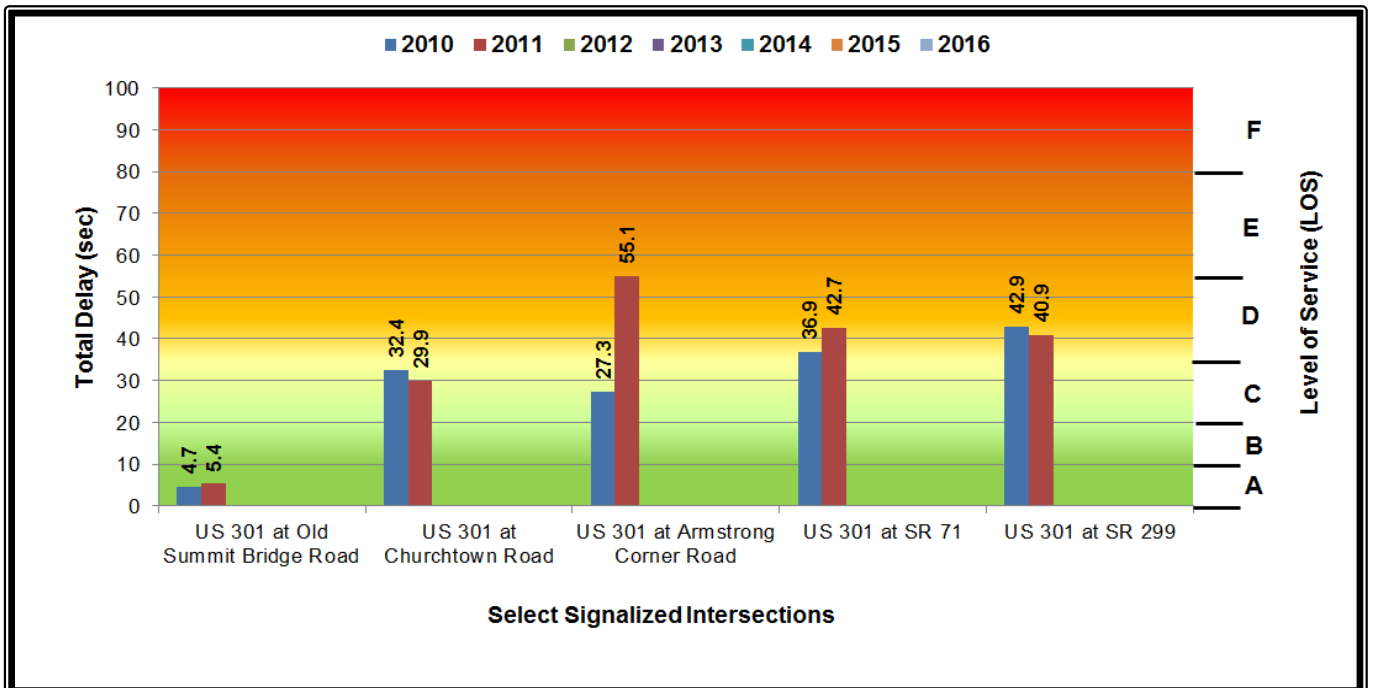


Figure 13: Total Delay and Corresponding Level of Service (LOS) at Select Signalized Intersections along US 301 during the PM Peak Hour



Unsignalized Intersections

Delay studies were performed at the following three (3) unsignalized intersections along the existing US 301 and Choptank Road corridor:

- US 301 at Old School House Road
- US 301 at Keenan Auto Body
- Choptank Road at Clayton Manor Drive

The locations were selected to represent the typical operation of unsignalized access points along the US 301 and Choptank Road corridors, both of which are likely to be impacted by construction of the Spur Road. Similar to the signalized intersections, the operational performance of unsignalized intersections is presented in terms of average delay per vehicle and a corresponding Level of Service (LOS). For unsignalized intersections, the Level of Service thresholds are somewhat lower than the thresholds for signalized intersections, with LOS F representing conditions where vehicles experience 50 or more seconds of delay.

The number of vehicles stopping at the stop sign and the length of each stop was recorded at each of the three study intersections during the PM peak hour. The PM peak hour was selected since it represents the period that vehicles typically experience the highest level of delay making turns from minor street approaches onto US 301 and Choptank Road. The average delay per stopped vehicle was determined for each location (see Figure 14). In 2011, the average control delay was 38 seconds per vehicle (LOS D) at the intersection of US 301 and Old School House Road, 58 seconds per vehicle (LOS F) at the intersection of US 301 at Keenan Auto Body and 18 seconds per vehicle (LOS B) at the intersection of Choptank Road and Clayton Manor Drive. A comparison of the 2010 and 2011 studies is shown in Figure 14.

There was relatively minimal change in delay at the intersection of US 301 and Old School House Road; however, delay increased substantially (by 21 seconds per vehicle) to nearly a minute of delay per vehicle at the intersection of US 301 and Keenan Auto Body. This increase in delay may be attributable to the temporary Cedar Lane Road closure. Delay increased moderately at the intersection of Choptank Road and Clayton Manor Drive (by 8 seconds per vehicle); however, the average delay per vehicle remains fairly low at 18 seconds per vehicle.

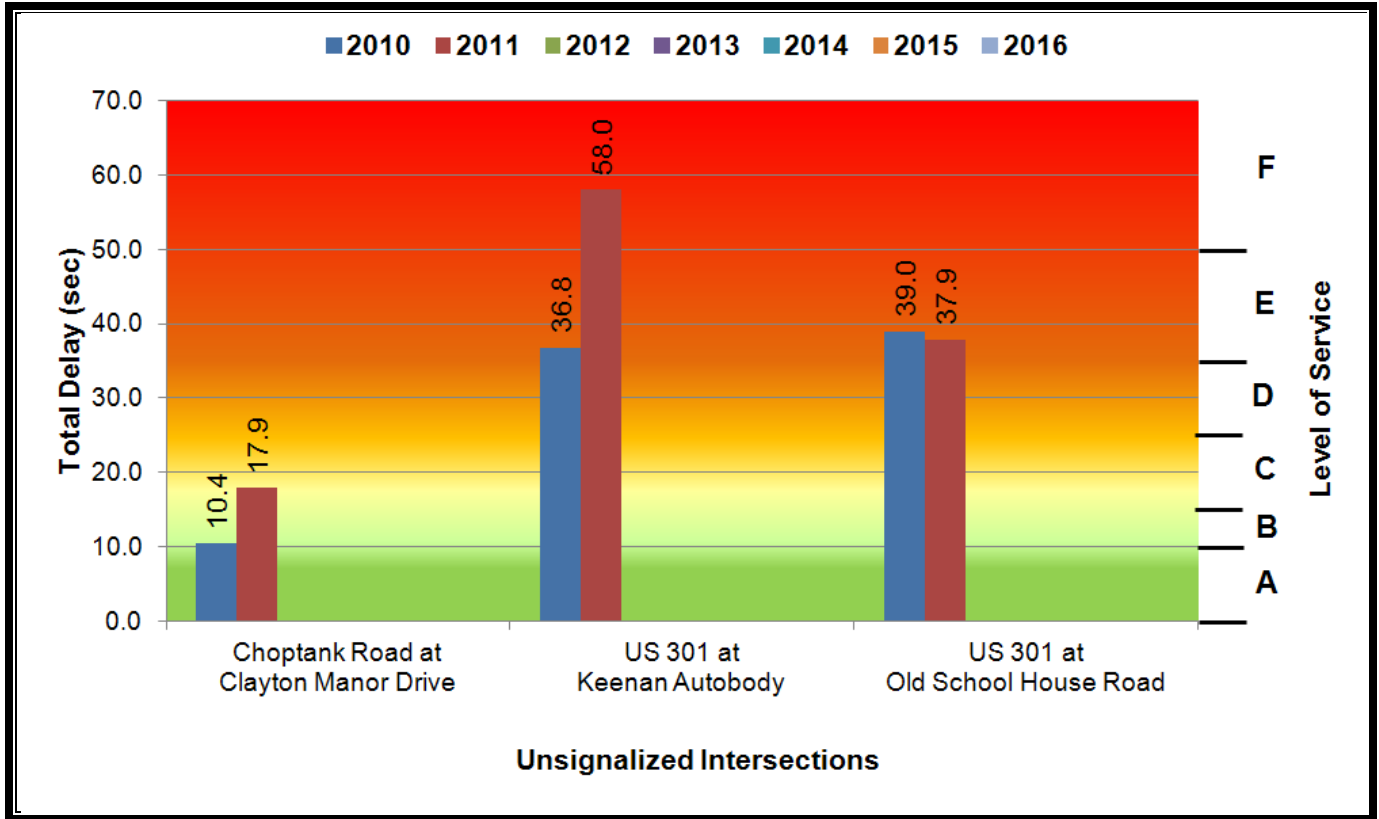


Figure 14: Total Delay and Corresponding Level of Service (LOS) at Select Unsignalized Intersections along US 301 during the PM Peak Hour

Highway Safety

The goal of this annual monitoring report with respect to safety is to monitor the number of crashes occurring on local roads throughout the US 301 Project Area. The number of crashes will be documented each year to determine if any road segments experience a significant increase in crashes.

The number of reported crashes occurring on each key road segment in 2011 is shown in Table 4 and on Figure 15. Crash data for prior years, while available, was not included in this summary for two reasons: First, there was a considerable amount of roadway construction activity ongoing during 2007 and 2008 throughout the project area that would likely skew the crash data for those years, including long-term lane reductions and temporary closures of US 301, construction along Choptank Road, etc. Second, data will be collected each year for several years into the future, providing a basis for comparison of several year’s worth of crash data, including the identification of crash trends over time.

Average Accident Rates have been calculated for each road segment to provide a relative measure of comparison of each roadway segment, factoring in traffic volumes, with other similar roads throughout Delaware and New Castle County (see Table 4). The calculated Average Accident Rates were compared to the Statewide and New Castle County crash rates for similar roadway segments of the same functional classifications. It should be noted that DelDOT was not able to provide 2011 Statewide and New Castle County crash rates; therefore, those columns were left blank. They will be updated in future reports when the data becomes available. In general, the



number of crashes has decreased between 2010 and 2011 at most of the locations being monitored. The exceptions were the curve between Summit Bridge and Bethel Church Road, where the number of crashes increased from 2 to 5, Bunker Hill Road between Choptank Road and US 301, where the number of crashes increased from 5 to 7, and SR 1 between Roth Bridge and US 13 / SR 1 Split (Tybouts Corner), where the number of crashes increased from 53 to 69.

Additional detail for these crashes, including the specific location, type and severity of each crash are summarized in Appendix C.

| US 301 Spur Road 2011 Monitoring Report | | | | | | | | | | | | | | | April 2012 | | | |
|---|-------------------|------------|---------------------|----------------|-------------------|------------|---------------------|----------------|-------------------|------------|---------------------|----------------|-------------------|------------|---------------------|----------------|--|--|
| Table 4: Average Accident Rate for Road Type (AART) (Accidents/ Million Vehicle Miles Traveled) | | | | | | | | | | | | | | | | | | |
| Site | 2010 | | | | 2011 | | | | 2012 | | | | 2013 | | | | | |
| | Number of Crashes | Crash Rate | Delaware Crash Rate | NCC Crash Rate | Number of Crashes | Crash Rate | Delaware Crash Rate | NCC Crash Rate | Number of Crashes | Crash Rate | Delaware Crash Rate | NCC Crash Rate | Number of Crashes | Crash Rate | Delaware Crash Rate | NCC Crash Rate | | |
| US 301 between Summit Bridge and SR 896 (Boyds Corner Rd) | 32 | 1.44 | 0.60 | 0.41 | 21 | 0.93 | | | | | | | | | | | | |
| The "curve" between Summit Bridge and Bethel Church Rd | 2 | | | | 5 | | | | | | | | | | | | | |
| The intersection of US 301 and Bethel Church Rd | 3 | | | | 3 | | | | | | | | | | | | | |
| US 301 between SR 896 and Peterson Rd | 50 | 1.78 | 1.14 | 1.17 | 27 | 0.94 | | | | | | | | | | | | |
| US 301 between Peterson Rd and Levels Rd | 22 | 3.06 | 2.37 | 2.54 | 16 | 2.18 | | | | | | | | | | | | |
| US 301 between Levels Rd and DE / MD State Line | 19 | 1.42 | 1.14 | 1.17 | 13 | 0.95 | | | | | | | | | | | | |
| Bethel Church Rd between US 301 and Choptank Rd | 6 | 6.05 | 1.58 | 2.37 | 2 | 1.30 | | | | | | | | | | | | |
| Choptank Rd between Bethel Church Rd and Bunker Hill Rd | 8 | 3.32 | 1.58 | 2.37 | 5 | 0.86 | | | | | | | | | | | | |
| Bunker Hill Rd between Choptank Rd and US 301 | 5 | 8.83 | 1.58 | 2.37 | 7 | 12.97 | | | | | | | | | | | | |
| SR 1 between Roth Bridge and US 13 / SR 1 Split (Tybouts Corner) | 53 | 0.41 | 0.90 | 0.90 | 69 | 0.52 | | | | | | | | | | | | |

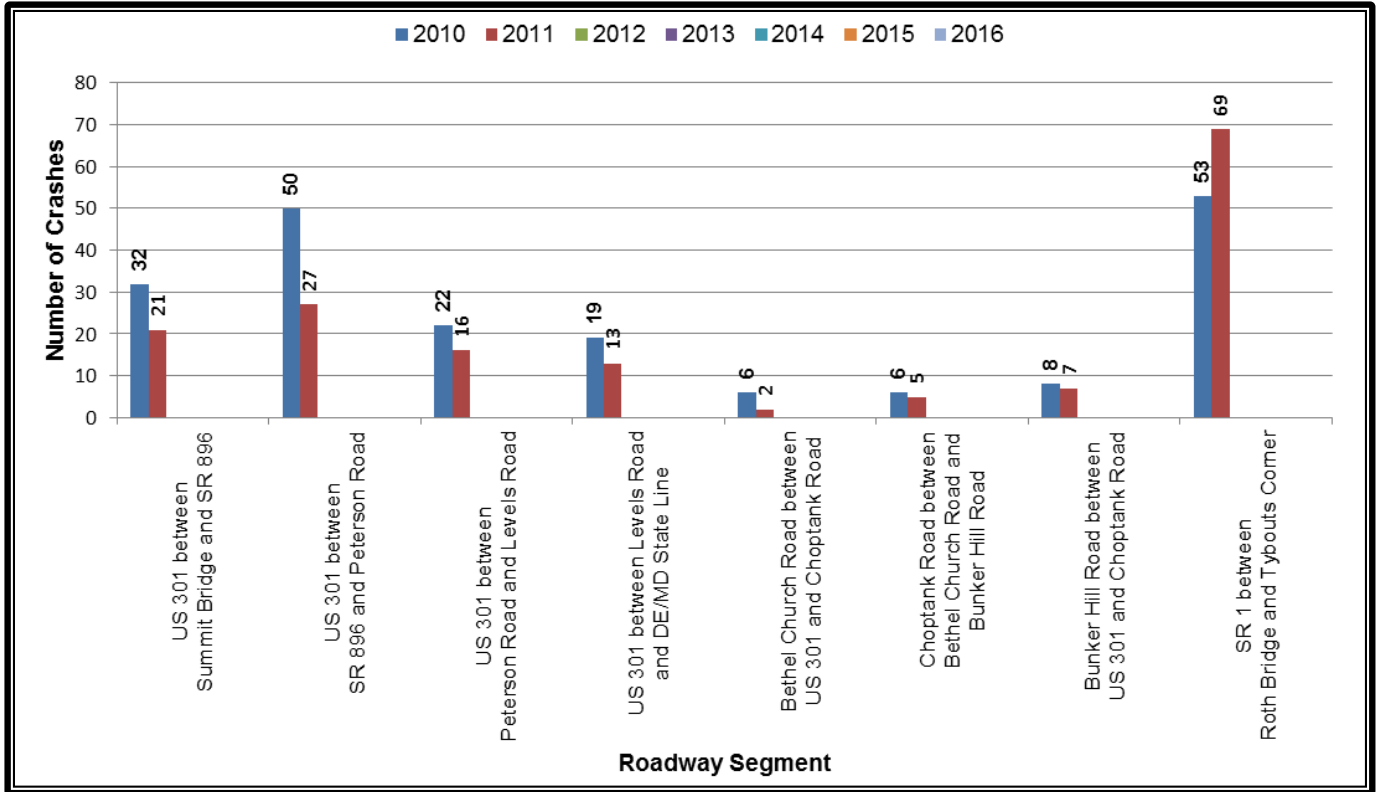


Figure 15: Comparison of Crashes for Select Roadways in the US 301 Corridor



Hazard Elimination Program

Roadway segments in the project area that are reported within DeIDOT’s Hazard Elimination Program (HEP) and High Risk Rural Roads Program (HRRRP) will be identified each year during the construction of US 301. These programs seek improvements focused on reducing the number of crashes at each location. A list of the HEP and HRRRP locations between 2007 and 2011 can be found in Tables 5 and 6.

| US 301 Spur Road 2011 Monitoring Report | | | April 2012 |
|--|--------------------------------------|---------------------------------------|--------------|
| Table 5: Hazard Elimination Program Locations – From 2006 to 2011 | | | |
| Site | Start Milepost | End Milepost | Year Studied |
| US 13 | 0.19 miles South of Greylag Road | 0.24 miles North of Boyds Corner Road | 2006 |
| US 301/SR 896 Summit Bridge Rd | 0.44 miles North of Beaston Rd | 0.56 miles South of Bethel Church Rd | 2007 |
| SR 299/Main Street | 0.25 miles West of Brick Mill Road | 0.24 miles East of Brick Mill Road | 2007 |
| SR 299/Main Street | 0.35 miles East of Brick Mill Road | 0.23 miles West of Brick Mill Road | 2009 |
| SR 1 | 1.36 miles South of SR 299 | 0.97 miles south of SR 299 | 2009 |
| SR 299/Main Street | US 301 | 0.11 miles East of Silver Lake Road | 2010 |
| US 301/SR 896 Summit Bridge Rd | 0.21 miles North of Springmill Drive | 0.25 miles North of Marl Pit Road | 2011 |

| US 301 Spur Road 2011 Monitoring Report | | | April 2012 |
|---|-----------------------------------|---|--------------|
| Table 6: High Risk Rural Roads Program Locations – from 2007 to 2011 | | | |
| Site | Start Milepost | End Milepost | Year Studied |
| Churchtown Rd | 0.11 miles East of Dickerson Lane | 0.33 miles West of SR 896/ Summit Bridge Rd | 2009 |

List of 2012 Hazard Elimination Program sites was also obtained from DeIDOT. The list showed the following two potential locations in the project area in the 2012 program:

- US 301 – between SR 896 (Boyds Corner Road) and 0.29 mile north of SR 896
- SR 299 – between 0.1 mile west of Corbit Alley and Fifth Street (northbound US 13)

It should be noted that the 2012 Hazard Elimination Program sites have not been finalized and the above listed sites may be removed in future revisions.



Incident Management

One of the regional benefits identified with the Spur Road is that it will provide an alternative north-south route for traffic should there be an incident that occurs on the following road segments:

- Existing US 301 between SR 299 and Bethel Church Road
- SR 896 (Boyds Corner Road) between US 301 and US 13
- Bethel Church Road between US 301 and Choptank Road
- SR 1 between Roth Bridge and I-95

For this monitoring program, DeIDOT will track the number of significant incidents that occur each year on these roads which result in detours that could have been accommodated more safely and efficiently on the Spur Road rather than on the local road network. Since 2004, there have been 56 incidents, including 10 in 2011, that have resulted in 170 or more hours of detours that could have utilized the Spur Road as an alternate detour route, thereby reducing impacts to the local roadway network. Additional detail for each significant incident that has occurred since 2004 are summarized in Appendix D.

