# Atlanta Avenue Corridor Study

*City of Lynchburg, Virginia*

*Prepared on:*

***June 2015***

*Prepared for:*

***Central Virginia Metropolitan Planning Organization***

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# ATLANTA AVENUE CORRIDOR STUDY

## DRAFT FINAL REPORT

**JULY 2015**

**Prepared for:**

**City of Lynchburg**

**Central Virginia**
**Metropolitan Planning Organization**

**Lynchburg, Virginia**

**Prepared by:**
**AECOM**
**Virginia Beach, Virginia**

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# EXECUTIVE SUMMARY

The Region 2000 Local Government Council (Region 2000) in partnership with the City of Lynchburg engaged AECOM to conduct a corridor analysis along Atlanta Avenue in Lynchburg, Virginia. The Atlanta Avenue corridor connects Wards Road (U.S. Route 29 Business) in the east with Wards Ferry Road in the west.

## *Purpose*

The purpose of this study is to develop and evaluate enhancements for both traveler safety (vehicular and non-vehicular) and pedestrian and bicycle connections on Atlanta Avenue between Wards Ferry Road and retail activities along Wards Road. The need for addressing these issues previously has been identified both in the *Wards Ferry Road Corridor Study* and in the *Wards Road Area Pedestrian & Bicycle Concept Plan.* Both documents identify the Atlanta Avenue corridor as exhibiting deficiencies in pedestrian and bicycle access as well as safety issues. To develop a recommended set of measures to address deficiencies, this study begins by defining them.

The measure of success of the implementation of the recommendations of this study is reflected in the attainment of goals articulated in the *Comprehensive Plan* and in the two supporting documents identified in the paragraph above. The key goals are:

1. Extending pedestrian and bicyclists access west along Atlanta Avenue to Wards Ferry Road; and,
2. Provide for safety in transportation in the design of facilities.

## *Planning Process*

The corridor study process involved a coordinated effort that included staff from the City of Lynchburg, the Region 2000 Local Government Council and the consultant. Existing conditions were defined and forecasted conditions were developed and analyzed; deficiencies were detailed and a range of mitigative measures were considered. Key stakeholders and the public were engaged in two community meetings and improvement recommendations were finalized and documented.

## *Existing Conditions*

To define vehicular deficiencies on Atlanta Avenue, daily directional traffic counts, an analysis of crash data and a speed study were conducted, and the key findings were:

- **Speed:** The average vehicle speed was **36 mph** and the posted speed limit is 25 mph.
- **Safety:** In the past 3 years, a total of **24 crashes** occurred at the intersection of Atlanta Avenue and Badcock Place. Roughly 20 of these may have been eliminated by the installation of a mini-roundabout
- **Capacity:** Traffic conditions at the intersection of Atlanta Avenue with Badcock Place in the PM peak hour display a Level of Service (**LOS) F** conditions, with average vehicle delays of approximately 120 seconds. In contrast, the intersection of Atlanta Avenue with Wards Ferry Road operates with good service level conditions. (A Level of Service is the measure of the relationship between service capacity and

service demand for the transportation network. LOS range from A, best to F, worst conditions)

- **Pedestrian & Bicyclist Access:** The roadway west of Badcock Place is a narrow, section providing **two lanes – each with of 10 feet pavement width** - and earthen shoulders with an open drainage ditches. It does not meet current standards for lane widths (12 feet), and no accommodations are provided for pedestrians or bicyclists. The ditches present a hazard for all travelers who may run off the roadway.

*Improvement Measures*

**Traffic Calming:** To address the problem with excess vehicular speed on Atlanta Avenue, a traffic calming study was conducted in accordance with the City's Neighborhood Traffic Management Program (NTMP). Atlanta Avenue meets the requirements to be eligible for traffic management techniques. Feasible traffic calming measure that could be used would be the installation of a **speed hump** and establishing an **increased fine zone**.

**Safety and Capacity:** To address the issue of excessive average vehicle delay on the Badcock Place and Wards Crossing Shopping Center driveway approaches to Atlanta Avenue, the intersection was evaluated as a potential candidate for a **mini-roundabout**. The analysis results show that with a mini-roundabout, the overall delay at the intersection of Atlanta Avenue with Badcock Place improves, particularly for motorists on the minor streets. In addition, installing the proposed mini-roundabout likely will result in a reduction in the number of crashes.

**Pedestrian & Bicyclist Access:** The recommended improvements address two existing gaps in access that were identified in the *Wards Road Area Pedestrian & Bicycle Concept Plan.* First, on its eastern leg the mini-roundabout includes a **pedestrian crossing of Atlanta Avenue** that will connect the existing trail from the north to the proposed multiuse trail planned to extend south to Wards Ferry Road. Second, the proposed **multi-use trail on the north side of Atlanta Avenue** from Badcock Place in the east to Wards Ferry Road in the west addresses the issue of pedestrian and bicycle access addressed in the *Wards Ferry Road Corridor Study.*

*Public Involvement*

The Atlanta Avenue public involvement process was comprised of two public meetings held at the Church of the Brethern. The first was held April 23, 2015 and the second on May 21, 2015. Sixteen people attended the first public meeting including several residents of Atlanta Avenue and eleven people attended the second meeting. Attendees', opinions generally favored the proposed mini-roundabout and the speed table. There was strong support (especially from residents of homes fronting onto Atlanta Avenue) for pedestrian accommodations running the entire length of Atlanta Avenue. Most of the residents of Atlanta Avenue stated that speeding was a major problem on the road. Additionally, several residents of Atlanta Avenue complained of pavement edge drop-offs on the segments that have a significant vertical curve to the west of the Church of the Brethren.

*Cost Estimates*

Planning level cost estimates[1] were developed for the two main infrastructure improvements:

- The cost for the **mini-roundabout** is estimated at **$300,000**. Installation of elements of the mini-roundabout may be installed in phases.
- The cost of **the multiuse trail along Atlanta Avenue** is estimated at **$380,000**. These recommendations are detailed in the *Wards Road Area Pedestrian and Bicycle Concept Plan*.

*Recommendations*

1. **Install Mini-roundabout at Atlanta Avenue and Badcock Place.**
   - Address capacity and safety deficiencies at the intersection; and,
   - Include a crosswalk on Badcock Place and a crosswalk on the east side of the intersection on Atlanta Avenue.
2. **Install a temporary speed hump immediately west of Church of the Brethren.**
   - Evaluate on a trial basis to reduce excessive vehicular speeds on Atlanta Avenue;
   - If the speed hump is effective and it receives a positive resident response then a permanent speed hump could be evaluated; and,
   - The possibility of adding increased fine zone to provide greater enforcement activity also should be evaluated.
3. **Install multiuse trail (10 feet in width) on the north side of Atlanta Avenue from Badcock Place to Wards Ferry Road.**
   - Provide safe pedestrian and bicyclist access from the existing and planned Wards Road corridor trails to planned trail on Wards Ferry Road;
   - Address safety issues associated with narrow pavement and ditches on Atlanta Avenue; and,
   - Multiuse trail improvement to include installation of curb and gutter (north side of Atlanta Avenue only), with trail set immediately adjacent to the back of curb.

[1] Cost estimates that are not based on detailed surveys and engineering drawings.

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# I. INTRODUCTION

In partnership with the City of Lynchburg, the Region 2000 Local Government Council (Region 2000) engaged AECOM to conduct a corridor analysis along Atlanta Avenue in Lynchburg, Virginia. The Atlanta Avenue corridor connects to Wards Road (U.S. Route 29 Business) in the east with Wards Ferry Road in the west (See **Figure 1: Corridor Study Area)**.

The purpose of this study is to develop and evaluate enhancements for both traveler safety (both vehicular and non-vehicular) and pedestrian and bicycle access connections on Atlanta Avenue from Wards Ferry Road to Wards Road and also to retail commercial activities located along the Wards Road corridor. The need for addressing these issues previously has been identified both in the *Wards Ferry Road Corridor Study* and in the *Wards Road Area Pedestrian & Bicycle Concept Plan.* Both documents identify the Atlanta Avenue corridor as exhibiting deficiencies in pedestrian and bicycle access as well as safety issues. To develop a recommended set of measures to address deficiencies, they must first be defined in detail and then mitigative measures can be evaluated and recommended.

