MEMORANDUM

The Department of Community Development

Planning

455-3900

To: Planning Commission

From: Tom Martin, AICP, City Planner

Subj: Conditional Use Permit (CUP): Kirkley Apartment Community – 5212 Woodall Road & 2900 Candlers Mountain Road

Date: March 26, 2014

On April 9, 2013, Council approved the petitions of GDG Lynchburg Hotel, LLC to amend the *Future Land Use Map* (*FLUM*) from Employment 2 to High Density Residential, to rezone the subject property from I-2, Light Industrial District to B-3C, Community Business District (Conditional) and for a CUP to allow the construction of a one hundred fifty-six (156) unit apartment complex with clubhouse, pool and associated parking.

While the *FLUM* and zoning for the property are still valid, the CUP for the construction of the apartment complex was allowed to lapse. *Zoning Ordinance* Section 35.1-15. Conditional Use Permits Issued by City Council, (i) Time limitations on the validity of a conditional user permit (1) states: "If a building permit for construction authorized by a conditional use permit granted under these regulations shall not have been applied for within six (6) months of the granting of such conditional use permit, the conditional use permit so granted shall become void, unless the following appeal procedures are applied for and secured. Prior to the aforestated six (6) month expiration, a six (6) month extension may be applied for through the city manager's office". A building permit nor a six (6) month extension were applied for which resulted in the CUP becoming void on October 9, 2013. The expiration has resulted in the need for the petitioner to request approval from the Planning Commission and Council for a new CUP.

There have been no changes to the petition from that which was approved by Council on April 9, 2013. The City's Technical Review Committee (TRC) reviewed the petition at its March 4, 2014 meeting. Comments were minor in nature and have or will be addressed by the petitioner prior to final site plan approval.

Planning Division Recommendation

Based on the preceeding Fidnings of Fact, the Planning Commission recommends to City Council approval of the petition of GDG Lynchburg Hotel, LLC, for:

A Conditional Use Permit to allow the construction of a one hundred fifty-six (156) unit apartment complex within three (3), four (4) story buildings, with associated pool, club house, and parking subject to the following conditions:

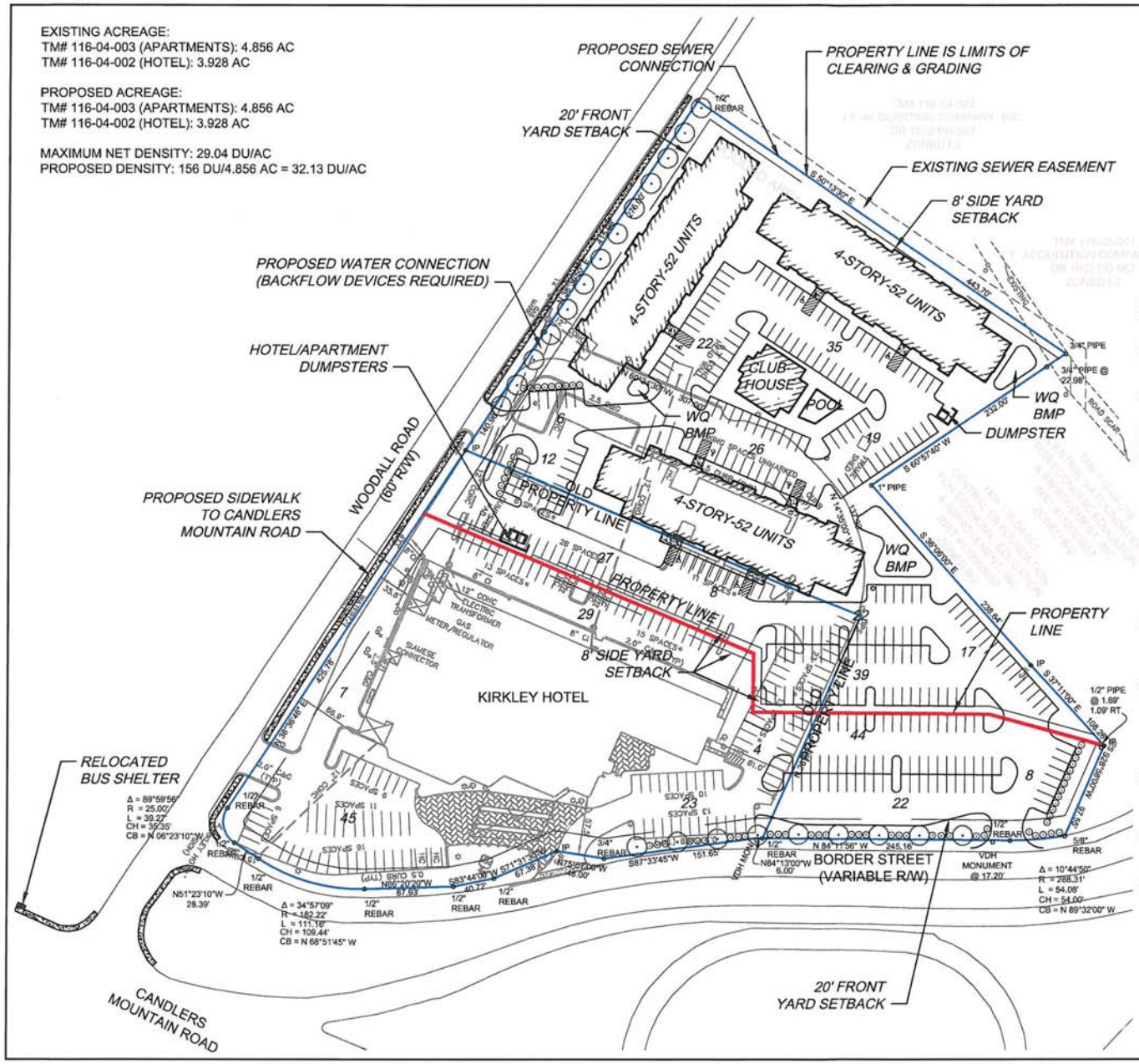
1. **The property shall be developed in substantial compliance with the site plan titled "CUP Plan for Kirkley Apartment Community" as prepared by Hurt & Proffitt, Inc. dated March 19, 2014.**
2. **A sidewalk shall be installed on Woodall Road as indicated on the submitted site plan.**
3. **The petitioner shall relocated the bus shelter to the western side of the intersection of Woodall Road and Candlers Mountain Road as shown on the submitted site plan.**
4. **All lighting shall be glare shielded and non-directional to prevent direct illumination beyond the property line.**
5. **Building elevations and materials shall be as indicated in the building elevations submitted by the petitioner and received by Community Development on October 9, 2012.**

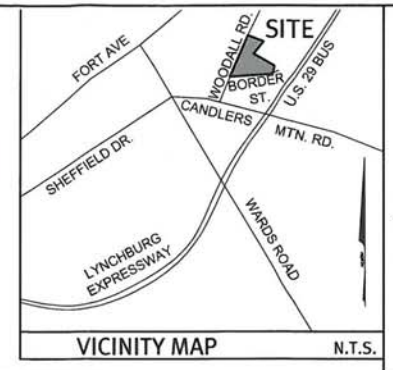
Attachments:
Site Plan – 3/19/14
Ordinance #O-13-041 (*FLUM* Amendment)
Ordinance #O-13-042 (Rezoning)
Resolution #R-13-043 (Void CUP)
Council Packet – April 9, 2013

EXISTING ACREAGE:
TM# 116-04-003 (APARTMENTS): 4.856 AC
TM# 116-04-002 (HOTEL): 3.928 AC

PROPOSED ACREAGE:
TM# 116-04-003 (APARTMENTS): 4.856 AC
TM# 116-04-002 (HOTEL): 3.928 AC

MAXIMUM NET DENSITY: 29.04 DU/AC
PROPOSED DENSITY: 156 DU/4.856 AC = 32.13 DU/AC





NOTES:

1. SITE TM#: 116-04-003
   HOTEL TM#: 116-04-002
2. SITE OWNER: GDG LYNCHBURG HOTEL, LLC
   HOTEL OWNER: GDG LYNCHBURG HOTEL, LLC
   ADDRESS: 5212 WOODALL ROAD, LYNCHBURG, VA 24502
3. SITE PROPOSED USE: MULTI-FAMILY APARTMENT COMMUNITY
4. EXISTING ZONING: B-3C
5. PROPOSED ZONING: B-3C
6. REQUIRED PARKING:
   APARTMENTS: 156 SPACES
   HOTEL: 176 SPACES
   TOTAL: 332 SPACES REQUIRED
   PROPOSED PARKING:
   APARTMENTS: 233 SPACES
   HOTEL: 182 SPACES
   TOTAL: 415
   REQUIRED ADA-ACCESSIBLE SPACES:
   APARTMENTS: 7 SPACES
   HOTEL: 6 SPACES
7. FOUNDATION PLANTINGS REQUIRED: 1 ORNAMENTAL TREE PER 50' AND 1 LARGE SHRUB PER 10':
   640'/50'=13 ORNAMENTAL TREES
   640'/10'=64 LARGE SHRUBS
8. PARKING LOT LANDSCAPING REQUIRED: 1 SHADE TREE PER 8 SPACES AND 1 MEDIUM SHRUB PER SPACE:
   APARTMENTS: 233/8 = 30 SHADE TREES; 233 MEDIUM SHRUBS
   HOTEL: NONE (PROPOSED PLAN REDUCES THE NUMBER OF SPACES ON THE HOTEL PROPERTY)
9. STREET TREES REQUIRED: 1 SHADE TREE PER 40' ROAD FRONTAGE:
   APARTMENTS: 490'/40' = 13 SHADE TREES
   HOTEL: 340'/40' = 9 SHADE TREES
10. EXTERIOR LIGHTING SHALL BE CONTROLLED SO THAT NO DIRECT ILLUMINATION WILL OCCUR BEYOND ANY PROPERTY LINE SHARED WITH A RESIDENTIAL DISTRICT.
11. THE AREA SHOWN HEREON IS LOCATED IN FLOOD ZONE 'X' AND IS NOT LOCATED WITHIN FLOOD HAZARD ZONE 'A' FOR A 100 YEAR FLOOD AS DETERMINED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY AS SHOWN ON COMMUNITY-PANEL MAP #5100930106D DATED JUNE 3, 2008.

RECEIVED
MAR 19 2014
COMMUNITY DEVELOPMENT

100 50 0 100 200
GRAPHIC SCALE IN FEET
1" = 100'

HURT & PROFFITT INCORPORATED
ENGINEERING » SURVEYING » PLANNING
2524 LANGHORNE ROAD
LYNCHBURG VA 24501
800.242.4906 TOLL FREE
434.847.7796 MAIN
434.847.0047 FAX

CUP PLAN FOR KIRKLEY APARTMENT COMMUNITY

CITY OF LYNCHBURG, VIRGINIA

PROJECT NO.	20120506
G.L. NO.	264-02-A1.6
FILE NO.	
DATE:	3/19/2014
DRAWN BY:	PSB/ASK
CHECKED BY:	PSB

SHEET NO.
1 OF 1

Mar 19, 2014 – 1:53pm C:\ACADtemp\AcPublish_7683\CUP PLAN.dwg

ORDINANCE: #O-13-041

AN ORDINANCE AMENDING THE FUTURE LAND USE MAP TO CHANGE THE PROPERTIES LOCATED AT 5212 WOODALL ROAD AND 2900 CANDLERS MOUNTAIN ROAD FROM EMPLOYMENT 2 TO HIGH DENSITY RESIDENTIAL.

BE IT ORDAINED BY THE COUNCIL OF THE CITY OF LYNCHBURG that in order to promote the public necessity, convenience, welfare and good zoning practice that Chapter 35.1 of the Code of the City of Lynchburg, 1981, as amended, be and the same is hereby further amended by adding thereto Section 35.1-76.___, which section shall read as follows:

Section 35.1-76.__. Amend the Future Land Use Map for subject properties located at 5212 Woodall Road and 2900 Candlers Mountain Road from Employment 2 to High Density Residential.

The area embraced within the following boundaries ...

BEGINNING AT A 1/2" REBAR FOUND IN THE SOUTHEAST RIGHT-OF-WAY LINE OF WOODALL ROAD 566.76 FEET FROM THE END OF THE RADIUS OF THE RIGHT-OF-WAY OF W00DALL ROAD AT ITS INTERSECTION WITH BORDER STREET TO THE TRUE POINT OF BEGINNING, THENCE ALONG THE RIGHT-OF-WAY OF WOODALL ROAD NORTH 38 DEGREES 36 MINUTES 50 SECONDS EAST 275.00 FEET TO A 1/2" REBAR FOUND; THENCE LEAVING RIGHT-OF-WAY OF WOODALL ROAD AND ALONG A LINE ADJOINING THE LANDS OF LIMITORQUE CORPORATION AND LT. ACQUISITION COMPANY, INC. SOUTH 50 DEGREES 13 MINUTES 30 SECONDs EAST 443.70 FEET TO A 3/4" PIPE FOUND; THENCE ALONG A LINE ADJOINING THE LANDS OF WAYNE R. BOOTH SOUTH 60 DEGREES 57 MINUTES 40 SECONDS WEST 232.00 FEET TO A 1" PIPE FOUND PASSING A 3/4" PIPE FOUND AT 22.98 FEET; THENCE ALONG SAID BOOTH LINE SOUTH 36 DEGREES 06 MINUTES 00 SECONDS EAST 238.64 FEET TO A 1/2" REBAR SET; THENCE ALONG SAID BOOTH LINE SOUTH 37 DEGREES 11 MINUTES 00 SECONDS EAST 108.26 FEET TO A 1/2" REDAR SET; THENCE ALONG SAID BOOTH LINE SOUTH 28 DEGREES 58 MINUTES 00 SECONDS WEST 97.55 FEET TO A 5/8" REBAR FOUND IN THE NORTHERLY RIGHT-OF-WAY LINE OF BORDER STREET PASSING A 1/2" PIPE AT 1.69 FEET 1.09 FEET RIGHT OF LINE; THENCE ALONG SAID RIGHT-OF-WAY THE FOLLOWING COURSES, A CURVE TO THE RIGHT HAVING A CENTRAL ANGLE I0 DEGREES 44 MINUTES 50 SECONDS, A RADIUS OF 288.31 FEET, A LENGTH 0F 54.08 FEET, A CHORD OF 54.00 FEET AND A CHORD BEARING OF NORTH 89 DEGREES 32 MINUTES 00 SECONDS WEST TO A 1/2" REBAR FOUND, NORTH 84 DEGREES 11 MINUTES 56 SECONDS WEST 245.16 FEET TO A 1/2" REBAR FOUND PASSING A VIRGINIA DEPARTMENT OF HIGHWAYS CONCRETE MONUMENT AT 17.20 FEET; THENCE LEAVING THE RIGHT-OF-WAY OF WOODALL ROAD NORTH 28 DEGREES 58 MINUTES 40 SECONDS EAST 271.00 FEET TO A 1/2" REBAR FOUND; THENCE NORTH 14 DEGREES 35 MINUTES 00 SECONDs WEST 137.33 FEET TO A 1/2" REBAR FOUND; THENCE NORTH 60 DEGREES 34 MINUTES 30 SECONDS WEST 307.00 FEET TO THE POINT 0F BEGINNING IN THE SOUTHEASTERLY RIGHT-OF-WAY OF WOODALL ROAD.

... is hereby amended on the Future Land Use Map from Employment 2 to High Density Residential and the Director of Community Development shall forthwith cause the Future Land Use Map referred to in Section 35.1-4 of this chapter to be amended in accordance therewith.

Adopted: April 9, 2013

Certified: Valerie P. Chandler
Clerk of Council

054K

#O-13-042

AN ORDINANCE CHANGING A CERTAIN AREA LOCATED AT 5212 WOODALL ROAD AND 2900 CANDLERS MOUNTAIN ROAD FROM I-2, LIGHT INDUSTRIAL DISTRICT TO B-3, COMMUNITY BUSINESS DISTRICT (CONDITIONAL).

BE IT ORDAINED BY THE COUNCIL OF THE CITY OF LYNCHBURG that in order to promote the public necessity, convenience, welfare and good zoning practice that Chapter 35.1 of the Code of the City of Lynchburg, 1981, as amended, be and the same is hereby further amended by adding thereto Section 35.1-76.____, which section shall read as follows:

Section 35.1-76.__. Change of a certain area located at 5200 Woodall Road and 2900 Candlers Mountain Road from I-2, Light Industrial District to B-3, Community Business District (Conditional)

The area embraced within the following boundaries ...

Beginning at a ½" rebar at the end of the radius in the southeasterly right-of-way line of Woodall Road at its intersection with Border Street, thence along said right-of-way N 38o36'46" E 425.78 feet to an iron pin at the corner of TM #116-04-002 and TM #116- 04-003; thence N 38°36'50" E 415.98 feet to a ½" rebar in the right-of-way of Woodall Road; thence leaving right-of-way of Woodall Road and along a line adjoining the lands of LT Acquisition Company Inc S 50°13'30" E 443.70 feet to a ¾" pipe; thence along a line adjoining the lands of Central Virginia Foundation For Economic Education & Improvement Inc S 60°57'40" W 232.00 feet to a 1" pipe, passing a ¾" pipe at 22.98 feet; thence along said Foundation line S 36°06'00" E 238.64 feet to an iron pin; thence along said Foundation line S 37°11'00" E 108.26 feet to an iron pin; thence along said
Foundation line S 28°58'00" W 97.55 feet to a 5/8" rebar in the northerly right-of-way line of Border Street passing a ½" pipe at 1.69 feet 1.09 feet right of line; thence along said right-of-way the following courses, a curve to the right having a central angle of 10°44'50" , a radius of 288.31 feet, a length of 54.08 feet, a chord of 54.00 feet and a chord bearing of N 89°32'00" W to a ½" rebar, N 84°11'56" W 245.16 feet to a ½" rebar passing a Virginia Department of Highways monument at 17.20 feet, N 84°13'00" W 6.00 feet to a Virginia Department of Highways concrete monument, S 87°33'45" W 151.65 feet to a ¾" rebar, N 75°57'00" W 48.00 feet to and iron pin at the edge of concrete pavers, S 71°31'30" W 67.38 feet to a ½" rebar, S 83°44'00" W 40.72 feet to a ½" rebar, N 86°20'20" W 87.93 feet to a ½" rebar, along a curve to the right having a central angle of 34°57'09", a radius of 182.22 feet, a length of 111.16 feet, a chord of
109.44 feet, and a chord bearing of N 68°51'45" W to a ½" rebar, N 51°23'10" W 28.39 feet to a ½" rebar, along a curve to the right with a central angle of 89°59'56", a radius of 25.00 feet, a length of 39.27 feet, a chord of 35.35 feet, and a chord bearing of N 06°23'10" W to the point of beginning and containing 8.784 acres, more or less

... is hereby changed from I-2, Light Industrial District to B-3, Community Business District (Conditional), subject to the conditions setout herein below which were voluntarily proffered in writing by the petitioner, namely, GDG Lynchburg Hotel, LLC, to wit:

1. Project will contribute funds or complete work for "ped heads," signal timing changes, painting for crosswalks and required ADA ramps.

2. A GLTC bus shelter will be provided at the site (location to be determined).

3. The project shall be constructed in substantial compliance with architectural renderings showing the appearance of the proposed buildings with list of proposed building materials.

4. The following uses, which are allowed in B-3, are not permitted within the area to be rezoned:
   - Virginia ABC package stores
   - Boardinghouses or lodging houses
   - Care centers
   - Convalescent and nursing homes
   - Funeral homes and undertaking establishments
   - Group homes
   - Rooming houses
   - Pawn shops

5. The site shall be developed in substantial compliance with submitted Rezoning Plan.

And the Director of Community Development shall forthwith cause the "Official Zoning Map of Lynchburg, Virginia," referred to in Section 35.1-4 of this chapter to be amended in accordance therewith.

Adopted: April 9, 2013

Certified: Valerie P. Chambers
Clerk of Council

RESOLUTION: #R-13-043

A RESOULUTION GRANTING A CONDITIONAL USE PERMIT TO GDG LYNCHBURG HOTEL, LLC TO ALLOW THE CONSTRUCTION OF A ONE HUNDRED FIFTY-SIX (156) APARTMENT UNIT COMPLEX WITHIN THREE (3) FOUR (4) STORY BUILDINGS WITH ASSOCIATED POOL, CLUB HOUSE AND PARKING AT 5212 WOODALL ROAD AND 2900 CANDLERS MOUNTATIN ROAD IN A B-3, COMMUNITY BUSINESS DISTRICT (CONDITIONAL).

BE IT RESOLVED BY THE COUNCIL OF THE CITY OF LYNCHBURG that the petition of GDG Lynchburg Hotel, LLC for a conditional use permit to allow the construction of a one hundred fifty-six (156) unit apartment unit complex within three (3) four (4) story buildings with associated pool, club house and parking at 5212 Woodall Road and 2900 Candlers Mountain Road is hereby approved subject to the following conditions:

1. The property shall be developed in substantial compliance with the site plan titled "Rezoning Plan for Kirkley Apartment Community" as prepared by Hurt & Proffitt, Inc., dated March 8, 2012.
2. A sidewalk will be installed on Woodall Road as indicated on the submitted site plan.
3. The petitioner will relocate the bus shelter to the western side of the intersection of Woodall Road and Candlers Mountain Road as shown on the submitted site plan.
4. All lighting shall be glare shielded and non-directional to prevent direct illumination beyond the property line.
5. Building elevations and materials shall be as indicated in building elevations submitted by the petitioner and received by Community Development on October 9, 2012.

Adopted: April 9, 2013

Certified: Valerie P. Chandler
Clerk of Council

The Department of Community Development

City Hall, Lynchburg, VA 24504 **434-455-3900**

To: Planning Commission
From: Planning Division
Date: March 27, 2013
Re: **5212 Woodall Road and 2900 Candlers Mountain Road**

***Future Land Use Map (FLUM)* Amendment – Employment 2 to High Density Residential**

Rezoning: I-2, Light Industrial District to B-3, Community Business District (Conditional)

Conditional Use Permit (CUP) – Apartment Complex

I. PETITIONER

Peter Greenberg, GDG Lynchburg Hotel, LLC, 2900 Candlers Mountain Road, Lynchburg, VA 24502
Representative: Jason Vickers-Smith, The WVS Companies, LLC, 5000 Old Osborne Turnpike, Richmond, VA 23223

II. LOCATION

The subject property includes two (2) tracts totaling approximately eight and seven hundred eighty-four thousandths (8.784) acres located at 5212 Woodall Road and 2900 Candlers Mountain Road
Property Owner: GDG, Lynchburg, Hotel, LLC, 2900 Candlers Mountain Road, Lynchburg, VA 24502

III. PURPOSE

The following are the purposes of the petitions:

- Amend the *FLUM* from Employment 2 to High Density Residential
- Rezone the properties from I-2, Light Industrial District to B-3, Community Business District (Conditional). The rezoning would allow the existing hotel to become a conforming use and allow the vacant portion to be developed for residential uses upon approval of a conditional use permit.
- CUP to allow the development of the vacant portion of the properties as a one hundred fifty-six unit apartment complex within three (3) four (4)-story buildings with associated pool, club house and parking.

IV. SUMMARY

- Petition would make the existing hotel, which was constructed in 1980, a conforming use.
- Residential uses are permitted in B-3, Community Business Districts upon approval of a CUP by Planning Commission and Council.
- The majority of the property is designated for Community Commercial uses on the FLUM. The proposed *FLUM* amendment from Employment 2 to High Density Residential is reasonable given the close proximity of the property to commercial uses and Liberty University.

<u>The Planning Division recommends approval of the *FLUM* amendment, rezoning petition and CUP petition.</u>

V. FINDINGS OF FACT

1. **Comprehensive Plan.** The *Comprehensive Plan 2002-2020* recommends Community Commercial and Employment 2 uses in this area:

   Community Commercial (**pg. 5.5**) areas "contain retail, personal service, entertainment, and restaurant uses that draw customers from at least several neighborhoods up to the entire City. Community Commercial areas contain clusters of businesses, often at major intersections, and shopping centers. Most community shopping centers range from 100,000 to 200,000 square feet and serve 40,000 to 70,000 people. Office, research and development, and technology development uses may be permitted in Community Commercial areas as long as traffic and other impacts to the community are mitigated. In particular, conversion of existing vacant retail space to these uses may be appropriate in areas where there is sufficient retail to serve the community and space for employment uses is needed."

   Employment 2 (**pg5.4**) areas "are to include light and heavy manufacturing, research and development, flex space and large-scale office uses. Restaurant, hotel and business service uses are also appropriate, if sized and designed to serve the employment area. Employment 2 differs primarily from Employment 1 in that it permits heavy industrial uses."

   The petition proposes to amend the *FLUM* for the portion of the property designated for an Employment 2 use to a High Density Residential Use. High Density Residential (**pg.5.6**) are "areas to be developed into high density townhouse or multi-family housing. Densities can range up to thirty (30) units per acre. They may include public, institutional, private, recreation and private open space uses."

   The City is currently in the process of updating the *Comprehensive Plan* and re-writing the *Zoning Ordinance*. The City has seen a significant growth (fifteen percent (15%) in its population over the past ten (10) years. To accommodate this and future growth the City must have a conversation on where density is appropriate. Given the close proximity of the subject property to commercial and employment areas, Liberty University and access to mass transit, development as apartments would be appropriate.

2. **Zoning.** The subject property was annexed into the City in 1958. The existing I-2, Light Industrial District Zoning was established in 1978 with the adoption of the Official *Zoning Map*.

3. **Proffers.** The petitioner has voluntarily submitted the following proffers:

   1. Signal timing improvements shall be made and pedestrian actuated signals installed at the intersection of Candlers Mountain Road and Woodall Road if required, based on a traffic engineering study to be conducted.
   2. A GLTC bus shelter will be provided at the site (location to be determined).
   3. The project shall be constructed in substantial compliance with architectural renderings showing the appearance of the proposed buildings with list of proposed building materials.
   4. The following uses, which are allowed in B-3, are not permitted within the area to be rezoned:

- Virginia ABC package stores
- Boardinghouses or lodging houses
- Care centers
- Convalescent and nursing homes
- Funeral homes and undertaking establishments
- Group homes
- Rooming houses
- Pawn shops

5. The site shall be developed in substantial compliance with submitted Rezoning Plan.

4. **Board of Zoning Appeals (BZA).** The Zoning Official has determined that no variances would be needed for the development of the property as proposed.