Construction Projects

DeIDOT and the Town of Middletown will likely have several other active maintenance and construction projects occurring at various times during the duration of the US 301 Spur Monitoring Program that could affect the traffic data being collected. DeIDOT identified three (3) active construction projects in the US 301 project area in 2011, as shown in Table 7. As part of the program, DeIDOT will continue to monitor all active roadway construction projects in the US 301 project area from south of Middletown to approximately the Chesapeake and Delaware Canal.

| US 301 Spur Road 2011 Monitoring Report | | April 2012 | |
|--|--|--------------------------------|--|
| Table 7: Construction Activity in the US 301 Project Area | | | |
| Contract Number | Project Title | Start/End | Project Description |
| T200712003 | Jamisons Corner Road, SR 896 (Boyds Corner Road) to Hyetts Corner Road | 11-14-2011 / TBD | Reconstruct Jamisons Corner Road to improve to current standards |
| T201007101 | Cedar Lane Bridge Construction | September 2011 / December 2011 | Bridge construction / repair requiring Cedar Lane Road closure |
| - | Summit Bridge Construction | 4-26-2011 / TBD | Bridge repair work requiring daytime intermittent lane closures. |



Appendix A

Proposed Development for Southern New Castle County

| Plan Name | Status | TAZ | Non Residential | | Comments | UNBUILT_HH | UNBUILT_HH | UNITS_BUILT | UNBUILT_HH | UNITS_BUILT | % Complete (Residential) | County |
|----------------------------------|-------------|-----|-----------------|-----------|--|------------|------------|-------------|------------|-------------|-----------------------------|------------|
| | | | 2009 | 2010 | | 2010 | 2011 | 2011 | | | | |
| SPRING ARBOR AT South Ridge | Approved | 190 | 521 | 0 | | 416 | 195 | 326 | 188 | 333 | 64% | New Castle |
| THE PARKWAY AT SOUTH RIDGE | Approved | 190 | 446 | 0 | | 0 | 208 | 238 | 206 | 240 | 54% | New Castle |
| Kohl Properties | Approved | 190 | 0 | 0 | Future Target, other Retail | 0 | 0 | 0 | 0 | 0 | N/A | New Castle |
| Merrimack Commons | Approved | 190 | 78 | 0 | 55+ Community | 0 | 2 | 76 | 2 | 76 | 97% | New Castle |
| PARKSIDE | Approved | 191 | 492 | 0 | | 333 | 326 | 166 | 316 | 176 | 36% | New Castle |
| SHANNON COVE | Approved | 192 | 409 | 0 | FORMERLY CROMWELL | 343 | 311 | 99 | 301 | 108 | 26% | New Castle |
| CARTER FARM | Pending | 193 | 578 | 0 | S ZONING | 578 | 578 | 0 | 578 | 0 | 0% | New Castle |
| BIGGS FARM | Approved | 193 | 20 | 0 | OPEN SPACE OPTION 1 | 20 | 20 | 0 | 20 | 0 | 0% | New Castle |
| VILLAGE OF SCOTT RUN | Pending | 194 | 271 | 0 | AGE RESTRICTED COMMUNITY/In path of US 301 | 271 | 271 | 0 | 271 | 0 | 0% | New Castle |
| CANALVIEW AT CROSSLAND (South) | Approved | 194 | 432 | 0 | RZ TO ST, RESUB CROSSLAND | 405 | 401 | 31 | 346 | 86 | 20% | New Castle |
| WILLOW GROVE MILL Phase II | Approved | 197 | 192 | 58,700 | Shopping Center | 120 | 87 | 105 | 74 | 118 | 61% | New Castle |
| The Highlands | Approved | 210 | 1250 | 0 | | 1250 | 1250 | 0 | 1250 | 0 | 0% | New Castle |
| Westown Commercial | Approved | 212 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | N/A | New Castle |
| Middletown Auto Mall | Approved | 212 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | N/A | New Castle |
| ESTATES AT RIDGEFIELD | Expired | 213 | 16 | 0 | CONSERVATION DESIGN OPT | 16 | 16 | 0 | 16 | 0 | 0% | New Castle |
| The Highlands @ Backcreek | Approved | 213 | 42 | 0 | CONSERVATION OPT 1 | 42 | 42 | 0 | 42 | 0 | 0% | New Castle |
| WOODGRIFF FARMS | Expired | 214 | 4 | 0 | | 4 | 4 | 0 | 0 | 4 | 100% | New Castle |
| 449 ARMSTRONG CORNER | Expired | 214 | 0 | 24,000 | 0 | 0 | 0 | 0 | 0 | 0 | N/A | New Castle |
| CEDAR LANE | Approved | 216 | 78 | 0 | | 77 | 77 | 1 | 77 | 1 | 1% | New Castle |
| PLEASANTON | Expired | 216 | 434 | 0 | OPEN SPACE PLANNED OPTION | 434 | 434 | 0 | 434 | 0 | 0% | New Castle |
| Whitehall Phase 1 | Pending | 218 | 499 | 79,300 | Street grid to be built | 0 | 0 | 0 | 499 | 0 | 0% | New Castle |
| Promenade at Middletown | Approved | 266 | 273 | 145,000 | 273 Condos plus retail/ movie theatre | 273 | 273 | 0 | 273 | 0 | 0% | New Castle |
| Poole Property | Exploratory | 267 | 385 | 420,000 | 240: Office, 90K Retail, 90K Warehouse | 385 | 385 | 0 | 385 | 0 | 0% | New Castle |
| BOHEMIA MILL POND | Approved | 268 | 50 | 0 | | 22 | 22 | 28 | 22 | 28 | 56% | New Castle |
| COUNTRY ACRES II | Approved | 268 | 6 | 0 | | 6 | 6 | 0 | 6 | 0 | 0% | New Castle |
| BAYBERRY SOUTH | Approved | 274 | 1190 | 0 | | 1186 | 1186 | 4 | 1186 | 0 | 0% | New Castle |
| Boyd's Corner Farm | Pending | 274 | 116 | 146,800 | Mixed use, apts. and townhomes | 287 | 287 | 0 | 287 | 0 | 0% | New Castle |
| COUNTRY CLUB ESTS | Expired | 277 | 407 | 0 | OPEN SPACE OPTION | 407 | 407 | 0 | 407 | 0 | 0% | New Castle |
| WINCHELSEA | Pending | 279 | 513 | 0 | REZONED ST, S Mix of Detached, attached, TH and Apt; Open Space Plar | 513 | 513 | 0 | 513 | 0 | 0% | New Castle |
| ASBURY CHASE II | Approved | 279 | 47 | 0 | ALSO 1301320179 | 16 | 9 | 31 | 0 | 47 | 100% | New Castle |
| BAYBERRY TOWN CENTER | Pending | 279 | 0 | 559,204 | PART REZONED FROM S TO CR | 0 | 0 | 0 | 0 | 0 | N/A | New Castle |
| HYETTS CORNER | Approved | 280 | 143 | 0 | | 136 | 109 | 34 | 103 | 40 | 28% | New Castle |
| Windsor Commons at Hyetts Corner | Approved | 280 | 316 | 0 | | 149 | 149 | 0 | 0 | 0 | 0% | New Castle |
| BAYBERRY NORTH | Approved | 280 | 951 | 0 | OSP, TDR | 951 | 951 | 0 | 938 | 13 | 1% | New Castle |
| LOREWOOD ESTATES | Approved | 281 | 10 | 0 | | 5 | 4 | 6 | 4 | 6 | 60% | New Castle |
| Whitehall Phase 1 | Pending | 281 | 358 | 79,300 | Mixed HH's 48K Retail/Off, 840 pupil school | 0 | 358 | 0 | 358 | 0 | 0% | New Castle |
| TOWNSEND VILLAGE | Approved | 289 | 242 | 0 | | 158 | 147 | 95 | 143 | 99 | 41% | New Castle |
| Isaacs Subdivision | Exploratory | 289 | 87 | 0 | Exploratory | 87 | 87 | 0 | 87 | 0 | 0% | New Castle |
| Westown (Levels) | Approved | 291 | 1800 | 0 | | 1800 | 1800 | 0 | 1800 | 0 | 0% | New Castle |
| ESTATES AT ST ANNES | Approved | 292 | 466 | 0 | | 326 | 302 | 164 | 291 | 175 | 38% | New Castle |
| Gateway/Christiana Care | Pending | 294 | 0 | 64,000 | Hospital Site | 0 | 0 | 0 | 0 | 0 | N/A | New Castle |
| TOWNSEND VILLAGE | Approved | 300 | 336 | 0 | | 166 | 162 | 174 | 154 | 182 | 54% | New Castle |
| Townsend Acres | Approved | 300 | 49 | 0 | | 49 | 49 | 0 | 49 | 0 | 0% | New Castle |
| Gander Hill | Approved | 301 | 80 | 0 | 0 | 80 | 48 | 32 | 47 | 33 | 41% | New Castle |
| Middletown Bus. Park | Approved | 308 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | N/A | New Castle |
| DEATS FARM | Pending | 309 | 1381 | 867,000 | Mixed-Use; 267K Comm, 600K Office | 1381 | 1381 | 0 | 1381 | 0 | 0% | New Castle |
| SUMMIT CROSSING PH 2 | Approved | 310 | 0 | 5,500 | REZONING APPROVED | 0 | 0 | 0 | 0 | 0 | N/A | New Castle |
| ROTHWELL VILLAGE | Approved | 310 | 150 | 0 | OPSP OPTION 2 | 150 | 150 | 0 | 150 | 0 | 0% | New Castle |
| CHURCHTOWN MANOR | Pending | 312 | 273 | 0 | WF housing Detached, attached and TH | 273 | 273 | 0 | 273 | 0 | 0% | New Castle |
| TSAGANOS | Approved | 313 | 0 | 16,960 | REZONING TO CN | 0 | 0 | 0 | 0 | 0 | N/A | New Castle |
| Whitehall Phase 1 | Pending | 314 | 141 | 79,300 | Mixed HHs - Retail (15K S.F.) | 0 | 141 | 0 | 141 | 0 | 0% | New Castle |
| SCOTT RUN BUSINESS PK | Approved | 335 | 0 | 1,700,000 | | 0 | 0 | 1 | 0 | 0 | N/A | New Castle |
| OASIS AT CYPRESS RIDGE | Expired | 337 | 29 | 0 | 0 | 29 | 29 | 0 | 29 | 0 | 0% | New Castle |
| Browning Creek | UNKNOWN | 960 | 47 | 0.00 | | 47 | 47 | 0 | 47 | 0 | 0% | Cecil |
| John Harrison | UNKNOWN | 960 | 2 | 0.00 | | 2 | 2 | 0 | 2 | 0 | 0% | Cecil |
| John Curtis | UNKNOWN | 960 | 3 | 0.00 | | 3 | 3 | 0 | 3 | 0 | 0% | Cecil |
| Edgardo Nieves | UNKNOWN | 960 | 41 | 0.00 | | 41 | 41 | 0 | 41 | 0 | 0% | Cecil |
| Blossom View | UNKNOWN | 960 | 28 | 0.00 | | 28 | 28 | 0 | 28 | 0 | 0% | Cecil |
| Fulton Hills | UNKNOWN | 960 | 17 | 0.00 | | 17 | 17 | 0 | 17 | 0 | 0% | Cecil |
| Horse Trails at Worsell Manor | UNKNOWN | 960 | 27 | 0.00 | | 27 | 27 | 0 | 27 | 0 | 0% | Cecil |
| Sycamore Lane Nursery | UNKNOWN | 960 | 90 | 0.00 | | 90 | 90 | 0 | 90 | 0 | 0% | Cecil |
| Frisby Meadows | UNKNOWN | 960 | 79 | 0.00 | | 79 | 79 | 0 | 79 | 0 | 0% | Cecil |
| Glenn Maple | UNKNOWN | 970 | 7 | 0.00 | | 7 | 7 | 0 | 7 | 0 | 0% | Cecil |
| Butlers Crossing | UNKNOWN | 970 | 18 | 0.00 | | 18 | 18 | 0 | 18 | 0 | 0% | Cecil |
| Spirit Airpark | UNKNOWN | 970 | 5 | 0.00 | | 5 | 5 | 0 | 5 | 0 | 0% | Cecil |

15925 4245064.00

13508

13814

1611

14011

1765

Other Development In SNCC outside of the 301 Spur study area

| Plan Name | Status | TAZ | Proposed Units | Non Residential Sq. Ft. | Comments | UNBUILT_HH | UNBUILT_HH | UNITS_BUILT | UNBUILT_HH | UNITS_BUILT | % Complete (Residential) | County | | | |
|---------------------------|-------------|------|----------------|----------------------------|--|------------|------------|-------------|------------|-------------|-----------------------------|------------|--|-----|--|
| | | | | | | 2009 | 2010 | 2010 | 2011 | 2011 | | | | | |
| WARREN TRACT | Pending | 195 | 126 | 0 | OPEN SPACE OPTION I | 126 | 126 | 0 | 126 | 0 | 0% | New Castle | | | |
| ROBERTS FARM | Pending | 199 | 205 | 0 | | 205 | 205 | 0 | 205 | 0 | 0% | New Castle | | | |
| EAGLES NEST (EAST) | Expired | 200 | 14 | 0 | OPEN SPACE SUBDIVISION | 14 | 14 | 0 | 14 | 0 | 0% | New Castle | | | |
| SILVER MAPLE FARM | Pending | 271 | 300 | 0 | Increase from 204 to 300; Age-Rest housing; Open space Planned | 300 | 300 | 0 | 300 | 0 | 0% | New Castle | | | |
| PONDS AT ODESSA | Pending | 272 | 280 | 0 | OPEN SPACE PLANNED DEV | 280 | 278 | 2 | 278 | 2 | 1% | New Castle | | | |
| TIDES AT SILVER RUN | Expired | 272 | 241 | 0 | OPSP | 241 | 241 | 0 | 241 | 0 | 0% | New Castle | | | |
| AUGUSTINE CREEK, PHASE II | Approved | 275 | 177 | 0 | | 56 | 39 | 138 | 28 | 149 | 84% | New Castle | | | |
| ASHBY'S PLACE | Pending | 275 | 54 | 0 | OPSP OPTION 2 | 54 | 54 | 0 | 54 | 0 | 0% | New Castle | | | |
| HUBERS CROSSING | Pending | 275 | 0 | 119,385 | CR Zoning | 0 | 0 | 0 | 0 | 0 | N/A | New Castle | | | |
| PENFIELD/LESTER PROPERTY | Expired | 278 | 140 | 0 | | 140 | 140 | 0 | 140 | 0 | 0% | New Castle | | | |
| LIGHTHOUSE FARM | Pending | 283 | 54 | 0 | S ZONING | 54 | 54 | 0 | 54 | 0 | 0% | New Castle | | | |
| PORT PENN ASSEMBLAGE | Pending | 284 | 505 | 0 | OPSP OPTION | 505 | 505 | 0 | 505 | 0 | 0% | New Castle | | | |
| PRESERVE | Expired | 284 | 264 | 0 | SF DETACHED & TOWNHOMES | 264 | 264 | 0 | 264 | 0 | 0% | New Castle | | | |
| AUGUSTINE PRESERVE | Expired | 288 | 72 | 0 | PRE-X | 72 | 72 | 0 | 72 | 0 | 0% | New Castle | | | |
| Odessa Commons | Exploratory | 296 | 240 | 0 | Exploratory | 240 | 240 | 0 | 240 | 0 | 0% | New Castle | | | |
| ENCLAVE AT ODESSA | Approved | 302 | 205 | 0 | | 145 | 127 | 78 | 109 | 96 | 47% | New Castle | | | |
| ROBINSON FARMS | Pending | 302 | 476 | 0 | Workforce Housing | 476 | 476 | 0 | 476 | 0 | 0% | New Castle | | | |
| ODESSA NATIONAL | Approved | 302 | 761 | 0 | | 104 | 280 | 479 | 278 | 481 | 63% | New Castle | | | |
| FAIRWAYS AT ODESSA NAT'L | Approved | 303 | 70 | 0 | | 58 | 62 | 8 | 53 | 17 | 24% | New Castle | | | |
| GOLDSBOROUGH FARM | Approved | 303 | 144 | 0 | | 144 | 79 | 65 | 144 | 0 | 0% | New Castle | | | |
| SMITH FARM | EXPIRED | 303 | 328 | 0 | PRE-X | 328 | 328 | 0 | 328 | 0 | 0% | New Castle | | | |
| Appoquinimink School Dist | Approved | 304 | 0 | 459,323 | 4 School Complex; ELC and Aquatic Cntr. | 0 | 0 | 0 | 0 | 0 | N/A | New Castle | | | |
| BAYMONT FARMS | Approved | 321 | 157 | 0 | OPEN SPACE OPTION 1 | 157 | 157 | 0 | 156 | 1 | 1% | New Castle | | | |
| SUGAR LOAF FARMS | Approved | 321 | 28 | 0 | RESUBDIVISION OF OLD PLA | 7 | 7 | 21 | 7 | 21 | 75% | New Castle | | | |
| HIGH HOOK FARMS | Pending | 321 | 390 | 0 | | 390 | 390 | 0 | 390 | 0 | 0% | New Castle | | | |
| CLAYBOURNE | Approved | 322 | 25 | 0 | | 13 | 13 | 12 | 12 | 13 | 52% | New Castle | | | |
| SPRING OAKS | Pending | 336 | 247 | 0 | Townhouses | 247 | 247 | 0 | 247 | 0 | 0% | New Castle | | | |
| BROOKMILL ESTATES | Approved | 339 | 7 | 0 | | 7 | 7 | 0 | 7 | 0 | 0% | New Castle | | | |
| EAGLES NEST WEST | Expired | 339 | 25 | 0 | | 25 | 25 | 0 | 25 | 0 | 0% | New Castle | | | |
| CRANBERRY COVE | Withdrawn | 339 | 15 | 0 | SR ZONING | 15 | 15 | 0 | 15 | 0 | 0% | New Castle | | | |
| TOWNSEND MINI-STORAGE | Approved | 339 | 0 | 50,855 | | 0 | 0 | 0 | 0 | 0 | N/A | New Castle | | | |
| Watson Subdivision | Pending | 339 | 800 | 0 | | 800 | 800 | 0 | 800 | 0 | 0% | New Castle | | | |
| KRM Investments | Pending | 339 | 200 | 0 | | 200 | 200 | 0 | 200 | 0 | 0% | New Castle | | | |
| Sharoff Property | Approved | 339 | 254 | 0 | | 254 | 254 | 0 | 254 | 0 | 0% | New Castle | | | |
| | | 6804 | | 629563.00 | | 5921 | | 5999 | | 803 | | 6022 | | 780 | |



Appendix B
Residential Construction in the Town of Middletown



Appendix C
US 301 Corridor Crash Reports

| | Date | Time | Milepoint | Type | Severity | Direction |
|-------------------------------------|------------|-------|-----------|---------------------------|-----------|-----------|
| 1 | 2/12/2011 | 16:22 | 3.78 | Animal | Injury | SB |
| 2 | 1/9/2011 | 14:07 | 2.69 | Rear-end | PDO | SB/SB |
| 3 | 9/3/2011 | 21:14 | 1.99 | Debris in roadway | PDO | NB |
| 4 | 3/26/2011 | 20:37 | 1.97 | Rear-end | PDO | SB/SB |
| 5 | 5/8/2011 | 19:00 | 2.71 | Rear-end | Injury | SB/SB |
| 6 | 2/18/2011 | 15:26 | 3.43 | Rear-end | PDO | SB/SB |
| 7 | 11/21/2011 | 21:01 | 0.3 | Angle | PDO | SB/SB |
| 8 | 9/9/2011 | 20:43 | 0.3 | Left-turn | PDO | NB/SB |
| 9 | 10/22/2011 | 15:14 | 1.44 | Angle | PDO | NB |
| 10 | 11/21/2011 | 22:06 | 2.55 | ROR-HFO | PDO | EB/SB |
| 11 | 4/2/2011 | 21:17 | 1.94 | Sideswipe-same | PDO | SB |
| 12 | 5/18/2011 | 21:48 | 2.12 | Head-on | Injury | NB |
| 13 | 6/25/2011 | 14:58 | 0.16 | Sideswipe-same | PDO | SB |
| 14 | 11/30/2011 | 17:40 | 2.71 | Rear-end | PDO | SB/SB |
| 15 | 3/5/2011 | 23:33 | 1.41 | Sideswipe-same | PDO | NB/NB |
| 16 | 11/7/2011 | 18:50 | 3.47 | Objects in roadway | PDO | SB/SB/SB |
| 17 | 4/22/2011 | 20:03 | 2.15 | Rear-end | PDO | NB/NB/NB |
| 18 | 12/13/2011 | 2:12 | 2.12 | Rear-end | PDO | NB/NB/NB |
| 19 | 11/11/2011 | 13:00 | 1.8 | Sideswipe-same / Rear-end | Injury | SB/SB/SB |
| 20 | 8/30/2011 | 16:59 | 0.69 | Rear-end | Injury | NB/NB |
| 21 | 4/22/2011 | 11:42 | 0.01 | Rear-end | PDO | WBRT/WBRT |
| 2011 Total Number of Crashes | | | | | 21 | |

HFO: Hit-fixed-object

ROR: Run-off the Road

PDO: Property Damage Only

US 301 between Summit Bridge and SR896

A total of twenty-one (21) crashes were reported in 2011, and the following trends were identified:

- Five (24 percent) of the twenty-one reported crashes resulted in personal injury.
- Sixteen (76 percent) of the twenty-one report crashes resulted in property damage only.
- Nine (43 percent) of the reported crashes were rear-end crashes.
- Four (19 percent) of the reported crashes were sideswipe-same direction crashes.
- Two (9 percent) of the reported crashed were angle crashes.
- Two (9 percent) of the reported crashes involved debris in the roadway and a motor vehicle.
- One (5 percent) of the reported crashes was a head-on crash.
- One (5 percent) of the reported crashes was a left-turn crash.
- One (5 percent) of the reported crashes was a run-off-the-road crash.
- One (5 percent) of the reported crashes involved an animal in the roadway and a motor vehicle.

| | Date | Time | Milepoint | Type | Severity | Direction |
|-------------------------------------|------------|-------|-----------|--------------------|-----------|-----------------|
| 1 | 5/8/2011 | 12:00 | 4.35 | Angle | PDO | NBLT/NB |
| 2 | 11/18/2011 | 14:20 | 3.56 | Motorcycle | Injury | SB |
| 3 | 6/27/2011 | 18:03 | 0 | Angle | PDO | SB/EBLT |
| 4 | 2/6/2011 | 17:00 | 3.96 | ROR | PDO | NB |
| 5 | 12/5/2011 | 17:30 | 3.87 | ROR | PDO | SB/EBRT |
| 6 | 3/17/2011 | 15:45 | 3.87 | Angle | PDO | NB/EBLT |
| 7 | 4/24/2011 | 21:07 | 3.68 | Sideswipe-same | PDO | NB/NB |
| 8 | 9/1/2011 | 17:47 | 2.8 | Rear-end | Injury | SB/SB |
| 9 | 10/13/2011 | 9:38 | 2.24 | Rear-end | Injury | SB/SB |
| 10 | 7/28/2011 | 8:30 | 3.85 | ROR | PDO | SB |
| 11 | 10/18/2011 | 16:21 | 2.33 | Sideswipe-same | PDO | SB/SB |
| 12 | 9/17/2011 | 15:46 | 2.07 | Sideswipe-opposite | Injury | SB/SB/NB |
| 13 | 9/18/2011 | 1:23 | 4.08 | Sideswipe-same | PDO | SB/SB |
| 14 | 9/18/2011 | 14:55 | 1.86 | Rear-end | PDO | NB/NB |
| 15 | 10/23/2011 | 12:02 | 3.02 | Rear-end | Injury | NB/NB |
| 16 | 9/18/2011 | 17:53 | 1.7 | Rear-end | PDO | NB/NB |
| 17 | 7/1/2011 | 4:30 | 1.74 | ROR-HFO / Rollover | Injury | NB |
| 18 | 5/26/2011 | 7:33 | 1.83 | Rear-end | PDO | NB/NB |
| 19 | 7/1/2011 | 7:13 | 1.77 | Rear-end | PDO | NB/NB/NB |
| 20 | 8/15/2011 | 14:32 | 2.14 | Rear-end | PDO | NB/NB |
| 21 | 3/4/2011 | 0:23 | 2.26 | ROR-HFO | PDO | SB |
| 22 | 11/8/2011 | 18:09 | 2.75 | Rear-end | PDO | SB/SB |
| 23 | 11/12/2011 | 13:47 | 2.21 | Rear-end | PDO | SB/SB |
| 24 | 5/6/2011 | 18:20 | 0.98 | Rear-end | PDO | NB/NB |
| 25 | 10/21/2011 | 18:35 | 1.11 | Sideswipe-same | PDO | NB/NB |
| 26 | 11/9/2011 | 17:55 | 1.34 | Rear-end | Injury | SB/NBLT/NBLT/NB |
| 27 | 5/3/2011 | 15:59 | 1.65 | Rear-end | PDO | SB/SB |
| 2011 Total Number of Crashes | | | | | 27 | |

HFO: Hit-fixed-object

ROR: Run-off the Road

PDO: Property Damage Only

US 301 between SR896 and Peterson Road

A total of twenty-seven (27) crashes were reported in 2011, and the following trends were identified:

- Seven (26 percent) of the twenty-seven reported crashes resulted in personal injury.
- Twenty (74 percent) of the twenty-seven reported crashes resulted in property damage only.
- Thirteen (48 percent) of the reported crashes were rear-end crashes. Three (3) of the crashes occurred on US 301 near the Old School House Road intersection. Five (5) of the crashes occurred on US 301 near the Springmill Drive intersection. Two (2) of the crashes occurred on US 301 near the Marl Pit Road intersection. One (1) crash occurred on US 301 at the SR71 intersection.
- Five (18 percent) of the reported crashes were runoff-the-road crashes. Two (2) of the crashes occurred on northbound US301 and three (3) crashes occurred on southbound US 301.
- Four (15 percent) of the reported crashes were sideswipe-same direction crashes. One (1) of the crashes occurred on US 301 near the Boyds Corner Road intersection and one (1) of the crashes occurred on US 301 near the SR 299 intersection. One (1) of the crashes occurred US 301 near the Marl Pit Road intersection and one (1) of the crashes occurred on US 301 near the Peterson Road intersection.
- Three (11 percent) of the reported crashes were angle crashes. Two (2) of the crashes occurred at the Ash Boulevard intersection and one (1) crash occurred at the Broad Street intersection.
- One (4 percent) of the reported crashes was a sideswipe-opposite direction crash. The crash occurred on southbound US 301 near the Marl Pit Road intersection.
- One (4 percent) of the reported crashes involved a motorcycle. The crash occurred on southbound US 301 near the Peterson Road intersection.

| | Date | Time | Milepoint | Type | Severity | Direction |
|-------------------------------------|------------|-------|-----------|----------------|-----------|-----------|
| 1 | 5/9/2011 | 14:19 | 2.74 | Rear-end | PDO | SB/SB |
| 2 | 10/7/2011 | 16:32 | 2.88 | Angle | Injury | EBLT/SB |
| 3 | 5/21/2011 | 21:43 | 2.88 | Angle | Injury | WBLT/EB |
| 4 | 5/21/2011 | 23:30 | 2.98 | Head-on / DUI | Injury | NB/SB |
| 5 | 10/30/2011 | 13:23 | 3.14 | Rear-end | PDO | SB/SB |
| 6 | 5/26/2011 | 16:00 | 0 | Rear-end | Injury | NB/NB |
| 7 | 6/8/2011 | 15:36 | 2.38 | Sideswipe-same | PDO | NB/NB |
| 8 | 11/20/2011 | 3:05 | 2.37 | Rear-end | Injury | NB/NB |
| 9 | 7/9/2011 | 7:09 | 0.48 | Angle | Injury | WBLT/NB |
| 10 | 3/30/2011 | 21:45 | 2.38 | Rear-end | Injury | SB/SB/SB |
| 11 | 12/15/2011 | 21:37 | 2.88 | Sideswipe-same | Injury | SB/SB |
| 12 | 7/30/2011 | 21:15 | 2.89 | Sideswipe-same | PDO | SB/SB |
| 13 | 8/26/2011 | 7:04 | 0.73 | ROR-HFO / DUI | PDO | SB |
| 14 | 8/30/2011 | 10:40 | 2.38 | Rear-end | Injury | NB/NB |
| 15 | 9/1/2011 | 21:15 | 3.1 | Pedestrian | Fatality | NB |
| 16 | 7/5/2011 | 16:00 | 2.88 | Rear-end | PDO | NB/NB |
| 2010 Total Number of Crashes | | | | | 16 | |

HFO: Hit-fixed-object

ROR: Run-off the Road

PDO: Property Damage Only

US 301 between Peterson Road and Levels Road

A total of sixteen (16) crashes were reported in 2011, and the following trends were identified:

- One (6 percent) of the reported sixteen crashes resulted in a fatality. The fatality involved a pedestrian.
- Nine (56 percent) of the reported sixteen crashes resulted in personal injury.
- Six (38 percent) of the reported crashes resulted in property damage only.
- Two (2) of the reported crashes involved alcohol and resulted in DUI's.
- Seven (44 percent) of the reported crashes were rear-end crashes.
- Three (19 percent) of the reported crashes were angle crashes. All (3) of the crashes occurred on US 301 at the Diamond State Boulevard Intersection.
- Three (19 percent) of the reported crashes were sideswipe-same direction crashes. One (1) of the crashes occurred on northbound US 301 near the Merrimac Avenue Intersection and two (2) of the crashes occurred on southbound US 301 near the Diamond State Boulevard Intersection.
- One (6 percent) of the reported crashes involved a pedestrian. The crash resulted in a fatality and occurred on northbound US 301 near the Bunker Hill Road intersection.
- One (6 percent) of the reported crashes was a head-on crash. The crash involved a DUI and occurred on US 301 near Diamond State Boulevard.
- One (6 percent) of the reported crashes was a runoff-the-road crash. The crash involved a DUI and occurred on southbound US 301.

| | Date | Time | Milepoint | Type | Severity | Direction |
|-------------------------------------|------------|-------|-----------|-------------------|-----------|------------|
| 1 | 5/28/2011 | 22:47 | 0.25 | Rear-end / DUI | Injury | SB/SB |
| 2 | 7/2/2011 | 1:50 | 1.01 | Angle | PDO | NB/SB |
| 3 | 1/10/2011 | 17:58 | 1.45 | Rear-end | Injury | SB/SB/SB |
| 4 | 5/3/2011 | 11:33 | 0.52 | Angle | PDO | SB/WB |
| 5 | 3/5/2011 | 19:39 | 0.56 | Animal | PDO | NB |
| 6 | 4/7/2011 | 13:11 | 0.52 | Angle | Injury | SB/EBLT |
| 7 | 7/15/2011 | 12:21 | 1.22 | Rear-end | Injury | SB/NBLT/NB |
| 8 | 11/11/2011 | 6:22 | 1.22 | Rear-end | Injury | NB/NB |
| 9 | 7/6/2011 | 18:56 | 2.01 | Angle | Injury | SB/EBLT |
| 10 | 12/19/2011 | 18:33 | 2.01 | Debris in roadway | PDO | NB |
| 11 | 8/7/2011 | 17:17 | | ROR-HFO | PDO | SB |
| 12 | 2/27/2011 | 13:20 | 1.97 | ROR-HFO | PDO | SB |
| 13 | 8/19/2011 | 17:35 | 1.25 | Rear-end | PDO | NB/NB |
| 2011 Total Number of Crashes | | | | | 13 | |

HFO: Hit-fixed-object

ROR: Run-off the Road

PDO: Property Damage Only

US 301 between Levels Road and DE / MD State Line

A total of thirteen (13) crashes were reported in 2011, and the following trends were identified:

- Six (46 percent) of the thirteen reported crashes resulted in personal injury.
- Seven (54 percent) of the thirteen reported crashes resulted in property damage only.
- Five (38 percent) of the reported crashes were rear-end crashes. All of the crashes occurred at or near the Middle Neck Road intersection.
- Four (31 percent) of the reported crashes were angle crashes. One (1) of the crashes occurred at the Strawberry Lane intersection and one (1) crash occurred at the SR299 intersection. One (1) crash occurred at the Hooper Inc. access and one (1) crash occurred at the truck stop access.
- Two (15 percent) of the reported crashes were runoff-the-road type crashes. Both of the crashes involved a motor vehicle on southbound US 301.
- One (8 percent) crash involved a deer and a motor vehicle.
- One (8 percent) of the reported crashes involved debris in the roadway and a motor vehicle.

Crash Reports Summary

**Bethel Church Road between
US301 and Choptank Road**

4/12/2012

| | Date | Time | Milepoint | Type | Severity | Direction |
|-------------------------------------|-------------|-------------|------------------|-------------|-----------------|------------------|
| 1 | 1/13/2011 | 9:59 | 2.11 | ROR-HFO | PDO | NB |
| 2 | 4/22/2011 | 19:22 | 2.13 | ROR-HFO | PDO | NB |
| 2011 Total Number of Crashes | | | | | 2 | |

HFO: Hit-fixed-object

ROR: Run-off the Road

PDO: Property Damage Only

Bethel Church Road between US 301 and Choptank Road

A total of two (2) crashes were reported in 2011, and the following trends were identified:

- All of the reported crashes resulted in property damage only.
- All of the reported crashes were runoff-the-road (ROR) type crashes. Both of the ROR crashes involved northbound vehicles.

Crash Reports Summary

**Choptank Road between
Bethel Church Road and Bunker Hill Road**

4/12/2012

| | Date | Time | Milepoint | Type | Severity | Direction |
|-------------------------------------|-------------|-------------|------------------|-------------|-----------------|------------------|
| 1 | 4/7/2011 | 8:39 | 3.47 | Angle | PDO | SB/EB |
| 2 | 6/21/2011 | 3:32 | 1.48 | ROR-HFO | Fatality | NB |
| 3 | 4/22/2011 | 16:26 | 1.68 | Angle | PDO | SB/EB |
| 4 | 10/13/2011 | 18:12 | 0.07 | ROR-HFO | PDO | SB |
| 5 | 12/13/2011 | 7:24 | 0.71 | ROR-HFO | Injury | SB |
| 2011 Total Number of Crashes | | | | | 5 | |

HFO: Hit-fixed-object

ROR: Run-off the Road

PDO: Property Damage Only

Choptank Rd between Bethel Church Road and Bunker Hill Road

A total of five (5) crashes were reported in 2011, and the following trends were identified:

- One (20 percent) of the five reported crashes resulted in a fatality. The crash was a runoff-the-road type crash. The crash occurred on northbound Choptank Road approaching the Bohemia Mill Road intersection.
- One (20 percent) of the five reported crashes resulted in personal injury.
- Three (60 percent) of the reported crashes resulted in property damage only.
- Three (60 percent) of the reported crashes were runoff-the-road (ROR) type crashes. One (1) crash involved a northbound vehicle and two (2) crashes involved southbound vehicles.
- Two (40 percent) of the reported crashes were angle crashes. Both (2) of the crashes occurred on Choptank Road at the Churchtown Road intersection.

Crash Reports Summary

**Bunker Hill Road between
Choptank Road and US301**

4/12/2012

| | Date | Time | Milepoint | Type | Severity | Direction |
|-------------------------------------|-------------|-------------|------------------|-------------|-----------------|------------------|
| 1 | 3/21/2011 | 7:20 | 1.75 | ROR-HFO | PDO | WB |
| 2 | 10/14/2011 | 7:38 | 1.77 | Rear-end | Injury | |
| 3 | 6/8/2011 | 9:10 | 2.68 | ROR-HFO | PDO | EB |
| 4 | 1/3/2011 | 8:04 | 2.17 | Rear-end | Inury | EB/EB/EB |
| 5 | 9/18/2011 | 14:24 | 0 | Angle | Injury | SB/NBLT |
| 6 | 1/14/2011 | 12:08 | 2.54 | Angle | PDO | WB/SB |
| 7 | 2/3/2011 | 12:18 | 2.54 | Angle | PDO | EB/SB |
| 2011 Total Number of Crashes | | | | | 7 | |

HFO: Hit-fixed-object

ROR: Run-off the Road

PDO: Property Damage Only

Bunker Hill Road between Choptank Road and US 301

A total of Seven (7) crashes were reported in 2011, and the following trends were identified:

- Three (42 percent) of the five reported crashes resulted in personal injury.
- Four (58 percent) of the five reported crashes resulted in property damage only
- Three (42 percent) of the reported crashes were angle crashes. All (3) of the crashes occurred at the Sand Hill intersection.
- Two (29 percent) of the reported crashes were rear-end crashes. One (1) of the crashes occurred on Bunker Hill Road at the entrance to Appoquinimink High School and the other crash (1) occurred on Bunker Hill Road near Merrimac Avenue.
- Two (29 percent) of the reported crashes were runoff-the-road (ROR) type crashes. One (1) of the crashes involved an eastbound vehicle and one (1) of the crashes involved a westbound vehicle.

| | Date | Time | Milepoint | Type | Severity | Direction |
|----|------------|-------|-----------|-------------------|----------|-----------|
| 1 | 7/17/2011 | 21:31 | 5.87 | Sideswipe-same | PDO | SB/SB |
| 2 | 5/7/2011 | 9:55 | 5.4 | Sideswipe-same | PDO | SB/SB |
| 3 | 5/17/2011 | 19:07 | 5.8 | Sideswipe-same | PDO | SB/SB |
| 4 | 11/23/2011 | 16:31 | 5.83 | Sideswipe-same | PDO | SB/SB |
| 5 | 7/8/2011 | 15:13 | 5.81 | Rear-end | PDO | SB/SB |
| 6 | 7/25/2011 | 11:46 | 3.83 | Rear-end | PDO | SB/SB |
| 7 | 1/2/2011 | 4:42 | 4.12 | ROR-HFO | PDO | SB |
| 8 | 2/5/2011 | 8:10 | 3.02 | Sideswipe-same | PDO | NB/NB |
| 9 | 1/2/2011 | 4:30 | 6.49 | Debris in roadway | PDO | NB/NB |
| 10 | 6/8/2011 | 22:59 | 1.77 | ROR-HFO | PDO | NB |
| 11 | 8/30/2011 | 19:41 | 5.58 | ROR-HFO, Rollover | Injury | SB |
| 12 | 4/4/2011 | 9:07 | 7.74 | Rear-end | PDO | SB/SB |
| 13 | 1/6/2011 | 8:31 | 2.83 | Debris in roadway | PDO | NB |
| 14 | 6/19/2011 | 6:36 | 4.65 | ROR-HFO, Rollover | PDO | NB |
| 15 | 5/8/2011 | 0:43 | 0.36 | Sideswipe-same | PDO | NB/NB |
| 16 | 11/13/2011 | 4:00 | 1.18 | ROR-HFO | PDO | NB |
| 17 | 2/10/2011 | 11:24 | 2.03 | Sideswipe-same | PDO | NB/NB |
| 18 | 9/6/2011 | 11:08 | 6.6 | ROR-HFO | PDO | SB |
| 19 | 10/10/2011 | 17:11 | 7.82 | Sideswipe-same | PDO | SB/SB |
| 20 | 6/26/2011 | 22:50 | 0.83 | ROR-HFO | PDO | SB |
| 21 | 1/11/2011 | 20:32 | 3.3 | ROR-HFO | PDO | NB |
| 22 | 4/10/2011 | 19:27 | 3.7 | ROR-HFO | PDO | SB |
| 23 | 2/10/2011 | 19:33 | 4.02 | ROR-HFO | Injury | SB |
| 24 | 1/11/2011 | 22:05 | 5.38 | Sideswipe-same | PDO | NB/NB |
| 25 | 7/25/2011 | 7:48 | 2.82 | ROR-HFO, Rollover | PDO | NB |
| 26 | 6/28/2011 | 9:51 | 2.74 | Sideswipe-same | Injury | NB/NB |
| 27 | 1/14/2011 | 14:00 | 4.89 | ROR-HFO | Injury | NB |
| 28 | 5/23/2011 | 15:04 | 4.53 | ROR-HFO | Injury | NB |
| 29 | 4/12/2011 | 5:55 | 2.37 | Rear-end | Injury | NB/NB |
| 30 | 9/19/2011 | 18:00 | 4.9 | Rear-end | PDO | SB/SB |
| 31 | 2/13/2011 | 16:56 | 3.9 | ROR-HFO | PDO | NB |
| 32 | 1/18/2011 | 0:09 | 1.08 | ROR-HFO | PDO | NB |
| 33 | 7/1/2011 | 10:30 | 1.11 | Debris in roadway | PDO | NB |
| 34 | 5/25/2011 | 14:46 | 4.44 | Animal, ROR-HFO | PDO | SB |
| 35 | 11/1/2011 | 14:10 | 3.34 | Debris in roadway | PDO | NB |
| 36 | 1/18/2011 | 5:34 | 3.09 | Sideswipe-same | PDO | NB/NB |
| 37 | 11/8/2011 | 14:08 | 1.21 | ROR-HFO | Injury | NB |
| 38 | 8/26/2011 | 14:25 | 5.74 | Sideswipe-same | PDO | SB/SB |
| 39 | 7/8/2011 | 13:29 | 6.06 | Sideswipe-same | PDO | SB/SB |
| 40 | 8/27/2011 | 13:25 | 5.3 | ROR-HFO | PDO | SB |
| 41 | 5/25/2011 | 21:23 | 7.91 | ROR-HFO | PDO | SB |
| 42 | 11/12/2011 | 6:00 | 2.49 | Animal | PDO | NB |
| 43 | 7/8/2011 | 18:45 | 5.32 | Sideswipe-same | PDO | NB/NB/NB |
| 44 | 2/17/2011 | 3:27 | 5.69 | Sideswipe-same | PDO | SB/SB |
| 45 | 7/8/2011 | 19:25 | 5.34 | ROR-HFO | PDO | NB |

| | Date | Time | Milepoint | Type | Severity | Direction |
|-------------------------------------|------------|-------|-----------|-------------------|-----------|-----------|
| 46 | 12/9/2011 | 2:31 | 4.19 | ROR-HFO | Injury | SB |
| 47 | 5/30/2011 | 12:51 | | ROR-HFO | PDO | NB |
| 48 | 1/18/2011 | 5:37 | 2.19 | ROR-HFO | PDO | SB |
| 49 | 12/9/2011 | 5:48 | 4.37 | ROR-HFO | PDO | NB |
| 50 | 2/22/2011 | 5:33 | 3.09 | ROR-HFO | PDO | NB |
| 51 | 1/18/2011 | 7:14 | 2.03 | Sideswipe-same | PDO | SB/SB |
| 52 | 12/12/2011 | 15:40 | 4.9 | ROR-HFO | Injury | NB |
| 53 | 2/22/2011 | 6:26 | 2.22 | ROR-HFO | Injury | NB |
| 54 | 1/18/2011 | 7:31 | 7.9 | Rear-end | PDO | SB/SB |
| 55 | 2/22/2011 | 8:27 | 5.66 | Rear-end | PDO | SB/SB |
| 56 | 1/18/2011 | 7:40 | 5.92 | Sideswipe-same | PDO | SB/SB |
| 57 | 1/18/2011 | 0:30 | 0 | Sideswipe-same | PDO | SB/SB |
| 58 | 2/25/2011 | 13:38 | 1.05 | ROR-HFO | Injury | NB |
| 59 | 2/26/2011 | 15:11 | 1.33 | ROR-HFO | PDO | NB |
| 60 | 1/20/2011 | 17:34 | 3.39 | Debris in roadway | PDO | SB |
| 61 | 3/2/2011 | 19:35 | 8.3 | Rear-end | PDO | SB/SB |
| 62 | 1/24/2011 | 18:28 | 7.5 | ROR-HFO | PDO | SB |
| 63 | 3/15/2011 | 19:33 | 2.87 | Head-on | Injury | NB/SB |
| 64 | 1/26/2011 | 7:31 | 6.89 | Rear-end | PDO | SB/SB |
| 65 | 3/16/2011 | 11:45 | 5.24 | ROR-HFO | PDO | NB/NB |
| 66 | 1/27/2011 | 5:21 | 8.47 | Sideswipe-same | PDO | SB/SB |
| 67 | 2/1/2011 | 6:03 | 8.07 | ROR-HFO | Injury | SB |
| 68 | 9/26/2011 | 7:41 | 4.6 | Rear-end | PDO | NB/NB |
| 69 | 10/7/2011 | 0:41 | 3.01 | ROR-HFO | Injury | NB |
| 2011 Total Number of Crashes | | | | | 69 | |

HFO: Hit-fixed-object

ROR: Run-off the Road

PDO: Property Damage Only

SR1 between Roth Bridge and Tybouts Corner

A total of sixty-nine (69) crashes were reported in 2011, and the following trends were identified:

- Fourteen (20 percent) of the sixty-nine reported crashes resulted in personal injury.
- Fifty-five (80 percent) of the sixty-nine reported crashes resulted in property damage only.
- Thirty-two (46 percent) of the reported crashes were runoff-the-road type crashes. Nineteen (19) (ROR) crashes involved northbound vehicles and twelve (12) crashes involved southbound vehicles.
- Nineteen (28 percent) of the reported crashes were sideswipe-same direction. Seven (7) crashes involved northbound vehicles and twelve (12) crashes involved southbound vehicles.
- Ten (15 percent) of the reported crashes were rear-end crashes.
- Five (7 percent) of the reported crashes involved road debris and a motor vehicle.
- Two (3 percent) of the reported crashes involved a deer and a motor vehicle.
- One (1 percent) of the reported crashes was a head-on crash.

| | Date | Time | Milepoint | Type | Severity | Direction |
|-------------------------------------|------------|-------|-----------|-------------------|----------|-----------|
| 1 | 9/3/2011 | 21:14 | 1.99 | Debris in roadway | PDO | NB |
| 2 | 4/2/2011 | 21:17 | 1.94 | Sideswipe-same | PDO | SB |
| 3 | 5/18/2011 | 21:48 | 2.12 | Head-on | Injury | NB |
| 4 | 11/11/2011 | 13:00 | 1.8 | Sideswipe-same | Injury | SB/SB/SB |
| 5 | 11/21/2011 | 22:06 | 2.55 | ROR-HFO | PDO | EB/SB |
| 2011 Total Number of Crashes | | | | | 5 | |

HFO: Hit-fixed-object

ROR: Run-off the Road

PDO: Property Damage Only

US 301 between Summit Bridge and Bethel Church Road

A total of five (5) crashes were reported in 2011, and the following trends were identified:

- Two (40 percent) of the five reported crashes resulted in personal injury.
- Three (60 percent) of the four reported crashes resulted in property damage only.
- Two (40 percent) of the reported crashes were sideswipe-same direction crashes. Both crashes involved southbound vehicles.
- One (20 percent) crash was a head-on crash.
- One (20 percent) crash was a run-off-the-road type crash. The crash involved a southbound vehicle.
- One (20 percent) crash involved debris in the roadway and a motor vehicle.

Crash Reports Summary

US301 @
Bethel Church Road

4/12/2012

| | Date | Time | Milepoint | Type | Severity | Direction |
|-------------------------------------|------------|-------|-----------|----------|----------|-----------|
| 1 | 3/26/2011 | 20:37 | 1.97 | Rear-end | PDO | SB/SB |
| 2 | 4/22/2011 | 22:03 | 2.15 | Rear-end | PDO | NB/NB/NB |
| 3 | 12/13/2011 | 17:24 | 2.12 | Rear-end | PDO | NB/NB/NB |
| 2011 Total Number of Crashes | | | | | | 3 |

HFO: Hit-fixed-object

ROR: Run-off the Road

PDO: Property Damage Only

US 301 at Bethel Church Road

A total of three (3) crashes were reported in 2011, and the following trends were identified:

- All of the reported crashes resulted in property damage only.
- All of the reported crashes were rear-end crashes. Two (2) of the crashes involved northbound vehicles and one (1) crash involved southbound vehicles.