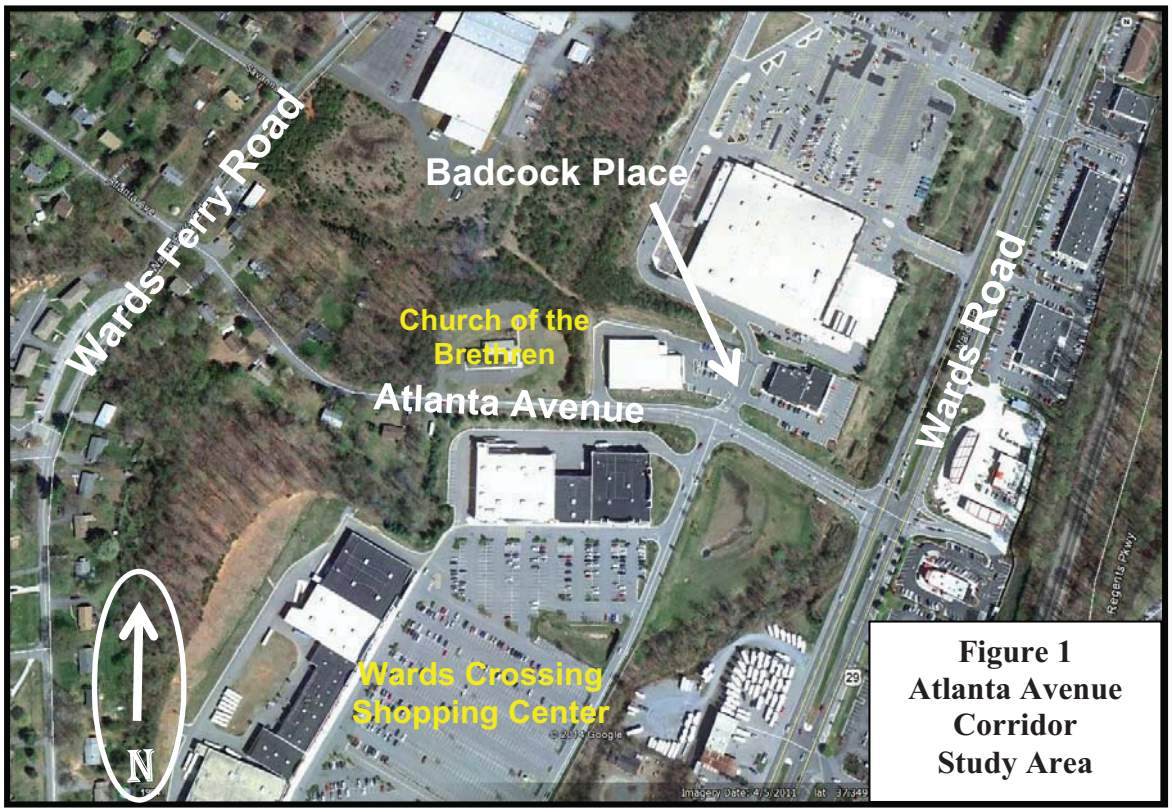


**Figure 1**
**Atlanta Avenue Corridor Study Area**

*Planning Basis for Corridor Study*

The overarching basis for the Atlanta Avenue Corridor Study is found in the *Lynchburg 2030 Comprehensive Plan.* In expanding of the first transportation goal – T1.0 Supportive Transportation System –- the document articulates two sub-goals that apply directly to the issues confronting this corridor:

> ***T-1.4*** *Prioritize improvements to the transportation system based on safety considerations; existing deficiencies; multimodal and environmental considerations; opportunities to improve street connectivity; physical, economic and policy constraints; contribution to neighborhood character; impact on historic and environmental resources; required right-of-way; target levels of service (see policy T-1.3); public safety access; regional connectivity; and system continuity.*
>
> ***T-1.5*** *Manage access to promote safety and convenience of (sic) along streets and on abutting properties for all modes of transportation.*[1]

The *Comprehensive Plan* further expands on the multi-modal aspects of transportation goals under the section detailing Goal T-2: Better Streets and Enhanced Mobility. The applicable sub-goal specifically identifies the intent to involve residents:

> ***T-2.4*** *Coordinate with private property owners and neighborhood groups to identify opportunities to better connect streets, pedestrian and bicycle facilities.*[2]

Additional planning studies have further detailed the vision for multi-modal facilities in the corridor area. *The Wards Road Area Pedestrian & Bicycle Concept Plan* focused on improvements to be pursued along the commercial area south of Harvard Street, but it also provided for these planned north-south facilities along Wards Road to be connection to adjacent residential areas:

> *Signed connector bicycle routes from adjoining neighborhoods west of the study area along Wards Ferry Road, Atlanta Avenue and Harvard Street.*[3]

Finally, in defining the needs on the Wards Ferry Road, the *Wards Ferry Road Corridor study* evaluated measures for providing pedestrian and bicycle access, but the limitations of the pavement section on Atlanta Avenue was seen as a challenge. In response the study recommended:

> *Atlanta Avenue merits a separate access management and multimodal (bike/pedestrian) study between Wards Ferry Road and the trail that is planned to end at the intersection of Atlanta Avenue and the driveway to Sam's Club.*[4]

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[1] *Lynchburg 2030 Comprehensive Plan.* pp. 30-31.
[2] *Lynchburg 2030 Comprehensive Plan.* p. 32.
[3] *The Wards Road Area Pedestrian & Bicycle Concept Plan. p. 15.*

# II. EXISTING AND FORECASTED CONDITIONS

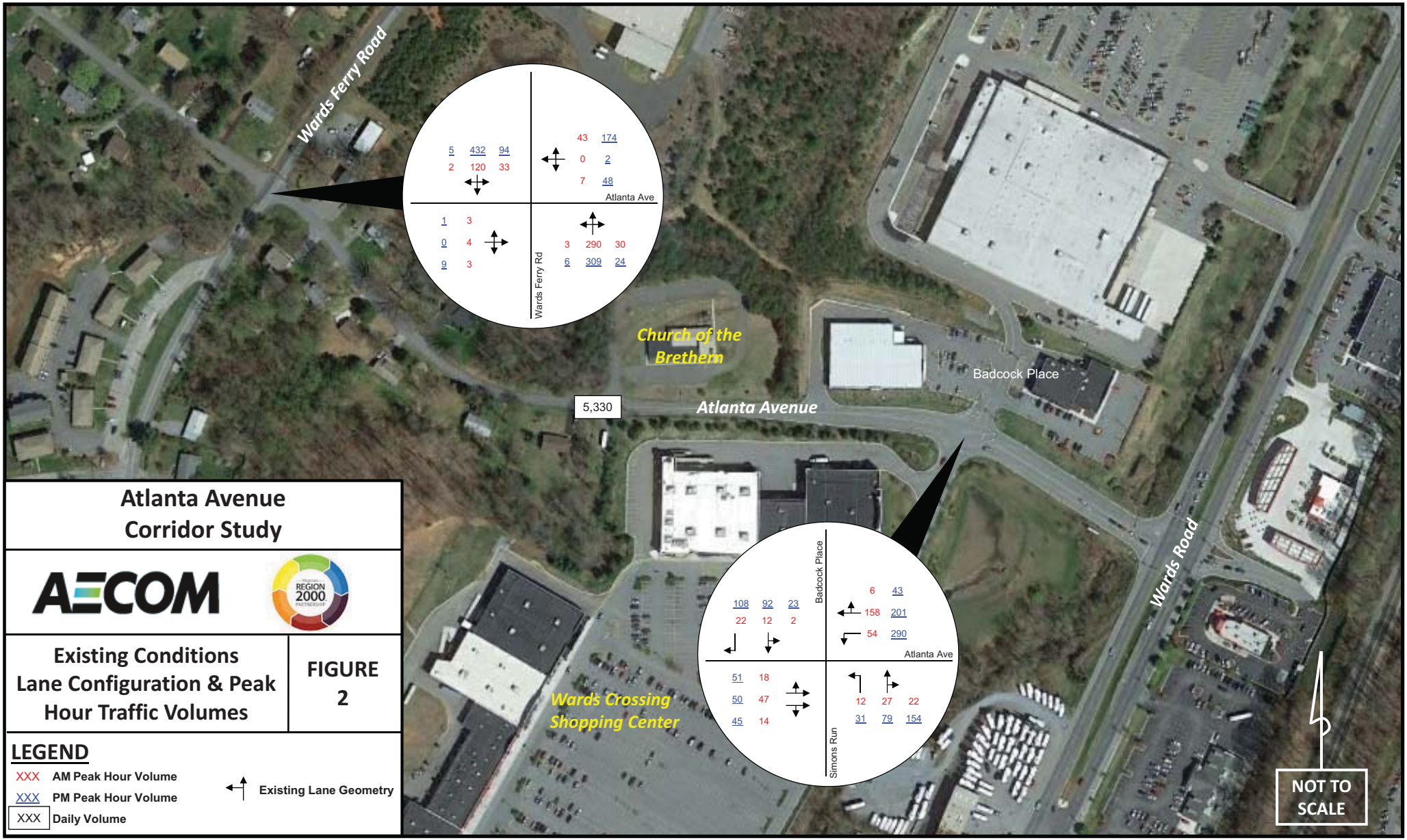
*Existing Conditions*

Daily directional traffic counts and measurements of vehicle speeds on Atlanta Avenue were recorded by Peggy Malone & Associates from November 5, 2014 through November 8, 2013. The location of the data collection was approximately 0.15 mile west of the Church of the Brethren driveway. Peak period turning movement counts (including pedestrian and bicycle movements) at the intersection of Atlanta Avenue with Badcock Place were conducted on November 6 & 8, 2014. The results of the traffic counts are documented in the Technical Appendix. Existing lane geometry and peak hour (8:00 – 9:00 AM and 4:30 – 5:30 PM) traffic volumes can be found in **Figure 2** - **Existing Conditions Lane Configuration & Peak Hour Traffic Volumes.**

Existing land use data was compiled with the use of City of Lynchburg GIS resources. **Figure 3 – Key Land Use Features** depicts land use characteristics in the study area, including roadways and hydrographic features, in addition to topography. **Figure 4 – Zoning Districts** defines the current mapping by zoning district[5], and **Figure 5 – Future Planned Land Use** shows planned land uses as recommended in the City of Lynchburg's *2030 Comprehensive Plan*.