5. **Surrounding Area.** There have been several items requiring City Council approval in the immediate area:

- On February 22, 1979, Council approved the CUP petition of J.B. Forehand to allow a tire store at 1005 Sheffield Drive.
- On July 13, 1982, Council approved the CUP petition of Video Voyage, Inc. to operate a game room at 2110 Wards Road.
- On November 11, 1986, Council approved the CUP of Autolease, Inc. to allow the use of an existing building and parking lot for automobile leasing at 2120 Wards Road.
- On September 8, 1987, Council approved the rezoning petition of MLB Corporation to rezone 4637-4641 Murray Place from I-3, Heavy Industrial District to B-5, General Business District (Conditional) to allow the construction of a Bowling Center.
- On January 15, 2002, Council approved the rezoning petition of Carl and Ellen Sanders to rezone 310 and 312 Border Street from I-2, Light Industrial District to B-3, Community Business District (Conditional) to allow the operation of an ice cream parlor/restaurant.
- On April 9, 2002, Council approved the CUP petition of Watts Petroleum Corporation to allow a car wash at 2209 Wards Road.
- On April 8, 2008, Council approved the rezoning petition of the Lynchburg Chamber of Commerce to rezoned 310 and 312 Border Street from B-3, Community Business District (Conditional) to B-3, Community Business District (Conditional) to allow the use of an existing building as an office.

6. **Site Description.** The subject property is two (2) tracts containing a hotel and vacant land. The property is bordered to the north by an industrial use, to the east by the future home of the Lynchburg Chamber of Commerce (office use) to the south by Border Street and the exit ramp from the Lynchburg Expressway and to the west by office and industrial uses.

7. **Proposed Use of Property.** If the FLUM amendment, rezoning and CUP petitions are approved, the Kirkley Hotel would become a "conforming" use. The remaining vacant portions of the property would be developed as a one hundred fifty-six unit apartment complex within three (3) four (4) story buildings with associated pool, club house and parking.

8. **Traffic, Parking and Public Transit.** The vehicle trip threshold for the existing and proposed uses resulted in the need for a traffic study.

   Parking requirements are established by the City's *Zoning Ordinance* and include one (1) parking space for each residential unit for the apartments (156 spaces) and one (1) per guest room plus one (1) per three (3) employees on duty at any one time for the hotel (176 spaces). A total of three hundred thirty-two (332) parking spaces are required and four hundred fifteen (415) are provided as indicated on the submitted site plan.

   The development, as proposed, would be accessed by one (1) entrance/exit located on Woodall Road and two (2) access points shared with the Kirkley Hotel located on Border Street. The petitioner has voluntarily proffered to make improvements as recommended by the traffic study. A traffic study analyzing traffic impacts from the proposed development was prepared by Martin Alexiou Bryson (MAB) and reviewed by the City's Transportation Engineer. The study accounts for a "No-Build (2015) Scenario and "Build" (Scenario). The MAB study indicates that under the build scenario, all intersections are projected to operate at acceptable levels of service.

   The MAB study does provide recommendations based upon potential pedestrian demand in the area:

   - Provide a sidewalk along the east side of Woodall Road between Candlers Mountain Road and the northern end of the site's frontage. Install appropriate wheelchair ramps at all appropriate curb cuts.
   - Add hi-visibility crosswalks to the southbound approach of Woodall Road and the eastbound approach of Candlers Mountain Road at Woodall Road.
   - Add actuated pedestrian phases to phases 2, 4 and 6 at the Candlers Mountain Road at Woodall intersection.
   - Add pedestrian signal heads, push buttons, signs and other appropriate measures.

   The site plan submitted by the petitioner indicates the sidewalk as recommended by the MAB study. The traffic signals in the area are owned and maintained by the Virginia Department of Transportation (VDOT). VDOT has informed the petitioner that prior to approving changes in signal timing or pedestrian improvements, actual pedestrian demand would need to be evaluated.

   The development would be served by the Greater Lynchburg Transit Company (GLTC) via a relocated bus shelter at the intersection of Candlers Mountain Road and Woodall Road.

9. **Stormwater Management.** The construction of the proposed apartment complex will require a stormwater management plan addressing both quality and quantity of runoff from the site. Preliminary information submitted by the petitioner's engineer indicates that stormwater quantity will be addressed by a combination of small bioretention ponds (rain gardens) and underground storage. Low Impact Design (LID) strategies such as porous concrete may also be utilized to reduce runoff. Water quality will be addressed by the use of rain gardens and mechanical devices such as inlet filters. Run off from the site would be conveyed to one (1) of two (2) available channels at the northeast or northwest corner of the property. Final stormwater management strategies are subject to the approval of the City's Environmental Reviewer.

10. **Emergency Services.** The City's Fire Marshal provided comments related to fire hydrant locations, fire department connections and fire department access roads. These comments will be addressed during final site plan approvals.

    The City Police Department had no comments of concern related to the proposed petition.

11. **Impact.** The submitted FLUM amendment, rezoning and conditional use permit petitions would allow the existing hotel to become a conforming use and facilitate the construction of a one hundred fifty-six (156) unit apartment complex. The property is currently zoned I-2, Light Industrial District, which does not permit hotels or apartments.

    The location of the subject property makes it ideal for the development of multi-family housing. It is accessible to mass transit, is located near a major road network, has access to a signal and is in close proximity to one of the City's largest commercial areas and Liberty University.

    The traffic study submitted by the petitioner indicates that intersections will function appropriately if the apartment complex is constructed. The study did make several recommendations for pedestrian improvements to the existing signals and intersections due to the potential for increased pedestrian demand. While the petitioner is agreeable to make these recommended improvements to the VDOT controlled signals, VDOT has requested to determine actual demand prior to approving changes. This is due to the close proximity of the traffic signal to the exit ramps from the Lynchburg Expressway.

    The petitioner has indicated that if the petitions are approved, a 2015 completion date is anticipated. As the City moves forward with updates to the *Comprehensive Plan*, in particular the Transportation Element it is vital that attention is given to ensuring that City streets are accessible to all users. While there is no definitive data available to indicate pedestrians will be crossing Candlers Mountain Road, it is reasonable that residents of the apartments will desire to access retail and restaurants in the area. If the petitions are approved, it is recommended that City staff continue to work with the petitioner and VDOT to determine appropriate improvements prior to the opening of the development.

12. **Technical Review Committee.** The Technical Review Committee (TRC) reviewed the preliminary site plan on October 23, 2012. Comments related to the proposed use have or will be addressed by the petitioner prior to final site plan approval.

VI. PLANNING DIVISION RECOMMENDATION

Based on the preceding Findings of Fact, the Planning Commission recommends to City Council approval of the petition of GDG Lynchburg Hotel, LLC, to/for:

Amend the *Future Land Use Map (FLUM)* from Employment 2 to High Density Residential for a portion of the property at 5212 Woodall Road.

Rezone approximately eight and seven hundred eighty-four thousandths (8.784) acres located at 5212 Woodall Road and 2900 Candlers Mountain Road from I-2, Light Industrial District to B-3, Community Business District (Conditional)

Conditional Use Permit to allow the construction of a one hundred fifty-six unit apartment complex within three (3) four (4) story buildings with associated pool, club house and parking, subject to the following conditions:

1. **The property shall be developed in substantial compliance with the site plan titled "Rezoning Plan for Kirkley Apartment Community" as prepared by Hurt & Proffitt, Inc., dated March 8, 2012.**
2. **A sidewalk will be installed on Woodall Road as indicated on the submitted site plan.**
3. **The petitioner will relocate the bus shelter to the western side of the intersection of Woodall Road and Candlers Mountain Road as shown on the submitted site plan.**
4. **All lighting shall be glare shielded and non-directional to prevent direct illumination beyond the property line.**
5. **Building elevations and materials shall be as indicated in building elevations submitted by the petitioner and received by Community Development on October 9, 2012.**

This matter is respectfully offered for your consideration.

William T. Martin, AICP
City Planner

pc: Mr. L. Kimball Payne, III, City Manager
Ms. Bonnie M. Svrcek, Deputy City Manager
Mr. Walter C. Erwin, City Attorney
Mr. Kent L. White, Director of Community Development
Mr. J. Lee Newland, City Engineer
Ms. Cynthia Kozerow, Lynchburg Police Department
Battalion Chief Greg Wormser, Fire Marshal
Mr. Don DeBerry, Transportation Engineer
Mr. Doug Saunders, Building Commissioner
Mr. Robert Fowler, Zoning Administrator
Mr. Jacob Dorman, Environmental Reviewer
Mr. Peter Greenberg, GDG Lynchburg Hotel, LLC
Mr. Jason Vickers-Smith, The WVS Companies, LLC
Mr. Scott Beasley, Hurt & Proffitt, Inc.

VII. ATTACHMENTS

1. **Vicinity Zoning Pattern Map**
2. **Vicinity Proposed Land Use Map**
3. **Watershed Location Map**
4. **Planimetric and Topographic Map**
5. **Rezoning Plan**
6. **Building Elevations**
7. **MAB Traffic Study**
8. **Narrative**
9. **Property Photograph**

MINUTES OF THE MARCH 27, 2013 PLANNING COMMISSION MEETING (MINUTES HAVE NOT BEEN APPROVED):

b. **Petition of GDG Lynchburg Hotel, LLC to amend the Future Land Use Map (FLUM) from Employment 2 to High Density Residential; to rezone approximately eight and seven hundred eighty-four thousandths (8.784) acres from I-2, Light Industrial District to B-3, Community Business District (Conditional) and for a conditional use permit to allow the existing hotel to become a conforming use and to allow the construction of one hundred fifty-six (156) apartment units within three (3), four (4)-story buildings with associated pool, club house and parking at 5212 Woodall Road and 2900 Candlers Mountain Road.**

Mr. Martin commented that this request, if approved, would allow for the hotel on this property to become a conforming use and to allow the construction of 156 apartments units. The hotel was built in the early 1980's when hotels were allowed in industrial districts. If the rezoning and FLUM amendments are approved, a conditional use permit is needed to allow the construction of the apartments. The FLUM amendment to High Density Residential is needed for the portion of the property in the rear that will be developed as apartments. The rest of the property is designated Community Commercial.

Mr. Martin explained that the apartments will have entrances from Border Street and Candlers Mountain Road. The petitioner will construct a sidewalk all along Woodall Road and relocate a bus shelter to the western side of Woodall Road. Mr. Martin remarked that the petitioner's initial proffer number one had stated that "Signal timing improvements shall be made and pedestrian actuated signals installed at the intersection of Candlers Mountain Road and Woodall Road if required, based on a traffic engineering study to be conducted." The petitioner submitted amended proffers on May 25, 2013 and proffer number one now states "Project will contribute up to $15,000 to the City for the construction of four (4) new countdown "ped heads" at the intersection of Candlers Mountain Road and Woodall Road. Contribution will be made following construction of apartments and after official determination by City or VDOT that pedestrian activity warrants the construction of the signals." Mr. Martin pointed out that although VDOT would like to take a "wait and see" approach, City staff feels the pedestrian improvements should be done at the time of the construction of the apartments.

Mr. Martin remarked that the upcoming *Comprehensive Plan* and *Zoning Ordinance* rewrites will need to deal with the issue of higher density and where it is appropriate. Staff believes that this location lends itself very well to higher density because of its convenient access to mass transit and its proximity to Liberty University and adjoining commercial uses. Staff recommends approval of the petitions but does take exception with the revised proffer number one and would suggest that the Planning Commission discuss this item.

Mr. Jason Vickers-Smith of WVS Companies was present to represent the petitioner. He outlined the reasons they feel this project is appropriate for this site. They feel that the site uses the vacant land well and the layout will fit nicely on the irregularly shaped parcel. There are also good financing options available at the present time for this type of development. The demand for multi-family housing is high right now, especially near Liberty. All the major employment centers of the City are also close and the public transit loop is convenient and easy to navigate. In addition, the hotel essentially eliminates the possibility of putting an industrial use on this property.

Mr. Vickers-Smith pointed out that the irregular shape of the property makes it difficult to develop this property, especially since the hotel takes up most of the road frontage. The layout of the apartments will fit nicely on the property. They will have a more contemporary look to them than what is generally in the Lynchburg area. They will have nice amenities such as washers and dryers in each unit, ample parking, a pool and a club house.

Chair Sale asked for anyone else who wished to speak in favor of the petition. No one came forward. He asked for anyone who wished to speak in opposition to the petition. No one came forward. He closed the public hearing portion of the petition.

Commissioner Hooper asked for a general summary of the traffic study. Mr. Martin said that it found that the difference between the build and no build scenarios were negligible. It recommended specific pedestrian improvements. The signal timings would need to change due to pedestrian traffic but no changes were needed due to vehicular traffic. Mr. Don DeBerry, the Transportation Engineer, was present and agreed with that summary.

Commissioner Swienton asked how many average daily trips this would add to Candlers Mountain Road. Mr. Martin stated that the proposed development is projected to generate 1,069 new daily trips, with 80 trips (16 entering, 64 exiting) occurring in the AM peak hour and 103 trips (67 entering, 36 exiting) in the PM peak hour. Commissioner Swienton asked how much traffic exists there already. Mr. Scott Beasley of Hurt and Proffitt was available to answer questions. However, he said that the traffic study engineers did not do 24-hour counts. Mr. Beasley or Mr. DeBerry could get that information for the City Council meeting. However, Mr. Beasley pointed out that the traffic study showed that delays would only be increased by a second or two and that the level of service will not decrease. Commissioner Swienton pointed out that UPS, which is located nearby, could expand its business by right and that could certainly add a significant amount of daily traffic.

Commissioner Barnes agreed that this is a good location for high density development. He wondered if Liberty runs a shuttle that goes by this site. Mr. Martin answered that GLTC had suggested the location for the bus shelter but would have to adjust its route to serve it. Since the apartments are not due to be constructed until 2015, there is ample time for GLTC to make this adjustment. Mr. Martin pointed out that changes in the area, such as the vehicular tunnels being constructed by Liberty are working to strengthen the transportation grid in the area.

Commissioner Coleman stated that he is pleased to see this development and it appears to be a well thought out project.

Chair Sale wanted to resolve the issue of proffer number one. Mr. Vickers-Smith stated that the petitioner is willing to make the improvements. Mr. Martin stated that City staff will need to communicate with VDOT and encourage them to have the petitioner do the improvements at the time of construction. The items that need to be covered in the proffer are the four "ped heads" that will be needed, redoing the signal timings, striping for the crossings and an ADA ramp. If those items could be specifically mentioned in the proffer and be designated as the responsibility of the petitioner, a dollar amount does not to be assigned to them. Mr. Vickers-Smith stated that the petitioner agrees with these suggestions and the timing for them to be done during construction. He will advocate for these improvements with VDOT but was not sure how strong his voice would be with VDOT. Mr. Martin stated that City staff will need to speak with VDOT and the commissioners were in consensus that City staff should proceed in that direction.

Mr. Vickers-Smith amended proffer number one to read: "Project will contribute funds or complete work for "ped heads," signal timing changes, painting for crosswalk and required ADA ramps." Chair Sale asked if the proffer should state that the improvements need to be done at the time of construction. Mr. Martin said they could not put that requirement in because VDOT needs to agree to that request. Mr. Martin believes this proffer will be sufficient and Mr. DeBerry agreed.

Commissioner Coleman made the following motion, which was seconded by Commissioner Barnes:

"That the Planning Commission recommends to City Council approval of the petition of GDG Lynchburg Hotel, LLC, to amend the *Future Land Use Map (FLUM)* from Employment 2 to High Density Residential for a portion of the property at 5212 Woodall Road."

The motion passed by the following vote:

AYES:	Barnes, Coleman, Hooper, Sale and Swienton	5
NOES:		0
ABSTENTIONS:		0
ABSENT:	Hannon and Kennedy	2

Commissioner Barnes made the following motion, which was seconded by Commissioner Swienton:

"That the Planning Commission waives the 21-day submittal requirement for proffers."

The motion passed by the following vote:

AYES:	Barnes, Coleman, Hooper, Sale and Swienton	5
NOES:		0
ABSTENTIONS:		0
ABSENT:	Hannon and Kennedy	2

Commissioner Coleman made the following motion, which was seconded by Commissioner Hooper:

"That the Planning Commission recommends approval of the petition of GDG Lynchburg Hotel, LLC, to rezone approximately eight and seven hundred eighty-four thousandths (8.784) acres located at 5212 Woodall Road and 2900 Candlers Mountain Road from I-2, Light Industrial District to B-3, Community Business District (Conditional) with amended proffers."

The motion passed by the following vote:

AYES:	Barnes, Coleman, Hooper, Sale and Swienton	5
NOES:		0
ABSTENTIONS:		0
ABSENT:	Hannon and Kennedy	2

Commissioner Coleman made the following motion, which was seconded by Commissioner Hooper:

"That the Planning Commission recommends approval of the petition of GDG Lynchburg Hotel, LLC, for a Conditional Use Permit to allow the construction of a one hundred fifty-six unit apartment complex within three (3) four (4) story buildings with associated pool, club house and parking, subject to the following conditions:

1. **The property shall be developed in substantial compliance with the site plan titled "Rezoning Plan for Kirkley Apartment Community" as prepared by Hurt & Proffitt, Inc., dated March 8, 2012.**

2. **A sidewalk will be installed on Woodall Road as indicated on the submitted site plan.**

3. **The petitioner will relocate the bus shelter to the western side of the intersection of Woodall Road and Candlers Mountain Road as shown on the submitted site plan.**

4. **All lighting shall be glare shielded and non-directional to prevent direct illumination beyond the property line.**

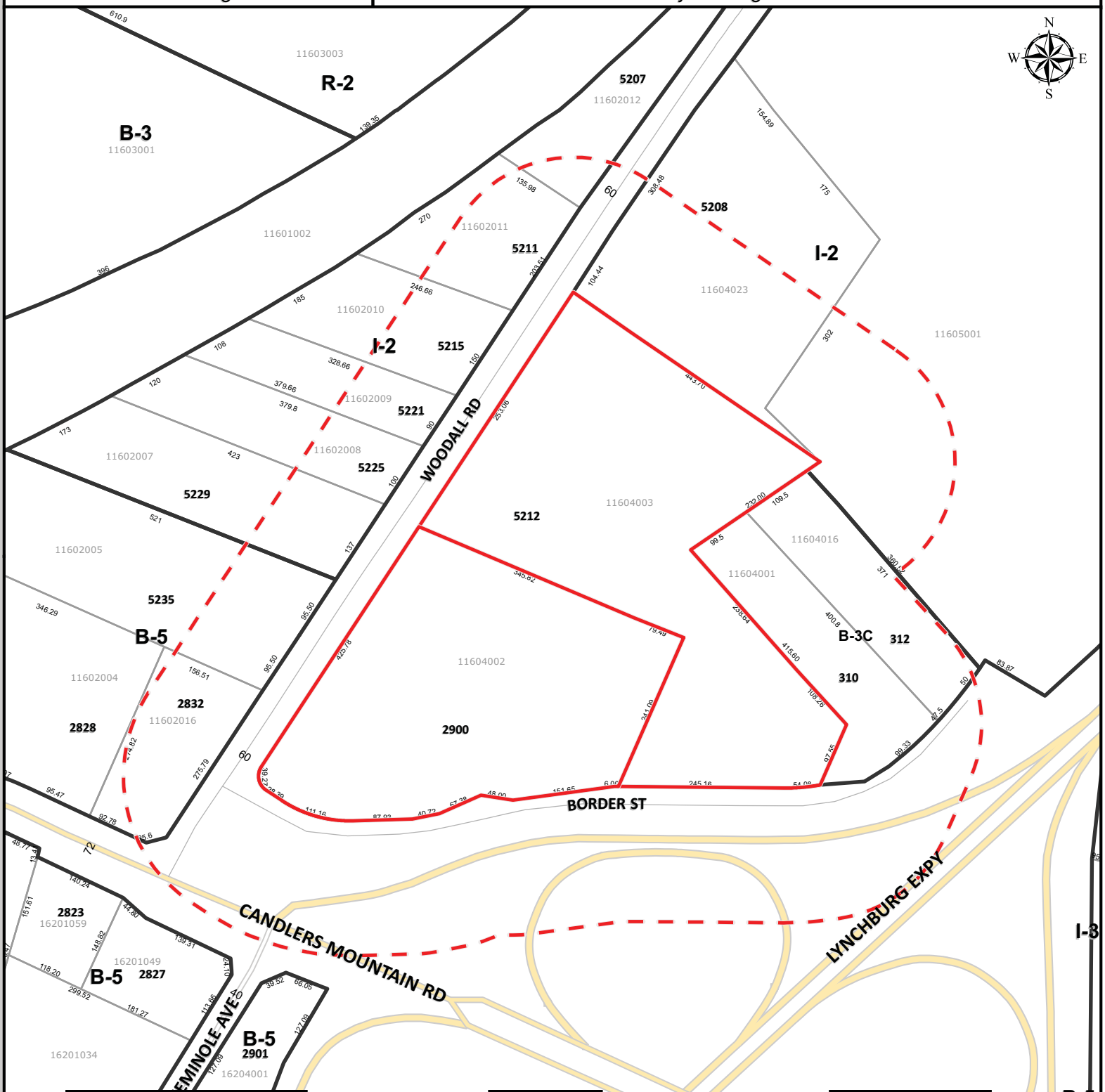
5. **Building elevations and materials shall be as indicated in building elevations submitted by the petitioner and received by Community Development on October 9, 2012.**

The motion passed by the following vote:

AYES:	Barnes, Coleman, Hooper, Sale and Swienton	5
NOES:		0
ABSTENTIONS:		0
ABSENT:	Hannon and Kennedy	2

Chair Sale commented that the Planning Commission and City Council are looking at appropriate locations for higher density and this does seem to be an ideal location. The apartments will be in kind of a "cubbyhole" and not really visible from the road and will have nice tree coverage as well. They have looked at the safety of potential clients and how they can safely access the nearby commercial uses by foot. This is a wonderful location because of nearby transportation corridors. He thinks this will be a good contribution to Lynchburg and to this particular place in the City.

Zoning Map	KIRKLEY APARTMENT COMMUNITY
Rezoning	GDG Lynchburg Hotel LLC



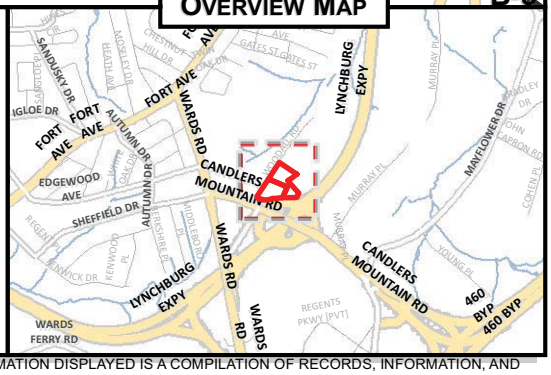
Property Information

Parcel ID	Address
11604002	2900 CANDLERS MOUNTAIN RD
11604003	5212 WOODALL RD

Legend

- Subject Property
- 200' Buffer
- Zoning Boundary

Overview Map

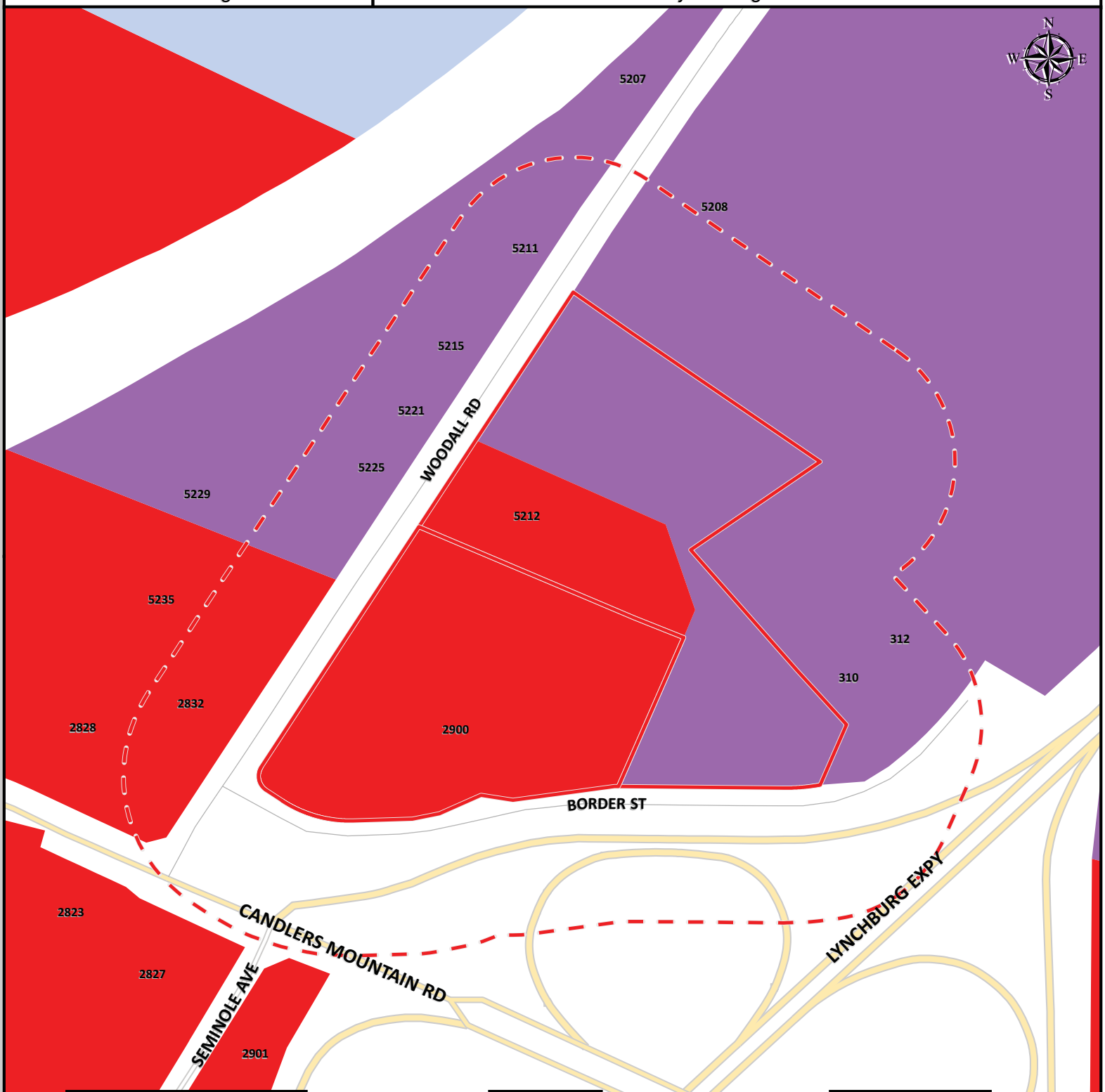


Map Scale: 1 " to 200 ' **Date Printed:** 03/15/2013

DISCLAIMER: THIS MAP IS NEITHER A LEGALLY RECORDED MAP NOR A SURVEY AND IS NOT INTENDED TO BE USED AS SUCH. THE INFORMATION DISPLAYED IS A COMPILATION OF RECORDS, INFORMATION, AND DATA OBTAINED FROM VARIOUS SOURCES. THE CITY OF LYNCHBURG IS NOT RESPONSIBLE FOR ITS ACCURACY OR HOW CURRENT IT MAY BE.