Appendix D

**Significant Incidents on SR 1 and
Other Roadways in the Middletown Region**

**Significant Incidents on SR 1 that Could have Utilized the Spur Road
to Accommodate Detoured Traffic – 2004 through present**

| Date | Location | Event | Duration | Roads used for Detour |
|-------------|--|---|-----------------|----------------------------------|
| 5/14/2004 | SR 1 at SR 273 | Property Damage Crash - SB SR 1 Left Lane Closed | 1.5 Hours | Unknown |
| 9/24/2004 | SR 1 South of SR 273 | Personal Injury Crash - SB SR 1 Closed | 1 Hours | Unknown |
| 4/3/2005 | SR 1 at SR 72 | Personal Injury Crash - Right and Center Lane Closed on SB SR 1 | 0.5 Hour | Unknown |
| 4/14/2005 | SR 1 South of US 40 | Dump Truck Rolled Over – SB SR 1 Closed | 3 Hours | Unknown |
| 5/16/2005 | NB SR 1 at Christiana Mall Ramp | Vehicle Fire - NB SR 1 Closed | 1 Hour | Unknown |
| 7/1/2005 | SB SR 1 South of SR 273 | Possible Fatal Crash / Entrapment - SB SR 1 Closed | 2 Hours | Unknown |
| 8/7/2006 | SB SR 1 at Christiana Mall Ramp | Tractor Trailer Rolled Over - SB SR 1 Closed | 7.5 Hours | Unknown |
| 11/30/2006 | NB SR 1 at Tybouts Corner | Personal Injury Crash - NB SR 1 Closed | 1 Hour | Unknown |
| 1/31/2007 | SB SR 1 North of School House Road | Property Damage Crash – SB Left and Center Lane and NB Left Lane on SR 1 Closed | 1.5 Hours | Unknown |
| 2/14/2007 | NB SR 1 South of SR 72 | Tractor Trailer Rolled Over - NB SR 1 Closed at SR 896 | 6.5 Hours | Unknown |
| 3/7/2007 | NB SR 1 at Christiana Mall | Multiple (6) Vehicle Personal Injury Crash - NB SR 1 Closed | 1.5 Hours | US 13, SR 72, SR 273 and I-95 |
| 5/14/2007 | SB SR 1 on Roth Bridge | Personal Injury Crash - SB SR 1 Closed | 1 Hour | Unknown |
| 6/27/2007 | SB SR 1 North of Roth Bridge | Tractor Trailer Rolled Over – SB SR 1 Closed | 3 Hours | US 13 and SR 72 |
| 9/2/2007 | NB SR 1 near Hyetts Corner Road | Personal Injury Crash - NB SR 1 Closed | 2 Hours | Unknown |
| 9/7/2007 | SR 1 at SR 72 | Vehicle Fire & Clean-up – SR 1 Closed at SR 72 | 3 Hours | SR 72 |
| 11/29/2007 | SB SR 1 North of Roth Bridge | Fluid Spilled on Road - SB SR 1 Right Lane and Shoulder Closed | 1 Hour | Unknown |
| 1/29/2008 | SB SR 1, South of SR 273 | Property Damage Crash/ Rollover – SB SR 1 Left Lane Closed | 1.5 Hours | Unknown |
| 2/10/2008 | SB SR 1 at Christiana Mall Ramp | Personal Injury Crash - Left Lanes Closed on NB & SB SR 1 s/o I-95 | 3 Hours | Unknown |
| 2/12/2008 | SR 1 near I-95 | DSP Fatal Accident Reconstruction – Partial Closure | 9.5 Hours | Unknown |
| 2/12/2008 | SR 1 between US 40 and SR 273 | DSP Fatal Accident Reconstruction - Partial Closure | 12 Hours | Unknown |
| 4/2/2008 | SR 1 at SR 273 | Possible Fatal Crash involving 3 vehicles - NB SR 1 and SB SR 1 Ramp to SR 273 Closed | 3 Hours | US 13 |
| 6/17/2008 | NB SR 1 at SR 273 | Possible Fatal Crash / damaged bridge – NB SR 1 Closed | 3 Hours | Unknown |
| 3/30/2009 | NB SR 1 North of SR 72 | Personal Injury Crash involving 4 vehicles – Partial closure | 2 Hours | US 13 |
| 4/5/2009 | SB SR 1 Ramp at Lorewood Grove Road | Tractor Trailer Rolled Over - SB SR 1 Closed | 9 Hours | SR 9, US13 and SR 72 |

**Significant Incidents on SR 1 that Could have Utilized the Spur Road
to Accommodate Detoured Traffic – 2004 through present (Continued)**

| Date | Location | Event | Duration | Roads used for Detour |
|--------------|---|---|--------------------|------------------------------|
| 6/29/2009 | SR 1 at SR 273 | Truck Rolled Over - SB SR 1 Closed | 2.5 Hours | Unknown |
| 8/2/2009 | SR 1 at SR 273 | Personal Injury Crash - SB SR 1 Closed at SR 273 | 2.5 Hours | Unknown |
| 8/6/2009 | SR 1 on Roth Bridge | Fatal Crash/ Vehicle Fire – SB SR 1 Closed | Unknown | Unknown |
| 4/5/2010 | SB SR 1, South of SR 71 | Personal Injury Crash - SB SR 1 Closed | Unknown | Unknown |
| 4/5/2010 | NB SR 1 at Christiana Mall | Personal Injury Crash – Partial Closure on NB SR 1 | Unknown | Unknown |
| 5/27/2010 | NB SR 1, North of US 40 | Personal Injury Crash – NB SR 1 at US 40 Closed | Unknown | Unknown |
| 3/17/2011 | NB SR 1 at Biddles Toll Plaza | EZ Pass Lane Closure | 7.5 Hours | US 13 / Others |
| 4/8/2011 | NB SR 1 at Christiana Mall Ramp | Jack-Knifed Tractor-Trailer | 1 Hour | SR 273 |
| 6/2/2011 | SB SR 1 at Biddles Toll Plaza | EZ Pass Lane Closure | 7.5 Hours | US 13 / Others |
| 7/17/2011 | SR 1 near Christiana Mall | Fatal Crash in the work zone - Both NB & SB SR 1 Closed | 3 Hours | SR 273 |
| 9/29/2011 | NB SR 1 near SR 72 Ramps | Truck Fire - NB SR 1 Closed | 1.5 Hours | Unknown |
| 10/27/2011 | SB SR 1 over Drawyers Creek Overpass | Personal Injury / Possible Fatal Crash – NB & SB SR 1 Closed | 3 Hours | Unknown |
| 10/27/2011 | NB SR 1 at Christiana Mall Ramp | Personal Injury Crash – NB SR 1 On-Ramp to I-95 Closed | 12.5 Hours | SR 273 |
| 12/12/2011 | NB SR 1 at Tybouts Corner | Vehicle Crash – NB SR 1 Closed | 1 Hour | US 13 |
| 11/8/2011 | NB SR 1 on Roth Bridge | Vehicle Crash – NB SR 1 Closed | 1.5 Hours | US 13 / Others |
| Total | | | 123.5 Hours | |

**Significant Incidents in the Middletown Region that Could have Utilized
the Spur Road to Accommodate Detoured Traffic – 2004 through present**

| Date | Location | Event | Duration | Roads used for Detour |
|--------------|--|---|-----------------|---|
| 11/29/2004 | Bethel Church Rd\oad | Personal Injury Crash - SB US 301 Left Lane and Left-turn Lane Closed | 1 Hour | Right lane and shoulder on US 301 |
| 9/3/2005 | US 301 at SR 71 | Property Damage Crash - US 301 SB and SR 71 NB Left-turn Lane Closed | 1 Hour | Access to Middletown Village back on to US 301 |
| 1/30/2006 | SB US 301 at Bethel Church Road | Property Damage Crash & Fuel Spill - SB US 301 Closed | 7 Hours | Bethel Church Road, Choptank Road and Churchtown Road |
| 8/24/2006 | US 301 North of Churchtown Road | Property Damage Crash – US 301 Closed | 1 Hour | Unknown |
| 12/25/2006 | SB US 301 South of Summit Bridge | Personal Injury Crash - SB US 301 Closed | 1 Hour | Shoulder Lane on SB US 301 |
| 7/26/2007 | US 301 South of Summit Bridge | Fatal Crash – US 301 Closed | 3 Hours | SR 1 and US 13 |
| 10/20/2007 | Bethel Church Road | Fatal Crash – Bethel Church Road Closed at US 301 | 3.5 Hours | Unknown |
| 11/2/2007 | US 301 at Bethel Church Road | Damaged Pole - Bethel Church Road Closed | 7 Hours | Unknown |
| 1/5/2008 | US 301 at Bethel Church Road | Damaged Pole - Bethel Church Road Closed | 5 Hours | Unknown |
| 5/30/2008 | SB US 301 at SR 71 | Personal Injury Crash - SB US 301 Closed | 1 Hour | SR 71 |
| 6/16/2008 | SR 896 East of Jamisons Corner Road | Barn Fire – SR 896 Closed | 3.5 Hours | Unknown |
| 9/30/2008 | Old School House Road and US 301 | Personal Injury Crash – Old School House Road Closed at US 301 | 1.5 Hours | Unknown |
| 12/1/2009 | US 301 and Churchtown Road | Personal Injury Crash – Details Unknown | 1 Hour | Unknown |
| 12/3/2009 | US 301 at SR 71 | Roadway Flooding - Details Unknown | Unknown | Unknown |
| 12/11/2009 | SB US 301 near Summit Bridge | Fatal Crash - Full Closure | 3 Hours | Unknown |
| 12/28/2009 | US 301 North of SR 299 | Property Damage Crash – US 301 Closed between SR 299 & SR 71 | 5 Hours | Unknown |
| 9/26/2011 | SR 299 near Clever Farms Road | Vehicle Crash – SR 299 Closed (Direction Unknown) | 2.5 Hours | Unknown |
| Total | | | 47 Hours | |



Appendix E
Peak Hour Traffic Volumes,
SYNCHRO Capacity Reports and
Delay Study Results

Rummel, Klepper & Kahl, LLP

Consulting Engineers
81 Mosher St
Baltimore MD 21217

File Name : US301-SR896
Site Code : 00000000
Start Date : 10/5/2011
Page No : 8

| Start Time | US 301 From North | | | | | US 301 From South | | | | | Boyd's Corner Rd (SR 896) From East | | | | | Churchtown Rd From West | | | | | Int. Total |
|--|----------------------|------|-------|------|------------|----------------------|------|-------|------|------------|--|------|-------|------|------------|----------------------------|------|-------|------|------------|------------|
| | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | |
| Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:15 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:15 AM | 75 | 111 | 4 | 0 | 190 | 3 | 217 | 45 | 0 | 265 | 29 | 9 | 78 | 0 | 116 | 17 | 34 | 2 | 0 | 53 | 624 |
| 07:30 AM | 41 | 114 | 5 | 0 | 160 | 1 | 220 | 35 | 0 | 256 | 33 | 7 | 93 | 0 | 133 | 17 | 37 | 4 | 0 | 58 | 607 |
| 07:45 AM | 58 | 121 | 3 | 0 | 182 | 4 | 164 | 48 | 0 | 216 | 36 | 3 | 72 | 0 | 111 | 6 | 27 | 4 | 0 | 37 | 546 |
| 08:00 AM | 42 | 111 | 6 | 0 | 159 | 3 | 199 | 45 | 0 | 247 | 31 | 4 | 76 | 0 | 111 | 7 | 27 | 4 | 0 | 38 | 555 |
| Total Volume | 216 | 457 | 18 | 0 | 691 | 11 | 800 | 173 | 0 | 984 | 129 | 23 | 319 | 0 | 471 | 47 | 125 | 14 | 0 | 186 | 2332 |
| % App. Total | 31.3 | 66.1 | 2.6 | 0 | | 1.1 | 81.3 | 17.6 | 0 | | 27.4 | 4.9 | 67.7 | 0 | | 25.3 | 67.2 | 7.5 | 0 | | |
| PHF | .720 | .944 | .750 | .000 | .909 | .688 | .909 | .901 | .000 | .928 | .896 | .639 | .858 | .000 | .885 | .691 | .845 | .875 | .000 | .802 | .934 |

| | | | | | | | | | | | | | | | | | | | | | |
|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|------|------|
| Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 05:00 PM | | | | | | | | | | | | | | | | | | | | | |
| 05:00 PM | 69 | 192 | 22 | 0 | 283 | 5 | 150 | 40 | 0 | 195 | 79 | 36 | 41 | 0 | 156 | 10 | 6 | 4 | 0 | 20 | 654 |
| 05:15 PM | 81 | 218 | 14 | 0 | 313 | 4 | 149 | 49 | 0 | 202 | 67 | 25 | 59 | 0 | 151 | 14 | 7 | 4 | 0 | 25 | 691 |
| 05:30 PM | 66 | 215 | 14 | 0 | 295 | 3 | 133 | 48 | 0 | 184 | 64 | 30 | 69 | 0 | 163 | 16 | 16 | 4 | 0 | 36 | 678 |
| 05:45 PM | 75 | 172 | 21 | 0 | 268 | 4 | 129 | 45 | 0 | 178 | 73 | 30 | 43 | 0 | 146 | 14 | 16 | 4 | 0 | 34 | 626 |
| Total Volume | 291 | 797 | 71 | 0 | 1159 | 16 | 561 | 182 | 0 | 759 | 283 | 121 | 212 | 0 | 616 | 54 | 45 | 16 | 0 | 115 | 2649 |
| % App. Total | 25.1 | 68.8 | 6.1 | 0 | | 2.1 | 73.9 | 24 | 0 | | 45.9 | 19.6 | 34.4 | 0 | | 47 | 39.1 | 13.9 | 0 | | |
| PHF | .898 | .914 | .807 | .000 | .926 | .800 | .935 | .929 | .000 | .939 | .896 | .840 | .768 | .000 | .945 | .844 | .703 | 1.000 | .000 | .799 | .958 |

Rummel, Klepper & Kahl, LLP

Consulting Engineers
81 Mosher St
Baltimore MD 21217

File Name : US301-Armstrong Corner
Site Code : 00000000
Start Date : 10/4/2011
Page No : 9

| Start Time | US 301 From North | | | | | US 301 From South | | | | | Marl Pit Rd From East | | | | | Armstrong Corner Rd From West | | | | | Int. Total |
|--|----------------------|------|-------|------|------------|----------------------|------|-------|------|------------|--------------------------|------|-------|------|------------|----------------------------------|------|-------|------|------------|------------|
| | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | |
| Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:00 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:00 AM | 11 | 145 | 2 | 0 | 158 | 4 | 209 | 28 | 0 | 241 | 40 | 14 | 37 | 0 | 91 | 2 | 10 | 3 | 0 | 15 | 505 |
| 07:15 AM | 17 | 121 | 2 | 0 | 140 | 6 | 217 | 32 | 0 | 255 | 31 | 5 | 34 | 0 | 70 | 5 | 24 | 6 | 0 | 35 | 500 |
| 07:30 AM | 17 | 125 | 0 | 0 | 142 | 3 | 209 | 32 | 0 | 244 | 35 | 9 | 48 | 0 | 92 | 1 | 20 | 4 | 0 | 25 | 503 |
| 07:45 AM | 23 | 157 | 2 | 0 | 182 | 6 | 199 | 26 | 0 | 231 | 40 | 8 | 25 | 0 | 73 | 0 | 12 | 4 | 0 | 16 | 502 |
| Total Volume | 68 | 548 | 6 | 0 | 622 | 19 | 834 | 118 | 0 | 971 | 146 | 36 | 144 | 0 | 326 | 8 | 66 | 17 | 0 | 91 | 2010 |
| % App. Total | 10.9 | 88.1 | 1 | 0 | | 2 | 85.9 | 12.2 | 0 | | 44.8 | 11 | 44.2 | 0 | | 8.8 | 72.5 | 18.7 | 0 | | |
| PHF | .739 | .873 | .750 | .000 | .854 | .792 | .961 | .922 | .000 | .952 | .913 | .643 | .750 | .000 | .886 | .400 | .688 | .708 | .000 | .650 | .995 |

| | | | | | | | | | | | | | | | | | | | | | |
|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 05:00 PM | | | | | | | | | | | | | | | | | | | | | |
| 05:00 PM | 29 | 223 | 3 | 0 | 255 | 13 | 169 | 44 | 0 | 226 | 64 | 15 | 21 | 0 | 100 | 2 | 3 | 5 | 0 | 10 | 591 |
| 05:15 PM | 39 | 250 | 3 | 0 | 292 | 5 | 165 | 44 | 0 | 214 | 53 | 13 | 24 | 0 | 90 | 1 | 13 | 8 | 0 | 22 | 618 |
| 05:30 PM | 41 | 256 | 1 | 0 | 298 | 6 | 154 | 48 | 0 | 208 | 50 | 15 | 17 | 0 | 82 | 2 | 10 | 4 | 0 | 16 | 604 |
| 05:45 PM | 41 | 229 | 8 | 0 | 278 | 9 | 153 | 53 | 0 | 215 | 65 | 12 | 13 | 0 | 90 | 1 | 10 | 6 | 0 | 17 | 600 |
| Total Volume | 150 | 958 | 15 | 0 | 1123 | 33 | 641 | 189 | 0 | 863 | 232 | 55 | 75 | 0 | 362 | 6 | 36 | 23 | 0 | 65 | 2413 |
| % App. Total | 13.4 | 85.3 | 1.3 | 0 | | 3.8 | 74.3 | 21.9 | 0 | | 64.1 | 15.2 | 20.7 | 0 | | 9.2 | 55.4 | 35.4 | 0 | | |
| PHF | .915 | .936 | .469 | .000 | .942 | .635 | .948 | .892 | .000 | .955 | .892 | .917 | .781 | .000 | .905 | .750 | .692 | .719 | .000 | .739 | .976 |

Rummel, Klepper & Kahl, LLP

Consulting Engineers
81 Mosher St
Baltimore MD 21217

File Name : US301-SR299
Site Code : 00000000
Start Date : 10/4/2011
Page No : 8

| Start Time | US 301 From North | | | | | US 301 From South | | | | | Main St (SR 299) From East | | | | | Bunker Hill Rd (SR 299) From West | | | | | Int. Total |
|--|----------------------|------|-------|------|------------|----------------------|------|-------|------|------------|-------------------------------|------|-------|------|------------|--------------------------------------|------|-------|------|------------|------------|
| | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | |
| Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:00 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:00 AM | 16 | 54 | 29 | 0 | 99 | 10 | 81 | 40 | 0 | 131 | 20 | 55 | 10 | 0 | 85 | 18 | 60 | 12 | 0 | 90 | 405 |
| 07:15 AM | 16 | 57 | 35 | 0 | 108 | 6 | 80 | 19 | 0 | 105 | 39 | 49 | 15 | 0 | 103 | 20 | 62 | 13 | 0 | 95 | 411 |
| 07:30 AM | 14 | 53 | 11 | 0 | 78 | 8 | 82 | 34 | 0 | 124 | 30 | 35 | 15 | 0 | 80 | 8 | 49 | 9 | 0 | 66 | 348 |
| 07:45 AM | 26 | 76 | 17 | 0 | 119 | 13 | 81 | 31 | 0 | 125 | 36 | 51 | 21 | 0 | 108 | 4 | 40 | 8 | 0 | 52 | 404 |
| Total Volume | 72 | 240 | 92 | 0 | 404 | 37 | 324 | 124 | 0 | 485 | 125 | 190 | 61 | 0 | 376 | 50 | 211 | 42 | 0 | 303 | 1568 |
| % App. Total | 17.8 | 59.4 | 22.8 | 0 | | 7.6 | 66.8 | 25.6 | 0 | | 33.2 | 50.5 | 16.2 | 0 | | 16.5 | 69.6 | 13.9 | 0 | | |
| PHF | .692 | .789 | .657 | .000 | .849 | .712 | .988 | .775 | .000 | .926 | .801 | .864 | .726 | .000 | .870 | .625 | .851 | .808 | .000 | .797 | .954 |

| | | | | | | | | | | | | | | | | | | | | | |
|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 05:00 PM | | | | | | | | | | | | | | | | | | | | | |
| 05:00 PM | 30 | 102 | 7 | 0 | 139 | 12 | 113 | 31 | 0 | 156 | 80 | 42 | 26 | 0 | 148 | 26 | 60 | 17 | 0 | 103 | 546 |
| 05:15 PM | 47 | 90 | 10 | 1 | 148 | 10 | 95 | 48 | 0 | 153 | 54 | 42 | 34 | 0 | 130 | 28 | 77 | 17 | 0 | 122 | 553 |
| 05:30 PM | 48 | 107 | 11 | 0 | 166 | 10 | 98 | 44 | 0 | 152 | 60 | 50 | 30 | 0 | 140 | 16 | 61 | 9 | 0 | 86 | 544 |
| 05:45 PM | 31 | 110 | 13 | 1 | 155 | 7 | 85 | 33 | 0 | 125 | 69 | 51 | 28 | 1 | 149 | 19 | 67 | 13 | 0 | 99 | 528 |
| Total Volume | 156 | 409 | 41 | 2 | 608 | 39 | 391 | 156 | 0 | 586 | 263 | 185 | 118 | 1 | 567 | 89 | 265 | 56 | 0 | 410 | 2171 |
| % App. Total | 25.7 | 67.3 | 6.7 | 0.3 | | 6.7 | 66.7 | 26.6 | 0 | | 46.4 | 32.6 | 20.8 | 0.2 | | 21.7 | 64.6 | 13.7 | 0 | | |
| PHF | .813 | .930 | .788 | .500 | .916 | .813 | .865 | .813 | .000 | .939 | .822 | .907 | .868 | .250 | .951 | .795 | .860 | .824 | .000 | .840 | .981 |