The roadway along the Atlanta Avenue corridor starts at the Wards Road intersection as a four-lane facility with a pavement width of 48 feet and curb and gutter drainage. Beginning at the Church of the Brethren the roadway section transitions to a two-lane section with a pavement width of 20 feet and earthen shoulders and an open drainage system (ditches), and this section continues west to the intersection with Wards Ferry Road. Atlanta Avenue is approximately 0.36 miles in length and exhibits a steep increase in elevation (approximately 90 feet at an average grade of 4.7%). No bicycle or pedestrian accommodations are currently provided west of Badcock Place.

[4] *Wards Ferry Road Corridor Study.* p.36.
[5] For a complete description of each zoning district, see the City of Lynchburg Zoning Ordinance.




# Atlanta Avenue Corridor Study

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## Existing Conditions Lane Configuration & Peak Hour Traffic Volumes

**FIGURE 2**

## LEGEND

XXX AM Peak Hour Volume

XXX PM Peak Hour Volume

XXX Daily Volume

Existing Lane Geometry

# Atlanta Avenue Corridor Study

## Figure 3 - Key Land Use Features

Region 2000 Local Government Council
Lynchburg, Virginia

## Legend

- Stream Area
- Stream
- 10' Contour Index
- Floodzone
- Roadway

June 2015

0 0.025 0.05 0.1 Miles

N

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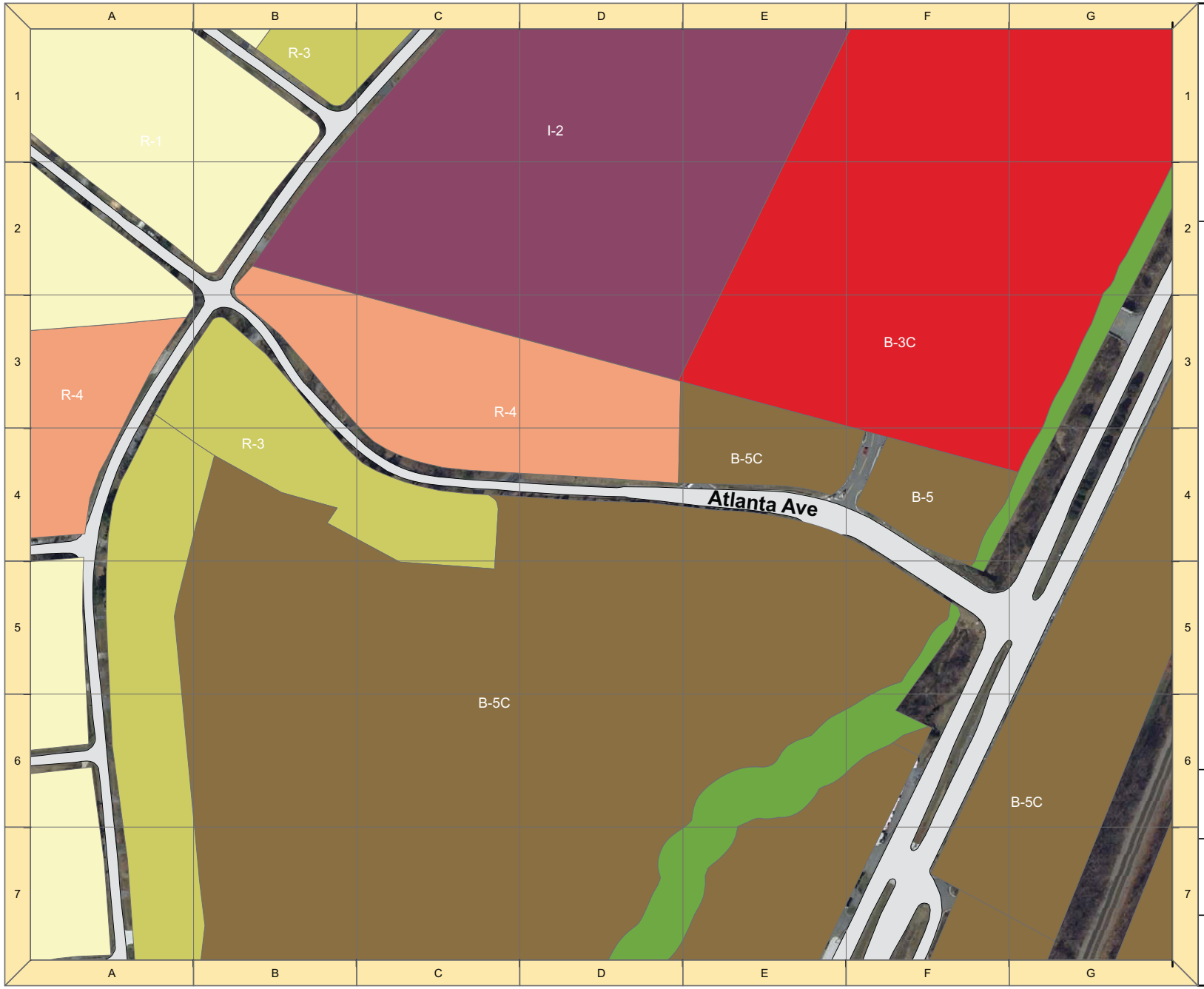



# Atlanta Avenue Corridor Study

## Figure 4 - Zoning Districts

Region 2000 Local Government Council
Lynchburg, Virginia

## Legend

### Zoning Districts

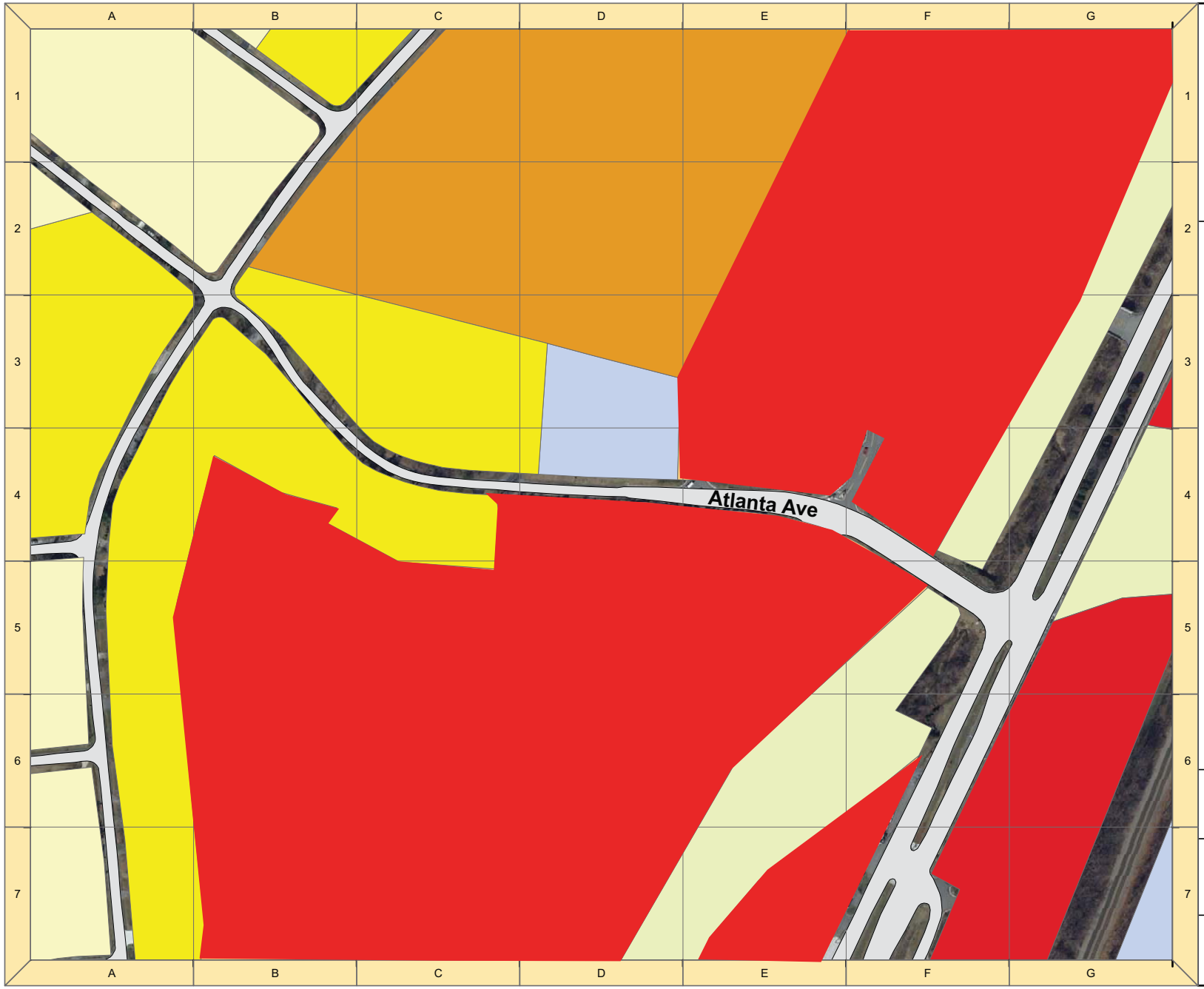
- B1
- B2
- B3
- B5
- I2
- R1
- R2
- R3
- R4
- RC