PIN	Local Address	Owner
11602007	5229 WOODALL RD	COVA CORPORATION
11602008	5225 WOODALL RD	COVA CORPORATION
11602005	5235 WOODALL RD	EDISON CORPORATION
11604003	5212 WOODALL RD	GDG LYNCHBURG HOTEL LLC
11604002	2900 CANDLERS MOUNTAIN RD	GDG LYNCHBURG HOTEL LLC
11602011	5211 WOODALL RD	LT ACQUISITION COMPANY INC
11602009	5221 WOODALL RD	LT ACQUISITION COMPANY INC
11604023	5208 WOODALL RD	LT ACQUISITION COMPANY INC
11605001	5114 WOODALL RD	LT ACQUISITION COMPANY INC
11602010	5215 WOODALL RD	LT ACQUISITION COMPANY INC
11604001	310 BORDER ST	LYNCHBURG REGIONAL CHAMBER OF COMMERCE
11604016	312 BORDER ST	LYNCHBURG REGIONAL CHAMBER OF COMMERCE
11602012	5207 WOODALL RD	NORFOLK & WESTERN RAILWAY
11602016	2832 CANDLERS MOUNTAIN RD	PTC REAL ESTATE LLC

FLUM Map	KIRKLEY APARTMENT COMMUNITY
Rezoning	GDG Lynchburg Hotel LLC



Property Information

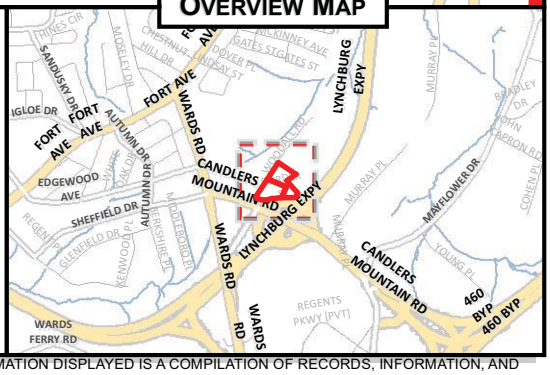
Parcel ID	Address
11604002	2900 CANDLERS MOUNTAIN RD
11604003	5212 WOODALL RD

Legend

- Local Historic District
- Traditional Residential
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Neighborhood Commercial
- Community Commercial
- Regional Commercial
- Employment 1
- Employment 2
- Office
- Institution
- Downtown
- Public Use
- Public Parks
- Resource Conservation

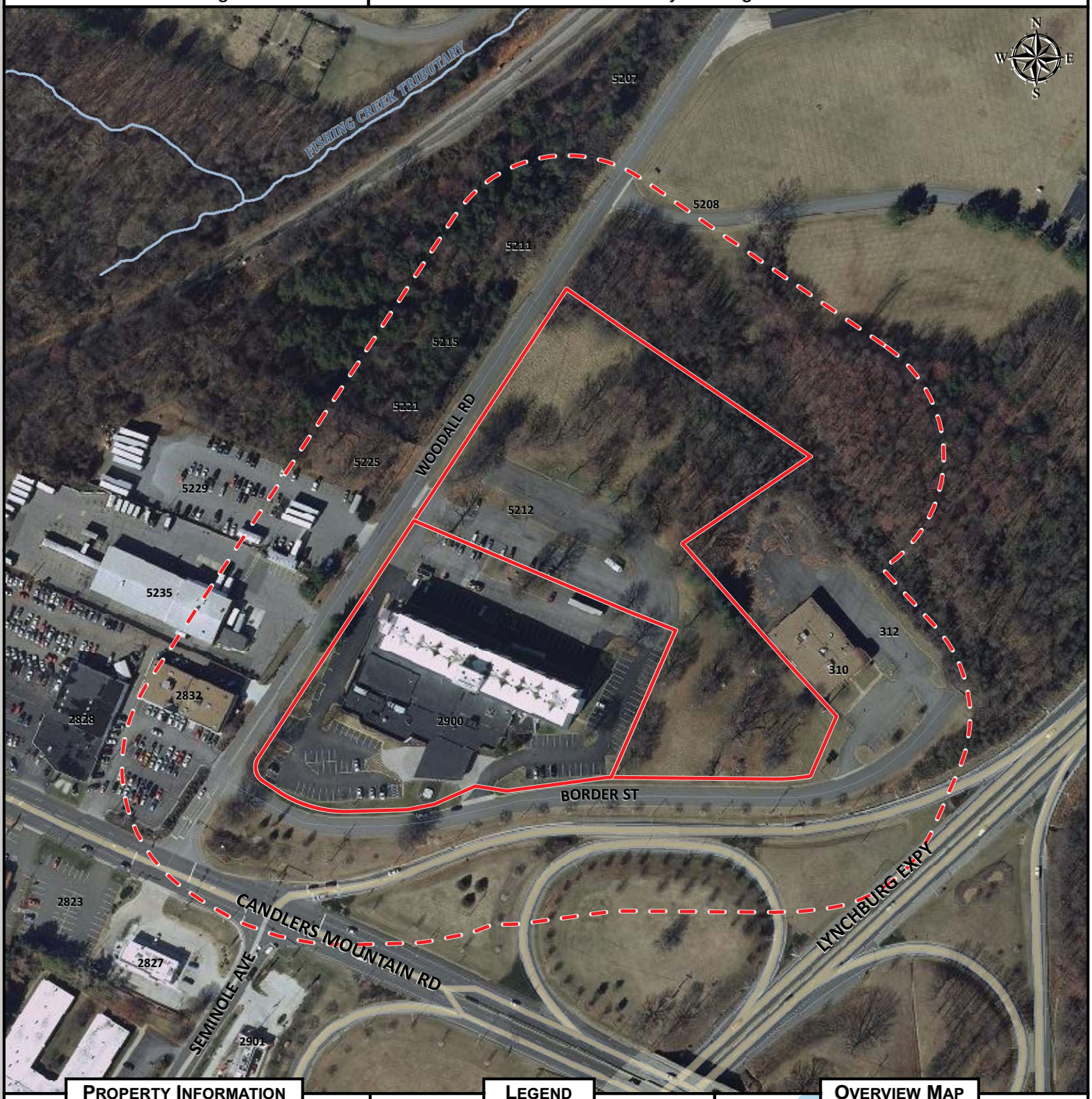
Map Scale: 1 " to 200 ' **Date Printed:** 03/15/2013

Overview Map



DISCLAIMER: THIS MAP IS NEITHER A LEGALLY RECORDED MAP NOR A SURVEY AND IS NOT INTENDED TO BE USED AS SUCH. THE INFORMATION DISPLAYED IS A COMPILATION OF RECORDS, INFORMATION, AND DATA OBTAINED FROM VARIOUS SOURCES. THE CITY OF LYNCHBURG IS NOT RESPONSIBLE FOR ITS ACCURACY OR HOW CURRENT IT MAY BE.

Watershed Map	KIRKLEY APARTMENT COMMUNITY
Rezoning	GDG Lynchburg Hotel LLC



Property Information

Parcel ID	Address
11604002	2900 CANDLERS MOUNTAIN RD
11604003	5212 WOODALL RD

Legend

- Subject Property
- Base Flood Elevation
- Floodway
- Floodzone
- River / Lake / Stream

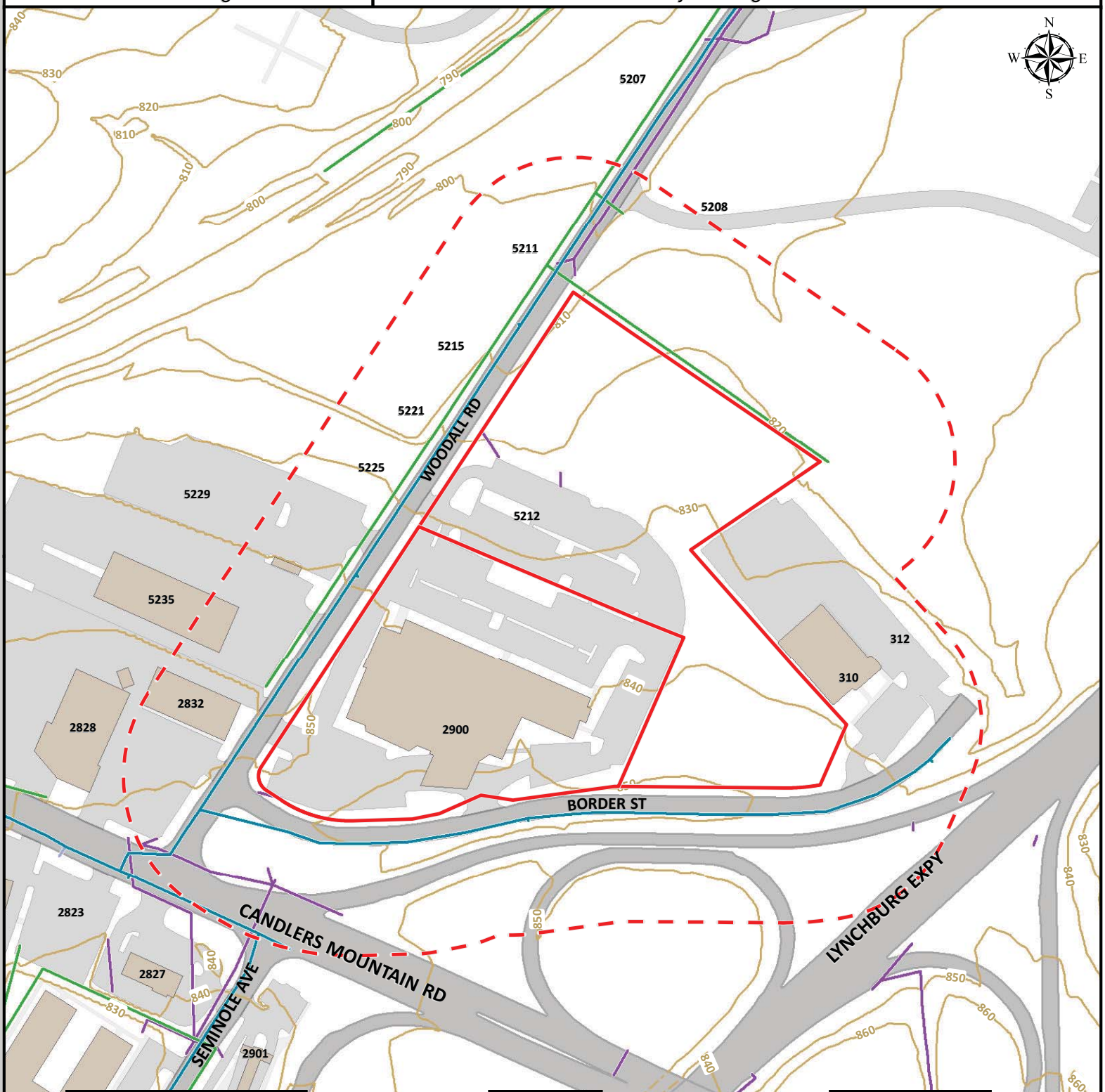
Map Scale: 1 " to 200 ' **Date Printed:** 03/15/2013

Overview Map

Opossum Creek-James River

DISCLAIMER: THIS MAP IS NEITHER A LEGALLY RECORDED MAP NOR A SURVEY AND IS NOT INTENDED TO BE USED AS SUCH. THE INFORMATION DISPLAYED IS A COMPILATION OF RECORDS, INFORMATION, AND DATA OBTAINED FROM VARIOUS SOURCES. THE CITY OF LYNCHBURG IS NOT RESPONSIBLE FOR ITS ACCURACY OR HOW CURRENT IT MAY BE.

Planimetric and Topographic Map	KIRKLEY APARTMENT COMMUNITY
Rezoning	GDG Lynchburg Hotel LLC



Property Information

Parcel ID	Address
11604002	2900 CANDLERS MOUNTAIN RD
11604003	5212 WOODALL RD

Legend

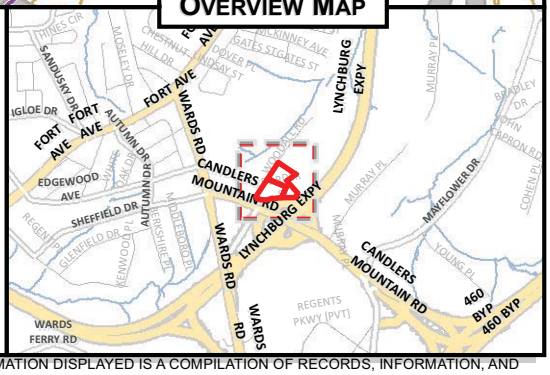
		Active	Proposed	Abandoned
Utilities	Water			
	Sanitary			
	Storm			

		Paved	Unpaved	Other
Planimetrics	Structure	-	-	
	Roadway			-
	Parking			-
	Sidewalk	-		-
	Driveway	-	-	

		10'	10' Obs
Topography	Contour		

Map Scale: 1 " to 200 ' **Date Printed:** 03/15/2013

Overview Map

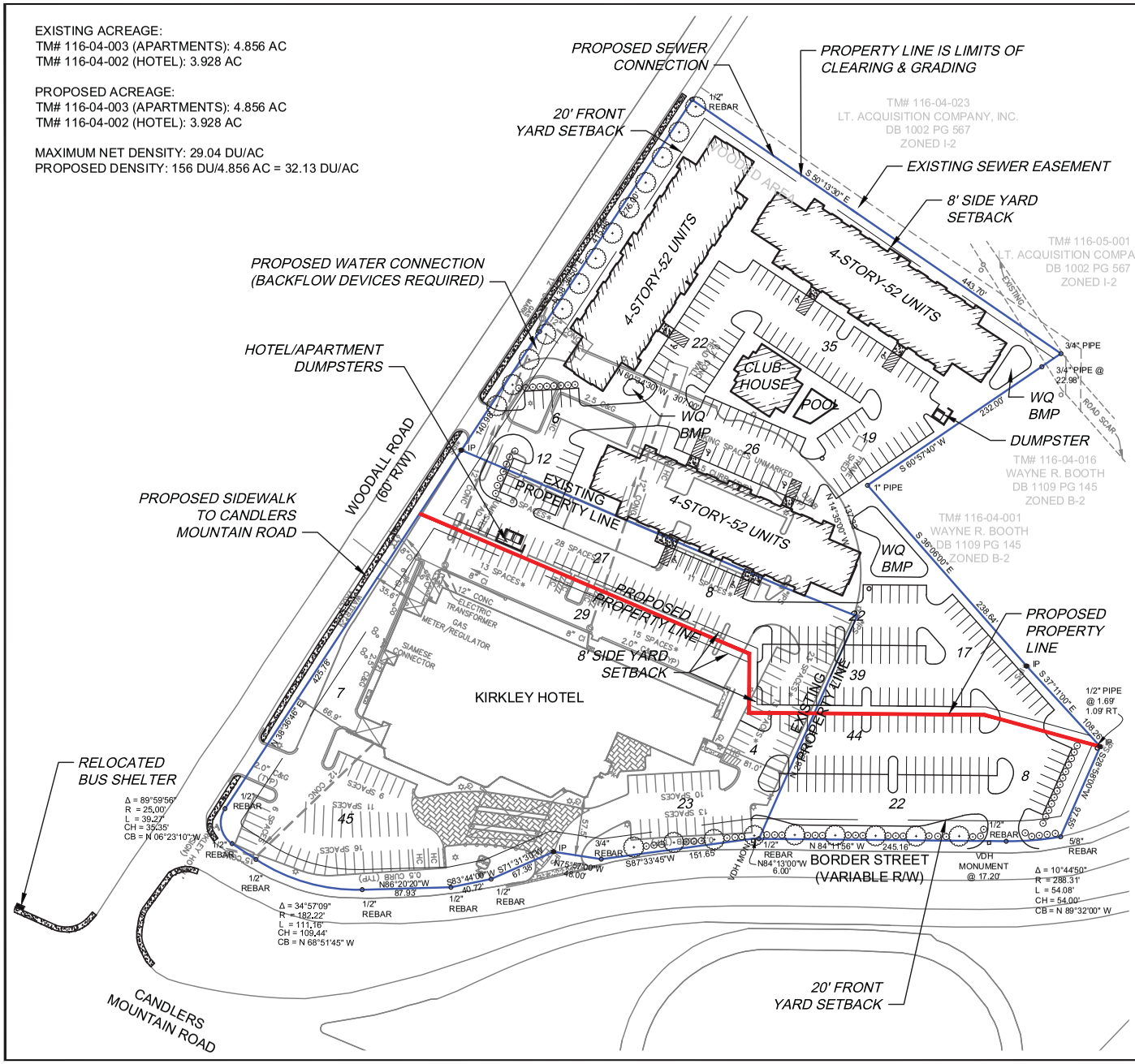


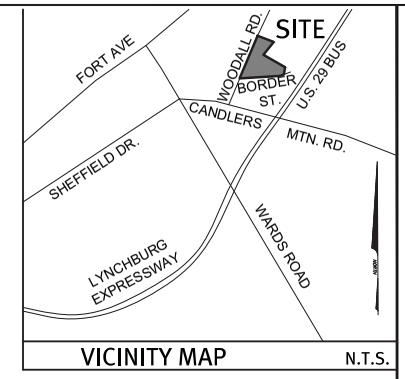
DISCLAIMER: THIS MAP IS NEITHER A LEGALLY RECORDED MAP NOR A SURVEY AND IS NOT INTENDED TO BE USED AS SUCH. THE INFORMATION DISPLAYED IS A COMPILATION OF RECORDS, INFORMATION, AND DATA OBTAINED FROM VARIOUS SOURCES. THE CITY OF LYNCHBURG IS NOT RESPONSIBLE FOR ITS ACCURACY OR HOW CURRENT IT MAY BE.

EXISTING ACREAGE:
TM# 116-04-003 (APARTMENTS): 4.856 AC
TM# 116-04-002 (HOTEL): 3.928 AC

PROPOSED ACREAGE:
TM# 116-04-003 (APARTMENTS): 4.856 AC
TM# 116-04-002 (HOTEL): 3.928 AC

MAXIMUM NET DENSITY: 29.04 DU/AC
PROPOSED DENSITY: 156 DU/4.856 AC = 32.13 DU/AC





NOTES:

1. SITE TM#: 116-04-003
   HOTEL TM#: 116-04-002
2. SITE OWNER: GDG LYNCHBURG HOTEL, LLC
   HOTEL OWNER: GDG LYNCHBURG HOTEL, LLC
   ADDRESS: 5212 WOODALL ROAD, LYNCHBURG, VA 24502
3. SITE PROPOSED USE: MULTI-FAMILY APARTMENT COMMUNITY
4. SITE ZONED: I-2
5. SITE PROPOSED ZONE: B-3C
6. REQUIRED PARKING:
   APARTMENTS: 156 SPACES
   HOTEL: 176 SPACES
   TOTAL: 332 SPACES REQUIRED
   PROPOSED PARKING:
   APARTMENTS: 233 SPACES
   HOTEL: 182 SPACES
   TOTAL: 415
   REQUIRED ADA-ACCESSIBLE SPACES:
   APARTMENTS: 7 SPACES
   HOTEL: 6 SPACES
7. FOUNDATION PLANTINGS REQUIRED: 1 ORNAMENTAL TREE PER 50' AND 1 LARGE SHRUB PER 10':
   640'/50'=13 ORNAMENTAL TREES
   640'/10'=64 LARGE SHRUBS
8. PARKING LOT LANDSCAPING REQUIRED: 1 SHADE TREE PER 8 SPACES AND 1 MEDIUM SHRUB PER SPACE:
   APARTMENTS: 233/8 = 30 SHADE TREES; 233 MEDIUM SHRUBS
   HOTEL: NONE (PROPOSED PLAN REDUCES THE NUMBER OF SPACES ON THE HOTEL PROPERTY)
9. STREET TREES REQUIRED: 1 SHADE TREE PER 40' ROAD FRONTAGE:
   APARTMENTS: 490'/40' = 13 SHADE TREES
   HOTEL: 340'/40' = 9 SHADE TREES
10. EXTERIOR LIGHTING SHALL BE CONTROLLED SO THAT NO DIRECT ILLUMINATION WILL OCCUR BEYOND ANY PROPERTY LINE SHARED WITH A RESIDENTIAL DISTRICT.
11. THE AREA SHOWN HEREON IS LOCATED IN FLOOD ZONE 'X' AND IS NOT LOCATED WITHIN FLOOD HAZARD ZONE 'A' FOR A 100 YEAR FLOOD AS DETERMINED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY AS SHOWN ON COMMUNITY-PANEL MAP #5100930106D DATED JUNE 3, 2008.

100 50 0 100 200
GRAPHIC SCALE IN FEET
1" = 100'

*ENGINEERING >> SURVEYING >> PLANNING
HURT & PROFFITT INCORPORATED
2524 LANGHORNE ROAD
LYNCHBURG VA 24501
800.242.4906 TOLL FREE
434.847.7796 MAIN
434.847.0047 FAX

REZONING PLAN FOR KIRKLEY APARTMENT COMMUNITY

CITY OF LYNCHBURG, VIRGINIA

PROJECT NO.	20120506
G.L. NO.	264-02-A1.6
FILE NO.	
DATE:	3/8/2012
DRAWN BY:	PSB/ASK
CHECKED BY:	PSB

SHEET NO.
1 OF 2

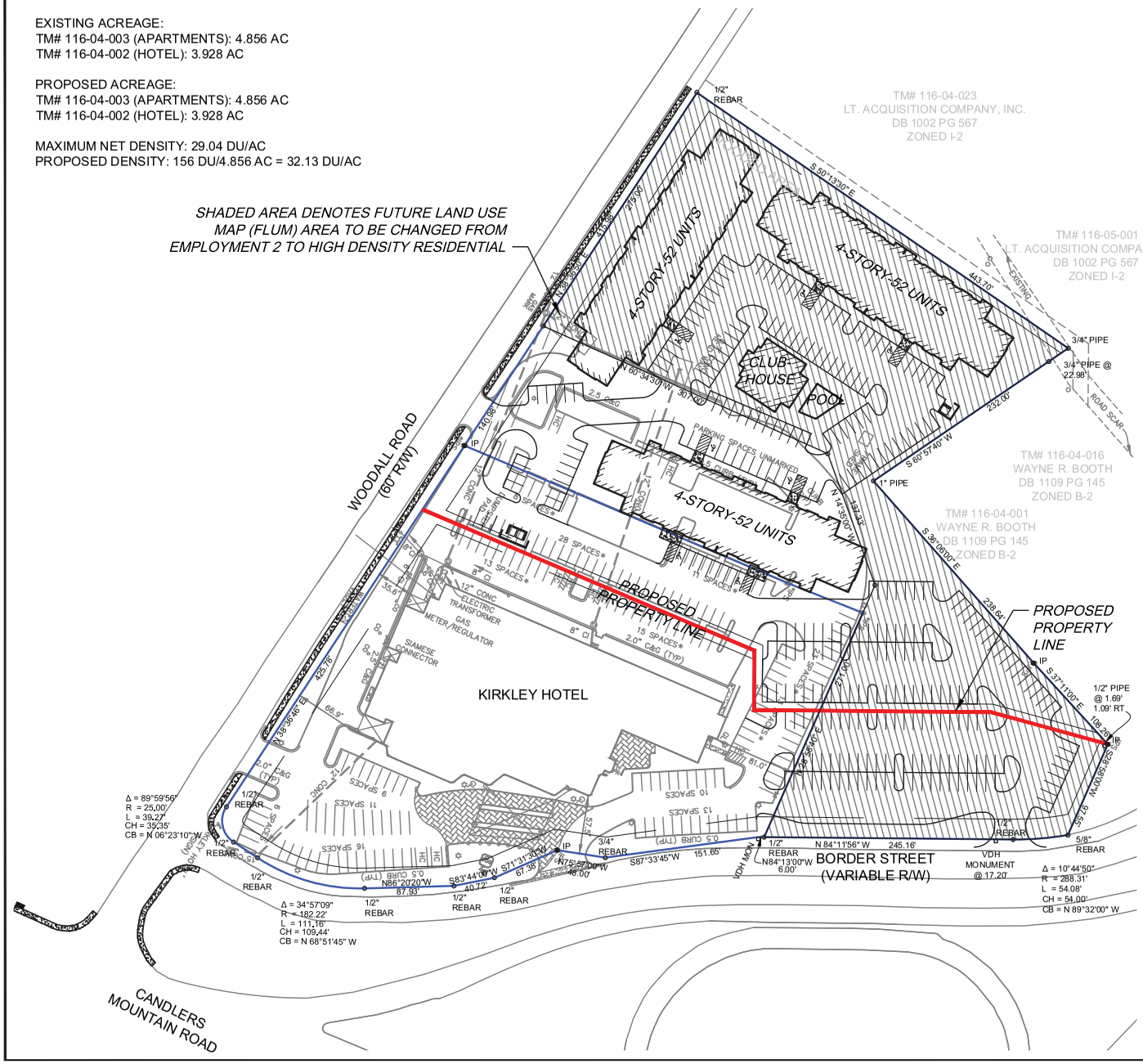
Mar 21, 2013 – 12:38pm C:\Users\PSB\appdata\local\temp\AcPublish_8896\REZONING-color3.dwg

EXISTING ACREAGE:
TM# 116-04-003 (APARTMENTS): 4.856 AC
TM# 116-04-002 (HOTEL): 3.928 AC

PROPOSED ACREAGE:
TM# 116-04-003 (APARTMENTS): 4.856 AC
TM# 116-04-002 (HOTEL): 3.928 AC

MAXIMUM NET DENSITY: 29.04 DU/AC
PROPOSED DENSITY: 156 DU/4.856 AC = 32.13 DU/AC

SHADED AREA DENOTES FUTURE LAND USE MAP (FLUM) AREA TO BE CHANGED FROM EMPLOYMENT 2 TO HIGH DENSITY RESIDENTIAL


WOODALL ROAD
(60' R/W)
CANDLERS MOUNTAIN ROAD
KIRKLEY HOTEL
4-STORY-52 UNITS
4-STORY-52 UNITS
4-STORY-52 UNITS
CLUB HOUSE
POOL
PROPOSED PROPERTY LINE
PROPOSED PROPERTY LINE
BORDER STREET
(VARIABLE R/W)
TM# 116-04-023
LT. ACQUISITION COMPANY, INC.
DB 1002 PG 567
ZONED I-2
TM# 116-05-001
LT. ACQUISITION COMPANY, INC.
DB 1002 PG 567
ZONED I-2
TM# 116-04-016
WAYNE R. BOOTH
DB 1109 PG 145
ZONED B-2
TM# 116-04-001
WAYNE R. BOOTH
DB 1109 PG 145
ZONED B-2
Δ = 89°59'56"
R = 25.00'
L = 39.27'
CH = 35.35'
CB = N 06°23'10" W
Δ = 34°57'09"
R = 182.22'
L = 111.16'
CH = 109.44'
CB = N 68°51'45" W
Δ = 10°44'50"
R = 288.31'
L = 54.08'
CH = 54.00'
CB = N 89°32'00" W
N 84°11'56" W 245.16'
S 87°33'45" W 151.65'
S 60°57'40" W 232.00'
S 50°13'30" E 443.70'
S 37°11'00" E 109.28'
N 00°35'52" W 32.16'
S 38°05'00" E 238.84'
N 14°35'00" W 432.33'
N 60°34'30" W 90.00'
S 71°31'31" W 67.38'
N 75°57'00" W 48.00'
S 83°44'00" W 40.72'
N 86°20'20" W 87.93'
N 84°13'00" W 6.00'
N 38°38'46" E 425.78'
N 38°38'46" E 66.9'
N 38°38'46" E 140.98'
N 38°38'46" E 229.90'
N 38°38'46" E 110.08'
N 38°38'46" E 271.00'
N 38°38'46" E 138.56'
N 38°38'46" E 81.0'
N 38°38'46" E 57.8'
N 38°38'46" E 35.6'
N 38°38'46" E 19.0'
N 38°38'46" E 19.0'
N 38°38'46" E 19.0

FRONT ELEVATION

0' 5' 10' 25'

RECEIVED
OCT 09 2012
COMMUNITY
DEVELOPMENT

Kirkley Apartment Community

Lynchburg, Virginia

TRAFFIC IMPACT ANALYSIS

Prepared for

Hurt & Proffitt

c/o Scott Beasley, PE, LEED AP
Senoir Project Manager
Hurt & Proffitt
2524 Langhorne Road
Lynchburg, VA 24501

COMMONWEALTH OF VIRGINIA
LYLE WAYNE OVERCASH
No. 032228
3/4/13
PROFESSIONAL ENGINEER

Prepared by

MARTIN ALEXIOU BRYSON

March 4, 2013

4000 WESTCHASE BOULEVARD, SUITE 530, RALEIGH, NC 27607

EXECUTIVE SUMMARY

Project Background

The proposed Kirkley Apartment Community is to be located along Woodall Road, north of Virginia Route 128 (Candlers Mountain Road) in Lynchburg, Virginia as shown in Figure 1. The development will consist of 156 apartment units with an expected completion date of 2015. The development is expected to have one access point along Woodall Road and two shared access points along Border Street and (Figure 2).