Lanes, Volumes, Timings
2: US 301 & Bunker Hill Rd

Timing Plan: ACTRA - AM

4/12/2012



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↖↖ | ↗↗ | ↘ | ↖↖ | ↗↗ | ↘ | ↖ | ↗↗ | ↘ | ↖ | ↗↗ | ↘ |
| Volume (vph) | 50 | 211 | 42 | 125 | 190 | 61 | 37 | 324 | 124 | 72 | 240 | 92 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 330 | | 210 | 390 | | 230 | 480 | | 307 | 290 | | 300 |
| Storage Lanes | 2 | | 1 | 2 | | 1 | 1 | | 1 | 1 | | 1 |
| Taper Length (ft) | 100 | | | 140 | | | 180 | | | 85 | | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (prot) | 3502 | 3574 | 1538 | 3127 | 3574 | 1538 | 1719 | 2983 | 1553 | 1752 | 3059 | 1615 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 3502 | 3574 | 1538 | 3127 | 3574 | 1538 | 1719 | 2983 | 1553 | 1752 | 3059 | 1615 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 52 | | | 70 | | | 133 | | | 108 |
| Link Speed (mph) | | 35 | | | 35 | | | 50 | | | 50 | |
| Link Distance (ft) | | 1027 | | | 832 | | | 1861 | | | 1623 | |
| Travel Time (s) | | 20.0 | | | 16.2 | | | 25.4 | | | 22.1 | |
| Peak Hour Factor | 0.80 | 0.80 | 0.80 | 0.87 | 0.87 | 0.87 | 0.93 | 0.93 | 0.93 | 0.85 | 0.85 | 0.85 |
| Heavy Vehicles (%) | 0% | 1% | 5% | 12% | 1% | 5% | 5% | 21% | 4% | 3% | 18% | 0% |
| Adj. Flow (vph) | 62 | 264 | 52 | 144 | 218 | 70 | 40 | 348 | 133 | 85 | 282 | 108 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 62 | 264 | 52 | 144 | 218 | 70 | 40 | 348 | 133 | 85 | 282 | 108 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(ft) | | 24 | | | 24 | | | 12 | | | 12 | |
| Link Offset(ft) | | 0 | | | 0 | | | 0 | | | 0 | |
| Crosswalk Width(ft) | | 16 | | | 16 | | | 16 | | | 16 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Number of Detectors | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| Detector Template | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Leading Detector (ft) | 20 | 100 | 20 | 20 | 100 | 20 | 20 | 100 | 20 | 20 | 100 | 20 |
| Trailing Detector (ft) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Position(ft) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Size(ft) | 20 | 6 | 20 | 20 | 6 | 20 | 20 | 6 | 20 | 20 | 6 | 20 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(ft) | | 94 | | | 94 | | | 94 | | | 94 | |
| Detector 2 Size(ft) | | 6 | | | 6 | | | 6 | | | 6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Prot | NA | Perm | Prot | NA | custom | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 3 | 8 | | 7 | 4 | | 1 | 6 | | 5 | 2 | |
| Permitted Phases | | | 8 | | | 8 | | | 6 | | | 2 |

Lanes, Volumes, Timings
2: US 301 & Bunker Hill Rd

Timing Plan: ACTRA - AM

4/12/2012

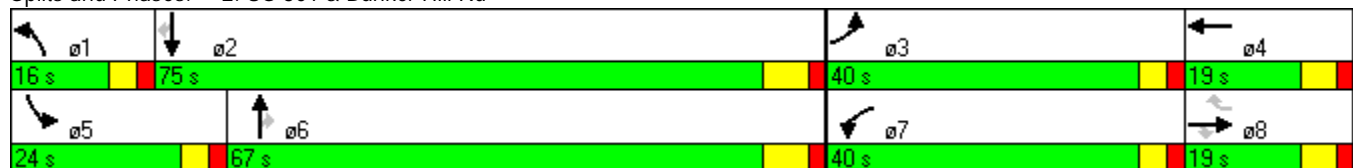


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Detector Phase | 3 | 8 | 8 | 7 | 4 | 8 | 1 | 6 | 6 | 5 | 2 | 2 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 16.0 | 16.0 | 5.0 | 16.0 | 16.0 |
| Minimum Split (s) | 11.0 | 12.0 | 12.0 | 11.0 | 12.0 | 12.0 | 11.0 | 23.0 | 23.0 | 11.0 | 23.0 | 23.0 |
| Total Split (s) | 40.0 | 19.0 | 19.0 | 40.0 | 19.0 | 19.0 | 16.0 | 67.0 | 67.0 | 24.0 | 75.0 | 75.0 |
| Total Split (%) | 26.7% | 12.7% | 12.7% | 26.7% | 12.7% | 12.7% | 10.7% | 44.7% | 44.7% | 16.0% | 50.0% | 50.0% |
| Maximum Green (s) | 35.0 | 13.0 | 13.0 | 35.0 | 13.0 | 13.0 | 11.0 | 60.0 | 60.0 | 19.0 | 68.0 | 68.0 |
| Yellow Time (s) | 3.0 | 4.0 | 4.0 | 3.0 | 4.0 | 4.0 | 3.0 | 5.0 | 5.0 | 3.0 | 5.0 | 5.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 | 5.0 | 7.0 | 7.0 | 5.0 | 7.0 | 7.0 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 3.0 | 4.0 | 4.0 | 3.0 | 4.0 | 4.0 | 3.0 | 4.0 | 4.0 | 3.0 | 4.0 | 4.0 |
| Recall Mode | None | None | None | None | None | None | None | C-Min | C-Min | None | C-Min | C-Min |
| Act Effect Green (s) | 8.1 | 18.3 | 18.3 | 12.3 | 24.7 | 18.3 | 8.9 | 83.8 | 83.8 | 12.6 | 89.6 | 89.6 |
| Actuated g/C Ratio | 0.05 | 0.12 | 0.12 | 0.08 | 0.16 | 0.12 | 0.06 | 0.56 | 0.56 | 0.08 | 0.60 | 0.60 |
| v/c Ratio | 0.33 | 0.61 | 0.22 | 0.56 | 0.37 | 0.28 | 0.39 | 0.21 | 0.14 | 0.58 | 0.15 | 0.11 |
| Control Delay | 72.6 | 68.1 | 15.9 | 74.4 | 57.5 | 14.8 | 78.2 | 18.4 | 3.5 | 73.5 | 13.9 | 3.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 72.6 | 68.1 | 15.9 | 74.4 | 57.5 | 14.8 | 78.2 | 18.4 | 3.5 | 73.5 | 13.9 | 3.8 |
| LOS | E | E | B | E | E | B | E | B | A | E | B | A |
| Approach Delay | | 61.7 | | | 56.2 | | | 19.2 | | | 22.3 | |
| Approach LOS | | E | | | E | | | B | | | C | |

Intersection Summary

| | |
|------------------------------------|---|
| Area Type: | Other |
| Cycle Length: | 150 |
| Actuated Cycle Length: | 150 |
| Offset: | 80 (53%), Referenced to phase 2:SBT and 6:NBT, Start of Green |
| Natural Cycle: | 60 |
| Control Type: | Actuated-Coordinated |
| Maximum v/c Ratio: | 0.61 |
| Intersection Signal Delay: | 37.8 |
| Intersection LOS: | D |
| Intersection Capacity Utilization: | 46.7% |
| ICU Level of Service: | A |
| Analysis Period (min): | 15 |

Splits and Phases: 2: US 301 & Bunker Hill Rd



Lanes, Volumes, Timings
7: US 301 & Armstrong Corner Rd

Timing Plan: ACTRA - AM

4/12/2012



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | ↕ | | | ↕ | | ↗ | ↖ | ↗ | ↖ | ↖ | ↗ |
| Volume (vph) | 8 | 66 | 17 | 146 | 36 | 144 | 19 | 834 | 118 | 68 | 548 | 6 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 0 | | 0 | 0 | | 0 | 250 | | 145 | 250 | | 60 |
| Storage Lanes | 0 | | 0 | 0 | | 0 | 1 | | 1 | 1 | | 1 |
| Taper Length (ft) | 25 | | | 25 | | | 200 | | | 200 | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 0.975 | | | 0.940 | | | | 0.850 | | | 0.850 |
| Flt Protected | | 0.996 | | | 0.978 | | 0.950 | | | 0.950 | | |
| Satd. Flow (prot) | 0 | 1750 | 0 | 0 | 1711 | 0 | 1805 | 1681 | 1495 | 1805 | 1610 | 1615 |
| Flt Permitted | | 0.949 | | | 0.707 | | 0.340 | | | 0.117 | | |
| Satd. Flow (perm) | 0 | 1667 | 0 | 0 | 1237 | 0 | 646 | 1681 | 1495 | 222 | 1610 | 1615 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 7 | | | 25 | | | | 48 | | | 2 |
| Link Speed (mph) | | 40 | | | 50 | | | 50 | | | | 50 |
| Link Distance (ft) | | 1915 | | | 1875 | | | 944 | | | | 1823 |
| Travel Time (s) | | 32.6 | | | 25.6 | | | 12.9 | | | | 24.9 |
| Peak Hour Factor | 0.65 | 0.65 | 0.65 | 0.89 | 0.89 | 0.89 | 0.95 | 0.95 | 0.95 | 0.85 | 0.85 | 0.85 |
| Heavy Vehicles (%) | 25% | 3% | 6% | 2% | 3% | 2% | 0% | 13% | 8% | 0% | 18% | 0% |
| Adj. Flow (vph) | 12 | 102 | 26 | 164 | 40 | 162 | 20 | 878 | 124 | 80 | 645 | 7 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 140 | 0 | 0 | 366 | 0 | 20 | 878 | 124 | 80 | 645 | 7 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(ft) | | 0 | | | 0 | | | 12 | | | | 12 |
| Link Offset(ft) | | 0 | | | 0 | | | 0 | | | | 0 |
| Crosswalk Width(ft) | | 16 | | | 16 | | | 16 | | | | 16 |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Number of Detectors | 1 | 2 | | 1 | 2 | | 1 | 2 | 1 | 1 | 2 | 1 |
| Detector Template | Left | Thru | | Left | Thru | | Left | Thru | Right | Left | Thru | Right |
| Leading Detector (ft) | 20 | 100 | | 20 | 100 | | 20 | 100 | 20 | 20 | 100 | 20 |
| Trailing Detector (ft) | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Position(ft) | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Size(ft) | 20 | 6 | | 20 | 6 | | 20 | 6 | 20 | 20 | 6 | 20 |
| Detector 1 Type | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(ft) | | 94 | | | 94 | | | 94 | | | | 94 |
| Detector 2 Size(ft) | | 6 | | | 6 | | | 6 | | | | 6 |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | | Cl+Ex |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | | 0.0 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | | 8 | | | 4 | | 1 | 6 | | 5 | | 2 |
| Permitted Phases | 8 | | | 4 | | | 6 | | 6 | 2 | | 2 |

Lanes, Volumes, Timings
 7: US 301 & Armstrong Corner Rd

Timing Plan: ACTRA - AM

4/12/2012



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------|-------|-------|-----|-------|-------|-----|-------|-------|-------|-------|-------|-------|
| Detector Phase | 8 | 8 | | 4 | 4 | | 1 | 6 | 6 | 5 | 2 | 2 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 15.0 | 15.0 | 4.0 | 15.0 | 15.0 |
| Minimum Split (s) | 12.0 | 12.0 | | 12.0 | 12.0 | | 11.0 | 38.0 | 38.0 | 11.0 | 38.0 | 38.0 |
| Total Split (s) | 40.0 | 40.0 | | 40.0 | 40.0 | | 25.0 | 85.0 | 85.0 | 25.0 | 85.0 | 85.0 |
| Total Split (%) | 26.7% | 26.7% | | 26.7% | 26.7% | | 16.7% | 56.7% | 56.7% | 16.7% | 56.7% | 56.7% |
| Maximum Green (s) | 34.0 | 34.0 | | 34.0 | 34.0 | | 20.0 | 78.0 | 78.0 | 18.0 | 80.0 | 80.0 |
| Yellow Time (s) | 4.0 | 4.0 | | 4.0 | 4.0 | | 3.0 | 5.0 | 5.0 | 5.0 | 3.0 | 3.0 |
| All-Red Time (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | | 0.0 | | | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | | 6.0 | | | 6.0 | | 5.0 | 7.0 | 7.0 | 7.0 | 5.0 | 5.0 |
| Lead/Lag | | | | | | | Lead | Lag | Lag | Lead | Lag | Lag |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 6.0 | 6.0 | 6.0 | 3.0 | 3.0 |
| Recall Mode | None | None | | None | None | | None | C-Min | C-Min | Min | C-Max | C-Max |
| Act Effect Green (s) | | 34.0 | | 34.0 | 34.0 | | 93.4 | 85.3 | 85.3 | 102.9 | 98.2 | 98.2 |
| Actuated g/C Ratio | | 0.23 | | 0.23 | 0.23 | | 0.62 | 0.57 | 0.57 | 0.69 | 0.65 | 0.65 |
| v/c Ratio | | 0.37 | | 1.22 | 1.22 | | 0.04 | 0.92 | 0.14 | 0.30 | 0.61 | 0.01 |
| Control Delay | | 49.6 | | 169.6 | 169.6 | | 3.2 | 33.2 | 2.2 | 16.4 | 18.3 | 8.5 |
| Queue Delay | | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | | 49.6 | | 169.6 | 169.6 | | 3.2 | 33.2 | 2.2 | 16.4 | 18.3 | 8.5 |
| LOS | | D | | F | F | | A | C | A | B | B | A |
| Approach Delay | | 49.6 | | 169.6 | 169.6 | | 28.9 | | | | 18.0 | |
| Approach LOS | | D | | F | F | | C | | | | B | |

Intersection Summary

| | |
|------------------------------------|---|
| Area Type: | Other |
| Cycle Length: | 150 |
| Actuated Cycle Length: | 150 |
| Offset: | 52 (35%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green |
| Natural Cycle: | 100 |
| Control Type: | Actuated-Coordinated |
| Maximum v/c Ratio: | 1.22 |
| Intersection Signal Delay: | 49.4 |
| Intersection LOS: | D |
| Intersection Capacity Utilization: | 89.8% |
| ICU Level of Service: | E |
| Analysis Period (min): | 15 |

Splits and Phases: 7: US 301 & Armstrong Corner Rd



Lanes, Volumes, Timings
8: US 301 & Churchtown Rd/SR 896

Timing Plan: ACTRA - AM
4/12/2012



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 47 | 125 | 14 | 129 | 23 | 319 | 11 | 800 | 173 | 216 | 457 | 18 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 100 | | 0 | 450 | | 466 | 195 | | 370 | 400 | | 220 |
| Storage Lanes | 1 | | 0 | 2 | | 1 | 1 | | 1 | 2 | | 1 |
| Taper Length (ft) | 100 | | | 100 | | | 60 | | | 150 | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frt | | 0.984 | | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (prot) | 1805 | 1808 | 0 | 2824 | 1681 | 1509 | 1421 | 3343 | 1223 | 3335 | 3374 | 1455 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1805 | 1808 | 0 | 2824 | 1681 | 1509 | 1421 | 3343 | 1223 | 3335 | 3374 | 1455 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 3 | | | | 358 | | | 186 | | | 20 |
| Link Speed (mph) | | 45 | | | 25 | | | 50 | | | | 50 |
| Link Distance (ft) | | 1984 | | | 1201 | | | 1469 | | | | 1377 |
| Travel Time (s) | | 30.1 | | | 32.8 | | | 20.0 | | | | 18.8 |
| Peak Hour Factor | 0.80 | 0.80 | 0.80 | 0.89 | 0.89 | 0.89 | 0.93 | 0.93 | 0.93 | 0.91 | 0.91 | 0.91 |
| Heavy Vehicles (%) | 0% | 3% | 7% | 24% | 13% | 7% | 27% | 8% | 32% | 5% | 7% | 11% |
| Adj. Flow (vph) | 59 | 156 | 18 | 145 | 26 | 358 | 12 | 860 | 186 | 237 | 502 | 20 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 59 | 174 | 0 | 145 | 26 | 358 | 12 | 860 | 186 | 237 | 502 | 20 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(ft) | | 24 | | | 24 | | | 24 | | | | 24 |
| Link Offset(ft) | | 0 | | | 0 | | | 0 | | | | 0 |
| Crosswalk Width(ft) | | 16 | | | 16 | | | 16 | | | | 16 |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Number of Detectors | 1 | 2 | | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| Detector Template | Left | Thru | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Leading Detector (ft) | 20 | 100 | | 20 | 100 | 20 | 20 | 100 | 20 | 20 | 100 | 20 |
| Trailing Detector (ft) | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Position(ft) | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Size(ft) | 20 | 6 | | 20 | 6 | 20 | 20 | 6 | 20 | 20 | 6 | 20 |
| Detector 1 Type | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(ft) | | 94 | | | 94 | | | 94 | | | | 94 |
| Detector 2 Size(ft) | | 6 | | | 6 | | | 6 | | | | 6 |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | | Cl+Ex |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | | 0.0 |
| Turn Type | Split | NA | | Split | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 8 | 8 | | 4 | 4 | | 1 | 6 | | 5 | 2 | |
| Permitted Phases | | | | | | 4 | | | 6 | | | 2 |

Lanes, Volumes, Timings
 8: US 301 & Churchtown Rd/SR 896

Timing Plan: ACTRA - AM

4/12/2012



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------|-------|-------|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Detector Phase | 8 | 8 | | 4 | 4 | 4 | 1 | 6 | 6 | 5 | 2 | 2 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | | 10.0 | 10.0 | 10.0 | 5.0 | 20.0 | 20.0 | 5.0 | 20.0 | 20.0 |
| Minimum Split (s) | 12.0 | 12.0 | | 17.0 | 17.0 | 17.0 | 12.0 | 29.0 | 29.0 | 12.0 | 29.0 | 29.0 |
| Total Split (s) | 32.0 | 32.0 | | 35.0 | 35.0 | 35.0 | 30.0 | 53.0 | 53.0 | 30.0 | 53.0 | 53.0 |
| Total Split (%) | 21.3% | 21.3% | | 23.3% | 23.3% | 23.3% | 20.0% | 35.3% | 35.3% | 20.0% | 35.3% | 35.3% |
| Maximum Green (s) | 26.0 | 26.0 | | 29.0 | 29.0 | 29.0 | 24.0 | 45.0 | 45.0 | 24.0 | 45.0 | 45.0 |
| Yellow Time (s) | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 5.0 | 5.0 | 4.0 | 5.0 | 5.0 |
| All-Red Time (s) | 2.0 | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | 6.0 | 8.0 | 8.0 | 6.0 | 8.0 | 8.0 |
| Lead/Lag | | | | | | | Lead | Lag | Lag | Lead | Lag | Lag |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 5.0 | 5.0 | 4.0 | 5.0 | 5.0 |
| Recall Mode | None | None | | None | None | None | None | C-Max | C-Max | None | C-Max | C-Max |
| Act Effect Green (s) | 20.3 | 20.3 | | 16.6 | 16.6 | 16.6 | 7.9 | 70.3 | 70.3 | 16.9 | 87.0 | 87.0 |
| Actuated g/C Ratio | 0.14 | 0.14 | | 0.11 | 0.11 | 0.11 | 0.05 | 0.47 | 0.47 | 0.11 | 0.58 | 0.58 |
| v/c Ratio | 0.24 | 0.70 | | 0.47 | 0.14 | 0.74 | 0.16 | 0.55 | 0.28 | 0.63 | 0.26 | 0.02 |
| Control Delay | 58.6 | 75.5 | | 66.2 | 59.1 | 15.2 | 85.8 | 16.5 | 1.8 | 69.3 | 17.9 | 8.6 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 58.6 | 75.5 | | 66.2 | 59.1 | 15.2 | 85.8 | 16.5 | 1.8 | 69.3 | 17.9 | 8.6 |
| LOS | E | E | | E | E | B | F | B | A | E | B | A |
| Approach Delay | | 71.2 | | | 31.3 | | | 14.7 | | | 33.7 | |
| Approach LOS | | E | | | C | | | B | | | C | |

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 89 (59%), Referenced to phase 2:SBT and 6:NBT, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 28.8
 Intersection LOS: C
 Intersection Capacity Utilization 65.7%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 8: US 301 & Churchtown Rd/SR 896



Lanes, Volumes, Timings
 10: US 301 & Old Summit Bridge Road

Timing Plan: ACTRA - AM

4/12/2012



| Lane Group | WBL | WBR | NBU | NBT | NBR | SBL | SBT |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | |
| Volume (vph) | 33 | 17 | 0 | 1122 | 30 | 47 | 618 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 0 | 100 | 250 | | 384 | 445 | |
| Storage Lanes | 1 | 1 | 1 | | 1 | 1 | |
| Taper Length (ft) | 25 | | 85 | | | 85 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 |
| Flt | | 0.850 | | | 0.850 | | |
| Flt Protected | 0.950 | | | | | 0.950 | |
| Satd. Flow (prot) | 1805 | 1371 | 1900 | 3438 | 1615 | 1770 | 3312 |
| Flt Permitted | 0.950 | | | | | 0.149 | |
| Satd. Flow (perm) | 1805 | 1371 | 1900 | 3438 | 1615 | 278 | 3312 |
| Right Turn on Red | | Yes | | | Yes | | |
| Satd. Flow (RTOR) | | 19 | | | 36 | | |
| Link Speed (mph) | 35 | | | 55 | | | 55 |
| Link Distance (ft) | 277 | | | 1231 | | | 2058 |
| Travel Time (s) | 5.4 | | | 15.3 | | | 25.5 |
| Peak Hour Factor | 0.91 | 0.91 | 0.84 | 0.84 | 0.84 | 0.91 | 0.91 |
| Heavy Vehicles (%) | 0% | 6% | 0% | 5% | 0% | 2% | 9% |
| Parking (#/hr) | | 0 | | | | | |
| Adj. Flow (vph) | 36 | 19 | 0 | 1336 | 36 | 52 | 679 |
| Shared Lane Traffic (%) | | | | | | | |
| Lane Group Flow (vph) | 36 | 19 | 0 | 1336 | 36 | 52 | 679 |
| Enter Blocked Intersection | No | No | No | No | No | No | No |
| Lane Alignment | Left | Right | R NA | Left | Right | Left | Left |
| Median Width(ft) | 12 | | | 12 | | | 12 |
| Link Offset(ft) | 0 | | | 0 | | | 0 |
| Crosswalk Width(ft) | 16 | | | 16 | | | 16 |
| Two way Left Turn Lane | | | | | | | |
| Headway Factor | 1.00 | 1.14 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | 9 | 9 | | 9 | 15 | |
| Number of Detectors | 1 | 1 | 1 | 2 | 1 | 1 | 2 |
| Detector Template | Left | Right | Left | Thru | Right | Left | Thru |
| Leading Detector (ft) | 20 | 20 | 20 | 100 | 20 | 20 | 100 |
| Trailing Detector (ft) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Position(ft) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Size(ft) | 20 | 20 | 20 | 6 | 20 | 20 | 6 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(ft) | | | | 94 | | | 94 |
| Detector 2 Size(ft) | | | | 6 | | | 6 |
| Detector 2 Type | | | | Cl+Ex | | | Cl+Ex |
| Detector 2 Channel | | | | | | | |
| Detector 2 Extend (s) | | | | 0.0 | | | 0.0 |
| Turn Type | NA | Perm | pm+pt | NA | Perm | pm+pt | NA |
| Protected Phases | 4 | | 1 | 6 | | 5 | 2 |