June 2015

0 0.025 0.05 0.1 Miles

N

AECOM




# Atlanta Avenue Corridor Study

## Figure 5 - Future Planned Land Use

Region 2000 Local Government Council
Lynchburg, Virginia

## Legend

### Future Planned Land Use

- Resource Conservation
- Public Use
- Institution
- Office
- Employment 2
- ~~Regional Commercial~~
- Community Commercial
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Roadway

June 2015

0 0.025 0.05 0.1 Miles

N

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*Capacity Analysis of Existing Conditions*

Using the peak hour traffic volumes shown in **Figure 2** - **Existing Lane Configuration & Peak Hour Traffic Volumes**, capacity analysis was conducted. The intersection capacity analyses were performed using Synchro 8 software, which computes estimates of service levels using the methodology developed in the *Highway Capacity Manual* (HCM 2010).

Capacity analysis is used to determine a Level of Service (LOS) for a given intersection, and the analysis procedures differ depending upon the type of traffic control at the intersection - signalized or unsignalized. In general, LOS A and B indicate little or no delay, LOS C indicates modest delay, LOS D indicates delay is increasing and noticeable, LOS E indicates the limit of acceptable delay and LOS F is characteristic of over-saturated conditions.

The capacity analysis results of existing conditions are documented in **Table 1**, which shows that the intersection of Atlanta Avenue with Badcock Place operates with good service level conditions in the AM peak hour – service levels no worse than B. The PM peak hour, however, displays poor service levels for the north and southbound movements: the side street left turns displays LOS F, with average vehicle delays of approximately 120 seconds.

**Table 1**
**Existing Conditions**
**Average Unsignalized Vehicle Delay and Service Levels**
**Synchro HCM 2010 Methodology**

| Approach | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| | Delay (sec.) | LOS | Delay (sec.) | LOS |
| **Atlanta Avenue @ Badcock Place** | | | | |
| EB Left/Through | 7.6 | A | 7.9 | A |
| EB Right | 0.0 | A | 0.1 | A |
| WB Left | 7.4 | A | 8.1 | A |
| WB Through/Right | 0.0 | A | 0.0 | A |
| NB Left | 12.3 | B | 114.7 | F |
| NB Through/Right | 10.9 | B | 34.4 | D |
| SB Left/Through | 12.3 | B | 126.4 | F |
| SB Right | 9.3 | A | 10.3 | B |
| **Atlanta Avenue @ Wards Ferry Road** | | | | |
| EB Left/Through/Right | 12.5 | B | 13.8 | B |
| WB Left/Through/Right | 11.0 | B | 23.7 | C |
| NB Left/Through/Right | 0.1 | A | 0.1 | A |
| SB Left/Through/Right | 1.7 | A | 1.5 | A |

Also shown in **Table 1,** the results of the analysis of the intersection of Atlanta Avenue and Wards Ferry Road indicate service levels on all approaches are adequate - exhibiting LOS C or better.

Next, SimTraffic 8.0 simulation software was used to run a microsimulation, and the results of these simulation runs are included in **Table 2**. The simulations show that motorists on the side streets still experience delay, but on the order of 15 to 20 seconds, rather than approximately 120 seconds as shown in the results in Table 1. This lower average vehicle delay is consistent with observed field conditions.

**Table 2**
**Existing Conditions**
**Average Vehicle Delay and Service Levels**
**SimTraffic Microsimulation**

| Approach | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| | Delay (sec.) | LOS | Delay (sec.) | LOS |
| **Atlanta Avenue @ Badcock Place** | | | | |
| EB Left/Through | 2.6 | A | 2.6 | A |
| EB Right | 0.1 | A | 0.3 | A |
| WB Left | 1.8 | A | 3.1 | A |
| WB Through/Right | 0.3 | A | 0.9 | A |
| NB Left | 5.9 | A | 18.3 | C |
| NB Through/Right | 8.0 | A | 16.3 | C |
| SB Left/Through | 6.4 | A | 17.3 | C |
| SB Right | 6.5 | A | 13.6 | B |

As previously documented in the report, *Wards Ferry Road Corridor Study¸* the intersection of Atlanta Avenue with Wards Ferry Road operates with good service level conditions, with no worse than LOS C conditions in both peak hours.[6]

*Crash Analysis*

Crash records from the most recent 3-year period (2011-2014) were evaluated to identify patterns in crash histories. **Table 3** displays a summary of all crashes along the Atlanta Avenue corridor. In the past 3 years, there were a total of 24 crashes; of these, 22 (92%) involved angle collisions, 1 (4%) involved a rear-end collision, and 1 (4%) involved a collision with an off-road fixed object. Generally, more than 5 crashes annually indicate a potential intersection safety issue.

[6] *Wards Ferry Road Corridor Study.* June 2013. p.6.

| Table 3<br>Atlanta Avenue 3-Year Crash Summary | | | | |
|---|---|---|---|---|
| **Intersection** | **Rear End** | **Angle** | **Fixed Object – Off Road** | **Total** |
| Wards Rd @ Atlanta Ave | 1 | - | 1 | **2** |
| Badcock Pl @ Atlanta Ave | - | 20 | - | **20** |
| Wards Ferry Rd @ Atlanta Ave | - | 2 | - | **2** |
| **Total** | **1** | **22** | **1** | **24** |

The majority of crashes (20 of 24, or 84%) occurred at the intersection of Atlanta Avenue and Badcock Place. Speed was not determined to be a factor in any of these crashes. Darkness was the prevailing lighting condition in 4 of 20 (20%) crashes; the pavement was wet in 2 of 20 (10%) crashes; and other vehicles obstructing drivers' views were a factor in 6 of 20 (30%) crashes. There were 3 crashes resulting in personal injuries, 17 resulting in property damage only, and none resulting in a fatality. From the analysis of crash causes and conditions, neither weather nor darkness is a significant factor, and the high frequency of crashes is most likely related to the intersection configuration. **Figure 6 – Diagram of Collision Reports** displays the crash patterns for the intersection of Badcock Place with Atlanta Avenue.

### *Forecasted Conditions*

Background traffic volume growth – traffic not related to site development on the corridor - on all study area roads has been accounted for by applying a 1% annual growth rate to existing volumes. The 1% annual growth rate is consistent with that used and documented in the *Wards Ferry Road Corridor Study*, which was conducted in 2013.

The design year for this project was set at 2024 - ten years beyond the existing conditions. **Figure 7 - Year 2024 Lane Configuration & Peak Hour Traffic Volumes** presents the design year traffic volumes.

Using the peak hour traffic volumes found in **Figure 7**, capacity analysis of year 2024 forecasted conditions was conducted. Synchro 8 software was used for the analysis to calculate results based on *2010 Highway Capacity Manual* procedures. **Table 4** summarizes the results of the Build Alternative analysis.