Based on the discussions with Virginia Department of Transportation (VDOT) and City of Lynchburg staff, the following intersections were included in the study area and were analyzed for existing and future conditions:

- Route 128 (Candlers Mountain Road) and Woodall Road (signalized)
- Route 128 (Candlers Mountain Road) and US 29 Southbound Off-Ramp (Lynchburg Expressway)/Seminole Avenue (signalized)

The traffic analysis for the proposed development was performed under four scenarios: Existing (2013), No-Build (2015), Build (2015), and Build (2015) with improvements. Typical weekday AM and PM peak hour conditions were analyzed for each scenario. The Existing (2013) scenario includes peak hour volumes based on turning movement count data collected in February 2013. The No-Build (2015) scenario includes existing traffic with projected annual growth between the existing and future years. The Build (2015) scenario includes No-Build (2015) scenario volumes with the addition of site trips generated by the proposed development. The Build (2015) with improvements scenario includes Build (2015) scenario volumes with any recommended improvements in place.

Existing (2013) Conditions

Existing analyses were conducted based on current roadway geometrics and intersection turning movement counts. As reported in the Summary Level of Service table on page iv, the study area intersections operate at acceptable levels (LOS D or better) in both the AM and PM peak periods.

No-Build (2015) Conditions

Typical growth rates range between one and three percent (1% - 3%), however to be conservative, a growth rate of three percent (3%) was applied to the existing traffic volumes to account for normal traffic growth between the base year (2013) and the build year (2015).

Based on the No-Build (2015) analysis, the intersections in the study area are projected to experience increases in delay ranging from 0.2 to 0.5 seconds per vehicle during the peak hour periods. As a result, all intersections continue to operate at acceptable levels.

Trip Generation and Assignment

The proposed development is to consist of up to 156 apartment units. Trip generation was conducted for the proposed land use based on the most appropriate corresponding trip generation codes included in the *ITE Trip Generation, 9th Edition*. As a result, the proposed development is projected to generate 1,069 new daily trips, with 80 trips (16 entering, 64 exiting) occurring in the

AM peak hour and 103 trips (67 entering, 36 exiting) in the PM peak hour. The generated site trips were distributed in accordance with the existing turning movement counts.

Build (2015) Conditions

The Build (2015) conditions account for both the No-Build (2015) traffic and the site traffic generated by the proposed development. As shown in the Summary Level of Service table, the addition of the site trips has only a minor effect on the operations of the two intersections adding between 0.6 and 2.1 seconds per vehicle of delay. All intersections are projected to continue to operate at acceptable levels of service.

Roadway Improvement Recommendations

As indicated in the traffic operations analyses, the proposed Kirkley Apartment Community will have a very slight impact on intersections within the study area. The development is however, expected to result in some increased pedestrian demand in the area as residents walk to restaurants and other destinations across Candlers Mountain Road. In order to safely accommodate this new pedestrian demand, the following roadway improvements are recommended:

- Provide a sidewalk along the east side of Woodall Road between Candlers Mountain Road and the northern end of the site's frontage. Install appropriate wheelchair ramps at all appropriate curb cuts.
- Add hi-visibility crosswalks to the southbound approach of Woodall Road and the eastbound approach of Candlers Mountain Road at Woodall Road.
- Add actuated pedestrian phases to phases 2, 4, and 6 at the Candlers Mountain Road at Woodall intersection.
- Add pedestrian signal heads, push buttons, signs, and other appropriate measures.

One signal controller controls the signals at the intersections of Candlers Mountain Road/Woodall Road and Candlers Mountain Road/US 29 Southbound Off-Ramp/Seminole Avenue. As shown in the Summary LOS table, even with pedestrian accommodations to the signals, the intersection is projected to continue to operate at an acceptable level of service in both the AM and PM peak periods with a maximum delay increase of 0.3 seconds in the AM peak hour at the Candlers Mountain Road and Woodall Road intersection and 1.2 seconds in the PM peak hour at the Candlers Mountain Road and US 29 Ramp/Seminole Avenue intersection.

Level of Service Results Summary

Intersection and Approach	Existing (2013)		No-Build (2015)		Build (2015)		Build Improved (2015)	
	AM	PM	AM	PM	AM	PM	AM	PM
Candlers Mountain Road and Woodall Road	**B (12.7 sec)**	**C (20.3 sec)**	**B (12.9 sec)**	**C (20.8 sec)**	**B (15.0 sec)**	**C (21.4 sec)**	**B (15.3 sec)**	**C (21.6 sec)**
Eastbound	C	C	C	C	C	C	C	D
Westbound	A	A	A	A	A	A	A	A
Northbound	C	D	C	D	C	D	C	C
Southbound	D	D	D	D	D	D	D	D
Candlers Mountain Road and US 29 Southbound Ramp/Seminole Avenue	**B (11.8 sec)**	**B (16.4 sec)**	**B (12.3 sec)**	**B (16.9 sec)**	**B (13.2 sec)**	**B (18.5 sec)**	**B (13.4 sec)**	**B (19.7 sec)**
Eastbound	A	A	A	A	A	A	A	A
Westbound	B	C	B	C	B	C	B	C
Northbound	C	C	C	C	C	C	C	C
Southbound	C	D	C	C	D	D	D	D

LEGEND: **X** = Overall signalized intersection LOS;
(XX sec) = Overall signalized intersection control delay in seconds; X = approach LOS

TABLE OF CONTENTS

1.0 INTRODUCTION 1
2.0 EXISTING (2013) CONDITIONS 9
- 2.1 EXISTING ROADWAY CONDITIONS 9
- 2.2 EXISTING TURNING MOVEMENT DATA 11
- 2.3 LEVEL OF SERVICE CRITERIA 11
- 2.4 LEVEL OF SERVICE ANALYSIS 12

3.0 NO-BUILD (2015) CONDITIONS 14
- 3.1 BACKGROUND GROWTH AND DEVELOPMENT 14
- 3.2 LEVEL OF SERVICE ANALYSIS 14

4.0 BUILD (2015) ANALYSIS 16
- 4.1 TRIP GENERATION 16
- 4.2 TRIP DISTRIBUTION AND ASSIGNMENT 16
- 4.3 LEVEL OF SERVICE ANALYSIS 18

5.0 FINDINGS AND CONCLUSIONS 20

LIST OF FIGURES

Figure 1 Vicinity Map 7
Figure 2 Site Plan 8
Figure 3 Existing (2013) Lane Geometrics and Traffic Control 11
Figure 4 Existing (2013) AM and PM Peak Turning Movement Hour Volumes 13
Figure 5 No-Build (2015) AM and PM Peak Hour Turning Movement Volumes 15
Figure 6 AM and PM Peak Hour Directional Distribution Percentages 17
Figure 7 Site Traffic Turning Movement Volumes 17
Figure 8 Build (2015) AM and PM Peak Hour Turning Movement Volumes 19

LIST OF TABLES

Table 1 Weekday Peak Period Turning Movement Count Schedule 11
Table 2 Level of Service Descriptions for Intersections 12
Table 3 Existing (2013) LOS Results 12
Table 4 No-Build (2015) LOS Results 14
Table 5 Trip Generation Rates (Vehicle Trips) 16
Table 6 Build (2015) LOS Results 18
Table 7 LOS Results Summary 20

APPENDICES

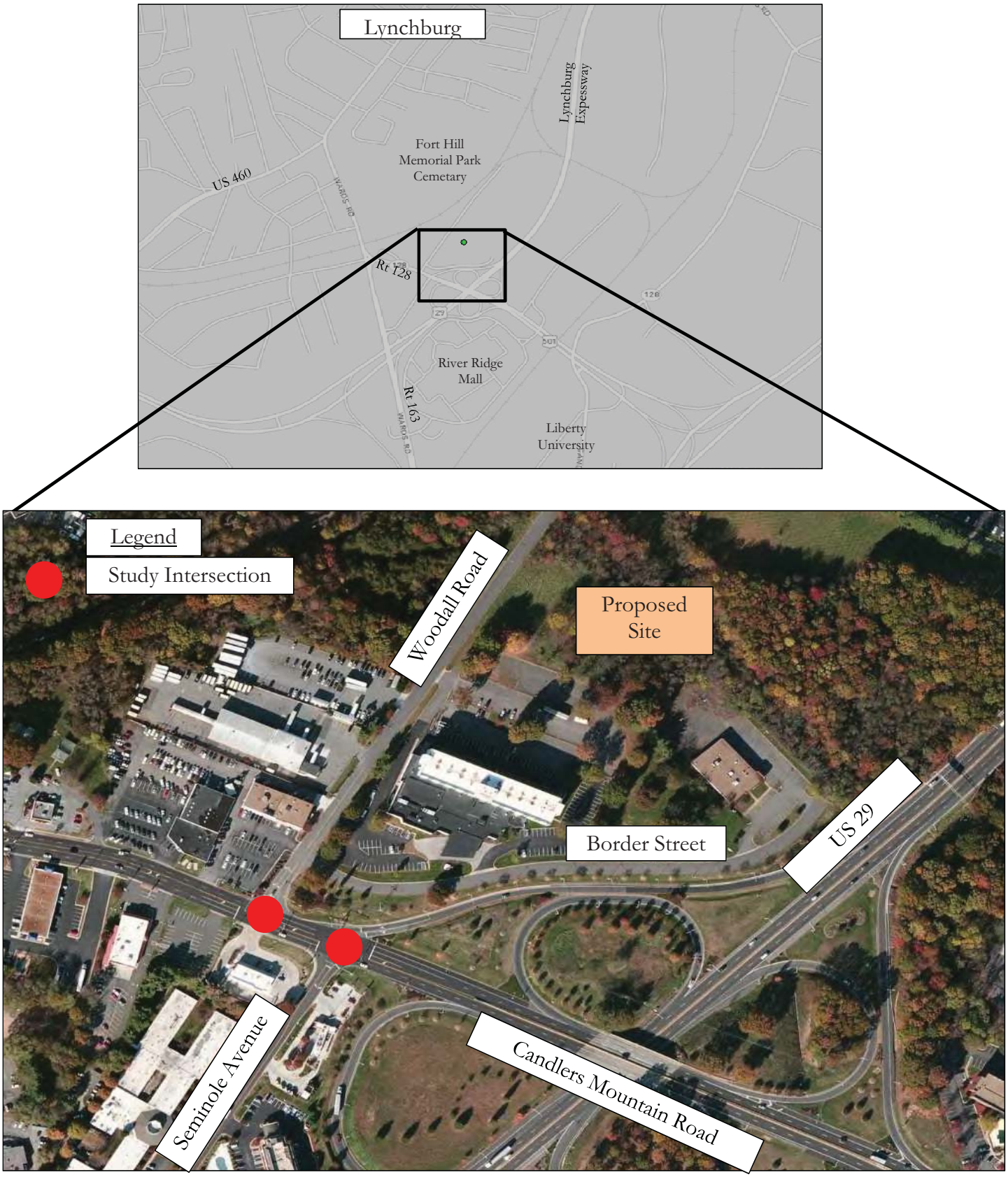
Appendix A Existing (2013) Turning Movement Counts
Appendix B Intersection Capacity Analysis
Appendix C Signal Plans and Timings

1.0 INTRODUCTION

The proposed Kirkley Apartment Community is to be located along Woodall Road, north of Virginia Route 128 (Candlers Mountain Road) in Lynchburg, Virginia as shown in Figure 1. The development will consist of 108 apartment units with an expected completion date of 2015. The development is expected to have two access points along Borders Street and one along Woodall Road (Figure 2).

Based on the discussions with Virginia Department of Transportation (VDOT) and City of Lynchburg staff, the following intersections were included in the study area and were analyzed for existing and future conditions:

- Route 128 (Candlers Mountain Road) and Woodall Road (signalized)
- Route 128 (Candlers Mountain Road) and US 29 Southbound Off-Ramp (Lynchburg Expressway)/Seminole Avenue (signalized).



MARTIN ALEXIOU BRYSON

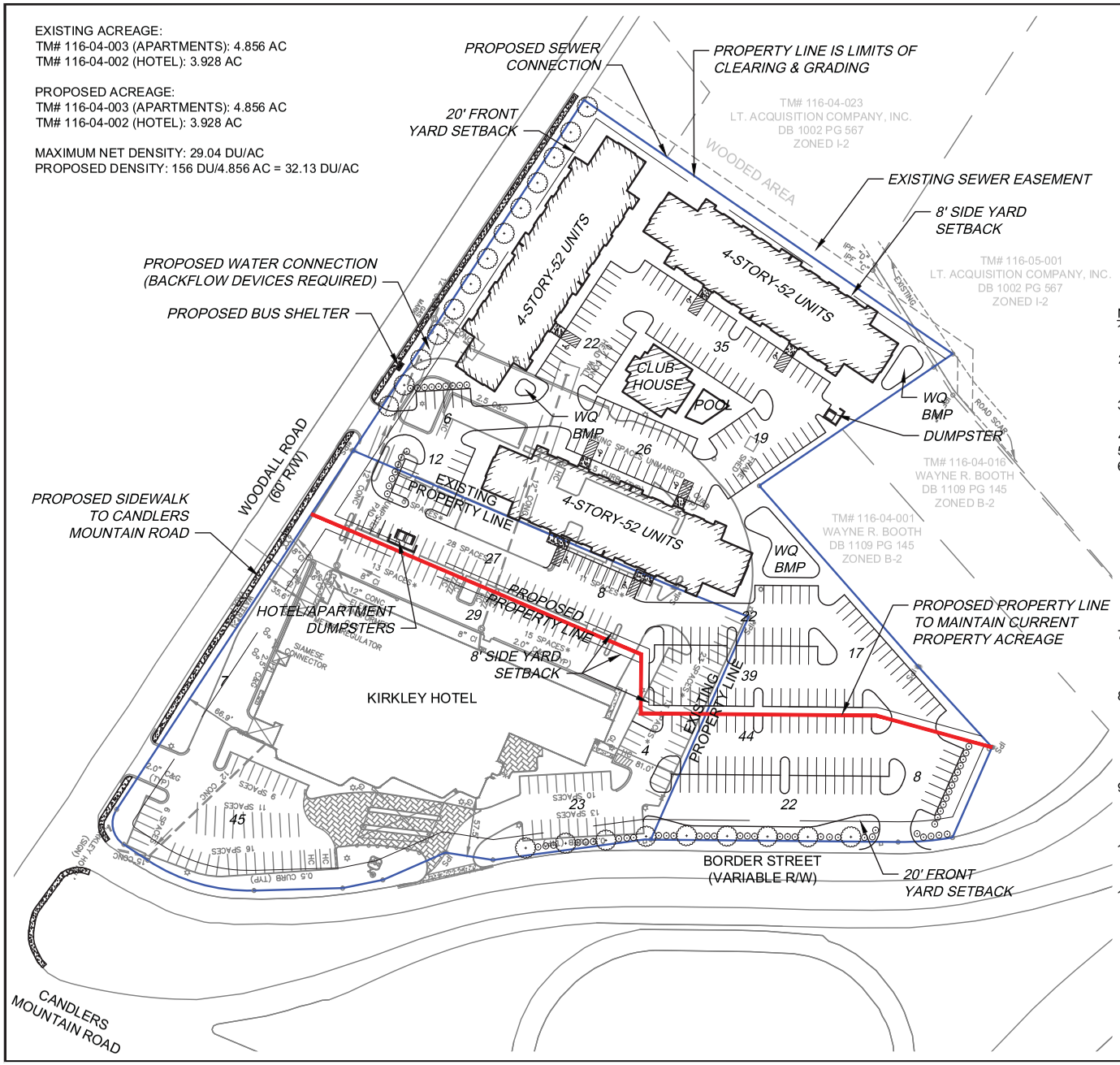
Figure 1
Vicinity Map

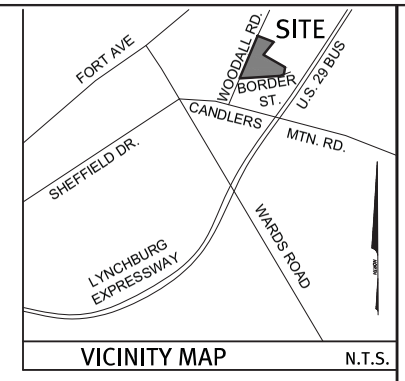
Kirkley Apartment Community
Traffic Impact Analysis
Lynchburg, Virginia

EXISTING ACREAGE:
TM# 116-04-003 (APARTMENTS): 4.856 AC
TM# 116-04-002 (HOTEL): 3.928 AC

PROPOSED ACREAGE:
TM# 116-04-003 (APARTMENTS): 4.856 AC
TM# 116-04-002 (HOTEL): 3.928 AC

MAXIMUM NET DENSITY: 29.04 DU/AC
PROPOSED DENSITY: 156 DU/4.856 AC = 32.13 DU/AC





NOTES:

1. SITE TM#: 116-04-003
   HOTEL TM#: 116-04-002
2. SITE OWNER: GDG LYNCHBURG HOTEL, LLC
   HOTEL OWNER: GDG LYNCHBURG HOTEL, LLC
   ADDRESS: 5212 WOODALL ROAD, LYNCHBURG, VA 24502
3. SITE PROPOSED USE: MULTI-FAMILY APARTMENT COMMUNITY
4. SITE ZONED: I-2
5. SITE PROPOSED ZONE: B-3C
6. REQUIRED PARKING:
   APARTMENTS: 156 SPACES
   HOTEL: 176 SPACES
   TOTAL: 332 SPACES REQUIRED
   PROPOSED PARKING:
   APARTMENTS: 233 SPACES
   HOTEL: 182 SPACES
   TOTAL: 415
   REQUIRED ADA-ACCESSIBLE SPACES:
   APARTMENTS: 7 SPACES
   HOTEL: 6 SPACES
7. FOUNDATION PLANTINGS REQUIRED: 1 ORNAMENTAL TREE PER 50' AND 1 LARGE SHRUB PER 10':
   640'/50'=13 ORNAMENTAL TREES
   640'/10'=64 LARGE SHRUBS
8. PARKING LOT LANDSCAPING REQUIRED: 1 SHADE TREE PER 8 SPACES AND 1 MEDIUM SHRUB PER SPACE:
   APARTMENTS: 233/8 = 30 SHADE TREES; 233 MEDIUM SHRUBS
   HOTEL: NONE (PROPOSED PLAN REDUCES THE NUMBER OF SPACES ON THE HOTEL PROPERTY)
9. STREET TREES REQUIRED: 1 SHADE TREE PER 40' ROAD FRONTAGE:
   APARTMENTS: 490'/40' = 13 SHADE TREES
   HOTEL: 340'/40' = 9 SHADE TREES
10. EXTERIOR LIGHTING SHALL BE CONTROLLED SO THAT NO DIRECT ILLUMINATION WILL OCCUR BEYOND ANY PROPERTY LINE SHARED WITH A RESIDENTIAL DISTRICT.
11. THE AREA SHOWN HEREON IS LOCATED IN FLOOD ZONE 'X' AND IS NOT LOCATED WITHIN FLOOD HAZARD ZONE 'A' FOR A 100 YEAR FLOOD AS DETERMINED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY AS SHOWN ON COMMUNITY-PANEL MAP #5100930106D DATED JUNE 3, 2008.

100 50 0 100 200
GRAPHIC SCALE IN FEET
1" = 100'

*ENGINEERING >> SURVEYING >> PLANNING
HURT & PROFFITT INCORPORATED
2524 LANGHORNE ROAD
LYNCHBURG VA 24501
800.242.4906 TOLL FREE
434.847.7796 MAIN
434.847.0047 FAX

REZONING PLAN FOR KIRKLEY APARTMENT COMMUNITY

CITY OF LYNCHBURG, VIRGINIA

PROJECT NO.	20120506
G.L. NO.	264-02-A1.6
FILE NO.	
DATE:	12/5/2012
DRAWN BY:	PSB/ASK
CHECKED BY:	PSB

SHEET NO.
1 OF 1

Jan 15, 2013 – 2:21pm \\Data01\CAD\LandProjects\20120506\dwg\REZONING--color2.dwg

2.0 EXISTING (2013) CONDITIONS

2.1 Existing Roadway Conditions

This section describes the existing streets in the vicinity of the proposed development.

Route 128 (Candlers Mountain Road)

- Candlers Mountain Road consists of a five-lane undivided, two-way traffic pattern with a center two-way, left-turn lane with a posted speed limit of 35 mph in the study area.
- The land uses are a mix of commercial land uses within the study area.

Looking east along Candlers Mountain Road toward Woodall Road	*Looking west along Candlers Mountain Road toward Seminole Avenue*

Woodall Road

- Woodall Road is a two-lane roadway with no posted speed limit within the study area.
- The land use along Woodall Road is mostly commercial and industrial land uses.

Looking south along Woodall Road toward Candlers Mountain Road	*Looking north along Woodall Road near Candlers Mountain Road*

Seminole Avenue

- Seminole Avenue is a two-lane roadway with no posted speed limit within the study area
- The land uses along Seminole Avenue are commercial.

Looking south along Seminole Avenue toward Candlers Mountain Road	*Looking north along Seminole Avenue near Candlers Mountain Road*

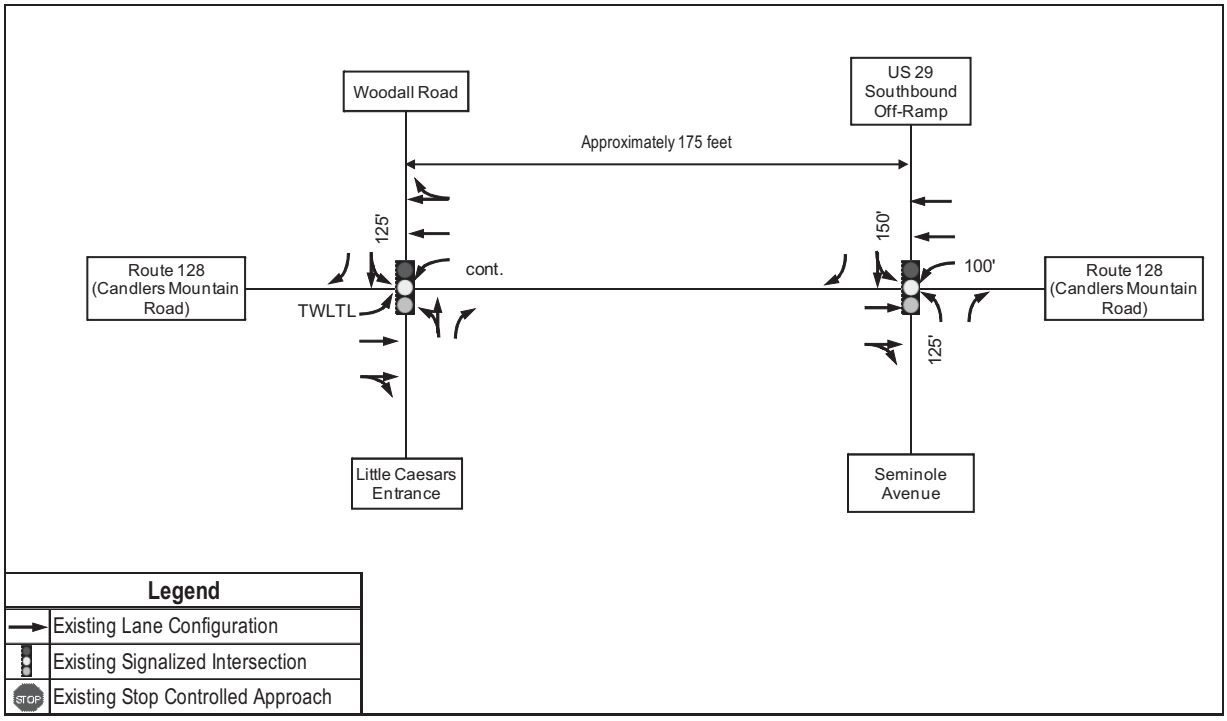
US 29-501 (Lynchburg Expressway)

- Lynchburg Expressway is a four-lane divided freeway.

Looking south along Southbound Off Ramp toward Candlers Mountain Road	*Looking north along Southbound Off Ramp near Candlers Mountain Road*

Figure 3 provides a schematic diagram of the roadways near the proposed development including the existing intersection geometrics and traffic control.