Lanes, Volumes, Timings
 10: US 301 & Old Summit Bridge Road

Timing Plan: ACTRA - AM
 4/12/2012



| Lane Group | WBL | WBR | NBU | NBT | NBR | SBL | SBT |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| Permitted Phases | | 4 | 6 | | 6 | 2 | 2 |
| Detector Phase | 4 | 4 | 1 | 6 | 6 | 5 | 2 |
| Switch Phase | | | | | | | |
| Minimum Initial (s) | 4.0 | 4.0 | 3.0 | 17.0 | 17.0 | 3.0 | 17.0 |
| Minimum Split (s) | 12.0 | 12.0 | 11.0 | 24.0 | 24.0 | 11.0 | 24.0 |
| Total Split (s) | 13.0 | 13.0 | 12.0 | 50.0 | 50.0 | 12.0 | 50.0 |
| Total Split (%) | 17.3% | 17.3% | 16.0% | 66.7% | 66.7% | 16.0% | 66.7% |
| Maximum Green (s) | 7.0 | 7.0 | 7.0 | 43.0 | 43.0 | 7.0 | 43.0 |
| Yellow Time (s) | 4.0 | 4.0 | 3.0 | 5.0 | 5.0 | 3.0 | 5.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 6.0 | 6.0 | 5.0 | 7.0 | 7.0 | 5.0 | 7.0 |
| Lead/Lag | | | Lead | Lag | Lag | Lead | Lag |
| Lead-Lag Optimize? | | | | | | | |
| Vehicle Extension (s) | 4.0 | 4.0 | 3.0 | 5.0 | 5.0 | 3.0 | 5.0 |
| Recall Mode | None | None | None | C-Max | C-Max | None | C-Max |
| Act Effect Green (s) | 6.9 | 6.9 | | 56.2 | 56.2 | 62.2 | 63.0 |
| Actuated g/C Ratio | 0.09 | 0.09 | | 0.75 | 0.75 | 0.83 | 0.84 |
| v/c Ratio | 0.22 | 0.13 | | 0.52 | 0.03 | 0.15 | 0.24 |
| Control Delay | 35.0 | 17.0 | | 7.6 | 2.3 | 3.0 | 2.7 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 35.0 | 17.0 | | 7.6 | 2.3 | 3.0 | 2.7 |
| LOS | C | B | | A | A | A | A |
| Approach Delay | 28.8 | | | 7.4 | | | 2.7 |
| Approach LOS | C | | | A | | | A |

Intersection Summary













Area Type: Other
 Cycle Length: 75
 Actuated Cycle Length: 75
 Offset: 16 (21%), Referenced to phase 2:SBTL and 6:NBTU, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.52
 Intersection Signal Delay: 6.4
 Intersection Capacity Utilization 52.7%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 10: US 301 & Old Summit Bridge Road



Lanes, Volumes, Timings
30: US 301 & SR 71

Timing Plan: ACTRA - AM
4/12/2012

| |  |  |  |  |  |  |
|----------------------------|---|---|---|---|---|---|
| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations |  |  |  |  |  |  |
| Volume (vph) | 47 | 340 | 526 | 47 | 209 | 449 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 315 | 0 | | 400 | 250 | |
| Storage Lanes | 1 | 1 | | 1 | 1 | |
| Taper Length (ft) | 25 | | | | 50 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Fr _t | | 0.850 | | 0.850 | | |
| Fl _t Protected | 0.950 | | | | 0.950 | |
| Satd. Flow (prot) | 1543 | 1538 | 1610 | 1380 | 1703 | 1712 |
| Fl _t Permitted | 0.950 | | | | 0.950 | |
| Satd. Flow (perm) | 1543 | 1538 | 1610 | 1380 | 1703 | 1712 |
| Right Turn on Red | | Yes | | No | | |
| Satd. Flow (RTOR) | | 378 | | | | |
| Link Speed (mph) | 35 | | 45 | | | 50 |
| Link Distance (ft) | 1186 | | 916 | | | 549 |
| Travel Time (s) | 23.1 | | 13.9 | | | 7.5 |
| Peak Hour Factor | 0.90 | 0.90 | 0.86 | 0.86 | 0.87 | 0.87 |
| Heavy Vehicles (%) | 17% | 5% | 18% | 17% | 6% | 11% |
| Adj. Flow (vph) | 52 | 378 | 612 | 55 | 240 | 516 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 52 | 378 | 612 | 55 | 240 | 516 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Right | Left | Right | Left | Left |
| Median Width(ft) | 12 | | 12 | | | 12 |
| Link Offset(ft) | 0 | | 0 | | | 0 |
| Crosswalk Width(ft) | 16 | | 16 | | | 16 |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | 9 | | 9 | 15 | |
| Number of Detectors | 1 | 1 | 2 | 1 | 1 | 2 |
| Detector Template | Left | Right | Thru | Right | Left | Thru |
| Leading Detector (ft) | 20 | 20 | 100 | 20 | 20 | 100 |
| Trailing Detector (ft) | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Position(ft) | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Size(ft) | 20 | 20 | 6 | 20 | 20 | 6 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(ft) | | | 94 | | | 94 |
| Detector 2 Size(ft) | | | 6 | | | 6 |
| Detector 2 Type | | | Cl+Ex | | | Cl+Ex |
| Detector 2 Channel | | | | | | |
| Detector 2 Extend (s) | | | 0.0 | | | 0.0 |
| Turn Type | NA | Free | NA | Prot | Prot | NA |
| Protected Phases | | | 6 | 6 | 5 | 2 |
| Permitted Phases | 7 | Free | | | | |



| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|-----------------------|-------|-------|-------|-------|-------|-------|
| Detector Phase | 7 | | 6 | 6 | 5 | 2 |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 6.0 | | 15.0 | 15.0 | 8.0 | 15.0 |
| Minimum Split (s) | 16.0 | | 30.0 | 30.0 | 15.0 | 30.0 |
| Total Split (s) | 30.0 | | 68.0 | 68.0 | 52.0 | 120.0 |
| Total Split (%) | 20.0% | | 45.3% | 45.3% | 34.7% | 80.0% |
| Maximum Green (s) | 21.0 | | 59.0 | 59.0 | 46.0 | 111.0 |
| Yellow Time (s) | 5.0 | | 5.0 | 5.0 | 4.0 | 5.0 |
| All-Red Time (s) | 4.0 | | 4.0 | 4.0 | 2.0 | 4.0 |
| Lost Time Adjust (s) | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 9.0 | | 9.0 | 9.0 | 6.0 | 9.0 |
| Lead/Lag | | | Lag | Lag | Lead | |
| Lead-Lag Optimize? | | | | | | |
| Vehicle Extension (s) | 4.0 | | 7.0 | 7.0 | 4.0 | 7.0 |
| Recall Mode | None | | C-Min | C-Min | None | C-Min |
| Act Effect Green (s) | 11.4 | 150.0 | 90.3 | 90.3 | 27.5 | 125.6 |
| Actuated g/C Ratio | 0.08 | 1.00 | 0.60 | 0.60 | 0.18 | 0.84 |
| v/c Ratio | 0.44 | 0.25 | 0.63 | 0.07 | 0.77 | 0.36 |
| Control Delay | 77.0 | 0.4 | 21.9 | 10.7 | 73.8 | 3.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 77.0 | 0.4 | 21.9 | 10.7 | 73.8 | 3.7 |
| LOS | E | A | C | B | E | A |
| Approach Delay | 9.7 | | 21.0 | | | 25.9 |
| Approach LOS | A | | C | | | C |

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 136 (91%), Referenced to phase 2:SBT and 6:NBT, Start of Green
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 20.4
 Intersection LOS: C
 Intersection Capacity Utilization 64.3%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 30: US 301 & SR 71



Lanes, Volumes, Timings
2: US 301 & Bunker Hill Rd/SR 299

Timing Plan: ACTRA - PM

3/9/2012



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↖↖ | ↗↗ | ↘ | ↖↖ | ↗↗ | ↘ | ↖ | ↗↗ | ↘ | ↖ | ↗↗ | ↘ |
| Volume (vph) | 89 | 265 | 56 | 263 | 185 | 118 | 39 | 391 | 156 | 156 | 409 | 41 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 330 | | 210 | 390 | | 230 | 480 | | 307 | 290 | | 300 |
| Storage Lanes | 2 | | 1 | 2 | | 1 | 1 | | 1 | 1 | | 1 |
| Taper Length (ft) | 100 | | | 140 | | | 180 | | | 85 | | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (prot) | 3502 | 3610 | 1615 | 3367 | 3539 | 1482 | 1805 | 3059 | 1495 | 1770 | 3252 | 1583 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 3502 | 3610 | 1615 | 3367 | 3539 | 1482 | 1805 | 3059 | 1495 | 1770 | 3252 | 1583 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 67 | | | 124 | | | 166 | | | 45 |
| Link Speed (mph) | | 35 | | | 35 | | | 50 | | | | 50 |
| Link Distance (ft) | | 1051 | | | 832 | | | 1861 | | | | 1623 |
| Travel Time (s) | | 20.5 | | | 16.2 | | | 25.4 | | | | 22.1 |
| Peak Hour Factor | 0.84 | 0.84 | 0.84 | 0.95 | 0.95 | 0.95 | 0.94 | 0.94 | 0.94 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles (%) | 0% | 0% | 0% | 4% | 2% | 9% | 0% | 18% | 8% | 2% | 11% | 2% |
| Adj. Flow (vph) | 106 | 315 | 67 | 277 | 195 | 124 | 41 | 416 | 166 | 170 | 445 | 45 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 106 | 315 | 67 | 277 | 195 | 124 | 41 | 416 | 166 | 170 | 445 | 45 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(ft) | | 24 | | | 24 | | | 12 | | | | 12 |
| Link Offset(ft) | | 0 | | | 0 | | | 0 | | | | 0 |
| Crosswalk Width(ft) | | 16 | | | 16 | | | 16 | | | | 16 |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Number of Detectors | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| Detector Template | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Leading Detector (ft) | 20 | 100 | 20 | 20 | 100 | 20 | 20 | 100 | 20 | 20 | 100 | 20 |
| Trailing Detector (ft) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Position(ft) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Size(ft) | 20 | 6 | 20 | 20 | 6 | 20 | 20 | 6 | 20 | 20 | 6 | 20 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(ft) | | 94 | | | 94 | | | 94 | | | | 94 |
| Detector 2 Size(ft) | | 6 | | | 6 | | | 6 | | | | 6 |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | | Cl+Ex |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | | 0.0 |
| Turn Type | Prot | NA | Perm | Prot | NA | custom | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 3 | 8 | | 7 | 4 | | 1 | 6 | | 5 | 2 | |
| Permitted Phases | | | 8 | | | 8 | | | 6 | | | 2 |

Lanes, Volumes, Timings
2: US 301 & Bunker Hill Rd/SR 299

Timing Plan: ACTRA - PM
3/9/2012



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Detector Phase | 3 | 8 | 8 | 7 | 4 | 8 | 1 | 6 | 6 | 5 | 2 | 2 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 16.0 | 16.0 | 5.0 | 16.0 | 16.0 |
| Minimum Split (s) | 11.0 | 12.0 | 12.0 | 11.0 | 12.0 | 12.0 | 11.0 | 23.0 | 23.0 | 11.0 | 23.0 | 23.0 |
| Total Split (s) | 40.0 | 19.0 | 19.0 | 40.0 | 19.0 | 19.0 | 16.0 | 67.0 | 67.0 | 24.0 | 75.0 | 75.0 |
| Total Split (%) | 26.7% | 12.7% | 12.7% | 26.7% | 12.7% | 12.7% | 10.7% | 44.7% | 44.7% | 16.0% | 50.0% | 50.0% |
| Maximum Green (s) | 35.0 | 13.0 | 13.0 | 35.0 | 13.0 | 13.0 | 11.0 | 60.0 | 60.0 | 19.0 | 68.0 | 68.0 |
| Yellow Time (s) | 3.0 | 4.0 | 4.0 | 3.0 | 4.0 | 4.0 | 3.0 | 5.0 | 5.0 | 3.0 | 5.0 | 5.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 | 5.0 | 7.0 | 7.0 | 5.0 | 7.0 | 7.0 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 3.0 | 4.0 | 4.0 | 3.0 | 4.0 | 4.0 | 3.0 | 4.0 | 4.0 | 3.0 | 4.0 | 4.0 |
| Recall Mode | None | None | None | None | None | None | None | C-Min | C-Min | None | C-Min | C-Min |
| Act Effect Green (s) | 9.9 | 22.5 | 22.5 | 17.7 | 30.3 | 22.5 | 8.8 | 66.8 | 66.8 | 20.0 | 80.1 | 80.1 |
| Actuated g/C Ratio | 0.07 | 0.15 | 0.15 | 0.12 | 0.20 | 0.15 | 0.06 | 0.45 | 0.45 | 0.13 | 0.53 | 0.53 |
| v/c Ratio | 0.46 | 0.58 | 0.22 | 0.70 | 0.27 | 0.38 | 0.39 | 0.31 | 0.22 | 0.72 | 0.26 | 0.05 |
| Control Delay | 73.4 | 63.7 | 13.1 | 72.9 | 50.8 | 11.9 | 77.7 | 29.4 | 5.1 | 68.4 | 19.2 | 4.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 73.4 | 63.7 | 13.1 | 72.9 | 50.8 | 11.9 | 77.7 | 29.4 | 5.1 | 68.4 | 19.2 | 4.0 |
| LOS | E | E | B | E | D | B | E | C | A | E | B | A |
| Approach Delay | | 58.8 | | | 53.0 | | | 26.1 | | | 30.8 | |
| Approach LOS | | E | | | D | | | C | | | C | |

Intersection Summary

| | |
|-----------------------------------|---|
| Area Type: | Other |
| Cycle Length: | 150 |
| Actuated Cycle Length: | 150 |
| Offset: | 40 (27%), Referenced to phase 2:SBT and 6:NBT, Start of Green |
| Natural Cycle: | 60 |
| Control Type: | Actuated-Coordinated |
| Maximum v/c Ratio: | 0.72 |
| Intersection Signal Delay: | 40.9 |
| Intersection LOS: | D |
| Intersection Capacity Utilization | 56.0% |
| ICU Level of Service | B |
| Analysis Period (min) | 15 |

Splits and Phases: 2: US 301 & Bunker Hill Rd/SR 299



Lanes, Volumes, Timings
7: US 301 & Armstrong Corner Rd/Marl Pit Road

Timing Plan: ACTRA - PM

3/9/2012



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | ↕ | | | ↕ | | ↗ | ↖ | ↗ | ↖ | ↖ | ↗ |
| Volume (vph) | 6 | 36 | 22 | 232 | 55 | 75 | 33 | 641 | 189 | 150 | 958 | 15 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 0 | | 0 | 0 | | 0 | 250 | | 145 | 250 | | 60 |
| Storage Lanes | 0 | | 0 | 0 | | 0 | 1 | | 1 | 1 | | 1 |
| Taper Length (ft) | 25 | | | 25 | | | 200 | | | 200 | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 0.954 | | | 0.972 | | | | 0.850 | | | 0.850 |
| Flt Protected | | 0.995 | | | 0.969 | | 0.950 | | | 0.950 | | |
| Satd. Flow (prot) | 0 | 1779 | 0 | 0 | 1726 | 0 | 1703 | 1681 | 1568 | 1787 | 1727 | 1615 |
| Flt Permitted | | 0.964 | | | 0.743 | | 0.089 | | | 0.230 | | |
| Satd. Flow (perm) | 0 | 1724 | 0 | 0 | 1324 | 0 | 160 | 1681 | 1568 | 433 | 1727 | 1615 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 16 | | | 8 | | | | 100 | | | 3 |
| Link Speed (mph) | | 40 | | | 50 | | | 50 | | | | 50 |
| Link Distance (ft) | | 1915 | | | 1875 | | | 944 | | | | 1823 |
| Travel Time (s) | | 32.6 | | | 25.6 | | | 12.9 | | | | 24.9 |
| Peak Hour Factor | 0.75 | 0.75 | 0.75 | 0.91 | 0.91 | 0.91 | 0.96 | 0.96 | 0.96 | 0.94 | 0.94 | 0.94 |
| Heavy Vehicles (%) | 0% | 0% | 4% | 3% | 2% | 7% | 6% | 13% | 3% | 1% | 10% | 0% |
| Adj. Flow (vph) | 8 | 48 | 29 | 255 | 60 | 82 | 34 | 668 | 197 | 160 | 1019 | 16 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 85 | 0 | 0 | 397 | 0 | 34 | 668 | 197 | 160 | 1019 | 16 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(ft) | | 0 | | | 0 | | | 12 | | | | 12 |
| Link Offset(ft) | | 0 | | | 0 | | | 0 | | | | 0 |
| Crosswalk Width(ft) | | 16 | | | 16 | | | 16 | | | | 16 |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Number of Detectors | 1 | 2 | | 1 | 2 | | 1 | 2 | 1 | 1 | 2 | 1 |
| Detector Template | Left | Thru | | Left | Thru | | Left | Thru | Right | Left | Thru | Right |
| Leading Detector (ft) | 20 | 100 | | 20 | 100 | | 20 | 100 | 20 | 20 | 100 | 20 |
| Trailing Detector (ft) | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Position(ft) | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Size(ft) | 20 | 6 | | 20 | 6 | | 20 | 6 | 20 | 20 | 6 | 20 |
| Detector 1 Type | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(ft) | | 94 | | | 94 | | | 94 | | | | 94 |
| Detector 2 Size(ft) | | 6 | | | 6 | | | 6 | | | | 6 |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | | Cl+Ex |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | | 0.0 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | | 8 | | | 4 | | 1 | 6 | | 5 | | 2 |
| Permitted Phases | 8 | | | 4 | | | 6 | | 6 | 2 | | 2 |

Lanes, Volumes, Timings
 7: US 301 & Armstrong Corner Rd/Marl Pit Road

Timing Plan: ACTRA - PM

3/9/2012



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------|-------|-------|-----|-------|-------|-----|-------|-------|-------|-------|-------|-------|
| Detector Phase | 8 | 8 | | 4 | 4 | | 1 | 6 | 6 | 5 | 2 | 2 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 15.0 | 15.0 | 4.0 | 15.0 | 15.0 |
| Minimum Split (s) | 12.0 | 12.0 | | 12.0 | 12.0 | | 11.0 | 38.0 | 38.0 | 11.0 | 38.0 | 38.0 |
| Total Split (s) | 40.0 | 40.0 | | 40.0 | 40.0 | | 25.0 | 85.0 | 85.0 | 25.0 | 85.0 | 85.0 |
| Total Split (%) | 26.7% | 26.7% | | 26.7% | 26.7% | | 16.7% | 56.7% | 56.7% | 16.7% | 56.7% | 56.7% |
| Maximum Green (s) | 34.0 | 34.0 | | 34.0 | 34.0 | | 20.0 | 78.0 | 78.0 | 18.0 | 78.0 | 78.0 |
| Yellow Time (s) | 4.0 | 4.0 | | 4.0 | 4.0 | | 3.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| All-Red Time (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | | 0.0 | | | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | | 6.0 | | | 6.0 | | 5.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| Lead/Lag | | | | | | | Lead | Lag | Lag | Lead | Lag | Lag |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| Recall Mode | None | None | | None | None | | None | C-Min | C-Min | Min | C-Min | C-Min |
| Act Effect Green (s) | | 34.0 | | | 34.0 | | 91.3 | 82.9 | 82.9 | 103.0 | 93.7 | 93.7 |
| Actuated g/C Ratio | | 0.23 | | | 0.23 | | 0.61 | 0.55 | 0.55 | 0.69 | 0.62 | 0.62 |
| v/c Ratio | | 0.21 | | | 1.30 | | 0.21 | 0.72 | 0.22 | 0.38 | 0.94 | 0.02 |
| Control Delay | | 39.7 | | | 199.8 | | 4.7 | 13.2 | 0.3 | 11.9 | 42.2 | 9.4 |
| Queue Delay | | 0.0 | | | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | | 39.7 | | | 199.8 | | 4.7 | 13.2 | 0.3 | 11.9 | 42.2 | 9.4 |
| LOS | | D | | | F | | A | B | A | B | D | A |
| Approach Delay | | 39.7 | | | 199.8 | | | 10.0 | | | 37.7 | |
| Approach LOS | | D | | | F | | | B | | | D | |

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 32 (21%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.30
 Intersection Signal Delay: 53.1
 Intersection LOS: D
 Intersection Capacity Utilization 96.6%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 7: US 301 & Armstrong Corner Rd/Marl Pit Road