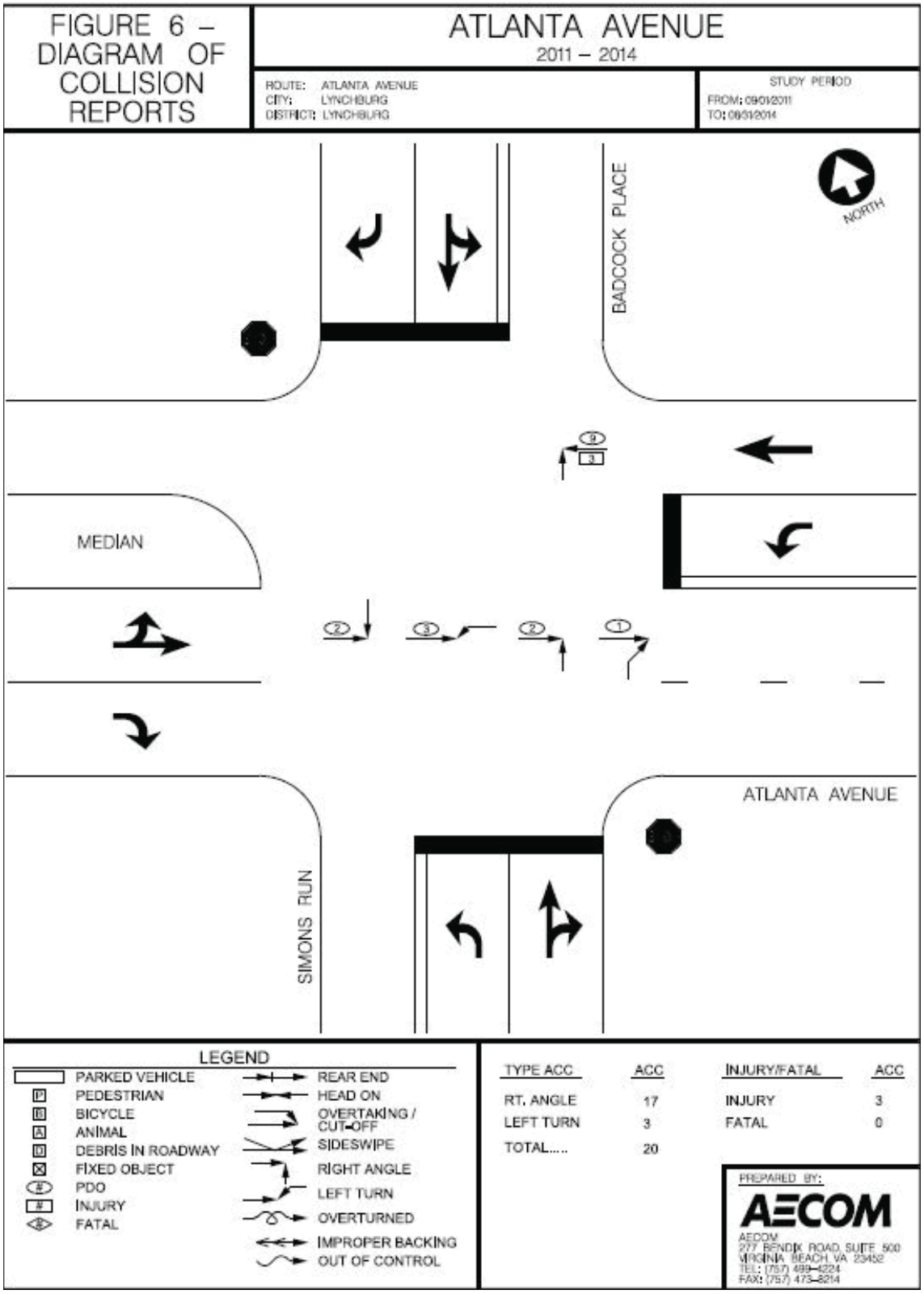
FIGURE 6 – DIAGRAM OF COLLISION REPORTS
ATLANTA AVENUE
2011 – 2014
ROUTE: ATLANTA AVENUE
CITY: LYNCHBURG
DISTRICT: LYNCHBURG
STUDY PERIOD
FROM: 09/01/2011
TO: 08/31/2014
NORTH
BADCOCK PLACE
MEDIAN
ATLANTA AVENUE
SIMONS RUN
LEGEND
PARKED VEHICLE
PEDESTRIAN
BICYCLE
ANIMAL
DEBRIS IN ROADWAY
FIXED OBJECT
PDO
INJURY
FATAL
REAR END
HEAD ON
OVERTAKING / CUT-OFF
SIDESWIPE
RIGHT ANGLE
LEFT TURN
OVERTURNED
IMPROPER BACKING
OUT OF CONTROL
TYPE ACC ACC
RT. ANGLE 17
LEFT TURN 3
TOTAL..... 20
INJURY/FATAL ACC
INJURY 3
FATAL 0
PREPARED BY:
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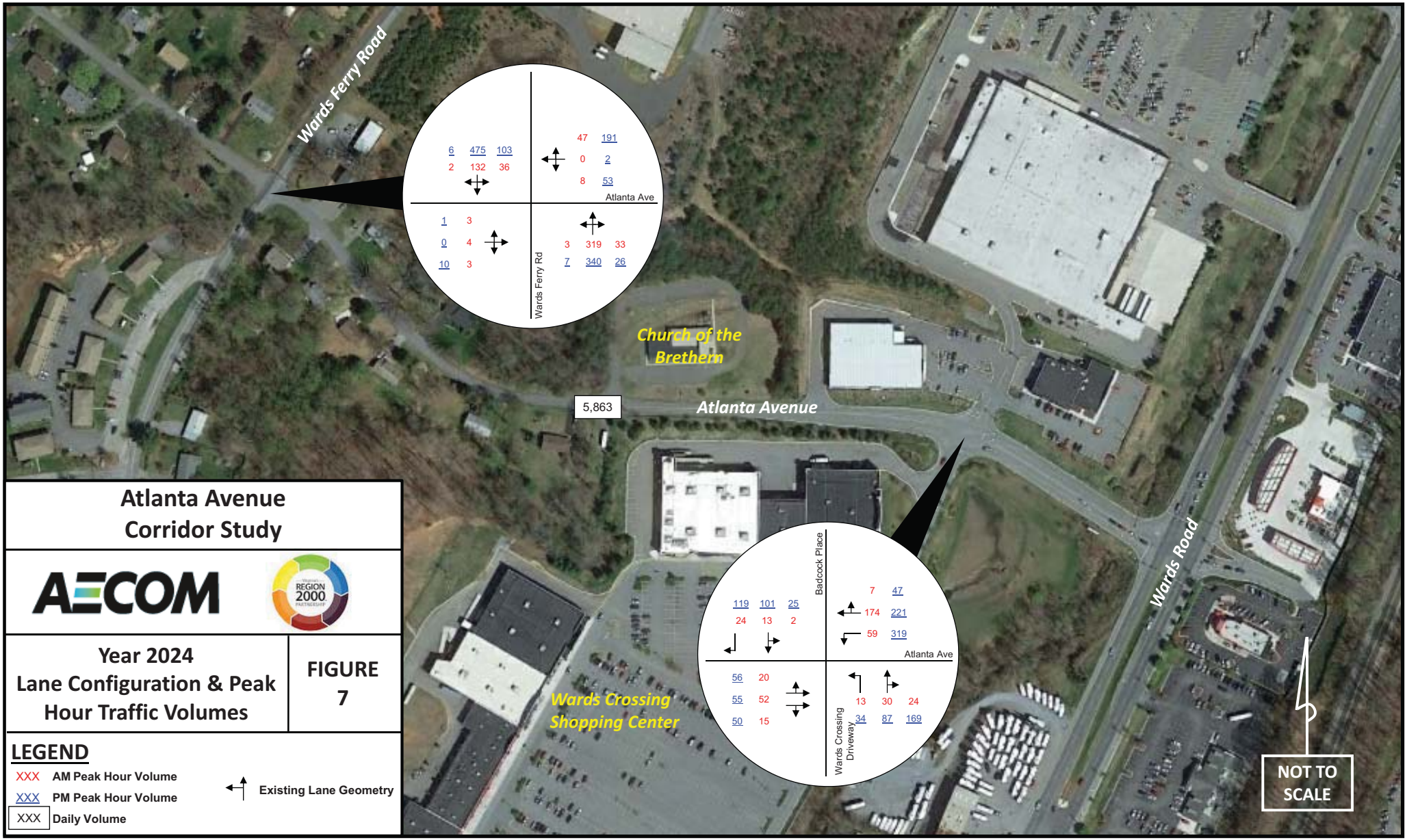
AECOM
277 BENDIX ROAD, SUITE 500
VIRGINIA BEACH, VA 23452
TEL: (757) 499-4224
FAX: (757) 473-8214

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## Year 2024 Lane Configuration & Peak Hour Traffic Volumes

**FIGURE 7**

## LEGEND

XXX AM Peak Hour Volume

XXX PM Peak Hour Volume

XXX Daily Volume

Existing Lane Geometry

Similar to the existing conditions results, the intersection of Atlanta Avenue with Badcock Place is forecast to operate with good service levels in the AM peak hour with no worse than LOS B conditions. The PM peak hour continues to display poor service levels for the northbound and southbound approach movements: the side street left turns display LOS F conditions, with average vehicle delays in excess of 400 seconds.

**Table 4** also shows that, in contrast with the Badcock Place intersection, the intersection of Atlanta Avenue with Wards Ferry Road is forecast to operate with adequate service levels during both peak periods.