Figure 3 Existing (2013) Lane Geometrics and Traffic Control



2.2 *Existing Turning Movement Data*

Martin/Alexiou/Bryson, PC collected the weekday AM peak period (7:00 AM to 9:00 AM), Midday peak period (11:00 AM to 1:00 PM), and PM peak period (4:00 PM to 6:00 PM) intersection turning movement counts analyzed in this TIA. Table 1 summarizes the schedule used to obtain the turning movement data. A detailed summary of traffic counts can be found in Appendix A.

Table 1 Weekday Peak Period Turning Movement Count Schedule

Intersection	Time Period	Count Date
Route 128 (Candlers Mountain Road) and Woodall Road (signalized)	7:00 AM – 9:00 AM 11:00 AM – 1:00 PM 4:00 PM – 6:00 PM	Tuesday February 12, 2013
Route 128 (Candlers Mountain Road) and US 29 (Lynchburg Expressway)/Seminole Avenue (signalized)	7:00 AM – 9:00 AM 11:00 AM – 1:00 PM 4:00 PM – 6:00 PM	Tuesday February 12, 2013

The existing peak hour volumes are shown in Figure 4 and are used in the Existing (2013) scenario analysis.

2.3 *Level of Service Criteria*

Peak hour level of service (LOS) measures the adequacy of the intersection geometrics and traffic control of a particular intersection or approach for the given turning volumes. Levels of service range from A through F, based on the average control delay experienced by vehicles traveling

through the intersection during the peak hour. Control delay represents the portion of total delay attributed to traffic control devices (e.g., signals or stop signs). Table 2 provides a general description of the LOS categories and delay ranges.

Table 2 Level of Service Descriptions for Intersections

Level of Service	Description	Signalized Intersection	Unsignalized Intersection
A	Little or no delay	<= 10 sec.	<= 10 sec.
B	Short traffic delay	10-20 sec.	10-15 sec.
C	Average traffic delay	20-35 sec.	15-25 sec.
D	Long traffic delay	35-55 sec.	25-35 sec.
E	Very long traffic delay	55-80 sec.	35-50 sec.
F	Unacceptable delay	> 80 sec.	> 50 sec.

2.4 Level of Service Analysis

Intersection levels of service analyses were performed for typical weekday peak hours, using *Synchro/SimTraffic Professional Version 7*. A summary of the findings for the Existing (2013) scenario can be found in Table 3 and the full *Synchro* output can be found in Appendix B.

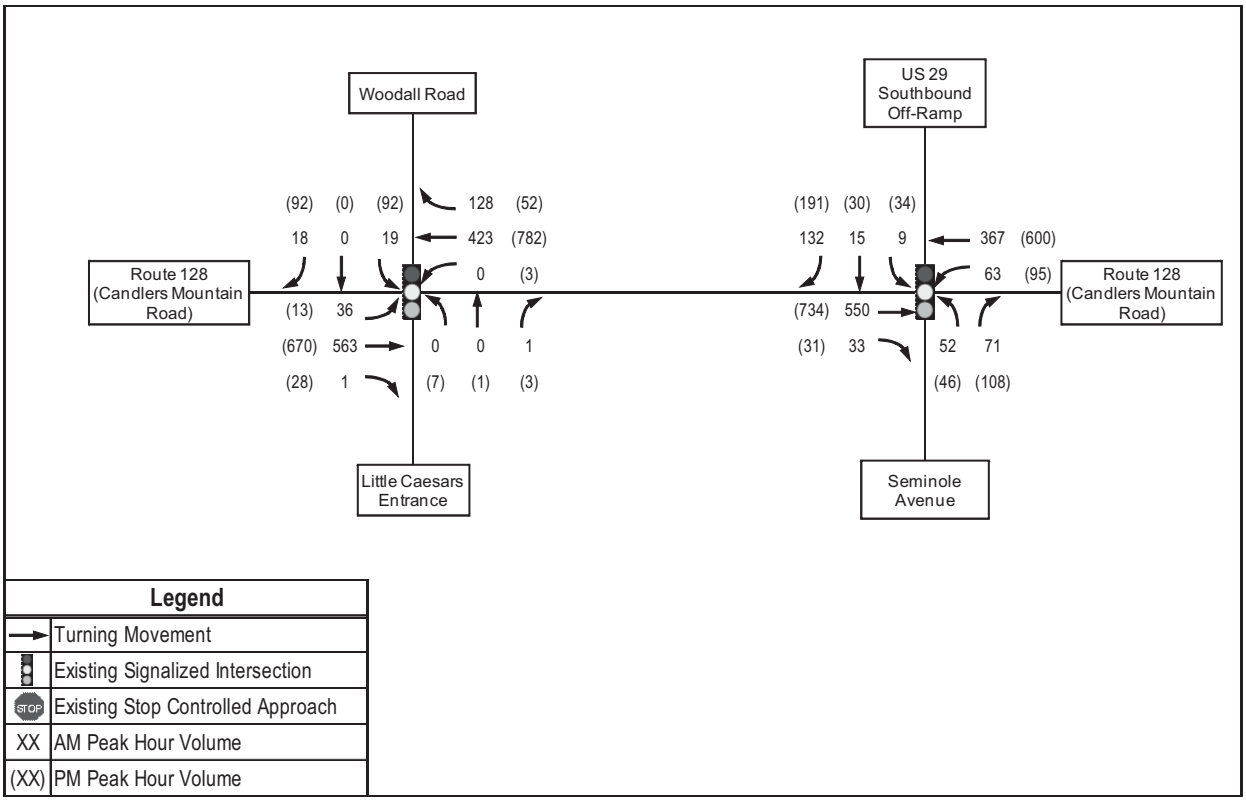
As reported in Table 3, the study area intersections operate at acceptable levels (LOS D or better) in both the AM and PM peak periods.

Table 3 Existing (2013) LOS Results

Intersection and Approach	Existing (2013)	
	AM	PM
Candlers Mountain Road and Woodall Road	**B (12.7 sec)**	**C (20.3 sec)**
Eastbound	C	C
Westbound	A	A
Northbound	C	D
Southbound	D	D
Candlers Mountain Road and US 29 Southbound Ramp/Seminole Avenue	**B (11.8 sec)**	**B (16.4 sec)**
Eastbound	A	A
Westbound	B	C
Northbound	C	C
Southbound	C	D

LEGEND: **X** = Overall signalized intersection LOS;
(XX sec) = Overall signalized intersection control delay in seconds; X = approach LOS

Figure 4 Existing (2013) AM and PM Peak Turning Movement Hour Volumes



3.0 NO-BUILD (2015) CONDITIONS

3.1 Background Growth and Development

Typical growth rates range between one and three percent (1% - 3%), to be conservative, a growth rate of three percent (3%) was applied to the existing traffic volumes to account for normal traffic growth between the base year (2013) and the build year (2015). The No-Build (2015) peak hour trips are shown in Figure 5.

3.2 Level of Service Analysis

Intersection levels of service analyses were performed for typical weekday peak hours, using *Synchro/SimTraffic Professional Version 7*. A summary of the findings for the LOS analysis can be found in Table 4 and the full *Synchro* output could be found in Appendix B.

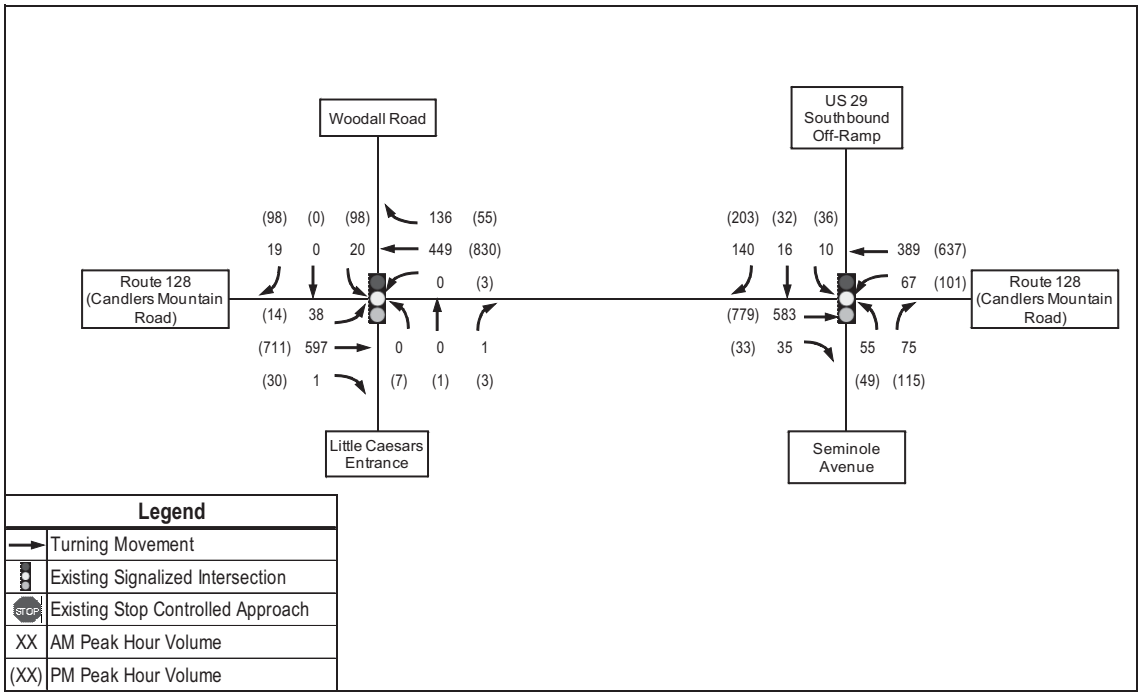
As reported in Table 4, the intersections in the study area are projected to experience increases in delay ranging from 0.2 to 0.5 seconds per vehicle during the peak hour periods. As a result, all intersections continue to operate at acceptable levels.

Table 4 No-Build (2015) LOS Results

Intersection and Approach	Existing (2013)		No-Build (2015)	
	AM	PM	AM	PM
Candlers Mountain Road and Woodall Road	**B (12.7 sec)**	**C (20.3 sec)**	**B (12.9 sec)**	**C (20.8 sec)**
Eastbound	C	C	C	C
Westbound	A	A	A	A
Northbound	C	D	C	D
Southbound	D	D	D	D
Candlers Mountain Road and US 29 Southbound Ramp/Seminole Avenue	**B (11.8 sec)**	**B (16.4 sec)**	**B (12.3 sec)**	**B (16.9 sec)**
Eastbound	A	A	A	A
Westbound	B	C	B	C
Northbound	C	C	C	C
Southbound	C	D	C	C

LEGEND: **X** = Overall signalized intersection LOS;
(XX sec) = Overall signalized intersection control delay in seconds; X = approach LOS

Figure 5 No-Build (2015) AM and PM Peak Hour Turning Movement Volumes



4.0 BUILD (2015) ANALYSIS

The Kirkley Apartment Community is located along Woodall Road, north of Candlers Mountain Road in Lynchburg, Virginia as shown in Figure 1. The proposed development will consist of 108 apartment units with a completion date of 2015.

4.1 Trip Generation

The proposed development is to consist of up to 156 apartment units. Trip generation was conducted for the proposed land use based on the most appropriate corresponding trip generation codes included in the *ITE Trip Generation, 9th Edition.*

As shown in Table 5, the proposed development is projected to generate 1,069 new daily trips, with 80 trips (16 entering, 64 exiting) occurring in the AM peak hour and 103 trips (67 entering, 36 exiting) in the PM peak hour. The generated site trips were distributed in accordance with the existing turning movement counts

Table 5 Trip Generation Rates (Vehicle Trips)

AM Peak Hour Total Trips						
ITE Land Use Code	Use	Units	ITE MANUAL RATES*			
			ADT	AM Enter	AM Exit	AM Total
220	Apartments	156 units	1,069	16	64	80
		Totals	*1,069*	*16*	*64*	*80*
PM Peak Hour Total Trips						
ITE Land Use Code	Use	Units	ITE MANUAL RATES*			
			ADT	PM Enter	PM Exit	PM Total
220	Apartments	156 units	1,069	67	36	103
		Totals	*1,069*	*67*	*36*	*103*

** ITE 9th Edition Trip Generation Manual*

4.2 Trip Distribution and Assignment

The generated site trips were distributed in accordance with the existing turning movement counts as shown in Figure 6. The proposed trip distribution is as follows:

- Candlers Mountain Road to the west – 35%
- Seminole Avenue to the south – 15%
- Candlers Mountain Road to the east – 40%
- US 29 to the north – 10%

The resulting AM and PM peak hour site trips are shown in Figure 7.

Figure 6 AM and PM Peak Hour Directional Distribution Percentages

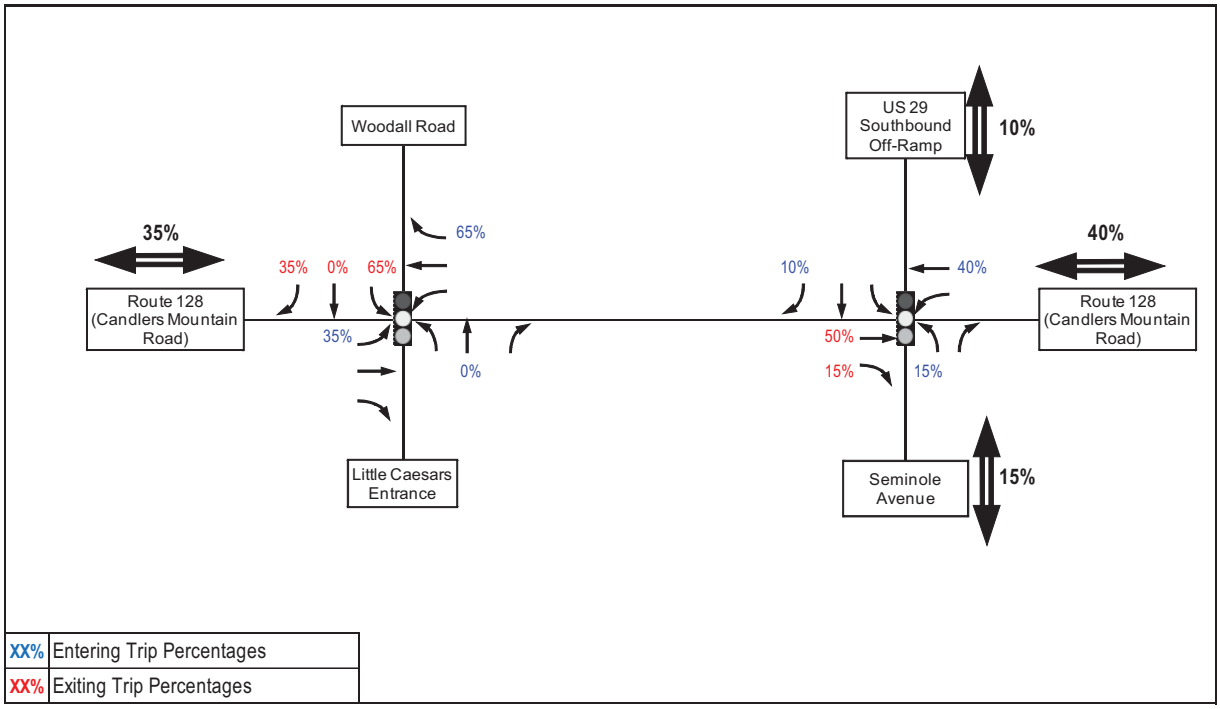
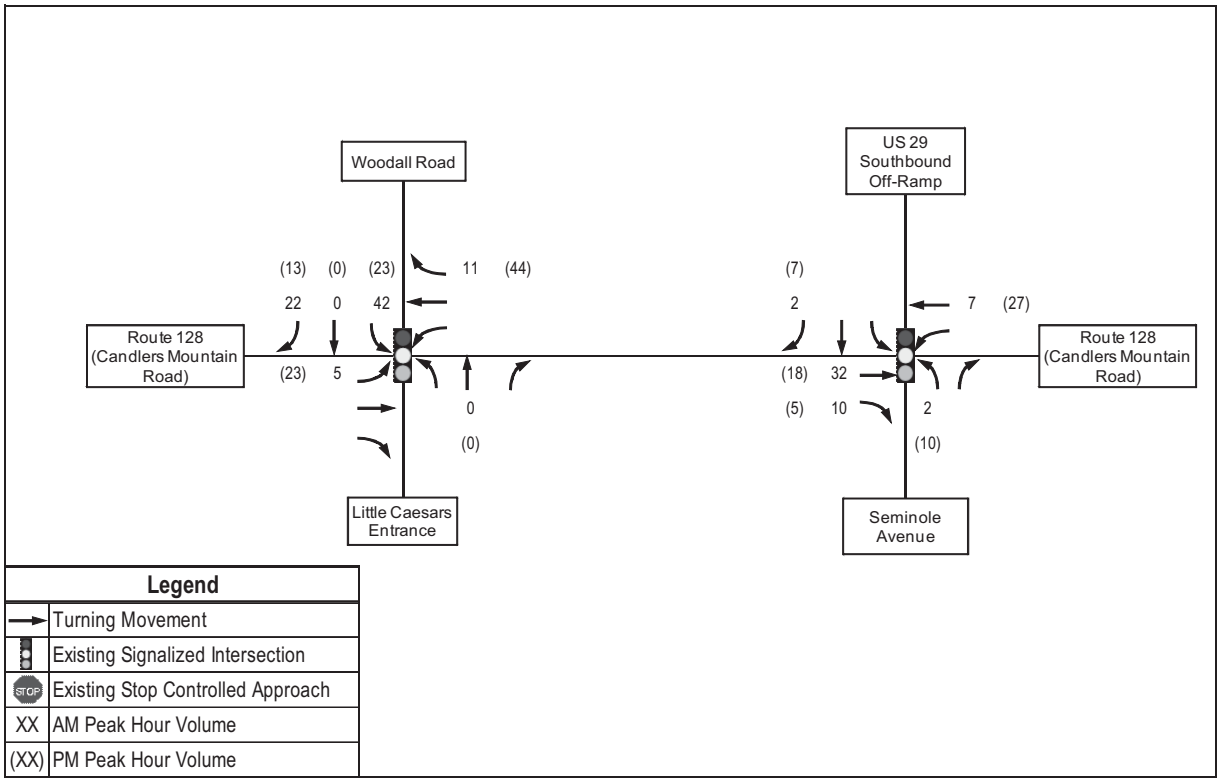


Figure 7 Site Traffic Turning Movement Volumes



4.3 Level of Service Analysis

The Build (2015) scenario includes the No-Build (2015) traffic as described in Section 3.0 of this report as well as site generated trips from the proposed development as described previously. Figure 8 depicts the turning movement volumes used in the Build (2015) analysis.

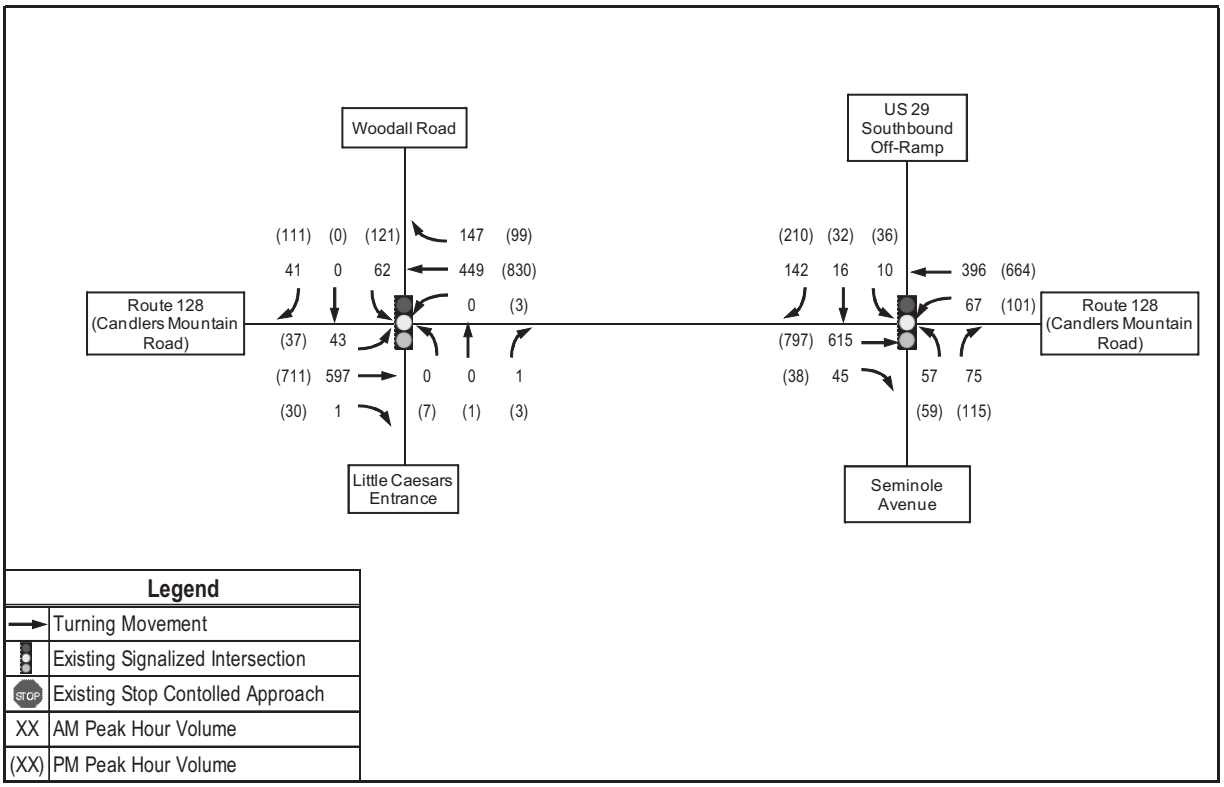
Intersection levels of service analyses were performed for typical weekday peak hours, using *Synchro/SimTraffic Professional Version 7*. A summary of the findings for the LOS analysis can be found in Table 6. The full *Synchro* output could be found in Appendix B. As shown in Table 6, the addition of the site trips has only a minor effect on the operations of the two intersections adding between 0.6 and 2.1 seconds per vehicle of delay. All intersections are projected to continue to operate at acceptable levels of service.

Table 6 Build (2015) LOS Results

Intersection and Approach	No-Build (2015)		Build (2015)	
	AM	PM	AM	PM
Candlers Mountain Road and Woodall Road	**B (12.9 sec)**	**C (20.8 sec)**	**B (15.0 sec)**	**C (21.4 sec)**
Eastbound	C	C	C	C
Westbound	A	A	A	A
Northbound	C	D	C	D
Southbound	D	D	D	D
Candlers Mountain Road and US 29 Southbound Ramp/Seminole Avenue	**B (12.3 sec)**	**B (16.9 sec)**	**B (13.2 sec)**	**B (18.5 sec)**
Eastbound	A	A	A	A
Westbound	B	C	B	C
Northbound	C	C	C	C
Southbound	C	C	D	D

LEGEND: **X** = Overall signalized intersection LOS;
(XX sec) = Overall signalized intersection control delay in seconds; X = approach LOS

Figure 8 Build (2015) AM and PM Peak Hour Turning Movement Volumes



5.0 FINDINGS AND CONCLUSIONS

As indicated in the traffic operations analyses, the proposed Kirkley Apartment Community will have a very slight impact on intersections within the study area. The development is however, expected to result in some increased pedestrian demand in the area as residents walk to restaurants and other destinations across Candlers Mountain Road. In order to safely accommodate this new pedestrian demand, the following roadway improvements are recommended:

- Provide a sidewalk along the east side of Woodall Road between Candlers Mountain Road and the northern end of the site's frontage. Install appropriate wheelchair ramps at all appropriate curb cuts.
- Add hi-visibility crosswalks to the southbound approach of Woodall Road and the eastbound approach of Candlers Mountain Road at Woodall Road.
- Add actuated pedestrian phases to phases 2, 4, and 6 at the Candlers Mountain Road at Woodall intersection.
- Add pedestrian signal heads, push buttons, signs, and other appropriate measures.

One signal controller controls the signals at the intersections of Candlers Mountain Road/Woodall Road and Candlers Mountain Road/US 29 Southbound Off-Ramp/Seminole Avenue. As shown in the Summary LOS table, even with pedestrian accommodations to the signals, the intersection is projected to continue to operate at an acceptable level of service in both the AM and PM peak periods with a maximum delay increase of 0.3 seconds in the AM peak hour at the Candlers Mountain Road and Woodall Road intersection and 1.2 seconds in the PM peak hour at the Candlers Mountain Road and US 29 Ramp/Seminole Avenue intersection.

A summary of LOS results across scenarios is shown in Table 7.