Lanes, Volumes, Timings
8: US 301 & Churchtown Rd/SR 896

Timing Plan: ACTRA - PM

3/9/2012

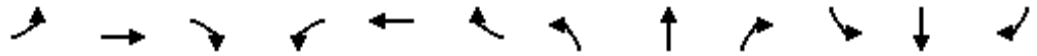


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 54 | 45 | 16 | 283 | 121 | 212 | 16 | 561 | 182 | 291 | 797 | 71 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 100 | | 0 | 450 | | 466 | 195 | | 370 | 400 | | 220 |
| Storage Lanes | 1 | | 0 | 2 | | 1 | 1 | | 1 | 2 | | 1 |
| Taper Length (ft) | 100 | | | 100 | | | 60 | | | 150 | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frt | | 0.961 | | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (prot) | 1805 | 1826 | 0 | 3127 | 1845 | 1538 | 1805 | 3343 | 1223 | 3433 | 3471 | 1599 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1805 | 1826 | 0 | 3127 | 1845 | 1538 | 1805 | 3343 | 1223 | 3433 | 3471 | 1599 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 10 | | | | 223 | | | 194 | | | 57 |
| Link Speed (mph) | | 45 | | | 25 | | | 50 | | | | 50 |
| Link Distance (ft) | | 1984 | | | 1173 | | | 1469 | | | | 1377 |
| Travel Time (s) | | 30.1 | | | 32.0 | | | 20.0 | | | | 18.8 |
| Peak Hour Factor | 0.81 | 0.81 | 0.81 | 0.95 | 0.95 | 0.95 | 0.94 | 0.94 | 0.94 | 0.93 | 0.93 | 0.93 |
| Heavy Vehicles (%) | 0% | 0% | 0% | 12% | 3% | 5% | 0% | 8% | 32% | 2% | 4% | 1% |
| Adj. Flow (vph) | 67 | 56 | 20 | 298 | 127 | 223 | 17 | 597 | 194 | 313 | 857 | 76 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 67 | 76 | 0 | 298 | 127 | 223 | 17 | 597 | 194 | 313 | 857 | 76 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(ft) | | 24 | | | 24 | | | 24 | | | | 24 |
| Link Offset(ft) | | 0 | | | 0 | | | 0 | | | | 0 |
| Crosswalk Width(ft) | | 16 | | | 16 | | | 16 | | | | 16 |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Number of Detectors | 1 | 2 | | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| Detector Template | Left | Thru | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Leading Detector (ft) | 20 | 100 | | 20 | 100 | 20 | 20 | 100 | 20 | 20 | 100 | 20 |
| Trailing Detector (ft) | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Position(ft) | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Size(ft) | 20 | 6 | | 20 | 6 | 20 | 20 | 6 | 20 | 20 | 6 | 20 |
| Detector 1 Type | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(ft) | | 94 | | | 94 | | | 94 | | | | 94 |
| Detector 2 Size(ft) | | 6 | | | 6 | | | 6 | | | | 6 |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | | Cl+Ex |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | | 0.0 |
| Turn Type | Split | NA | | Split | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 8 | 8 | | 4 | 4 | | 1 | 6 | | 5 | 2 | |
| Permitted Phases | | | | | | 4 | | | 6 | | | 2 |

Lanes, Volumes, Timings
 8: US 301 & Churchtown Rd/SR 896

Timing Plan: ACTRA - PM

3/9/2012



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------|-------|-------|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Detector Phase | 8 | 8 | | 4 | 4 | 4 | 1 | 6 | 6 | 5 | 2 | 2 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | | 10.0 | 10.0 | 10.0 | 5.0 | 20.0 | 20.0 | 5.0 | 20.0 | 20.0 |
| Minimum Split (s) | 12.0 | 12.0 | | 17.0 | 17.0 | 17.0 | 12.0 | 29.0 | 29.0 | 12.0 | 29.0 | 29.0 |
| Total Split (s) | 32.0 | 32.0 | | 35.0 | 35.0 | 35.0 | 30.0 | 53.0 | 53.0 | 30.0 | 53.0 | 53.0 |
| Total Split (%) | 21.3% | 21.3% | | 23.3% | 23.3% | 23.3% | 20.0% | 35.3% | 35.3% | 20.0% | 35.3% | 35.3% |
| Maximum Green (s) | 26.0 | 26.0 | | 29.0 | 29.0 | 29.0 | 24.0 | 45.0 | 45.0 | 24.0 | 45.0 | 45.0 |
| Yellow Time (s) | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 5.0 | 5.0 | 4.0 | 5.0 | 5.0 |
| All-Red Time (s) | 2.0 | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | 6.0 | 8.0 | 8.0 | 6.0 | 8.0 | 8.0 |
| Lead/Lag | | | | | | | Lead | Lag | Lag | Lead | Lag | Lag |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 5.0 | 5.0 | 4.0 | 5.0 | 5.0 |
| Recall Mode | None | None | | None | None | None | None | C-Max | C-Max | None | C-Max | C-Max |
| Act Effect Green (s) | 11.9 | 11.9 | | 22.9 | 22.9 | 22.9 | 8.0 | 69.4 | 69.4 | 19.8 | 89.0 | 89.0 |
| Actuated g/C Ratio | 0.08 | 0.08 | | 0.15 | 0.15 | 0.15 | 0.05 | 0.46 | 0.46 | 0.13 | 0.59 | 0.59 |
| v/c Ratio | 0.47 | 0.49 | | 0.62 | 0.45 | 0.53 | 0.18 | 0.39 | 0.29 | 0.69 | 0.42 | 0.08 |
| Control Delay | 75.7 | 67.4 | | 64.9 | 62.0 | 10.8 | 96.2 | 11.8 | 1.9 | 66.2 | 17.6 | 6.0 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 75.7 | 67.4 | | 64.9 | 62.0 | 10.8 | 96.2 | 11.8 | 1.9 | 66.2 | 17.6 | 6.0 |
| LOS | E | E | | E | E | B | F | B | A | E | B | A |
| Approach Delay | | 71.3 | | | 45.7 | | | 11.2 | | | 29.1 | |
| Approach LOS | | E | | | D | | | B | | | C | |

Intersection Summary

| | |
|------------------------------------|---|
| Area Type: | Other |
| Cycle Length: | 150 |
| Actuated Cycle Length: | 150 |
| Offset: | 66 (44%), Referenced to phase 2:SBT and 6:NBT, Start of Green |
| Natural Cycle: | 70 |
| Control Type: | Actuated-Coordinated |
| Maximum v/c Ratio: | 0.69 |
| Intersection Signal Delay: | 29.9 |
| Intersection LOS: | C |
| Intersection Capacity Utilization: | 60.4% |
| ICU Level of Service: | B |
| Analysis Period (min): | 15 |

Splits and Phases: 8: US 301 & Churchtown Rd/SR 896



Lanes, Volumes, Timings
 10: US 301 & Old Summit Bridge Rd

Timing Plan: ACTRA - PM













3/9/2012



| Lane Group | WBL | WBR | NBU | NBT | NBR | SBL | SBT |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | |
| Volume (vph) | 40 | 21 | 0 | 725 | 51 | 80 | 1145 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 0 | 100 | 250 | | 384 | 445 | |
| Storage Lanes | 1 | 1 | 1 | | 1 | 1 | |
| Taper Length (ft) | 25 | | 85 | | | 85 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 |
| Flt | | 0.850 | | | 0.850 | | |
| Flt Protected | 0.950 | | | | | 0.950 | |
| Satd. Flow (prot) | 1805 | 1615 | 1900 | 3471 | 1615 | 1752 | 3471 |
| Flt Permitted | 0.950 | | | | | 0.315 | |
| Satd. Flow (perm) | 1805 | 1615 | 1900 | 3471 | 1615 | 581 | 3471 |
| Right Turn on Red | | Yes | | | Yes | | |
| Satd. Flow (RTOR) | | 30 | | | 54 | | |
| Link Speed (mph) | 35 | | | 55 | | | 55 |
| Link Distance (ft) | 277 | | | 1227 | | | 2058 |
| Travel Time (s) | 5.4 | | | 15.2 | | | 25.5 |
| Peak Hour Factor | 0.69 | 0.69 | 0.94 | 0.94 | 0.94 | 0.90 | 0.90 |
| Heavy Vehicles (%) | 0% | 0% | 0% | 4% | 0% | 3% | 4% |
| Adj. Flow (vph) | 58 | 30 | 0 | 771 | 54 | 89 | 1272 |
| Shared Lane Traffic (%) | | | | | | | |
| Lane Group Flow (vph) | 58 | 30 | 0 | 771 | 54 | 89 | 1272 |
| Enter Blocked Intersection | No | No | No | No | No | No | No |
| Lane Alignment | Left | Right | R NA | Left | Right | Left | Left |
| Median Width(ft) | 12 | | | 12 | | | 12 |
| Link Offset(ft) | 0 | | | 0 | | | 0 |
| Crosswalk Width(ft) | 16 | | | 16 | | | 16 |
| Two way Left Turn Lane | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | 9 | 9 | | 9 | 15 | |
| Number of Detectors | 1 | 1 | 1 | 2 | 1 | 1 | 2 |
| Detector Template | Left | Right | Left | Thru | Right | Left | Thru |
| Leading Detector (ft) | 20 | 20 | 20 | 100 | 20 | 20 | 100 |
| Trailing Detector (ft) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Position(ft) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Size(ft) | 20 | 20 | 20 | 6 | 20 | 20 | 6 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(ft) | | | | 94 | | | 94 |
| Detector 2 Size(ft) | | | | 6 | | | 6 |
| Detector 2 Type | | | | Cl+Ex | | | Cl+Ex |
| Detector 2 Channel | | | | | | | |
| Detector 2 Extend (s) | | | | 0.0 | | | 0.0 |
| Turn Type | NA | Perm | pm+pt | NA | Perm | pm+pt | NA |
| Protected Phases | 4 | | 1 | 6 | | 5 | 2 |
| Permitted Phases | | 4 | 6 | | 6 | 2 | 2 |

Lanes, Volumes, Timings
30: US 301 & SR 71

Timing Plan: ACTRA - PM
3/9/2012

| |  |  |  |  |  |  |
|----------------------------|---|---|---|---|---|---|
| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations |  |  |  |  |  |  |
| Volume (vph) | 108 | 320 | 559 | 159 | 517 | 763 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 315 | 0 | | 400 | 250 | |
| Storage Lanes | 1 | 1 | | 1 | 1 | |
| Taper Length (ft) | 25 | | | | 50 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Fr _t | | 0.850 | | 0.850 | | |
| Fl _t Protected | 0.950 | | | | 0.950 | |
| Satd. Flow (prot) | 1770 | 1553 | 1652 | 1568 | 1719 | 1727 |
| Fl _t Permitted | 0.950 | | | | 0.950 | |
| Satd. Flow (perm) | 1770 | 1553 | 1652 | 1568 | 1719 | 1727 |
| Right Turn on Red | | Yes | | No | | |
| Satd. Flow (RTOR) | | 348 | | | | |
| Link Speed (mph) | 35 | | 45 | | | 50 |
| Link Distance (ft) | 1186 | | 916 | | | 549 |
| Travel Time (s) | 23.1 | | 13.9 | | | 7.5 |
| Peak Hour Factor | 0.92 | 0.92 | 0.84 | 0.84 | 0.89 | 0.89 |
| Heavy Vehicles (%) | 2% | 4% | 15% | 3% | 5% | 10% |
| Adj. Flow (vph) | 117 | 348 | 665 | 189 | 581 | 857 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 117 | 348 | 665 | 189 | 581 | 857 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Right | Left | Right | Left | Left |
| Median Width(ft) | 12 | | 12 | | | 12 |
| Link Offset(ft) | 0 | | 0 | | | 0 |
| Crosswalk Width(ft) | 16 | | 16 | | | 16 |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | 9 | | 9 | 15 | |
| Number of Detectors | 1 | 1 | 2 | 1 | 1 | 2 |
| Detector Template | Left | Right | Thru | Right | Left | Thru |
| Leading Detector (ft) | 20 | 20 | 100 | 20 | 20 | 100 |
| Trailing Detector (ft) | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Position(ft) | 0 | 0 | 0 | 0 | 0 | 0 |
| Detector 1 Size(ft) | 20 | 20 | 6 | 20 | 20 | 6 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(ft) | | | 94 | | | 94 |
| Detector 2 Size(ft) | | | 6 | | | 6 |
| Detector 2 Type | | | Cl+Ex | | | Cl+Ex |
| Detector 2 Channel | | | | | | |
| Detector 2 Extend (s) | | | 0.0 | | | 0.0 |
| Turn Type | NA | Free | NA | Prot | Prot | NA |
| Protected Phases | | | 6 | 6 | 5 | 2 |
| Permitted Phases | 7 | Free | | | | |

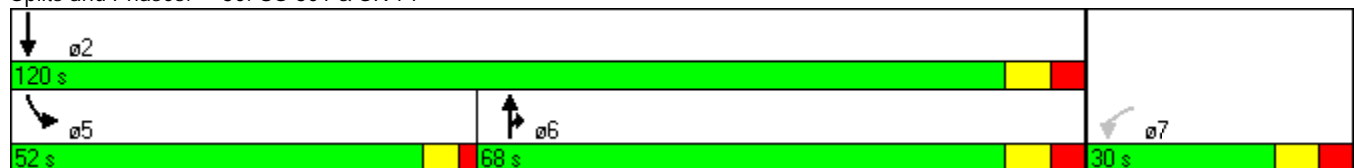


| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|-----------------------|-------|-------|-------|-------|-------|-------|
| Detector Phase | 7 | | 6 | 6 | 5 | 2 |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 6.0 | | 15.0 | 15.0 | 8.0 | 15.0 |
| Minimum Split (s) | 16.0 | | 30.0 | 30.0 | 15.0 | 30.0 |
| Total Split (s) | 30.0 | | 68.0 | 68.0 | 52.0 | 120.0 |
| Total Split (%) | 20.0% | | 45.3% | 45.3% | 34.7% | 80.0% |
| Maximum Green (s) | 21.0 | | 59.0 | 59.0 | 46.0 | 111.0 |
| Yellow Time (s) | 5.0 | | 5.0 | 5.0 | 4.0 | 5.0 |
| All-Red Time (s) | 4.0 | | 4.0 | 4.0 | 2.0 | 4.0 |
| Lost Time Adjust (s) | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 9.0 | | 9.0 | 9.0 | 6.0 | 9.0 |
| Lead/Lag | | | Lag | Lag | Lead | |
| Lead-Lag Optimize? | | | | | | |
| Vehicle Extension (s) | 4.0 | | 7.0 | 7.0 | 4.0 | 7.0 |
| Recall Mode | None | | C-Min | C-Min | None | C-Min |
| Act Effect Green (s) | 16.0 | 150.0 | 59.0 | 59.0 | 51.0 | 116.0 |
| Actuated g/C Ratio | 0.11 | 1.00 | 0.39 | 0.39 | 0.34 | 0.77 |
| v/c Ratio | 0.62 | 0.22 | 1.02 | 0.31 | 0.99 | 0.64 |
| Control Delay | 77.9 | 0.3 | 77.6 | 24.1 | 73.2 | 11.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 77.9 | 0.3 | 77.6 | 24.1 | 73.2 | 11.3 |
| LOS | E | A | E | C | E | B |
| Approach Delay | 19.8 | | 65.8 | | | 36.3 |
| Approach LOS | B | | E | | | D |

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 94 (63%), Referenced to phase 2:SBT and 6:NBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.02
 Intersection Signal Delay: 42.7
 Intersection LOS: D
 Intersection Capacity Utilization 84.0%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 30: US 301 & SR 71



Intersection Delay Study - Field Sheet

4 30 PM

Request No.:
Job No.:

Location: Choptank Rd at Clayton Manor Dr **Weather:** Clear
Date: 10/12/2011 **Recorder:** JS
Direction: EB **Start Time:** 16:30
(Military)

Location Characteristics:
Number Of Lanes : 1 Turning Lanes 1LT, 1RT
Number Of Pedestrians: 0 Parking N
Traffic Control Devices : Stop Sign Transit Stop (Y/N) N
Type of Delay (Fixed/ Operational): Fixed

Time Interval (hh:mm): 0:01

| No | Begin | End | Total Number of Vehicles | | | | Approach Volume: | |
|-----------------|-------|-------|------------------------------|----------|---------|---------|------------------|------------|
| | | | Stopped In Approach At Time: | | | | Number | Number not |
| | | | 0 SEC+ | 15 SEC + | 30 SEC+ | 45 SEC+ | Stopped | Stopped |
| 1 | 16:30 | 16:31 | 1 | 0 | 0 | 0 | 1 | 0 |
| 2 | 16:31 | 16:32 | 0 | 1 | 0 | 0 | 1 | 0 |
| 3 | 16:32 | 16:33 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 16:33 | 16:34 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 16:34 | 16:35 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 16:35 | 16:36 | 2 | 3 | 2 | 2 | 3 | 0 |
| 7 | 16:36 | 16:37 | 0 | 0 | 0 | 1 | 1 | 0 |
| 8 | 16:37 | 16:38 | 0 | 0 | 0 | 0 | 0 | 1 |
| 9 | 16:38 | 16:39 | 0 | 1 | 0 | 0 | 1 | 1 |
| 10 | 16:39 | 16:40 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 16:40 | 16:41 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 16:41 | 16:42 | 1 | 2 | 0 | 0 | 2 | 0 |
| 13 | 16:42 | 16:43 | 0 | 0 | 0 | 0 | 0 | 1 |
| 14 | 16:43 | 16:44 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 16:44 | 16:45 | 0 | 0 | 0 | 0 | 0 | 0 |
| SUBTOTAL | | | 4 | 7 | 2 | 3 | 9 | 3 |
| TOTAL | | | 16 | | | | 12 | |

Comments:
(Cell C50)

Total Delay = Total Number Stopped X Sampling Interval
= 16 X 15 = 240 Veh-Sec/ 3600 = 0.066667 Veh - Hr

Average Delay Per Stopped Vehicle = Total Delay / Number of Stopped Vehicles
= 240 / 9 = 26.66667 Sec

Average Delay Per Approach Vehicle = Total Delay / Approach Volume
= 240 / 12 = 20 Sec

Percent of Vehicles Stopped = Number of Stopped Vehicles / Approach Volume
= 9 / 12 = 0.75

Intersection Delay Study - Field Sheet

4 45 PM

Request No.:
Job No.:

Location: Choptank Rd at Clayton Manor Dr **Weather:** Clear
Date: ##### **Recorder:** JS
Direction: EB **Start Time:** 16:45
(Military)

Location Characteristics:

Number Of Lanes : 1 Turning Lanes 1LT, 1RT
Number Of Pedestrians: 0 Parking N
Traffic Control Devices : Stop Sign Transit Stop (Y/N) N
Type of Delay (Fixed/ Operational): Fixed

Time Interval (hh:mm): 0:01

| No | Begin | End | Total Number of Vehicles | | | | Approach Volume: | |
|-----------------|-------|-------|------------------------------|----------|---------|---------|------------------|------------|
| | | | Stopped In Approach At Time: | | | | Number | Number not |
| | | | 0 SEC+ | 15 SEC + | 30 SEC+ | 45 SEC+ | Stopped | Stopped |
| 1 | 16:45 | 16:46 | 0 | 0 | 0 | 1 | 1 | 2 |
| 2 | 16:46 | 16:47 | 0 | 0 | 0 | 1 | 1 | 0 |
| 3 | 16:47 | 16:48 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 16:48 | 16:49 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 16:49 | 16:50 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 16:50 | 16:51 | 0 | 1 | 3 | 2 | 3 | 0 |
| 7 | 16:51 | 16:52 | 0 | 1 | 0 | 0 | 1 | 0 |
| 8 | 16:52 | 16:53 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 16:53 | 16:54 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 16:54 | 16:55 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 16:55 | 16:56 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 16:56 | 16:57 | 0 | 0 | 0 | 1 | 1 | 1 |
| 13 | 16:57 | 16:58 | 1 | 0 | 1 | 1 | 1 | 1 |
| 14 | 16:58 | 16:59 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 16:59 | 17:00 | 0 | 0 | 0 | 1 | 1 | 1 |
| SUBTOTAL | | | 1 | 2 | 4 | 7 | 9 | 5 |
| TOTAL | | | 14 | | | | 14 | |

Comments:
(Cell C50)

Total Delay = Total Number Stopped X Sampling Interval
= 14 X 15 = 210 Veh-Sec/ 3600 = 0.058333 Veh - Hr

Average Delay Per Stopped Vehicle = Total Delay / Number of Stopped Vehicles
= 210 / 9 = 23.33333 Sec

Average Delay Per Approach Vehicle = Total Delay / Approach Volume
= 210 / 14 = 15 Sec

Percent of Vehicles Stopped = Number of Stopped Vehicles / Approach Volume
= 9 / 14 = 0.642857

Intersection Delay Study - Field Sheet

5 00 PM

Request No.:
Job No.:

Location: Choptank Rd at Clayton Manor Dr **Weather:** Clear
Date: ##### **Recorder:** JS
Direction: EB **Start Time:** 17:00
(Military)

Location Characteristics:

Number Of Lanes : 1 Turning Lanes 1LT, 1RT
Number Of Pedestrians: 0 Parking N
Traffic Control Devices : Stop Sign Transit Stop (Y/N) N
Type of Delay (Fixed/ Operational): Fixed

Time Interval (hh:mm): 0:01

| No | Begin | End | Total Number of Vehicles | | | | Approach Volume: | |
|-----------------|-------|-------|------------------------------|----------|---------|---------|------------------|------------|
| | | | Stopped In Approach At Time: | | | | Number | Number not |
| | | | 0 SEC+ | 15 SEC + | 30 SEC+ | 45 SEC+ | Stopped | Stopped |
| 1 | 17:00 | 17:01 | 1 | 0 | 0 | 1 | 2 | 0 |
| 2 | 17:01 | 17:02 | 2 | 1 | 0 | 0 | 1 | 0 |
| 3 | 17:02 | 17:03 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 17:03 | 17:04 | 0 | 0 | 0 | 0 | 0 | 1 |
| 5 | 17:04 | 17:05 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 17:05 | 17:06 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 17:06 | 17:07 | 0 | 1 | 1 | 1 | 2 | 0 |
| 8 | 17:07 | 17:08 | 1 | 1 | 0 | 0 | 0 | 0 |
| 9 | 17:08 | 17:09 | 1 | 0 | 1 | 1 | 2 | 0 |
| 10 | 17:09 | 17:10 | 0 | 2 | 2 | 2 | 3 | 0 |
| 11 | 17:10 | 17:11 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 17:11 | 17:12 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 17:12 | 17:13 | 0 | 0 | 0 | 0 | 0 | 1 |
| 14 | 17:13 | 17:14 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 17:14 | 17:15 | 0 | 0 | 0 | 0 | 0 | 1 |
| SUBTOTAL | | | 5 | 5 | 4 | 5 | 10 | 3 |
| TOTAL | | | 19 | | | | 13 | |

Comments:
(Cell C50)

Total Delay = Total Number Stopped X Sampling Interval
= 19 X 15 = 285 Veh-Sec/ 3600 = 0.079167 Veh - Hr

Average Delay Per Stopped Vehicle = Total Delay / Number of Stopped Vehicles
= 285 / 10 = 28.5 Sec

Average Delay Per Approach Vehicle = Total Delay / Approach Volume
= 285 / 13 = 21.92308 Sec

Percent of Vehicles Stopped = Number of Stopped Vehicles / Approach Volume
= 10 / 13 = 0.769231

Intersection Delay Study - Field Sheet

5 15 PM

Request No.:
Job No.:

Location: Choptank Rd at Clayton Manor Dr **Weather:** Clear
Date: ##### **Recorder:** JS
Direction: EB **Start Time:** 17:15
(Military)

Location Characteristics:

Number Of Lanes : 1 Turning Lanes 1LT, 1RT
Number Of Pedestrians: 0 Parking N
Traffic Control Devices : Stop Sign Transit Stop (Y/N) N
Type of Delay (Fixed/ Operational): Fixed