**Table 4**
**Build Alternative**
**Average Vehicle Delay and Service Levels**
**HCM 2010 Methodology**

| Approach | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| | Delay (sec.) | LOS | Delay (sec.) | LOS |
| **Atlanta Avenue @ Badcock Place** | | | | |
| EB Left/Through | 7.7 | A | 8.0 | A |
| EB Right | 0.0 | A | 0.1 | A |
| WB Left | 7.5 | A | 8.2 | A |
| WB Through/Right | 0.0 | A | 0.0 | A |
| NB Left | 13.0 | B | 419.0 | F |
| NB Through/Right | 11.2 | B | 62.7 | F |
| SB Left/Through | 12.8 | B | 316.3 | F |
| SB Right | 9.4 | A | 10.6 | B |
| **Atlanta Avenue @ Wards Ferry Road** | | | | |
| EB Left/Through/Right | 13.1 | B | 15.1 | C |
| WB Left/Through/Right | 11.4 | B | 33.5 | D |
| NB Left/Through/Right | 0.1 | A | 0.2 | A |
| SB Left/Through/Right | 1.7 | A | 1.5 | A |

As with the analysis of existing conditions, SimTraffic 8 software was again used to run a microsimulation using forecasted year 2024 volumes; the results of these simulations may be found in **Table 5**. The simulations again show that on average motorists using the side streets still experience approximately 15 to 21 seconds of delay, rather than over 400 seconds as shown in the HCM results in Table 4.

**Table 5**
**Build Alternative**
**Average Vehicle Delay and Service Levels**
**SimTraffic Microsimulation**

| Approach | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| | Delay (sec.) | LOS | Delay (sec.) | LOS |
| **Atlanta Avenue @ Badcock Place** | | | | |
| EB Left/Through | 2.3 | A | 3.3 | A |
| EB Right | 0.0 | A | 0.2 | A |
| WB Left | 2.5 | A | 2.9 | A |
| WB Through/Right | 0.3 | A | 1.0 | A |
| NB Left | 4.4 | A | 14.3 | C |
| NB Through/Right | 7.1 | A | 18.6 | C |
| SB Left/Through | 7.3 | A | 21.6 | C |
| SB Right | 3.1 | A | 6.6 | C |

# III. NEIGHBORHOOD TRAFFIC CALMING

In response to complaints received by the City of Lynchburg from corridor residents, a traffic calming study was initiated by Lynchburg and supported by AECOM. Traffic calming consists of physical design and other measures, including narrowed roads and speed humps, put in place on roads for the intention of slowing down or reducing motor-vehicle traffic as well as to improve safety for pedestrians and cyclists.

The guide for completing traffic calming study process is defined in the City of Lynchburg document, *Neighborhood Traffic Management Program (NTMP)* dated December 2005. It provides a step-by-step process to identify, evaluate and prioritize traffic management measures.

Residential collector streets such as Atlanta Avenue, although classified as collector roads, may have characteristics of a local residential street. These streets may be considered for traffic management techniques if they meet all the following conditions:

1. Posted speed of 25 mph
2. Two-lane roadway
3. Does not serve as the primary access to commercial, educational, or industrial sites.
4. Minimum of 12 dwelling units fronting the street per 1,000 feet of roadway, including both sides.
5. The volume of traffic is greater than 1,000 vehicles per day.
6. Documented Speed Problem – the average speed is greater than 5 mph over the speed limit based on documented speed studies (greater than 30 mph).

Atlanta Avenue has a posted speed limit of 25 mph and is a two lane roadway west of Badcock Place. While it provides direct access to residential units, motorists also use it as a cut-through connection between Wards Ferry Road and Wards Road and the commercial areas along Wards Road.

There are 10 residences fronting the street, however those residences only span an 800-foot length of roadway. Extrapolating this ratio out, a similar roadway of 1,000 feet would meet the 12-residence criterion. As documented by the traffic counts, the average daily traffic on Atlanta Avenue is 5,330 vehicles. And as documented in the speed study, the average speed on Atlanta Avenue is 36.2 mph. Based on all of these analysis measures, Atlanta Avenue meets the requirements to be eligible for traffic management techniques.

Since Atlanta Avenue meets the eligibility for traffic management, the next step according to the NTMP is to rank it as a prioritized need. Requests for traffic management measures scoring less than 40 points – as shown in **Table 6 -** will automatically be considered a low priority and not considered further for physical measures. Based on the results of **Table 6** with a score of 85 out of a possible 100 points, Atlanta Avenue is qualified to move on to more detailed scoring.

**Table 7** shows the results of this detailed analysis, which shows that Atlanta Avenue scores 70 out of a possible 105 points. Based on the results of the traffic calming investigation, it is recommended that physical measures be instituted to aid in traffic calming along Atlanta Avenue. A majority of crashes are located in the eastern end of the corridor - particularly at the intersection of Badcock Place with Atlanta Avenue. At this location, pedestrians may periodically cross Atlanta Avenue to move between shopping centers. Considering these corridor characteristics and as shown in Table 7 the score of 70, the list of potential traffic calming measures at this intersection is presented in **Table 8**.

**Table 6**
**Atlanta Avenue Traffic Management Techniques**
**Priority Calculation Basic Scoring**

| Criteria | Points | Basis for Point Assignment | Atlanta Avenue Value | Atlanta Avenue Score |
|---|---|---|---|---|
| Speed | 0 to 50 | 85th percentile traffic speeds more than 5 mph above the posted speed limit (5 points assigned for every mph over) | 37.1 mph | 35 |
| Volume | 0 to 50 | Average daily traffic volumes (2 points assigned for every 100 vehicles per day) | 5,330 | 50 |
| **Total Points Possible** | 100 | Must have at least 40 points to move on to **Table 7** | - | 85 |

**Table 7**
**Atlanta Avenue Traffic Management Techniques**
**Priority Calculation Detailed Scoring**

| Criteria | Points | Basis for Point Assignment | Atlanta Avenue Value | Atlanta Avenue Score |
|---|---|---|---|---|
| Speed | 0 to 50 | Percentage of vehicles traveling 10 mph over the posted speed (1 point assigned for every 1 percentage point) | 66.6% | 50 |
| Volume | 0 to 5 | Average daily traffic volumes (1 point assigned for every 100 cars over 500 vehicles per day) | 5,330 | 5 |
| Elementary Schools | 0 to 10 | 5 points assigned for each school zone in study area | None | 0 |
| Pedestrian Generators | 0 or 5 | 5 points assigned for public facilities (such as parks, community centers, and high schools) that generate a significant number of pedestrians on the street | None | 0 |
| Bicycle Route | 0 or 10 | 10 points assigned if any part of the street is a designated bicycle route | No bicycle route | 0 |
| Transit Streets | 0 or 10 | 10 points assigned if any part of the street is a designated transit route | No transit | 0 |
| Pedestrian Facility | 0 or 10 | 10 points assigned if there is no continuous sidewalk on at least one side of the street | No facilities | 10 |
| Crash Frequency | 0 to 5 | 5 points for injury accidents, 1 point for property damage (last 3 years) | 3 injury accidents 21 PDO accidents | 5 |
| **Total Points Possible** | 105 | - | - | 70 |

| Table 8<br>Atlanta Avenue Traffic Calming Measures<br>Atlanta Avenue @ Badcock Place | | | |
|---|---|---|---|
| **Traffic Calming Measure** | **Description** | **Drawbacks** | **Cost** |
| Traffic Circle | An elevated area in the middle of an intersection | May reduce parking spaces and require additional right-of-way | $3,500 to $15,000 |
| Raised Crosswalk | A raised hump with a 10-foot wide flat top | Slows emergency vehicles<br>Potential drainage problems<br>Increased noise<br>Increased maintenance cost | $2,500 to $8,000 |
| Raised Median Island | An elevated area in the middle of a roadway | Drainage problems<br>Increased maintenance cost | $5,000 to $15,000 |
| Crosswalk Refuge | A raised median in the middle of a roadway with a cut for the crosswalk | Increased maintenance cost | $5,000 to $15,000 |

The *NTMP* also present a series of traffic calming measures for consideration.[7] Comparing these measures and focusing on pedestrian and bicycle safety and access recommendations in *The Wards Road Area Pedestrian & Bicycle Concept Plan - Signed connector bicycle routes from adjoining neighborhoods west of the study area along Wards Ferry Road, Atlanta Avenue* – the narrow pavement section along the western segment of Atlanta Avenue presents an implementation challenge. Specifically, encouraging the pedestrian and bicycle use with signing on such a narrow roadway is not consistent with promoting traveler safety. Either the pavement section would need to be widened or a separate pedestrian and bicycle facility would need to be installed.

Turning to the speeding issues on Atlanta Avenue, along the western segment of the corridor horizontal and vertical curves tend to slow, and only earthen shoulders with open drainage (ditches – no curbs) are provided. Therefore, the only feasible traffic calming measures that could be used would be a speed hump and/or increased fine zone enhanced enforcement. Speed humps force emergency vehicles to slow, may cause drainage problems, and may impose increased noise and maintenance costs. However, they will also slow other vehicles traveling the roadway. They cost $2,000 to $3,000 each to install. Installation of a temporary device would allow further evaluation of this technique and would still leave the option for increased fine zone as a further measure.