Table 7 LOS Results Summary

Intersection and Approach	Existing (2013)		No-Build (2015)		Build (2015)		Build Improved (2015)	
	AM	PM	AM	PM	AM	PM	AM	PM
Candlers Mountain Road and Woodall Road	**B (12.7 sec)**	**C (20.3 sec)**	**B (12.9 sec)**	**C (20.8 sec)**	**B (15.0 sec)**	**C (21.4 sec)**	**B (15.3 sec)**	**C (21.6 sec)**
Eastbound	C	C	C	C	C	C	C	D
Westbound	A	A	A	A	A	A	A	A
Northbound	C	D	C	D	C	D	C	C
Southbound	D	D	D	D	D	D	D	D
Candlers Mountain Road and US 29 Southbound Ramp/Seminole Avenue	**B (11.8 sec)**	**B (16.4 sec)**	**B (12.3 sec)**	**B (16.9 sec)**	**B (13.2 sec)**	**B (18.5 sec)**	**B (13.4 sec)**	**B (19.7 sec)**
Eastbound	A	A	A	A	A	A	A	A
Westbound	B	C	B	C	B	C	B	C
Northbound	C	C	C	C	C	C	C	C
Southbound	C	D	C	C	D	D	D	D

LEGEND: **X** = Overall signalized intersection LOS;
(XX sec) = Overall signalized intersection control delay in seconds; X = approach LOS

APPENDICES

Appendix A:

Existing (2013) Turning Movement Counts

Martin/Alexiou/Bryson, P.C.
4000 WestChase Boulevard, Suite 530
Raleigh, North Carolina 27607
p: 919.829.0328 f: 919.829.0329

File Name : CandlersMtn@Seminole
Site Code : 20130092
Start Date : 2/12/2013
Page No : 1

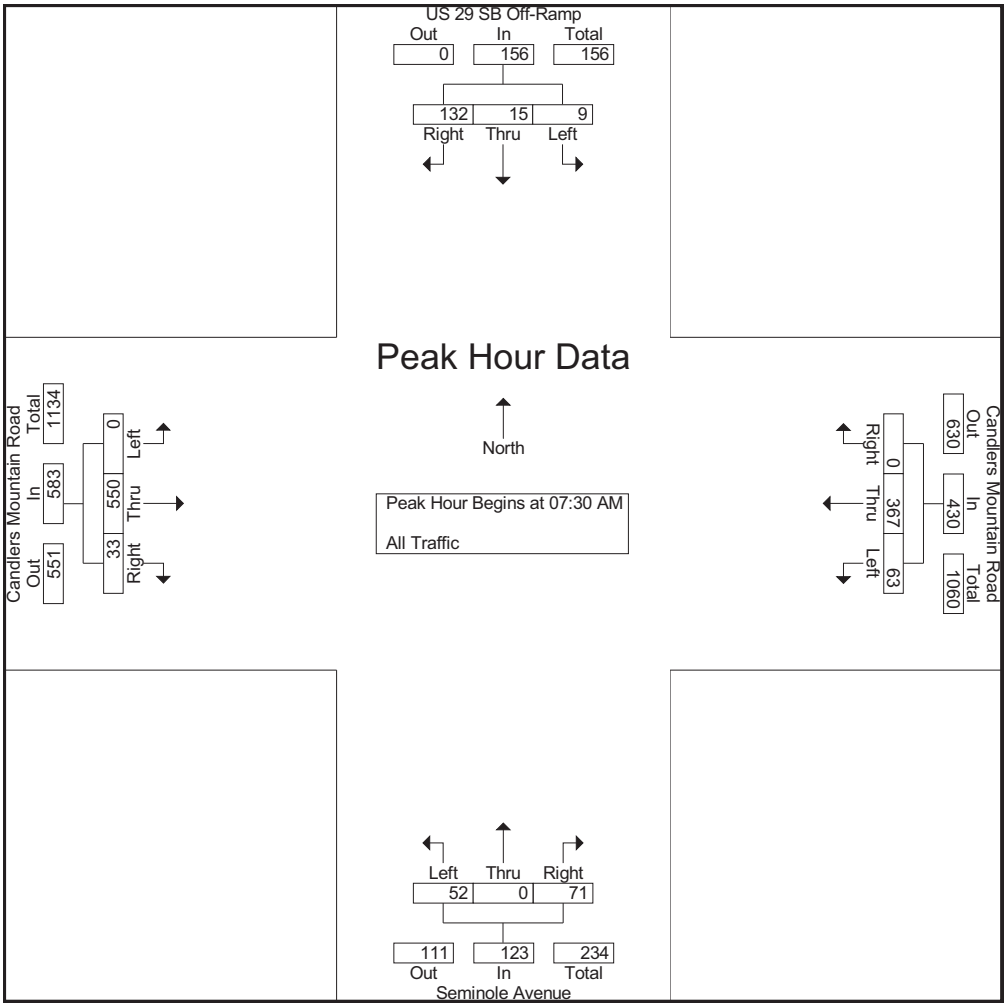
Groups Printed- All Traffic

	US 29 SB Off-Ramp Southbound				Candlers Mountain Road Westbound				Seminole Avenue Northbound				Candlers Mountain Road Eastbound						
Start Time	Left	Thru	Right	Trks	Left	Thru	Right	Trks	Left	Thru	Right	Trks	Left	Thru	Right	Trks	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	1	2	14	0	21	72	0	2	4	0	18	1	0	62	2	0	3	196	199
07:15 AM	0	5	27	2	13	75	0	1	6	0	22	0	0	87	18	3	6	253	259
07:30 AM	2	4	30	3	10	59	0	1	8	0	19	1	0	139	7	2	7	278	285
07:45 AM	2	3	36	0	13	99	0	1	15	0	15	0	0	160	12	3	4	355	359
Total	5	14	107	5	57	305	0	5	33	0	74	2	0	448	39	8	20	1082	1102
08:00 AM	2	6	45	1	22	95	0	0	21	0	23	0	0	147	9	0	1	370	371
08:15 AM	3	2	21	1	18	114	0	1	8	0	14	0	0	104	5	7	9	289	298
08:30 AM	0	8	29	0	6	76	0	1	16	0	10	1	0	119	4	10	12	268	280
08:45 AM	3	6	26	1	16	89	0	0	7	0	16	0	0	137	5	2	3	305	308
Total	8	22	121	3	62	374	0	2	52	0	63	1	0	507	23	19	25	1232	1257
Scheduled Break																			
11:00 AM	4	13	21	0	22	83	0	1	12	0	5	0	0	108	5	1	2	273	275
11:15 AM	2	10	23	0	23	121	0	3	8	0	21	0	0	123	3	3	6	334	340
11:30 AM	4	10	38	0	33	131	0	3	12	0	29	0	0	140	6	4	7	403	410
11:45 AM	7	6	43	0	25	126	0	0	9	0	38	0	0	147	7	0	0	408	408
Total	17	39	125	0	103	461	0	7	41	0	93	0	0	518	21	8	15	1418	1433
12:00 PM	11	7	52	2	35	139	0	0	11	0	32	0	0	150	7	1	3	444	447
12:15 PM	3	7	47	0	40	146	0	0	15	0	39	0	0	163	12	0	0	472	472
12:30 PM	4	10	37	2	33	158	0	2	18	0	27	0	0	154	16	0	4	457	461
12:45 PM	4	9	47	0	18	155	0	3	18	0	32	0	0	150	16	1	4	449	453
Total	22	33	183	4	126	598	0	5	62	0	130	0	0	617	51	2	11	1822	1833
Scheduled Break																			
04:00 PM	5	6	49	2	20	168	0	1	6	0	22	0	0	160	6	6	9	442	451
04:15 PM	1	8	42	0	28	152	0	0	8	0	29	0	0	177	3	2	2	448	450
04:30 PM	3	7	43	0	13	139	0	0	9	0	22	0	0	174	6	1	1	416	417
04:45 PM	3	5	29	1	22	148	0	0	12	0	23	0	0	163	10	1	2	415	417
Total	12	26	163	3	83	607	0	1	35	0	96	0	0	674	25	10	14	1721	1735
05:00 PM	10	5	43	0	25	172	0	0	9	0	27	0	0	178	7	2	2	476	478
05:15 PM	9	14	63	1	24	136	0	0	12	0	27	0	0	201	9	1	2	495	497
05:30 PM	12	6	56	0	24	144	0	2	13	0	31	0	0	192	5	1	3	483	486
05:45 PM	7	2	46	0	26	139	0	0	13	0	21	0	0	153	6	1	1	413	414
Total	38	27	208	1	99	591	0	2	47	0	106	0	0	724	27	5	8	1867	1875
Grand Total	102	161	907	16	530	2936	0	22	270	0	562	3	0	3488	186	52	93	9142	9235
Apprch %	8.7	13.8	77.5		15.3	84.7	0		32.5	0	67.5		0	94.9	5.1				
Total %	1.1	1.8	9.9		5.8	32.1	0		3	0	6.1		0	38.2	2		1	99	

Martin/Alexiou/Bryson, P.C.
4000 WestChase Boulevard, Suite 530
Raleigh, North Carolina 27607
p: 919.829.0328 f: 919.829.0329

File Name : CandlersMtn@Seminole
Site Code : 20130092
Start Date : 2/12/2013
Page No : 2

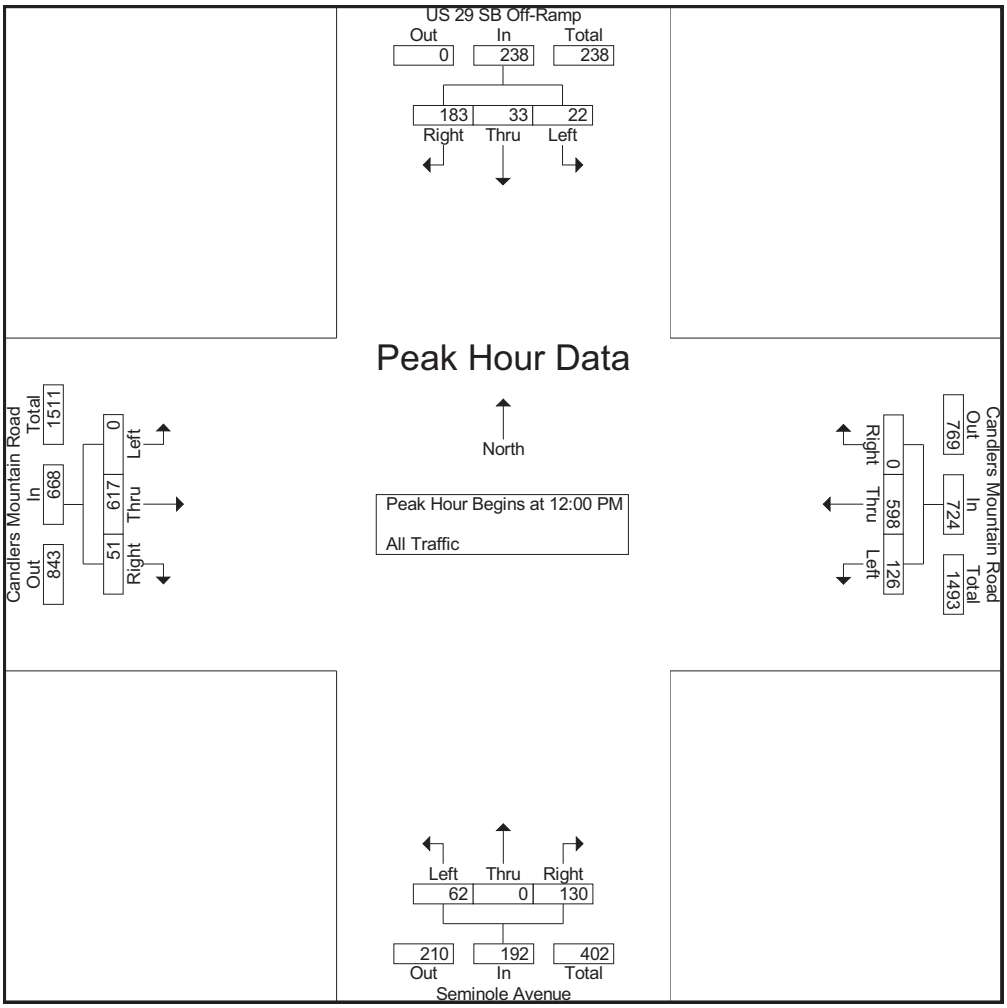
	US 29 SB Off-Ramp Southbound				Candlers Mountain Road Westbound				Seminole Avenue Northbound				Candlers Mountain Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	2	4	30	36	10	59	0	69	8	0	19	27	0	139	7	146	278
07:45 AM	2	3	36	41	13	99	0	112	15	0	15	30	0	**160**	**12**	**172**	355
08:00 AM	2	**6**	**45**	**53**	**22**	95	0	117	**21**	0	**23**	**44**	0	147	9	156	**370**
08:15 AM	**3**	2	21	26	18	**114**	0	**132**	8	0	14	22	0	104	5	109	289
Total Volume	9	15	132	156	63	367	0	430	52	0	71	123	0	550	33	583	1292
% App. Total	5.8	9.6	84.6		14.7	85.3	0		42.3	0	57.7		0	94.3	5.7		
PHF	.750	.625	.733	.736	.716	.805	.000	.814	.619	.000	.772	.699	.000	.859	.688	.847	.873



Martin/Alexiou/Bryson, P.C.
4000 WestChase Boulevard, Suite 530
Raleigh, North Carolina 27607
p: 919.829.0328 f: 919.829.0329

File Name : CandlersMtn@Seminole
Site Code : 20130092
Start Date : 2/12/2013
Page No : 3

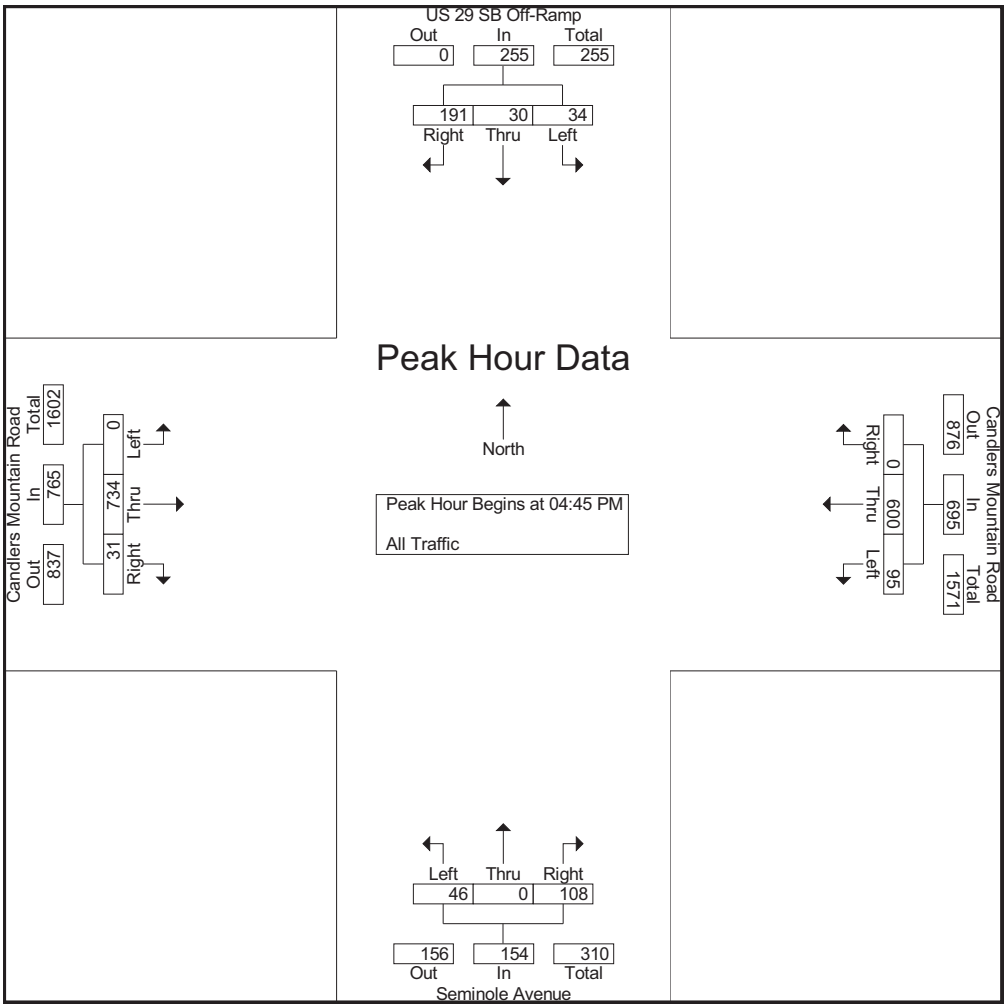
	US 29 SB Off-Ramp Southbound				Candlers Mountain Road Westbound				Seminole Avenue Northbound				Candlers Mountain Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	**11**	7	**52**	**70**	35	139	0	174	11	0	32	43	0	150	7	157	444
12:15 PM	3	7	47	57	**40**	146	0	186	15	0	**39**	**54**	0	**163**	12	**175**	**472**
12:30 PM	4	**10**	37	51	33	**158**	0	**191**	**18**	0	27	45	0	154	**16**	170	457
12:45 PM	4	9	47	60	18	155	0	173	18	0	32	50	0	150	16	166	449
Total Volume	22	33	183	238	126	598	0	724	62	0	130	192	0	617	51	668	1822
% App. Total	9.2	13.9	76.9		17.4	82.6	0		32.3	0	67.7		0	92.4	7.6		
PHF	.500	.825	.880	.850	.788	.946	.000	.948	.861	.000	.833	.889	.000	.946	.797	.954	.965



Martin/Alexiou/Bryson, P.C.
4000 WestChase Boulevard, Suite 530
Raleigh, North Carolina 27607
p: 919.829.0328 f: 919.829.0329

File Name : CandlersMtn@Seminole
Site Code : 20130092
Start Date : 2/12/2013
Page No : 4

	US 29 SB Off-Ramp Southbound				Candlers Mountain Road Westbound				Seminole Avenue Northbound				Candlers Mountain Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	3	5	29	37	22	148	0	170	12	0	23	35	0	163	**10**	173	415
05:00 PM	10	5	43	58	**25**	**172**	0	**197**	9	0	27	36	0	178	7	185	476
05:15 PM	9	**14**	**63**	**86**	24	136	0	160	12	0	27	39	0	**201**	9	**210**	**495**
05:30 PM	**12**	6	56	74	24	144	0	168	**13**	0	**31**	**44**	0	192	5	197	483
Total Volume	34	30	191	255	95	600	0	695	46	0	108	154	0	734	31	765	1869
% App. Total	13.3	11.8	74.9		13.7	86.3	0		29.9	0	70.1		0	95.9	4.1		
PHF	.708	.536	.758	.741	.950	.872	.000	.882	.885	.000	.871	.875	.000	.913	.775	.911	.944



Martin/Alexiou/Bryson, P.C.
4000 WestChase Boulevard, Suite 530
Raleigh, North Carolina 27607
p: 919.829.0328 f: 919.829.0329

File Name : CandlersMtn@Woodall
Site Code : 20130091
Start Date : 2/12/2013
Page No : 1

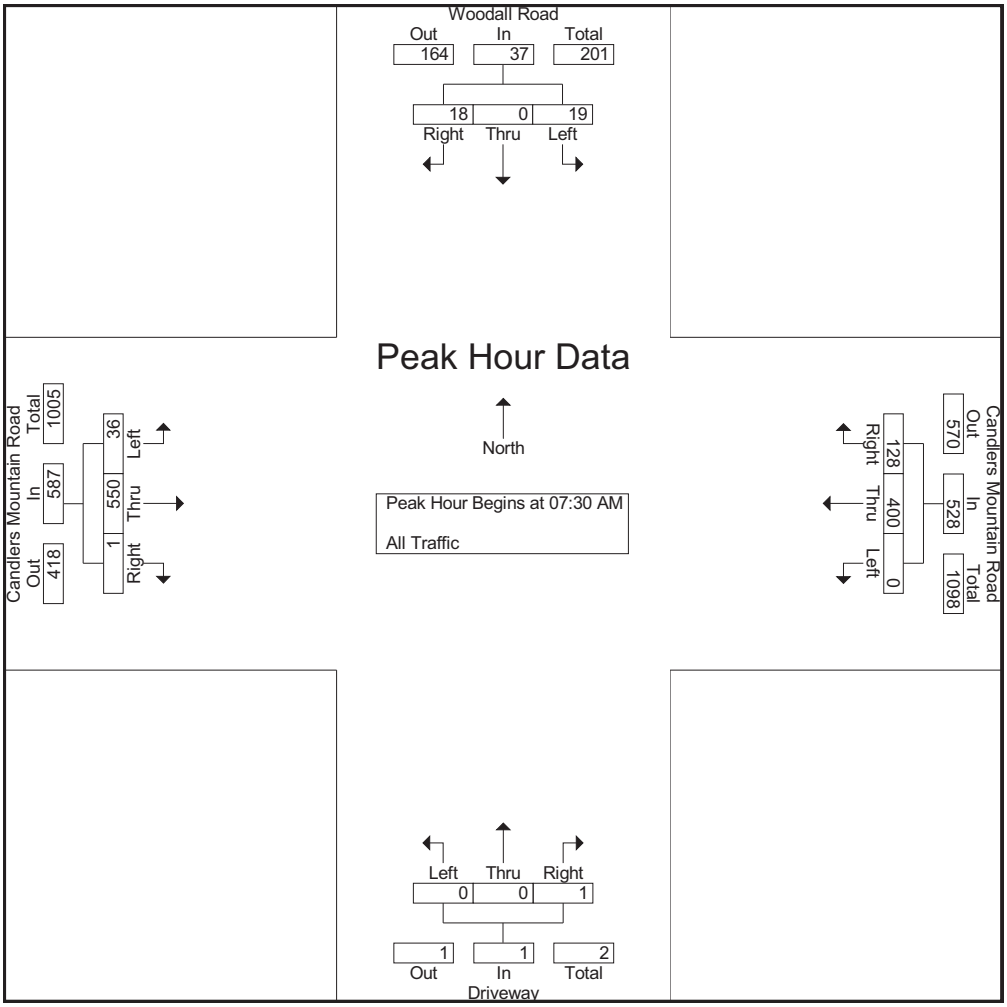
Groups Printed- All Traffic

	Woodall Road Southbound				Candlers Mountain Road Westbound				Driveway Northbound				Candlers Mountain Road Eastbound						
Start Time	Left	Thru	Right	Trks	Left	Thru	Right	Trks	Left	Thru	Right	Trks	Left	Thru	Right	Trks	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	3	0	2	0	0	81	7	1	0	0	0	0	11	74	1	0	1	179	180
07:15 AM	5	0	3	0	0	101	9	3	0	0	0	0	5	101	0	1	4	224	228
07:30 AM	6	0	5	1	0	76	18	3	0	0	0	0	13	139	0	1	5	257	262
07:45 AM	3	0	5	0	0	103	40	1	0	0	0	0	6	166	0	3	4	323	327
Total	17	0	15	1	0	361	74	8	0	0	0	0	35	480	1	5	14	983	997
08:00 AM	5	0	3	1	0	105	49	1	0	0	1	0	9	149	1	0	2	322	324
08:15 AM	5	0	5	0	0	116	21	1	0	0	0	0	8	96	0	7	8	251	259
08:30 AM	6	0	3	0	1	94	23	0	0	0	0	0	3	110	0	10	10	240	250
08:45 AM	10	0	4	0	1	103	15	1	0	0	0	1	6	130	0	2	4	269	273
Total	26	0	15	1	2	418	108	3	0	0	1	1	26	485	1	19	24	1082	1106
Scheduled Break																			
11:00 AM	12	0	5	1	0	107	9	1	0	0	0	0	1	115	3	3	5	252	257
11:15 AM	8	0	3	0	1	126	6	5	1	0	0	0	3	116	2	1	6	266	272
11:30 AM	14	0	11	1	2	161	8	3	0	0	1	0	4	132	1	3	7	334	341
11:45 AM	10	0	9	1	0	162	7	0	0	0	0	0	11	146	1	0	1	346	347
Total	44	0	28	3	3	556	30	9	1	0	1	0	19	509	7	7	19	1198	1217
12:00 PM	11	0	43	1	1	182	11	3	1	0	0	0	8	148	0	0	4	405	409
12:15 PM	8	0	7	1	1	183	10	0	1	0	1	0	15	170	4	2	3	400	403
12:30 PM	13	0	5	0	0	173	12	5	1	0	0	0	6	154	1	0	5	365	370
12:45 PM	9	0	6	2	0	181	23	3	0	0	0	0	12	159	2	0	5	392	397
Total	41	0	61	4	2	719	56	11	3	0	1	0	41	631	7	2	17	1562	1579
Scheduled Break																			
04:00 PM	13	0	9	1	1	182	23	3	0	0	1	0	13	153	3	5	9	398	407
04:15 PM	16	0	9	1	1	183	9	0	2	0	2	0	2	167	4	0	1	395	396
04:30 PM	32	0	30	0	1	175	12	0	2	0	1	0	2	153	4	1	1	412	413
04:45 PM	16	0	11	1	1	189	13	1	3	0	1	0	2	161	7	0	2	404	406
Total	77	0	59	3	4	729	57	4	7	0	5	0	19	634	18	6	13	1609	1622
05:00 PM	33	0	32	0	1	184	20	1	1	0	1	0	4	150	9	1	2	435	437
05:15 PM	24	0	35	0	1	180	12	1	2	1	1	0	4	184	7	1	2	451	453
05:30 PM	19	0	14	1	0	185	7	2	1	0	0	0	3	175	5	0	3	409	412
05:45 PM	14	0	18	0	0	172	10	0	2	2	1	0	4	149	6	1	1	378	379
Total	90	0	99	1	2	721	49	4	6	3	3	0	15	658	27	3	8	1673	1681
Grand Total	295	0	277	13	13	3504	374	39	17	3	11	1	155	3397	61	42	95	8107	8202
Apprch %	51.6	0	48.4		0.3	90.1	9.6		54.8	9.7	35.5		4.3	94	1.7				
Total %	3.6	0	3.4		0.2	43.2	4.6		0.2	0	0.1		1.9	41.9	0.8		1.2	98.8	

Martin/Alexiou/Bryson, P.C.
4000 WestChase Boulevard, Suite 530
Raleigh, North Carolina 27607
p: 919.829.0328 f: 919.829.0329

File Name : CandlersMtn@Woodall
Site Code : 20130091
Start Date : 2/12/2013
Page No : 2

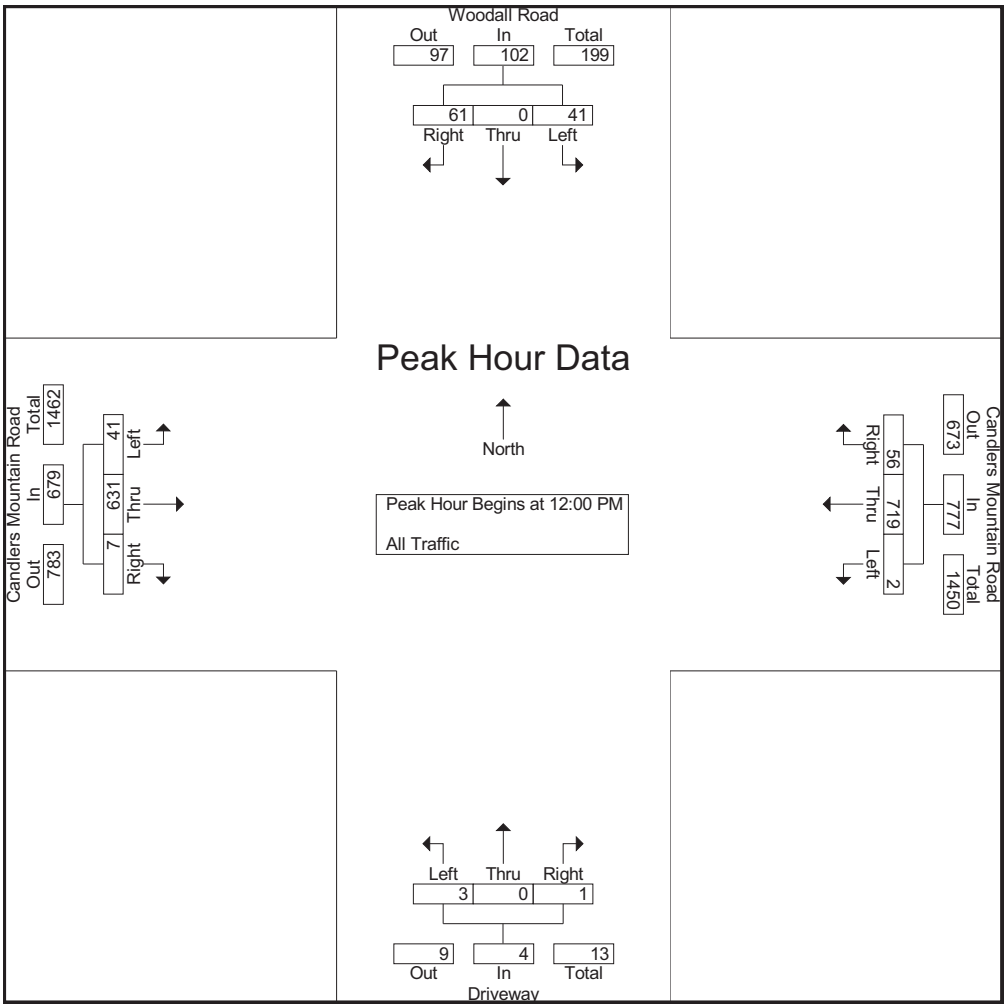
	Woodall Road Southbound				Candlers Mountain Road Westbound				Driveway Northbound				Candlers Mountain Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	**6**	0	**5**	**11**	0	76	18	94	0	0	0	0	**13**	139	0	152	257
07:45 AM	3	0	5	8	0	103	40	143	0	0	0	0	6	**166**	0	**172**	**323**
08:00 AM	5	0	3	8	0	105	**49**	**154**	0	0	**1**	**1**	9	149	**1**	159	322
08:15 AM	5	0	5	10	0	**116**	21	137	0	0	0	0	8	96	0	104	251
Total Volume	19	0	18	37	0	400	128	528	0	0	1	1	36	550	1	587	1153
% App. Total	51.4	0	48.6		0	75.8	24.2		0	0	100		6.1	93.7	0.2		
PHF	.792	.000	.900	.841	.000	.862	.653	.857	.000	.000	.250	.250	.692	.828	.250	.853	.892