Time Interval (hh:mm): 0:01

| No | Begin | End | Total Number of Vehicles | | | | Approach Volume: | |
|-----------------|-------|-------|------------------------------|----------|---------|---------|------------------|------------|
| | | | Stopped In Approach At Time: | | | | Number | Number not |
| | | | 0 SEC+ | 15 SEC + | 30 SEC+ | 45 SEC+ | Stopped | Stopped |
| 1 | 17:15 | 17:16 | 1 | 0 | 0 | 0 | 1 | 0 |
| 2 | 17:16 | 17:17 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 17:17 | 17:18 | 1 | 1 | 1 | 1 | 2 | 0 |
| 4 | 17:18 | 17:19 | 0 | 0 | 0 | 0 | 0 | 1 |
| 5 | 17:19 | 17:20 | 0 | 0 | 0 | 0 | 0 | 1 |
| 6 | 17:20 | 17:21 | 0 | 0 | 1 | 1 | 1 | 1 |
| 7 | 17:21 | 17:22 | 1 | 0 | 0 | 0 | 0 | 1 |
| 8 | 17:22 | 17:23 | 0 | 0 | 1 | 1 | 2 | 0 |
| 9 | 17:23 | 17:24 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 17:24 | 17:25 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 17:25 | 17:26 | 1 | 0 | 0 | 0 | 1 | 0 |
| 12 | 17:26 | 17:27 | 0 | 0 | 0 | 0 | 0 | 1 |
| 13 | 17:27 | 17:28 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 17:28 | 17:29 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 17:29 | 17:30 | 0 | 1 | 1 | 0 | 1 | 0 |
| SUBTOTAL | | | 4 | 2 | 4 | 3 | 8 | 5 |
| TOTAL | | | 13 | | | | 13 | |

Comments:

(Cell C50)

Total Delay = Total Number Stopped X Sampling Interval

= 13 X 15 = 195 Veh-Sec/ 3600 = 0.054167 Veh - Hr

Average Delay Per Stopped Vehicle = Total Delay / Number of Stopped Vehicles

= 195 / 8 = 24.375 Sec

Average Delay Per Approach Vehicle = Total Delay / Approach Volume

= 195 / 13 = 15 Sec

Percent of Vehicles Stopped = Number of Stopped Vehicles / Approach Volume

= 8 / 13 = 0.615385

Intersection Delay Study - Field Sheet

4 30 PM

Request No.:
Job No.:

Location: US 301 at Keenan Auto Body **Weather:** Clear
Date: 10/11/2011 **Recorder:** JS
Direction: WB **Start Time:** 16:30
(Military)

Location Characteristics:
Number Of Lanes : 1 Turning Lanes 1LT, 1RT
Number Of Pedestrians: 0 Parking N
Traffic Control Devices : Stop Sign Transit Stop (Y/N) N
Type of Delay (Fixed/ Operational): Fixed

Time Interval (hh:mm): 0:01

| No | Begin | End | Total Number of Vehicles | | | | Approach Volume: | |
|-----------------|-------|-------|------------------------------|----------|---------|---------|------------------|------------|
| | | | Stopped In Approach At Time: | | | | Number | Number not |
| | | | 0 SEC+ | 15 SEC + | 30 SEC+ | 45 SEC+ | Stopped | Stopped |
| 1 | 16:30 | 16:31 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 16:31 | 16:32 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 16:32 | 16:33 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 16:33 | 16:34 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 16:34 | 16:35 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 16:35 | 16:36 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 16:36 | 16:37 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 16:37 | 16:38 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 16:38 | 16:39 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 16:39 | 16:40 | 1 | 1 | 0 | 0 | 1 | 0 |
| 11 | 16:40 | 16:41 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 16:41 | 16:42 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 16:42 | 16:43 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 16:43 | 16:44 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 16:44 | 16:45 | 0 | 0 | 0 | 0 | 0 | 0 |
| SUBTOTAL | | | 1 | 1 | 0 | 0 | 1 | 0 |
| TOTAL | | | 2 | | | | 1 | |

Comments:
(Cell C50)

Total Delay = Total Number Stopped X Sampling Interval
= 2 X 15 = 30 Veh-Sec/ 3600 = 0.008333 Veh - Hr

Average Delay Per Stopped Vehicle = Total Delay / Number of Stopped Vehicles
= 30 / 1 = 30 Sec

Average Delay Per Approach Vehicle = Total Delay / Approach Volume
= 30 / 1 = 30 Sec

Percent of Vehicles Stopped = Number of Stopped Vehicles / Approach Volume
= 1 / 1 = 1

Intersection Delay Study - Field Sheet

4 45 PM

Request No.:
Job No.:

Location: US 301 at Keenan Auto Body **Weather:** Clear
Date: ##### **Recorder:** JS
Direction: WB **Start Time:** 16:45
(Military)

Location Characteristics:

Number Of Lanes : 1 Turning Lanes 1LT, 1RT
Number Of Pedestrians: 0 Parking N
Traffic Control Devices : Stop Sign Transit Stop (Y/N) N
Type of Delay (Fixed/ Operational): Fixed

Time Interval (hh:mm): 0:01

| No | Begin | End | Total Number of Vehicles | | | | Approach Volume: | |
|-----------------|-------|-------|------------------------------|----------|---------|---------|------------------|------------|
| | | | Stopped In Approach At Time: | | | | Number | Number not |
| | | | 0 SEC+ | 15 SEC + | 30 SEC+ | 45 SEC+ | Stopped | Stopped |
| 1 | 16:45 | 16:46 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 16:46 | 16:47 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 16:47 | 16:48 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 16:48 | 16:49 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 16:49 | 16:50 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 16:50 | 16:51 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 16:51 | 16:52 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 16:52 | 16:53 | 0 | 0 | 0 | 1 | 1 | 0 |
| 9 | 16:53 | 16:54 | 1 | 2 | 1 | 1 | 1 | 0 |
| 10 | 16:54 | 16:55 | 1 | 0 | 0 | 1 | 1 | 0 |
| 11 | 16:55 | 16:56 | 2 | 2 | 2 | 3 | 2 | 0 |
| 12 | 16:56 | 16:57 | 2 | 2 | 1 | 1 | 0 | 0 |
| 13 | 16:57 | 16:58 | 2 | 2 | 3 | 2 | 2 | 0 |
| 14 | 16:58 | 16:59 | 2 | 1 | 0 | 0 | 0 | 0 |
| 15 | 16:59 | 17:00 | 1 | 1 | 1 | 1 | 1 | 0 |
| SUBTOTAL | | | 11 | 10 | 8 | 10 | 8 | 0 |
| TOTAL | | | 39 | | | 8 | | |

Comments:

(Cell C50)

Total Delay = Total Number Stopped X Sampling Interval

= 39 X 15 = 585 Veh-Sec/ 3600 = 0.1625 Veh - Hr

Average Delay Per Stopped Vehicle = Total Delay / Number of Stopped Vehicles

= 585 / 8 = 73.125 Sec

Average Delay Per Approach Vehicle = Total Delay / Approach Volume

= 585 / 8 = 73.125 Sec

Percent of Vehicles Stopped = Number of Stopped Vehicles / Approach Volume

= 8 / 8 = 1

Intersection Delay Study - Field Sheet

5 00 PM

Request No.:
Job No.:

Location: US 301 at Keenan Auto Body **Weather:** Clear
Date: ##### **Recorder:** JS
Direction: WB **Start Time:** 17:00
(Military)

Location Characteristics:

Number Of Lanes : 1 Turning Lanes 1LT, 1RT
Number Of Pedestrians: 0 Parking N
Traffic Control Devices : Stop Sign Transit Stop (Y/N) N
Type of Delay (Fixed/ Operational): Fixed

Time Interval (hh:mm): 0:01

| No | Begin | End | Total Number of Vehicles | | | | Approach Volume: | |
|-----------------|-------|-------|------------------------------|----------|---------|---------|------------------|------------|
| | | | Stopped In Approach At Time: | | | | Number | Number not |
| | | | 0 SEC+ | 15 SEC + | 30 SEC+ | 45 SEC+ | Stopped | Stopped |
| 1 | 17:00 | 17:01 | 1 | 0 | 0 | 0 | 0 | 0 |
| 2 | 17:01 | 17:02 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 17:02 | 17:03 | 0 | 0 | 1 | 1 | 1 | 0 |
| 4 | 17:03 | 17:04 | 0 | 0 | 1 | 1 | 1 | 0 |
| 5 | 17:04 | 17:05 | 1 | 1 | 1 | 1 | 1 | 0 |
| 6 | 17:05 | 17:06 | 1 | 1 | 2 | 3 | 2 | 0 |
| 7 | 17:06 | 17:07 | 2 | 1 | 0 | 0 | 0 | 1 |
| 8 | 17:07 | 17:08 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 17:08 | 17:09 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 17:09 | 17:10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 17:10 | 17:11 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 17:11 | 17:12 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 17:12 | 17:13 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 17:13 | 17:14 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 17:14 | 17:15 | 0 | 0 | 0 | 0 | 0 | 0 |
| SUBTOTAL | | | 5 | 3 | 5 | 6 | 5 | 1 |
| TOTAL | | | 19 | | | | 6 | |

Comments:
(Cell C50)

Total Delay = Total Number Stopped X Sampling Interval
= 19 X 15 = 285 Veh-Sec/ 3600 = 0.079167 Veh - Hr

Average Delay Per Stopped Vehicle = Total Delay / Number of Stopped Vehicles
= 285 / 5 = 57 Sec

Average Delay Per Approach Vehicle = Total Delay / Approach Volume
= 285 / 6 = 47.5 Sec

Percent of Vehicles Stopped = Number of Stopped Vehicles / Approach Volume
= 5 / 6 = 0.833333

Intersection Delay Study - Field Sheet

5 15 PM

Request No.:

Job No.:

Location: US 301 at Keenan Auto Body

Weather: Clear

Date: #####

Recorder: JS

Direction: WB

Start Time: 17:15

(Military)

Location Characteristics:

| | | | |
|--------------------------------------|-----------|--------------------|----------|
| Number Of Lanes : | 1 | Turning Lanes | 1LT, 1RT |
| Number Of Pedestrians: | 0 | Parking | N |
| Traffic Control Devices : | Stop Sign | Transit Stop (Y/N) | N |
| Type of Delay (Fixed/ Operational): | Fixed | | |

Time Interval (hh:mm): 0:01

| No | Begin | End | Total Number of Vehicles | | | | Approach Volume: | |
|-----------------|-------|-------|------------------------------|----------|---------|---------|------------------|------------|
| | | | Stopped In Approach At Time: | | | | Number | Number not |
| | | | 0 SEC+ | 15 SEC + | 30 SEC+ | 45 SEC+ | Stopped | Stopped |
| 1 | 17:15 | 17:16 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 17:16 | 17:17 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 17:17 | 17:18 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 17:18 | 17:19 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 17:19 | 17:20 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 17:20 | 17:21 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 17:21 | 17:22 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 17:22 | 17:23 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 17:23 | 17:24 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 17:24 | 17:25 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 17:25 | 17:26 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 17:26 | 17:27 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 17:27 | 17:28 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 17:28 | 17:29 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 17:29 | 17:30 | 0 | 0 | 0 | 0 | 0 | 0 |
| SUBTOTAL | | | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | | | 0 | | | 0 | | |

Comments:

(Cell C50)

Total Delay = Total Number Stopped X Sampling Interval

= 0 X 15 = 0 Veh-Sec/ 3600 = 0 Veh - Hr

Average Delay Per Stopped Vehicle = Total Delay / Number of Stopped Vehicles

= 0 / 0 = #DIV/0! Sec

Average Delay Per Approach Vehicle = Total Delay / Approach Volume

= 0 / 0 = #DIV/0! Sec

Percent of Vehicles Stopped = Number of Stopped Vehicles / Approach Volume

= 0 / 0 = #DIV/0!

Intersection Delay Study - Field Sheet

Request No.:
Job No.:

5 00 PM

Location: Existing US 301 at Old Schoolhouse Rd **Weather:** Clear
Date: 10/6/2010 **Recorder:** JS
Direction: EB **Start Time:** 17:00
(Military)

Location Characteristics:

Number Of Lanes : 1 Turning Lanes 1LT, 1RT
Number Of Pedestrians: 0 Parking N
Traffic Control Devices : Stop Sign Transit Stop (Y/N) N
Type of Delay (Fixed/ Operational): Fixed

Time Interval (hh:mm): 0:01

| No | Begin | End | Total Number of Vehicles | | | | Approach Volume: | | |
|-----------------|-------|-------|------------------------------|----------|---------|---------|------------------|------------|--|
| | | | Stopped In Approach At Time: | | | | Number | Number not | |
| | | | 0 SEC+ | 15 SEC + | 30 SEC+ | 45 SEC+ | Stopped | Stopped | |
| 1 | 17:00 | 17:01 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 2 | 17:01 | 17:02 | 1 | 0 | 1 | 1 | 2 | 0 | |
| 3 | 17:02 | 17:03 | 0 | 0 | 0 | 1 | 1 | 0 | |
| 4 | 17:03 | 17:04 | 1 | 2 | 3 | 4 | 3 | 0 | |
| 5 | 17:04 | 17:05 | 1 | 1 | 0 | 0 | 0 | 0 | |
| 6 | 17:05 | 17:06 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 7 | 17:06 | 17:07 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 8 | 17:07 | 17:08 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 9 | 17:08 | 17:09 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 10 | 17:09 | 17:10 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 11 | 17:10 | 17:11 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 12 | 17:11 | 17:12 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 13 | 17:12 | 17:13 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 14 | 17:13 | 17:14 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 15 | 17:14 | 17:15 | 0 | 0 | 0 | 0 | 0 | 0 | |
| SUBTOTAL | | | 3 | 3 | 4 | 6 | 6 | 0 | |
| TOTAL | | | 16 | | | | 6 | | |

Comments:
(Cell C50)

Total Delay = Total Number Stopped X Sampling Interval
= 16 X 15 = 240 Veh-Sec/ 3600 = 0.066667 Veh - Hr

Average Delay Per Stopped Vehicle = Total Delay / Number of Stopped Vehicles
= 240 / 6 = 40 Sec

Average Delay Per Approach Vehicle = Total Delay / Approach Volume
= 240 / 6 = 40 Sec

Percent of Vehicles Stopped = Number of Stopped Vehicles / Approach Volume
= 6 / 6 = 1

Intersection Delay Study - Field Sheet

5 15 PM

Request No.:
Job No.:

Location: Existing US 301 at Old Schoolhouse Rd **Weather:** Clear
Date: ##### **Recorder:** JS
Direction: EB **Start Time:** 17:15
 (Military)

Location Characteristics:

Number Of Lanes : 1 Turning Lanes 1LT, 1RT
 Number Of Pedestrians: 0 Parking N
 Traffic Control Devices : Stop Sign Transit Stop (Y/N) N
 Type of Delay (Fixed/ Operational): Fixed

Time Interval (hh:mm): 0:01

| No | Begin | End | Total Number of Vehicles | | | | Approach Volume: | |
|-----------------|-------|-------|------------------------------|----------|---------|---------|------------------|------------|
| | | | Stopped In Approach At Time: | | | | Number | Number not |
| | | | 0 SEC+ | 15 SEC + | 30 SEC+ | 45 SEC+ | Stopped | Stopped |
| 1 | 17:15 | 17:16 | 0 | 0 | 0 | 1 | 1 | 0 |
| 2 | 17:16 | 17:17 | 2 | 1 | 1 | 0 | 1 | 0 |
| 3 | 17:17 | 17:18 | 0 | 0 | 0 | 0 | 0 | 2 |
| 4 | 17:18 | 17:19 | 0 | 1 | 1 | 1 | 2 | 0 |
| 5 | 17:19 | 17:20 | 1 | 1 | 1 | 1 | 0 | 0 |
| 6 | 17:20 | 17:21 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 17:21 | 17:22 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 17:22 | 17:23 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 17:23 | 17:24 | 0 | 0 | 1 | 1 | 1 | 0 |
| 10 | 17:24 | 17:25 | 1 | 0 | 0 | 0 | 0 | 0 |
| 11 | 17:25 | 17:26 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 17:26 | 17:27 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 17:27 | 17:28 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 17:28 | 17:29 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 17:29 | 17:30 | 0 | 0 | 0 | 0 | 0 | 0 |
| SUBTOTAL | | | 4 | 3 | 4 | 4 | 5 | 2 |
| TOTAL | | | 15 | | | | 7 | |

Comments:
 (Cell C50)

Total Delay = Total Number Stopped X Sampling Interval
 = 15 X 15 = 225 Veh-Sec/ 3600 = 0.0625 Veh - Hr

Average Delay Per Stopped Vehicle = Total Delay / Number of Stopped Vehicles
 = 225 / 5 = 45 Sec

Average Delay Per Approach Vehicle = Total Delay / Approach Volume
 = 225 / 7 = 32.14286 Sec

Percent of Vehicles Stopped = Number of Stopped Vehicles / Approach Volume
 = 5 / 7 = 0.714286

Intersection Delay Study - Field Sheet

5 30 PM

Request No.:
Job No.:

Location: Existing US 301 at Old Schoolhouse Rd **Weather:** Clear
Date: ##### **Recorder:** JS
Direction: EB **Start Time:** 17:30
 (Military)

Location Characteristics:

Number Of Lanes : 1 Turning Lanes 1LT, 1RT
 Number Of Pedestrians: 0 Parking N
 Traffic Control Devices : Stop Sign Transit Stop (Y/N) N
 Type of Delay (Fixed/ Operational): Fixed

Time Interval (hh:mm): 0:01

| No | Begin | End | Total Number of Vehicles | | | | Approach Volume: | |
|-----------------|-------|-------|------------------------------|----------|---------|---------|------------------|------------|
| | | | Stopped In Approach At Time: | | | | Number | Number not |
| | | | 0 SEC+ | 15 SEC + | 30 SEC+ | 45 SEC+ | Stopped | Stopped |
| 1 | 17:30 | 17:31 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 17:31 | 17:32 | 0 | 0 | 0 | 1 | 1 | 0 |
| 3 | 17:32 | 17:33 | 0 | 0 | 0 | 1 | 1 | 1 |
| 4 | 17:33 | 17:34 | 1 | 0 | 0 | 0 | 0 | 0 |
| 5 | 17:34 | 17:35 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 17:35 | 17:36 | 0 | 2 | 2 | 1 | 3 | 0 |
| 7 | 17:36 | 17:37 | 1 | 1 | 1 | 1 | 0 | 0 |
| 8 | 17:37 | 17:38 | 1 | 0 | 0 | 0 | 0 | 0 |
| 9 | 17:38 | 17:39 | 0 | 0 | 0 | 1 | 1 | 0 |
| 10 | 17:39 | 17:40 | 1 | 2 | 1 | 1 | 2 | 0 |
| 11 | 17:40 | 17:41 | 2 | 2 | 0 | 0 | 2 | 0 |
| 12 | 17:41 | 17:42 | 0 | 1 | 1 | 1 | 1 | 0 |
| 13 | 17:42 | 17:43 | 0 | 0 | 0 | 0 | 0 | 1 |
| 14 | 17:43 | 17:44 | 0 | 0 | 0 | 2 | 2 | 0 |
| 15 | 17:44 | 17:45 | 3 | 2 | 2 | 1 | 1 | 0 |
| SUBTOTAL | | | 9 | 10 | 7 | 10 | 14 | 2 |
| TOTAL | | | 36 | | | | 16 | |

Comments:
 (Cell C50)

Total Delay = Total Number Stopped X Sampling Interval
 = 36 X 15 = 540 Veh-Sec/ 3600 = 0.15 Veh - Hr

Average Delay Per Stopped Vehicle = Total Delay / Number of Stopped Vehicles
 = 540 / 14 = 38.57143 Sec

Average Delay Per Approach Vehicle = Total Delay / Approach Volume
 = 540 / 16 = 33.75 Sec

Percent of Vehicles Stopped = Number of Stopped Vehicles / Approach Volume
 = 14 / 16 = 0.875

Intersection Delay Study - Field Sheet

5 45 PM

Request No.:
Job No.:

Location: Existing US 301 at Old Schoolhouse Rd **Weather:** Clear
Date: ##### **Recorder:** JS
Direction: EB **Start Time:** 17:45
(Military)

Location Characteristics:

Number Of Lanes : 1 Turning Lanes 1LT, 1RT
Number Of Pedestrians: 0 Parking N
Traffic Control Devices : Stop Sign Transit Stop (Y/N) N
Type of Delay (Fixed/ Operational): Fixed

Time Interval (hh:mm): 0:01

| No | Begin | End | Total Number of Vehicles | | | | Approach Volume: | |
|-----------------|-------|-------|------------------------------|----------|---------|---------|------------------|------------|
| | | | Stopped In Approach At Time: | | | | Number | Number not |
| | | | 0 SEC+ | 15 SEC + | 30 SEC+ | 45 SEC+ | Stopped | Stopped |
| 1 | 17:45 | 17:46 | 2 | 2 | 2 | 1 | 1 | 0 |
| 2 | 17:46 | 17:47 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 17:47 | 17:48 | 0 | 0 | 0 | 1 | 1 | 1 |
| 4 | 17:48 | 17:49 | 1 | 1 | 1 | 1 | 0 | 0 |
| 5 | 17:49 | 17:50 | 2 | 2 | 0 | 0 | 1 | 0 |
| 6 | 17:50 | 17:51 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 17:51 | 17:52 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 17:52 | 17:53 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 17:53 | 17:54 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 17:54 | 17:55 | 0 | 1 | 1 | 0 | 1 | 0 |
| 11 | 17:55 | 17:56 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 17:56 | 17:57 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 17:57 | 17:58 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 17:58 | 17:59 | 0 | 0 | 0 | 1 | 1 | 0 |
| 15 | 17:59 | 18:00 | 3 | 4 | 3 | 0 | 3 | 0 |
| SUBTOTAL | | | 8 | 10 | 7 | 4 | 8 | 1 |
| TOTAL | | | 29 | | | | 9 | |

Comments:
(Cell C50)

Total Delay = Total Number Stopped X Sampling Interval
= 29 X 15 = 435 Veh-Sec/ 3600 = 0.120833 Veh - Hr

Average Delay Per Stopped Vehicle = Total Delay / Number of Stopped Vehicles
= 435 / 8 = 54.375 Sec

Average Delay Per Approach Vehicle = Total Delay / Approach Volume
= 435 / 9 = 48.33333 Sec

Percent of Vehicles Stopped = Number of Stopped Vehicles / Approach Volume
= 8 / 9 = 0.888889