[7] *Neighborhood Traffic Management Program* .pp. B-1 & B-2.

The preferred location for the speed hump is shown in **Figure 8: Multiuse Trail and Speed Hump**, presented in the next section of this report.

Later in this report, Section V presents an analysis of a mini-roundabout at this intersection. With no medians on the pavement section, the next possible traffic calming measure would be a raised crosswalk or speed humps, which would give pedestrians a set point to cross Atlanta Avenue and would further reduce the speed of traffic at this location.

# IV. PEDESTRIAN AND BICYCLE INFRASTRUCTURE

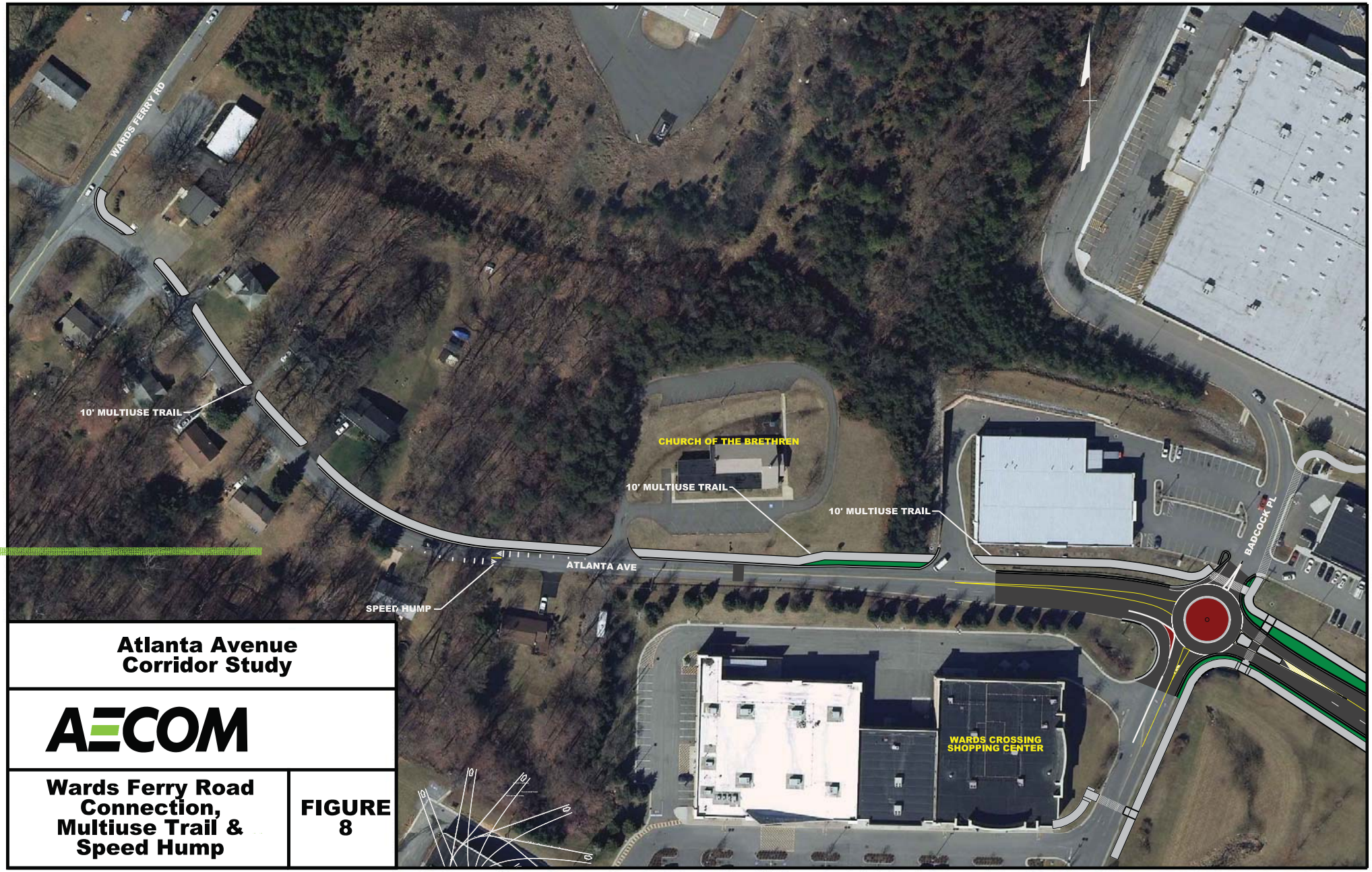
A number of pedestrian improvements were recommended in the *Wards Road Area Pedestrian & Bicycle Concept Plan* (2009), and some have been installed along the Wards Road corridor. Many of the improvements are intended to increase pedestrian access and mobility to and from nearby Liberty University. These improvements include a pedestrian tunnel under the railroad from the east side of Wards Road to the Liberty University campus, a pedestrian bridge crossing Wards Road, and the extension of sidewalks and/or trails throughout the area. The recently installed sidewalk network (Phase 1 of plan implementation) terminates at the northeast corner of the intersection of Atlanta Avenue with Badcock Place. From this location, no crosswalk is currently provided across Atlanta Avenue, and no pedestrian facility currently extends along Atlanta Avenue.

*Connections to Existing Facility*

Based on the current sidewalk location on the northeast corner of the intersection of Badcock Place with Atlanta Avenue, it is recommended that the adopted plan for the area be implemented by installing a crosswalk on the eastern approach to the intersection as well as continuing the multiuse trail along the east side of the driveway from Atlanta Avenue to the Wards Crossing shopping center – part of Phase III of plan implementation. This multiuse trail would eventually run the length of shopping center driveway - from Atlanta Avenue south to Wards Ferry Road. Placing the multiuse trail on the east side of the road would allow access to the businesses located between the shopping center driveway and Wards Road. To gain access to the businesses located on the west side of the Wards Crossing shopping center driveway, crosswalks would be installed at the eastern and western end of the commercial complex and additional crosswalks may also be considered at appropriate locations.

*Neighborhood Improvements*

To the west of Badcock Place, Atlanta Avenue narrows and becomes exclusively residential – west of the Church of the Brethern. The typical section is 20 feet of pavement width with earthen shoulders and open drainage (ditches). The distance from the edge of pavement to any of the structures is approximately 55 feet. To add any bicycle or pedestrian improvements along the roadway would require right of way acquisition. However, corridor residents who have attended one of the two community meetings have expressed support for a multiuse trail, even it if would impact private property. In response, **Figure 8 – Wards Ferry Road Connection, Multiuse Trail and Speed Hump** displays the proposed pedestrian improvements along Atlanta Avenue.




**Atlanta Avenue Corridor Study**

AECOM

**Wards Ferry Road Connection, Multiuse Trail & Speed Hump**

**FIGURE 8**

# V. MINI-ROUNDABOUT

Moving the study focus from the residential to the commercial segment of the corridor, due to its relatively low speeds and high crash frequency, the intersection of Badcock Place with Atlanta Avenue is a potential candidate for a mini-roundabout. A mini-roundabout is an intersection configuration that can be used at physically-constrained locations to mitigate safety issues and reduce excessive delays on minor approaches. Mini-roundabouts operate in the same manner as larger roundabouts, with yield control on all entries and counterclockwise circulation around a mountable central island. Some benefits of mini-roundabouts include its compact size, which eliminates right of way acquisition, traffic safety, traffic calming, and operational efficiency.

Common site applications for mini-roundabouts are at locations where space is constrained, and approach speeds are 30 mph or less. They are useful in and near residential areas as they constrain vehicle speeds, and when compared with a traffic signal, they require lower maintenance costs. Mini-roundabouts are typically designed with a central island is no larger than 90 feet in diameter, and they use a mountable central island in order to accommodate turning movements of larger vehicles with turning radii that may necessitate over-running the island.

To accommodate pedestrian improvements as previously discussed at the intersection of Badcock Place with Atlanta Avenue, the splitter island on the eastern approach (from Wards Road) to the intersection will include a crosswalk cut-through and pedestrian refuge. This will allow pedestrians to cross Atlanta Avenue from the existing sidewalk on the northeast corner to the proposed multiuse trail on the southeast corner. **Figure 9 – Mini-Roundabout** displays a concept for the design of a mini-roundabout at the intersection of Badcock Place with Atlanta Avenue.

Using the peak hour traffic volumes previously shown in **Figure 7** a capacity analysis of the Mini-roundabout Alternative was conducted. Synchro 8 software was used for the analysis using *2010 Highway Capacity Manual* procedures. **Table 9** summarizes the results of the analysis.