Martin/Alexiou/Bryson, P.C.
4000 WestChase Boulevard, Suite 530
Raleigh, North Carolina 27607
p: 919.829.0328 f: 919.829.0329

File Name : CandlersMtn@Woodall
Site Code : 20130091
Start Date : 2/12/2013
Page No : 3

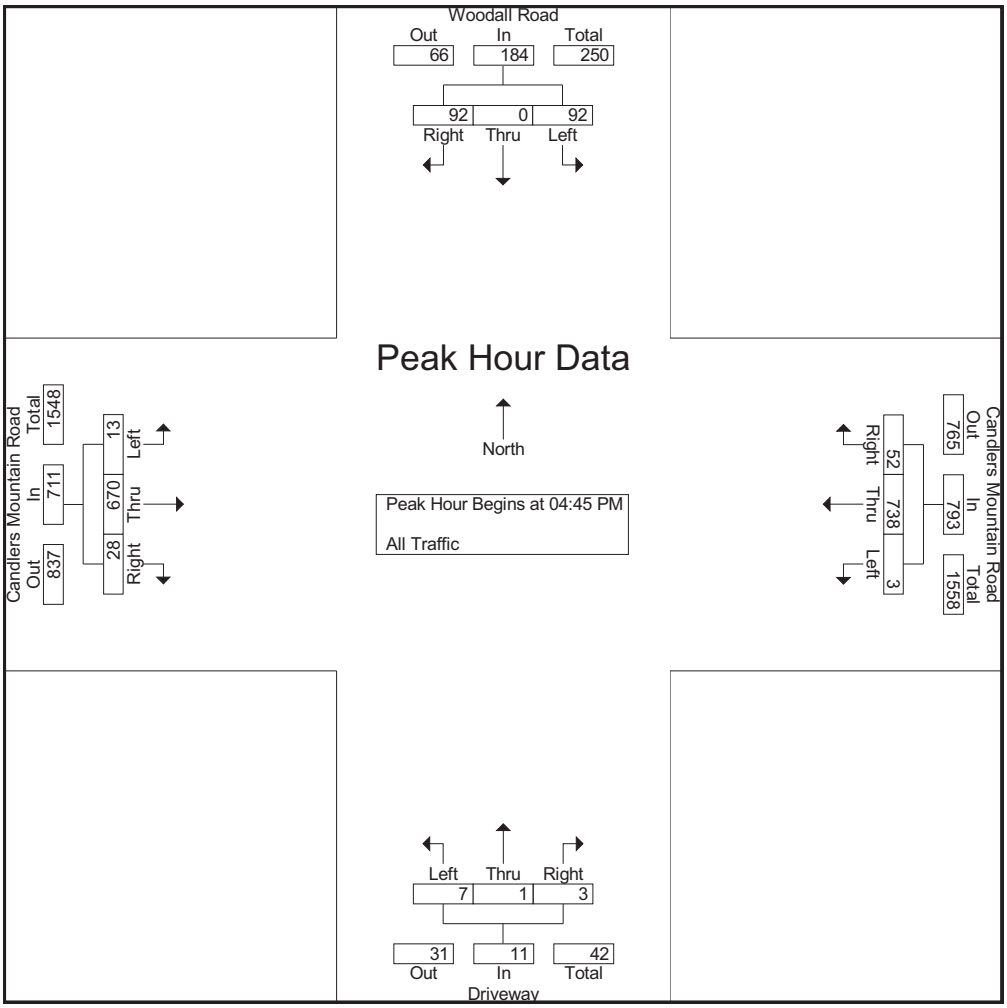
	Woodall Road Southbound				Candlers Mountain Road Westbound				Driveway Northbound				Candlers Mountain Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	11	0	**43**	**54**	**1**	182	11	194	**1**	0	0	1	8	148	0	156	**405**
12:15 PM	8	0	7	15	1	**183**	10	194	1	0	**1**	**2**	**15**	**170**	**4**	**189**	400
12:30 PM	**13**	0	5	18	0	173	12	185	1	0	0	1	6	154	1	161	365
12:45 PM	9	0	6	15	0	181	**23**	**204**	0	0	0	0	12	159	2	173	392
Total Volume	41	0	61	102	2	719	56	777	3	0	1	4	41	631	7	679	1562
% App. Total	40.2	0	59.8		0.3	92.5	7.2		75	0	25		6	92.9	1		
PHF	.788	.000	.355	.472	.500	.982	.609	.952	.750	.000	.250	.500	.683	.928	.438	.898	.964



Martin/Alexiou/Bryson, P.C.
4000 WestChase Boulevard, Suite 530
Raleigh, North Carolina 27607
p: 919.829.0328 f: 919.829.0329

File Name : CandlersMtn@Woodall
Site Code : 20130091
Start Date : 2/12/2013
Page No : 4

	Woodall Road Southbound				Candlers Mountain Road Westbound				Driveway Northbound				Candlers Mountain Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:45 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	16	0	11	27	**1**	**189**	13	203	**3**	0	**1**	**4**	2	161	7	170	404
05:00 PM	**33**	0	32	**65**	1	184	**20**	**205**	1	0	1	2	**4**	150	**9**	163	435
05:15 PM	24	0	**35**	59	1	180	12	193	2	**1**	1	4	4	**184**	7	**195**	**451**
05:30 PM	19	0	14	33	0	185	7	192	1	0	0	1	3	175	5	183	409
Total Volume	92	0	92	184	3	738	52	793	7	1	3	11	13	670	28	711	1699
% App. Total	50	0	50		0.4	93.1	6.6		63.6	9.1	27.3		1.8	94.2	3.9		
PHF	.697	.000	.657	.708	.750	.976	.650	.967	.583	.250	.750	.688	.813	.910	.778	.912	.942



Appendix B:

Intersection Capacity Analysis

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	563	1	0	423	128	0	0	1	19	0	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	10	10	10
Grade (%)		0%			0%			0%			-1%	
Storage Length (ft)	100		0	0		0	0		0	125		0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.965			0.850				0.850
Flt Protected	0.950										0.950	
Satd. Flow (prot)	1711	3421	0	1801	3301	0	1863	1583	0	0	1660	1485
Flt Permitted	0.420										0.757	
Satd. Flow (perm)	756	3421	0	1801	3301	0	1863	1583	0	0	1323	1485
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			35	
Link Distance (ft)		320			174			165			583	
Travel Time (s)		6.2			3.4			4.5			11.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	40	626	1	0	470	142	0	0	1	21	0	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	627	0	0	612	0	0	1	0	0	21	20
Turn Type	pm+pt			pm+pt			Perm			Perm		Perm
Protected Phases	1	6		5	2 4			3			3	
Permitted Phases	6			2 4			3			3		3
Detector Phase	1	6		5	2 4		3	3		3	3	3
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0			6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	14.0	30.0		14.0			20.0	20.0		20.0	20.0	20.0
Total Split (s)	14.0	41.0	0.0	14.0	64.0	0.0	22.0	22.0	0.0	22.0	22.0	22.0
Total Split (%)	14.0%	41.0%	0.0%	14.0%	64.0%	0.0%	22.0%	22.0%	0.0%	22.0%	22.0%	22.0%
Maximum Green (s)	10.0	36.0		10.0			18.0	18.0		18.0	18.0	18.0
Yellow Time (s)	3.0	3.5		3.0			3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	1.0	1.5		1.0			1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	1.0	0.5	-2.0	1.0	0.0	-2.0	1.0	1.0	1.0	-2.0	1.0	1.0
Total Lost Time (s)	5.0	5.5	2.0	5.0	5.0	2.0	5.0	5.0	5.0	2.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead			Lead	Lead		Lead	Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.5		3.0			3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None			Min	Min		Min	Min	Min
Act Effct Green (s)	29.9	25.2			45.1			8.4			8.4	8.4
Actuated g/C Ratio	0.41	0.35			0.62			0.12			0.12	0.12
v/c Ratio	0.10	0.53			0.30			0.01			0.14	0.12
Control Delay	11.5	22.0			1.5			35.0			37.1	36.4
Queue Delay	0.0	0.0			0.1			0.0			0.0	0.0
Total Delay	11.5	22.0			1.5			35.0			37.1	36.4
LOS	B	C			A			C			D	D
Approach Delay		21.4			1.5			35.0			36.8	

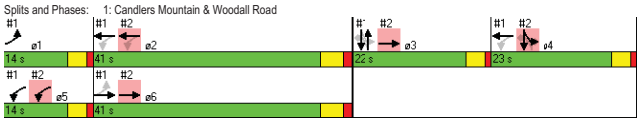
Lane Group	ø2	ø4
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Peak Hour Factor		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	2	4
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	15.0	6.0
Minimum Split (s)	22.0	20.0
Total Split (s)	41.0	23.0
Total Split (%)	41%	23%
Maximum Green (s)	36.0	19.0
Yellow Time (s)	3.5	3.0
All-Red Time (s)	1.5	1.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?		
Vehicle Extension (s)	3.5	3.0
Recall Mode	Min	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			A			C			D	
Queue Length 50th (ft)	9	120			7			0			9	9
Queue Length 95th (ft)	28	205			10			5			34	33
Internal Link Dist (ft)		240			94			85			503	
Turn Bay Length (ft)	100											
Base Capacity (vph)	466	1814			2475			402			336	377
Starvation Cap Reductn	0	0			560			0			0	0
Spillback Cap Reductn	0	0			0			0			0	0
Storage Cap Reductn	0	0			0			0			0	0
Reduced v/c Ratio	0.09	0.35			0.32			0.00			0.06	0.05

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 72.6
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.53
Intersection Signal Delay: 12.7 — Intersection LOS: B
Intersection Capacity Utilization 40.4% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 1: Candlers Mountain & Woodall Road



Lane Group	ø2	ø4
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	550	33	63	367	0	52	0	71	9	15	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	10	10	10	11	11	12
Grade (%)		0%			-1%			3%			0%	
Storage Length (ft)	0		0	100		0	125		0	150		0
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.991							0.850			0.850
Flt Protected				0.950			0.950				0.982	
Satd. Flow (prot)	0	3390	0	1719	3438	0	1627	0	1456	0	1768	1583
Flt Permitted				0.302			0.740				0.982	
Satd. Flow (perm)	0	3390	0	547	3438	0	1267	0	1456	0	1768	1583
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		174			396			346			444	
Travel Time (s)		3.4			7.7			6.7			8.6	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	611	37	70	408	0	58	0	79	10	17	147
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	648	0	70	408	0	58	0	79	0	27	147
Turn Type				custom			D.Pm		custom	custom		Perm
Protected Phases		3 6		5	2					4	4	
Permitted Phases				2 5			4		4	4		4
Detector Phase		3 6		5	2		4		4	4	4	4
Switch Phase												
Minimum Initial (s)				5.0	15.0		6.0		6.0	6.0	6.0	6.0
Minimum Split (s)				14.0	22.0		20.0		20.0	20.0	20.0	20.0
Total Split (s)	0.0	63.0	0.0	14.0	41.0	0.0	23.0	0.0	23.0	23.0	23.0	23.0
Total Split (%)	0.0%	63.0%	0.0%	14.0%	41.0%	0.0%	23.0%	0.0%	23.0%	23.0%	23.0%	23.0%
Maximum Green (s)				10.0	36.0		19.0		19.0	19.0	19.0	19.0
Yellow Time (s)				3.0	3.5		3.0		3.0	3.0	3.0	3.0
All-Red Time (s)				1.0	1.5		1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (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
Total Lost Time (s)	2.0	2.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag				Lead	Lag		Lag		Lag	Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.5		3.0		3.0	3.0	3.0	3.0
Recall Mode				None	Min		None		None	None	None	None
Act Effct Green (s)		42.8		37.7	31.1		16.5		16.5		16.5	16.5
Actuated g/C Ratio		0.59		0.52	0.43		0.23		0.23		0.23	0.23
v/c Ratio		0.32		0.16	0.28		0.20		0.24		0.07	0.41
Control Delay		0.5		10.0	15.8		29.2		29.3		27.4	31.9
Queue Delay		0.1		0.0	0.0		0.0		0.0		0.0	0.0
Total Delay		0.5		10.0	15.8		29.2		29.3		27.4	31.9
LOS		A		B	B		C		C		C	C
Approach Delay		0.5			14.9						31.2	

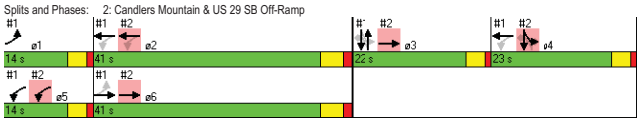
Lane Group	ø1	ø3	ø6
Lane Configurations			
Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Grade (%)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	1	3	6
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	5.0	6.0	15.0
Minimum Split (s)	14.0	20.0	30.0
Total Split (s)	14.0	22.0	41.0
Total Split (%)	14%	22%	41%
Maximum Green (s)	10.0	18.0	36.0
Yellow Time (s)	3.0	3.0	3.5
All-Red Time (s)	1.0	1.0	1.5
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead	Lead	Lag
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0	3.0	3.5
Recall Mode	None	Min	Min
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A			B						C	
Queue Length 50th (ft)		0		14	66		22		30		10	57
Queue Length 95th (ft)		0		39	120		65		81		36	137
Internal Link Dist (ft)		94			316			266			364	
Turn Bay Length (ft)				100			125					
Base Capacity (vph)		2467		496	1965		397		457		555	496
Starvation Cap Reductn		570		0	0		0		0		0	0
Spillback Cap Reductn		0		0	0		0		0		0	0
Storage Cap Reductn		0		0	0		0		0		0	0
Reduced v/c Ratio		0.34		0.14	0.21		0.15		0.17		0.05	0.30

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 72.6
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.53
Intersection Signal Delay: 11.8 — Intersection LOS: B
Intersection Capacity Utilization 40.0% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Candlers Mountain & US 29 SB Off-Ramp



Lane Group	ø1	ø3	ø6
Approach LOS			
Queue Length 50th (ft)			
Queue Length 95th (ft)			
Internal Link Dist (ft)			
Turn Bay Length (ft)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	670	28	3	782	52	7	1	3	92	0	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	10	10	10
Grade (%)		0%			0%			0%			-1%	
Storage Length (ft)	100		0	0		0	0		0	125		0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00								
Frt		0.993			0.988			0.880				0.850
Flt Protected	0.950			0.950			0.950				0.950	
Satd. Flow (prot)	1711	3394	0	1711	3380	0	1770	1639	0	0	1660	1485
Flt Permitted	0.302			0.251			0.646				0.754	
Satd. Flow (perm)	544	3394	0	452	3380	0	1203	1639	0	0	1317	1485
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			35	
Link Distance (ft)		320			174			165			583	
Travel Time (s)		6.2			3.4			4.5			11.4	
Confl. Peds. (#/hr)			1	1								
Peak Hour Factor	0.81	0.91	0.78	0.78	0.98	0.75	0.75	0.75	0.75	0.75	0.90	0.75
Adj. Flow (vph)	16	736	36	4	798	69	9	1	4	123	0	123
Shared Lane Traffic (%)												
Lane Group Flow (vph)	16	772	0	4	867	0	9	5	0	0	123	123
Turn Type	pm+pt			pm+pt			Perm			Perm		Perm
Protected Phases	1	6		5	2 4			3			3	
Permitted Phases	6			2 4			3			3		3
Detector Phase	1	6		5	2 4		3	3		3	3	3
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0			6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	14.0	30.0		14.0			20.0	20.0		20.0	20.0	20.0
Total Split (s)	14.0	37.0	0.0	14.0	65.0	0.0	21.0	21.0	0.0	21.0	21.0	21.0
Total Split (%)	14.0%	37.0%	0.0%	14.0%	65.0%	0.0%	21.0%	21.0%	0.0%	21.0%	21.0%	21.0%
Maximum Green (s)	10.0	32.0		10.0			17.0	17.0		17.0	17.0	17.0
Yellow Time (s)	3.0	3.5		3.0			3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	1.0	1.5		1.0			1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	1.0	0.5	-2.0	1.0	0.0	-2.0	1.0	1.0	1.0	-2.0	1.0	1.0
Total Lost Time (s)	5.0	5.5	2.0	5.0	5.0	2.0	5.0	5.0	5.0	2.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead			Lead	Lead		Lead	Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.5		3.0			3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None			Min	Min		Min	Min	Min
Act Effct Green (s)	33.9	29.6		59.2	59.4		14.2	14.2			14.2	14.2
Actuated g/C Ratio	0.38	0.33		0.66	0.66		0.16	0.16			0.16	0.16
v/c Ratio	0.06	0.69		0.01	0.39		0.05	0.02			0.59	0.53
Control Delay	15.6	31.8		1.0	1.6		36.4	35.8			51.3	47.0
Queue Delay	0.0	0.0		0.0	0.2		0.0	0.0			0.0	0.0
Total Delay	15.6	31.8		1.0	1.8		36.4	35.8			51.3	47.0

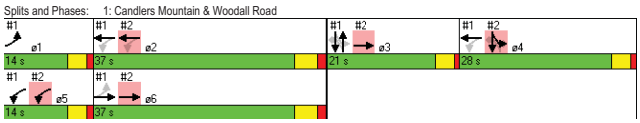
Lane Group	ø2	ø4
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	2	4
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	15.0	6.0
Minimum Split (s)	22.0	20.0
Total Split (s)	37.0	28.0
Total Split (%)	37%	28%
Maximum Green (s)	32.0	24.0
Yellow Time (s)	3.5	3.0
All-Red Time (s)	1.5	1.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?		
Vehicle Extension (s)	3.5	3.0
Recall Mode	Min	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	C		A	A		D	D			D	D
Approach Delay		31.4			1.8			36.2			49.2	
Approach LOS		C			A			D			D	
Queue Length 50th (ft)	5	226		0	12		5	3			73	72
Queue Length 95th (ft)	15	297		m0	17		16	11			135	107
Internal Link Dist (ft)		240			94			85			503	
Turn Bay Length (ft)	100											
Base Capacity (vph)	346	1257		431	2357		226	308			248	279
Starvation Cap Reductn	0	0		0	693		0	0			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	0.05	0.61		0.01	0.52		0.04	0.02			0.50	0.44

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 89.8
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 20.3 — Intersection LOS: C
Intersection Capacity Utilization 46.5% — ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Candlers Mountain & Woodall Road



Lane Group	ø2	ø4
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	734	31	95	600	0	46	0	108	34	30	191
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	10	10	10	11	11	12
Grade (%)		0%			-1%			3%			0%	
Storage Length (ft)	0		0	100		0	125		0	150		0
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00					0.99		1.00	
Frt		0.993							0.850			0.850
Flt Protected				0.950			0.950				0.974	
Satd. Flow (prot)	0	3394	0	1719	3438	0	1627	0	1456	0	1754	1583
Flt Permitted				0.208			0.659				0.974	
Satd. Flow (perm)	0	3394	0	376	3438	0	1129	0	1436	0	1753	1583
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		174			396			346			444	
Travel Time (s)		3.4			7.7			6.7			8.6	
Confl. Peds. (#/hr)			2	2					1	1		
Peak Hour Factor	0.90	0.91	0.78	0.95	0.87	0.90	0.89	0.90	0.87	0.75	0.75	0.76
Adj. Flow (vph)	0	807	40	100	690	0	52	0	124	45	40	251
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	847	0	100	690	0	52	0	124	0	85	251
Turn Type				custom			D.Pm		custom	custom		Perm
Protected Phases		3 6		5	2					4	4	
Permitted Phases				2 5			4		4	4		4
Detector Phase		3 6		5	2		4		4	4	4	4
Switch Phase												
Minimum Initial (s)				5.0	15.0		6.0		6.0	6.0	6.0	6.0
Minimum Split (s)				14.0	22.0		20.0		20.0	20.0	20.0	20.0
Total Split (s)	0.0	58.0	0.0	14.0	37.0	0.0	28.0	0.0	28.0	28.0	28.0	28.0
Total Split (%)	0.0%	58.0%	0.0%	14.0%	37.0%	0.0%	28.0%	0.0%	28.0%	28.0%	28.0%	28.0%
Maximum Green (s)				10.0	32.0		24.0		24.0	24.0	24.0	24.0
Yellow Time (s)				3.0	3.5		3.0		3.0	3.0	3.0	3.0
All-Red Time (s)				1.0	1.5		1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (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
Total Lost Time (s)	2.0	2.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag				Lead	Lag		Lag		Lag	Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.5		3.0		3.0	3.0	3.0	3.0
Recall Mode				None	Min		None		None	None	None	None
Act Effct Green (s)		52.7		43.0	38.1		23.1		23.1		23.1	23.1
Actuated g/C Ratio		0.59		0.48	0.42		0.26		0.26		0.26	0.26
v/c Ratio		0.42		0.29	0.47		0.18		0.34		0.19	0.62
Control Delay		0.6		16.1	21.4		30.6		32.9		30.1	39.1
Queue Delay		0.3		0.0	0.0		0.0		0.0		0.0	0.0
Total Delay		0.9		16.1	21.4		30.6		32.9		30.1	39.1

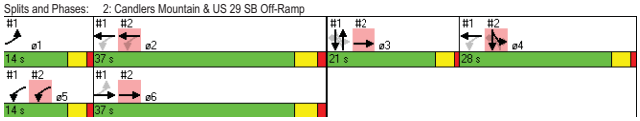
Lane Group	ø1	ø3	ø6
Lane Configurations			
Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Grade (%)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Ped Bike Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Peak Hour Factor			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	1	3	6
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	5.0	6.0	15.0
Minimum Split (s)	14.0	20.0	30.0
Total Split (s)	14.0	21.0	37.0
Total Split (%)	14%	21%	37%
Maximum Green (s)	10.0	17.0	32.0
Yellow Time (s)	3.0	3.0	3.5
All-Red Time (s)	1.0	1.0	1.5
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead	Lead	Lag
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0	3.0	3.5
Recall Mode	None	Min	Min
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		A		B	C		C		C		C	D
Approach Delay		0.9			20.8						36.8	
Approach LOS		A			C						D	
Queue Length 50th (ft)		1		33	145		26		64		42	140
Queue Length 95th (ft)		1		62	226		57		112		67	181
Internal Link Dist (ft)		94			316			266			364	
Turn Bay Length (ft)				100			125					
Base Capacity (vph)		2097		370	1600		345		439		536	484
Starvation Cap Reductn		597		0	0		0		0		0	0
Spillback Cap Reductn		0		0	0		0		0		0	0
Storage Cap Reductn		0		0	0		0		0		0	0
Reduced v/c Ratio		0.56		0.27	0.43		0.15		0.28		0.16	0.52

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 89.8
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 16.4 — Intersection LOS: B
Intersection Capacity Utilization 46.7% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Candlers Mountain & US 29 SB Off-Ramp



Lane Group	ø1	ø3	ø6
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (ft)			
Queue Length 95th (ft)			
Internal Link Dist (ft)			
Turn Bay Length (ft)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	38	597	1	0	449	136	0	0	1	20	0	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	10	10	10
Grade (%)		0%			0%			0%			-1%	
Storage Length (ft)	100		0	0		0	0		0	125		0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.965			0.850				0.850
Flt Protected	0.950										0.950	
Satd. Flow (prot)	1711	3421	0	1801	3301	0	1863	1583	0	0	1660	1485
Flt Permitted	0.405										0.757	
Satd. Flow (perm)	729	3421	0	1801	3301	0	1863	1583	0	0	1323	1485
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			35	
Link Distance (ft)		320			174			165			583	
Travel Time (s)		6.2			3.4			4.5			11.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	42	663	1	0	499	151	0	0	1	22	0	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	42	664	0	0	650	0	0	1	0	0	22	21
Turn Type	pm+pt			pm+pt			Perm			Perm		Perm
Protected Phases	1	6		5	2 4			3			3	
Permitted Phases	6			2 4			3			3		3
Detector Phase	1	6		5	2 4		3	3		3	3	3
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0			6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	14.0	30.0		14.0			20.0	20.0		20.0	20.0	20.0
Total Split (s)	14.0	42.0	0.0	14.0	64.0	0.0	22.0	22.0	0.0	22.0	22.0	22.0
Total Split (%)	14.0%	42.0%	0.0%	14.0%	64.0%	0.0%	22.0%	22.0%	0.0%	22.0%	22.0%	22.0%
Maximum Green (s)	10.0	37.0		10.0			18.0	18.0		18.0	18.0	18.0
Yellow Time (s)	3.0	3.5		3.0			3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	1.0	1.5		1.0			1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	1.0	0.5	-2.0	1.0	0.0	-2.0	1.0	1.0	1.0	-2.0	1.0	1.0
Total Lost Time (s)	5.0	5.5	2.0	5.0	5.0	2.0	5.0	5.0	5.0	2.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead			Lead	Lead		Lead	Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.5		3.0			3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None			Min	Min		Min	Min	Min
Act Effct Green (s)	31.8	27.0			47.5			9.3			9.3	9.3
Actuated g/C Ratio	0.42	0.36			0.63			0.12			0.12	0.12
v/c Ratio	0.11	0.55			0.31			0.01			0.14	0.12
Control Delay	11.6	22.5			1.6			35.0			37.4	36.8
Queue Delay	0.0	0.0			0.1			0.0			0.0	0.0
Total Delay	11.6	22.5			1.7			35.0			37.4	36.8
LOS	B	C			A			C			D	D
Approach Delay		21.8			1.7			35.0			37.1	