By installing a mini-roundabout, the overall delay at the intersection of Atlanta Avenue with Badcock Place improves. HCM analysis indicates that all vehicle movements in the AM peak hour exhibit decreases in delay, while the westbound left movement slightly increases in delay in the PM peak hour; however, this delay increase only results in a better than adequate LOS B. All other movements are forecast to retain or improve their respective service levels. To further analyze the intersection, SimTraffic 8 software was again used to run a microsimulation; the results of these simulations are shown in **Table 10**. The simulations show that the westbound left movement retains its LOS B, but that the side streets decrease their delay further still.

| | | | |
|---|---|---|---|
| **Atlanta Avenue Corridor Study** | **AECOM** | **Mini-Roundabout** | **FIGURE 9** |

| Table 9<br>Roundabout Alternative<br>Average Vehicle Delay and Service Levels<br>HCM 2010 Methodology | | | | |
|---|---|---|---|---|
| Approach | AM Peak Hour | | PM Peak Hour | |
| | Delay (sec.) | LOS | Delay (sec.) | LOS |
| **Atlanta Avenue @ Badcock Place** | | | | |
| EB Left/Through | 4.2 | A | 7.4 | A |
| EB Right | 0.0 | A | 0.0 | A |
| WB Left/Through | 5.8 | A | 14.1 | B |
| WB Right | 0.0 | A | 0.0 | A |
| NB Left/Through/Right | 4.2 | A | 7.3 | A |
| SB Left/Through/Right | 4.8 | A | 13.5 | B |

| Table 10<br>Roundabout Alternative<br>Average Vehicle Delay and Service Levels<br>SimTraffic Microsimulation | | | | |
|---|---|---|---|---|
| Approach | AM Peak Hour | | PM Peak Hour | |
| | Delay (sec.) | LOS | Delay (sec.) | LOS |
| **Atlanta Avenue @ Badcock Place** | | | | |
| EB Left/Through | 3.5 | A | 4.0 | A |
| EB Right | 2.1 | A | 2.4 | A |
| WB Left/Through | 3.3 | A | 14.2 | B |
| WB Right | 1.8 | A | 2.6 | A |
| NB Left/Through/Right | 3.4 | A | 4.7 | A |
| SB Left/Through/Right | 2.9 | A | 4.6 | A |

*Cost Estimates*

Planning level cost estimates were developed for the two recommended improvements.

The cost for the 10 foot wide multiuse trail along the north side of Atlanta from Badcock Place to Wards Ferry Road is $380,000.

The cost estimate for the mini-roundabout at the intersection of Atlanta Avenue and Badcock Place is $300,000. The mini-round-about and associated pedestrian improvements could be installed in phases.

# VI. PUBLIC INVOLVEMENT PROCESS

The Atlanta Avenue public involvement process was comprised of two public meetings. The first meeting was held April 23, 2015 from 3:00 PM to 6:00 PM at the Church of the Brethren located at 200 Atlanta Avenue. At this meeting preliminary findings and preliminary recommendations were presented using display boards in a town-hall style meeting. Additionally, a Federal Highway Administration (FHWA) video explaining mini-roundabouts, which can be accessed at (www.youtube.com/watch?v=94h1TCK-yNs) was played during the meeting. The public was notified of the first meeting through mailings to residences on Atlanta Avenue, advertisements in the local paper, and through the use of variable message boards placed on Atlanta Avenue a week in advance of the meeting.

Sixteen people attended the first public meeting including several residents of Atlanta Avenue. Attendees also included the manager of Badcock Furniture, located in the northwest quadrant of the intersection) and the owner of the Wards Road shopping center, located in the northeast quadrant of the intersection. Material presented at the first public meeting included the following:

- Speed study on Atlanta Avenue displaying average and 85$^{th}$ percentile speeds
- Existing traffic volumes
- Crash diagram of the intersection of Badcock Place and Atlanta Avenue
- Summary of existing capacity analysis and forecasted capacity analysis of the intersection of Badcock Place and Atlanta Avenue
- Diagram of speed hump
- Diagram of roundabout including pedestrian connections

As expressed by attendees, opinions generally favored the proposed mini-roundabout and the speed hump. Most residents and others at the meeting agreed that making left turns from southbound Badcock Place to eastbound Atlanta Avenue was difficult, unsafe and slow during the PM peak period. There was strong public support (especially from residents of Atlanta Avenue) for pedestrian accommodations running the entire length of Atlanta Avenue. Most of the residents of Atlanta Avenue stated that speeding was a major problem on the road. Additionally, several residents of Atlanta Avenue complained of pavement edge drop-offs on the segments that have a significant vertical curve to the west of the Church of the Brethren. The pavement edge drop off-claims were verified and found to be significant - drop-offs as large as 12 inches were found.

The second public meeting was held May 21, 2015 also at the Church of the Brethren from 3:00 p.m. to 6:00 p.m. Eleven people attended the second meeting. Many of the people whom attended the first meeting attended the second meeting. The material presented at the second meeting was the same as the first with multiuse trail added to the figures displaying it along the entire length of Atlanta Avenue. Attendees reiterated

many of the comments made at the first meeting. The only additional significant comment that was received was support for moving the speed humps to the west of the location shown at the meetings. At the meetings the display board had the speed humps located directly in front of Church of the Brethren. Residents wanted the speed humps to the hill where speeding was an issue in front of their homes. Eight residents signed a petition in support of the speed humps.

# VII. FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

*Findings & Conclusions*

This study has evaluated the safety and capacity of the Atlanta Avenue corridor from Wards Road to Wards Ferry Road. Additionally, this study examined potential multi-modal accommodations along the corridor. Three issues became apparent in conducting the analysis: 1) speeding is excessive; 2) the intersection with Badcock Place exhibits capacity and safety issues; and, 3) pedestrian and bicyclist accommodations or linkages are not provided.

The intersection of Badcock Place and Atlanta Avenue exhibits a poor crash history with 20 crashes in the most recent 3 years of recorded crashes. Additionally, capacity analysis results indicate poor service levels for both the side street left turn movements on the minor street (Badcock Place) approaches. A mini-roundabout is recommended to mitigate the crash frequency and severity as well as the poor service levels.

Turning to the residential neighborhood corridor issues, a speed study was conducted just west of Church of the Brethren, and average speeds were 5-8 MPH and 85$^{th}$ percentile speeds were 10-13 MPH over the posted 25 MPH speed limit. The City of Lynchburg has a traffic calming program in place (*NTMP*) which outlines the specific requirements for the installation of traffic calming measures. Atlanta Avenue scores fairly high in both the basic scoring and detailed scoring. Based on the scoring Atlanta Avenue is eligible for traffic calming measures with approval of 66% of the residents of the street, which requires seven of the ten residents to sign a petition. At the second public meeting eight residents signed a petition in favor of the installation of a speed hump.

Currently Atlanta Avenue does not provide for any pedestrian or bicyclist accommodations either along the length of the corridor or south to planned linkages. Most of the residents attending the two community meetings stated that there was significant pedestrian traffic on the corridor. In response, pedestrian accommodations are recommended on the north side of Atlanta Avenue west of Badcock Place. The preferred accommodation is a 10 foot wide multiuse trail, and installation would include curb and gutter on the edge of the existing pavement with the multiuse trail located immediately adjacent back of curb.

In addition, to link to an existing trail to the Atlanta Avenue trail and to planned facilities to the south, pedestrian crossings should also be accommodated in the mini-roundabout

Two public meetings were held on this study, one on April 23, 2015 and the other on May 21, 2015. Both meetings were held at the Church of the Brethren on Atlanta Avenue from 3-6 PM. Generally most of the meeting attendees were concerned about speeding on the corridor, safety at the Badcock Place intersection, and the lack of

pedestrian accommodations. Moreover, most of the attendees were in favor of the proposed recommendations to address their concerns for the corridor - a mini-roundabout, a speed humps, and a multiuse trail along the length of Atlanta Avenue.

The cost for the 10 foot wide multiuse trail along the north side of Atlanta Avenue from Badcock Place to Wards Ferry Road is $380,000.

The cost estimate for the mini-roundabout at the intersection of Atlanta Avenue and Badcock Place is $300,000. The mini-round-about and associated pedestrian improvements could be installed in phases.

*Recommendations*

1. **Install Mini-roundabout at Atlanta Avenue and Badcock Place.**
   - Address capacity and safety deficiencies at the intersection; and,
   - Include a crosswalk on Badcock Place and a crosswalk on the east side of the intersection over Atlanta Avenue.
2. **Install a temporary speed hump immediately west of Church of the Brethren.**
   - Evaluate on a trial basis to reduce excessive vehicular speeds on Atlanta Avenue;
   - If the speed hump is effective and it receives a positive resident response, then a permanent speed hump could be evaluated; and,
   - The possibility of adding increased fine zone to provide greater enforcement activity also should be evaluated.
3. **Install multiuse trail (10 feet in width) on the north side of Atlanta Avenue from Badcock Place to Wards Ferry Road.**
   - Provide safe pedestrian and bicyclist access from the existing and planned Wards Road corridor trails to planned trail on Wards Ferry Road;
   - Address safety issues associated with narrow pavement and ditches on Atlanta Avenue; and,
   - Multiuse trail improvement to include installation of curb and gutter (north side of Atlanta Avenue only), with trail set immediately adjacent to the back of curb.