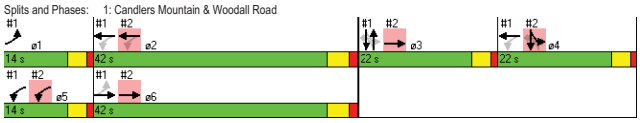
Lane Group	ø2	ø4
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Peak Hour Factor		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	2	4
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	15.0	6.0
Minimum Split (s)	22.0	20.0
Total Split (s)	42.0	22.0
Total Split (%)	42%	22%
Maximum Green (s)	37.0	18.0
Yellow Time (s)	3.5	3.0
All-Red Time (s)	1.5	1.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?		
Vehicle Extension (s)	3.5	3.0
Recall Mode	Min	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			A			C			D	
Queue Length 50th (ft)	10	137			8			0			10	10
Queue Length 95th (ft)	29	219			11			5			35	34
Internal Link Dist (ft)		240			94			85			503	
Turn Bay Length (ft)	100											
Base Capacity (vph)	454	1785			2400			385			321	361
Starvation Cap Reductn	0	0			552			0			0	0
Spillback Cap Reductn	0	0			0			0			0	0
Storage Cap Reductn	0	0			0			0			0	0
Reduced v/c Ratio	0.09	0.37			0.35			0.00			0.07	0.06

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 75.9
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 12.9 — Intersection LOS: B
Intersection Capacity Utilization 41.4% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 1: Candlers Mountain & Woodall Road



Lane Group	ø2	ø4
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	583	35	67	389	0	55	0	75	10	16	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	10	10	10	11	11	12
Grade (%)		0%			-1%			3%			0%	
Storage Length (ft)	0		0	100		0	125		0	150		0
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.991							0.850			0.850
Flt Protected				0.950			0.950				0.981	
Satd. Flow (prot)	0	3390	0	1719	3438	0	1627	0	1456	0	1766	1583
Flt Permitted				0.287			0.738				0.981	
Satd. Flow (perm)	0	3390	0	519	3438	0	1264	0	1456	0	1766	1583
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		174			396			346			444	
Travel Time (s)		3.4			7.7			6.7			8.6	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	648	39	74	432	0	61	0	83	11	18	156
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	687	0	74	432	0	61	0	83	0	29	156
Turn Type				custom			D.Pm		custom	custom		Perm
Protected Phases		3 6		5	2					4	4	
Permitted Phases				2 5			4		4	4		4
Detector Phase		3 6		5	2		4		4	4	4	4
Switch Phase												
Minimum Initial (s)				5.0	15.0		6.0		6.0	6.0	6.0	6.0
Minimum Split (s)				14.0	22.0		20.0		20.0	20.0	20.0	20.0
Total Split (s)	0.0	64.0	0.0	14.0	42.0	0.0	22.0	0.0	22.0	22.0	22.0	22.0
Total Split (%)	0.0%	64.0%	0.0%	14.0%	42.0%	0.0%	22.0%	0.0%	22.0%	22.0%	22.0%	22.0%
Maximum Green (s)				10.0	37.0		18.0		18.0	18.0	18.0	18.0
Yellow Time (s)				3.0	3.5		3.0		3.0	3.0	3.0	3.0
All-Red Time (s)				1.0	1.5		1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (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
Total Lost Time (s)	2.0	2.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag				Lead	Lag		Lag		Lag	Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.5		3.0		3.0	3.0	3.0	3.0
Recall Mode				None	Min		None		None	None	None	None
Act Effct Green (s)		45.4		39.6	33.0		17.1		17.1		17.1	17.1
Actuated g/C Ratio		0.60		0.52	0.43		0.23		0.23		0.23	0.23
v/c Ratio		0.34		0.17	0.29		0.21		0.25		0.07	0.44
Control Delay		0.5		10.2	16.0		31.2		31.4		29.2	34.3
Queue Delay		0.1		0.0	0.0		0.0		0.0		0.0	0.0
Total Delay		0.6		10.2	16.0		31.2		31.4		29.2	34.3
LOS		A		B	B		C		C		C	C
Approach Delay		0.6			15.1						33.5	

Kirkley Apts - Lynchburg
2: Candlers Mountain & US 29 SB Off-Ramp
No-Build (2015) AM

Lane Group	ø1	ø3	ø6
Lane Configurations			
Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Grade (%)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	1	3	6
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	5.0	6.0	15.0
Minimum Split (s)	14.0	20.0	30.0
Total Split (s)	14.0	22.0	42.0
Total Split (%)	14%	22%	42%
Maximum Green (s)	10.0	18.0	37.0
Yellow Time (s)	3.0	3.0	3.5
All-Red Time (s)	1.0	1.0	1.5
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead	Lead	Lag
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0	3.0	3.5
Recall Mode	None	Min	Min
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			

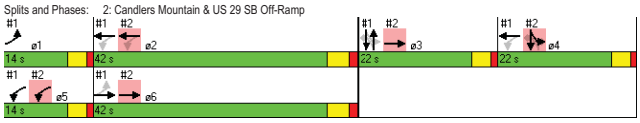
Kirkley Apts - Lynchburg
2: Candlers Mountain & US 29 SB Off-Ramp
No-Build (2015) AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A			B						C	
Queue Length 50th (ft)		1		16	76		25		34		11	67
Queue Length 95th (ft)		0		41	127		69		87		39	149
Internal Link Dist (ft)		94			316			266			364	
Turn Bay Length (ft)				100			125					
Base Capacity (vph)		2440		478	1930		361		416		505	452
Starvation Cap Reductn		577		0	0		0		0		0	0
Spillback Cap Reductn		0		0	0		0		0		0	0
Storage Cap Reductn		0		0	0		0		0		0	0
Reduced v/c Ratio		0.37		0.15	0.22		0.17		0.20		0.06	0.35

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 75.9
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 12.3 — Intersection LOS: B
Intersection Capacity Utilization 41.1% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Candlers Mountain & US 29 SB Off-Ramp



Kirkley Apts - Lynchburg
2: Candlers Mountain & US 29 SB Off-Ramp
No-Build (2015) AM

Lane Group	ø1	ø3	ø6
Approach LOS			
Queue Length 50th (ft)			
Queue Length 95th (ft)			
Internal Link Dist (ft)			
Turn Bay Length (ft)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	711	30	3	830	55	7	1	3	98	0	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	10	10	10
Grade (%)		0%			0%			0%			-1%	
Storage Length (ft)	100		0	0		0	0		0	125		0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00								
Frt		0.993			0.988			0.880				0.850
Flt Protected	0.950			0.950			0.950				0.950	
Satd. Flow (prot)	1711	3394	0	1711	3380	0	1770	1639	0	0	1660	1485
Flt Permitted	0.277			0.232			0.618				0.754	
Satd. Flow (perm)	499	3394	0	418	3380	0	1151	1639	0	0	1317	1485
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			35	
Link Distance (ft)		320			174			165			583	
Travel Time (s)		6.2			3.4			4.5			11.4	
Confl. Peds. (#/hr)			1	1								
Peak Hour Factor	0.81	0.91	0.78	0.78	0.98	0.75	0.75	0.75	0.75	0.75	0.90	0.75
Adj. Flow (vph)	17	781	38	4	847	73	9	1	4	131	0	131
Shared Lane Traffic (%)												
Lane Group Flow (vph)	17	819	0	4	920	0	9	5	0	0	131	131
Turn Type	pm+pt			pm+pt			Perm			Perm		Perm
Protected Phases	1	6		5	2 4			3			3	
Permitted Phases	6			2 4			3			3		3
Detector Phase	1	6		5	2 4		3	3		3	3	3
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0			6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	14.0	30.0		14.0			20.0	20.0		20.0	20.0	20.0
Total Split (s)	14.0	38.0	0.0	14.0	65.0	0.0	21.0	21.0	0.0	21.0	21.0	21.0
Total Split (%)	14.0%	38.0%	0.0%	14.0%	65.0%	0.0%	21.0%	21.0%	0.0%	21.0%	21.0%	21.0%
Maximum Green (s)	10.0	33.0		10.0			17.0	17.0		17.0	17.0	17.0
Yellow Time (s)	3.0	3.5		3.0			3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	1.0	1.5		1.0			1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	1.0	0.5	-2.0	1.0	0.0	-2.0	1.0	1.0	1.0	-2.0	1.0	1.0
Total Lost Time (s)	5.0	5.5	2.0	5.0	5.0	2.0	5.0	5.0	5.0	2.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead			Lead	Lead		Lead	Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.5		3.0			3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None			Min	Min		Min	Min	Min
Act Effct Green (s)	35.2	30.8		60.8	60.8		14.7	14.7			14.7	14.7
Actuated g/C Ratio	0.38	0.34		0.66	0.66		0.16	0.16			0.16	0.16
v/c Ratio	0.07	0.72		0.01	0.41		0.05	0.02			0.62	0.55
Control Delay	15.2	32.3		1.0	1.7		36.6	35.8			52.8	47.9
Queue Delay	0.0	0.0		0.0	0.2		0.0	0.0			0.0	0.0
Total Delay	15.2	32.3		1.0	2.0		36.6	35.8			52.8	47.9

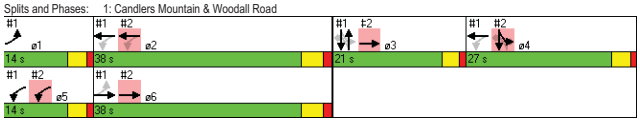
Lane Group	ø2	ø4
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	2	4
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	15.0	6.0
Minimum Split (s)	22.0	20.0
Total Split (s)	38.0	27.0
Total Split (%)	38%	27%
Maximum Green (s)	33.0	23.0
Yellow Time (s)	3.5	3.0
All-Red Time (s)	1.5	1.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?		
Vehicle Extension (s)	3.5	3.0
Recall Mode	Min	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	C		A	A		D	D			D	D
Approach Delay		32.0			2.0			36.3			50.3	
Approach LOS		C			A			D			D	
Queue Length 50th (ft)	6	241		0	12		5	3			78	77
Queue Length 95th (ft)	16	314		m0	26		16	11			#153	113
Internal Link Dist (ft)		240			94			85			503	
Turn Bay Length (ft)	100											
Base Capacity (vph)	330	1250		409	2352		209	297			239	270
Starvation Cap Reductn	0	0		0	649		0	0			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	0.05	0.66		0.01	0.54		0.04	0.02			0.55	0.49

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 91.7
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 20.8 — Intersection LOS: C
Intersection Capacity Utilization 48.3% — ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Candlers Mountain & Woodall Road



Lane Group	ø2	ø4
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	779	33	101	637	0	49	0	115	36	32	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	10	10	10	11	11	12
Grade (%)		0%			-1%			3%			0%	
Storage Length (ft)	0		0	100		0	125		0	150		0
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00					0.99		1.00	
Frt		0.993							0.850			0.850
Flt Protected				0.950			0.950				0.974	
Satd. Flow (prot)	0	3394	0	1719	3438	0	1627	0	1456	0	1754	1583
Flt Permitted				0.191			0.645				0.974	
Satd. Flow (perm)	0	3394	0	345	3438	0	1105	0	1436	0	1753	1583
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		174			396			346			444	
Travel Time (s)		3.4			7.7			6.7			8.6	
Confl. Peds. (#/hr)			2	2					1	1		
Peak Hour Factor	0.90	0.91	0.78	0.95	0.87	0.90	0.89	0.90	0.87	0.75	0.75	0.76
Adj. Flow (vph)	0	856	42	106	732	0	55	0	132	48	43	267
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	898	0	106	732	0	55	0	132	0	91	267
Turn Type				custom			D.Pm		custom	custom		Perm
Protected Phases		3 6		5	2					4	4	
Permitted Phases				2 5			4		4	4		4
Detector Phase		3 6		5	2		4		4	4	4	4
Switch Phase												
Minimum Initial (s)				5.0	15.0		6.0		6.0	6.0	6.0	6.0
Minimum Split (s)				14.0	22.0		20.0		20.0	20.0	20.0	20.0
Total Split (s)	0.0	59.0	0.0	14.0	38.0	0.0	27.0	0.0	27.0	27.0	27.0	27.0
Total Split (%)	0.0%	59.0%	0.0%	14.0%	38.0%	0.0%	27.0%	0.0%	27.0%	27.0%	27.0%	27.0%
Maximum Green (s)				10.0	33.0		23.0		23.0	23.0	23.0	23.0
Yellow Time (s)				3.0	3.5		3.0		3.0	3.0	3.0	3.0
All-Red Time (s)				1.0	1.5		1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (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
Total Lost Time (s)	2.0	2.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag				Lead	Lag		Lag		Lag	Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.5		3.0		3.0	3.0	3.0	3.0
Recall Mode				None	Min		None		None	None	None	None
Act Effct Green (s)		54.4		44.4	39.4		23.2		23.2		23.2	23.2
Actuated g/C Ratio		0.59		0.48	0.43		0.25		0.25		0.25	0.25
v/c Ratio		0.45		0.32	0.50		0.20		0.36		0.20	0.67
Control Delay		0.6		16.1	21.5		31.8		34.0		31.1	41.9
Queue Delay		0.4		0.0	0.0		0.0		0.0		0.0	0.0
Total Delay		1.0		16.1	21.5		31.8		34.0		31.1	41.9

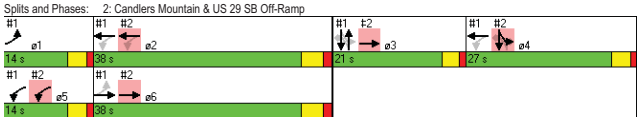
Lane Group	ø1	ø3	ø6
Lane Configurations			
Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Grade (%)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Ped Bike Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Peak Hour Factor			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	1	3	6
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	5.0	6.0	15.0
Minimum Split (s)	14.0	20.0	30.0
Total Split (s)	14.0	21.0	38.0
Total Split (%)	14%	21%	38%
Maximum Green (s)	10.0	17.0	33.0
Yellow Time (s)	3.0	3.0	3.5
All-Red Time (s)	1.0	1.0	1.5
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead	Lead	Lag
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0	3.0	3.5
Recall Mode	None	Min	Min
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		A		B	C		C		C		C	D
Approach Delay		1.0			20.9						39.2	
Approach LOS		A			C						D	
Queue Length 50th (ft)		1		35	153		28		69		46	153
Queue Length 95th (ft)		2		64	237		61		120		72	196
Internal Link Dist (ft)		94			316			266			364	
Turn Bay Length (ft)				100			125					
Base Capacity (vph)		2084		354	1589		313		407		497	449
Starvation Cap Reductn		598		0	0		0		0		0	0
Spillback Cap Reductn		0		0	0		0		0		0	0
Storage Cap Reductn		0		0	0		0		0		0	0
Reduced v/c Ratio		0.60		0.30	0.46		0.18		0.32		0.18	0.59

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 91.7
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 16.9 — Intersection LOS: B
Intersection Capacity Utilization 48.5% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Candlers Mountain & US 29 SB Off-Ramp



Lane Group	ø1	ø3	ø6
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (ft)			
Queue Length 95th (ft)			
Internal Link Dist (ft)			
Turn Bay Length (ft)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	597	1	0	449	147	0	0	1	62	0	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	10	10	10
Grade (%)		0%			0%			0%			-1%	
Storage Length (ft)	100		0	0		0	0		0	125		0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00			0.99			0.99			1.00	0.97
Frt					0.963			0.850				0.850
Flt Protected	0.950										0.950	
Satd. Flow (prot)	1711	3421	0	1801	3271	0	1863	1562	0	0	1660	1485
Flt Permitted	0.387										0.757	
Satd. Flow (perm)	694	3421	0	1801	3271	0	1863	1562	0	0	1320	1442
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			35	
Link Distance (ft)		320			174			165			583	
Travel Time (s)		6.2			3.4			4.5			11.4	
Confl. Peds. (#/hr)	10		10	10		10	10		1	1		10
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	48	663	1	0	499	163	0	0	1	69	0	46
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	664	0	0	662	0	0	1	0	0	69	46
Turn Type	pm+pt			pm+pt			Perm			Perm		Perm
Protected Phases	1	6		5	2 4			3			3	
Permitted Phases	6			2 4			3			3		3
Detector Phase	1	6		5	2 4		3	3		3	3	3
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0			6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	14.0	30.0		14.0			20.0	20.0		20.0	20.0	20.0
Total Split (s)	14.0	42.0	0.0	14.0	64.0	0.0	22.0	22.0	0.0	22.0	22.0	22.0
Total Split (%)	14.0%	42.0%	0.0%	14.0%	64.0%	0.0%	22.0%	22.0%	0.0%	22.0%	22.0%	22.0%
Maximum Green (s)	10.0	37.0		10.0			18.0	18.0		18.0	18.0	18.0
Yellow Time (s)	3.0	3.5		3.0			3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	1.0	1.5		1.0			1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	1.0	0.5	-2.0	1.0	0.0	-2.0	1.0	1.0	1.0	-2.0	1.0	1.0
Total Lost Time (s)	5.0	5.5	2.0	5.0	5.0	2.0	5.0	5.0	5.0	2.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead			Lead	Lead		Lead	Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.5		3.0			3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None			Min	Min		Min	Min	Min
Act Effct Green (s)	33.5	28.5			49.2			11.9			11.9	11.9
Actuated g/C Ratio	0.42	0.35			0.61			0.15			0.15	0.15
v/c Ratio	0.13	0.55			0.33			0.00			0.35	0.21
Control Delay	13.0	24.1			1.8			34.0			40.7	37.3
Queue Delay	0.0	0.0			0.1			0.0			0.0	0.0
Total Delay	13.0	24.1			1.8			34.0			40.7	37.3

Kirkley Apts - Lynchburg
1: Candlers Mountain & Woodall Road
Build (2015) AM

Lane Group	ø2	ø4
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	2	4
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	15.0	6.0
Minimum Split (s)	22.0	20.0
Total Split (s)	42.0	22.0
Total Split (%)	42%	22%
Maximum Green (s)	37.0	18.0
Yellow Time (s)	3.5	3.0
All-Red Time (s)	1.5	1.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?		
Vehicle Extension (s)	3.5	3.0
Recall Mode	Min	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

M/A/B
Synchro 8 Report
P:\Traffic\TIA\2013009 Lynchburg VA - Kirkley Apt Comm\TIA\Synchro\Build AM.syn

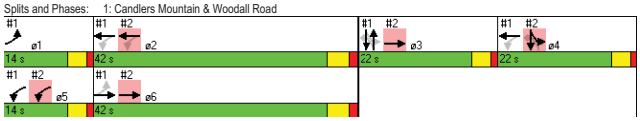
Kirkley Apts - Lynchburg
1: Candlers Mountain & Woodall Road
Build (2015) AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	C			A			C			D	D
Approach Delay		23.4			1.8			34.0			39.3	
Approach LOS		C			A			C			D	
Queue Length 50th (ft)	13	152			8			1			35	23
Queue Length 95th (ft)	33	228			12			5			81	59
Internal Link Dist (ft)		240			94			85			503	
Turn Bay Length (ft)	100											
Base Capacity (vph)	431	1693			2280			360			304	332
Starvation Cap Reductn	0	0			483			0			0	0
Spillback Cap Reductn	0	0			0			0			0	0
Storage Cap Reductn	0	0			0			0			0	0
Reduced v/c Ratio	0.11	0.39			0.37			0.00			0.23	0.14

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 80.5
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 15.0 — Intersection LOS: B
Intersection Capacity Utilization 45.0% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 1: Candlers Mountain & Woodall Road



M/A/B
Synchro 8 Report
P:\Traffic\TIA\2013009 Lynchburg VA - Kirkley Apt Comm\TIA\Synchro\Build AM.syn

Kirkley Apts - Lynchburg
1: Candlers Mountain & Woodall Road
Build (2015) AM

Lane Group	ø2	ø4
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

M/A/B
Synchro 8 Report
P:\Traffic\TIA\2013009 Lynchburg VA - Kirkley Apt Comm\TIA\Synchro\Build AM.syn

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	615	45	67	396	0	57	0	75	10	16	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	10	10	10	11	11	12
Grade (%)		0%			-1%			3%			0%	
Storage Length (ft)	0		0	100		0	125		0	150		0
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990							0.850			0.850
Flt Protected				0.950			0.950				0.981	
Satd. Flow (prot)	0	3387	0	1719	3438	0	1627	0	1456	0	1766	1583
Flt Permitted				0.270			0.738				0.981	
Satd. Flow (perm)	0	3387	0	489	3438	0	1264	0	1456	0	1766	1583
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		174			396			346			444	
Travel Time (s)		3.4			7.7			6.7			8.6	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	683	50	74	440	0	63	0	83	11	18	158
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	733	0	74	440	0	63	0	83	0	29	158
Turn Type				custom			D.Pm		custom	custom		Perm
Protected Phases		3 6		5	2					4	4	
Permitted Phases				2 5			4		4	4		4
Detector Phase		3 6		5	2		4		4	4	4	4
Switch Phase												
Minimum Initial (s)				5.0	15.0		6.0		6.0	6.0	6.0	6.0
Minimum Split (s)				14.0	22.0		20.0		20.0	20.0	20.0	20.0
Total Split (s)	0.0	64.0	0.0	14.0	42.0	0.0	22.0	0.0	22.0	22.0	22.0	22.0
Total Split (%)	0.0%	64.0%	0.0%	14.0%	42.0%	0.0%	22.0%	0.0%	22.0%	22.0%	22.0%	22.0%
Maximum Green (s)				10.0	37.0		18.0		18.0	18.0	18.0	18.0
Yellow Time (s)				3.0	3.5		3.0		3.0	3.0	3.0	3.0
All-Red Time (s)				1.0	1.5		1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (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
Total Lost Time (s)	2.0	2.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag				Lead	Lag		Lag		Lag	Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.5		3.0		3.0	3.0	3.0	3.0
Recall Mode				None	Min		None		None	None	None	None
Act Effct Green (s)		49.7		41.1	34.4		17.4		17.4		17.4	17.4
Actuated g/C Ratio		0.62		0.51	0.43		0.22		0.22		0.22	0.22
v/c Ratio		0.35		0.18	0.30		0.23		0.26		0.08	0.46
Control Delay		0.5		11.6	17.6		33.9		34.0		31.4	37.4
Queue Delay		0.1		0.0	0.0		0.0		0.0		0.0	0.0
Total Delay		0.6		11.6	17.6		33.9		34.0		31.4	37.4
LOS		A		B	B		C		C		C	D
Approach Delay		0.6			16.7						36.5	

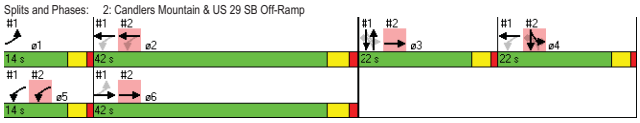
Lane Group	ø1	ø3	ø6
Lane Configurations			
Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Grade (%)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	1	3	6
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	5.0	6.0	15.0
Minimum Split (s)	14.0	20.0	30.0
Total Split (s)	14.0	22.0	42.0
Total Split (%)	14%	22%	42%
Maximum Green (s)	10.0	18.0	37.0
Yellow Time (s)	3.0	3.0	3.5
All-Red Time (s)	1.0	1.0	1.5
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead	Lead	Lag
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0	3.0	3.5
Recall Mode	None	Min	Min
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A			B						D	
Queue Length 50th (ft)		1		19	86		28		38		13	75
Queue Length 95th (ft)		0		43	136		73		90		40	155
Internal Link Dist (ft)		94			316			266			364	
Turn Bay Length (ft)				100			125					
Base Capacity (vph)		2369		451	1839		343		395		479	429
Starvation Cap Reductn		591		0	0		0		0		0	0
Spillback Cap Reductn		0		0	0		0		0		0	0
Storage Cap Reductn		0		0	0		0		0		0	0
Reduced v/c Ratio		0.41		0.16	0.24		0.18		0.21		0.06	0.37

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 80.5
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 13.2 — Intersection LOS: B
Intersection Capacity Utilization 42.4% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Candlers Mountain & US 29 SB Off-Ramp



Lane Group	ø1	ø3	ø6
Approach LOS			
Queue Length 50th (ft)			
Queue Length 95th (ft)			
Internal Link Dist (ft)			
Turn Bay Length (ft)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	711	30	3	830	99	7	1	3	121	0	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	10	10	10
Grade (%)		0%			0%			0%			-1%	
Storage Length (ft)	100		0	0		0	0		0	125		0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		0.99	0.99			1.00	0.97
Frt		0.993			0.980			0.880				0.850
Flt Protected	0.950			0.950			0.950				0.950	
Satd. Flow (prot)	1711	3392	0	1711	3340	0	1770	1621	0	0	1660	1485
Flt Permitted	0.221			0.237			0.546				0.754	
Satd. Flow (perm)	397	3392	0	426	3340	0	1004	1621	0	0	1315	1442
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			35	
Link Distance (ft)		320			174			165			583	
Travel Time (s)		6.2			3.4			4.5			11.4	
Confl. Peds. (#/hr)	10		11	11		10	10		1	1		10
Peak Hour Factor	0.81	0.91	0.78	0.78	0.98	0.75	0.75	0.75	0.75	0.75	0.90	0.75
Adj. Flow (vph)	46	781	38	4	847	132	9	1	4	161	0	148
Shared Lane Traffic (%)												
Lane Group Flow (vph)	46	819	0	4	979	0	9	5	0	0	161	148
Turn Type	pm+pt			pm+pt			Perm			Perm		Perm
Protected Phases	1	6		5	2 4			3			3	
Permitted Phases	6			2 4			3			3		3
Detector Phase	1	6		5	2 4		3	3		3	3	3
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0			6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	14.0	30.0		14.0			20.0	20.0		20.0	20.0	20.0
Total Split (s)	14.0	38.0	0.0	14.0	64.0	0.0	22.0	22.0	0.0	22.0	22.0	22.0
Total Split (%)	14.0%	38.0%	0.0%	14.0%	64.0%	0.0%	22.0%	22.0%	0.0%	22.0%	22.0%	22.0%
Maximum Green (s)	10.0	33.0		10.0			18.0	18.0		18.0	18.0	18.0
Yellow Time (s)	3.0	3.5		3.0			3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	1.0	1.5		1.0			1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	1.0	0.5	-2.0	1.0	0.0	-2.0	1.0	1.0	1.0	-2.0	1.0	1.0
Total Lost Time (s)	5.0	5.5	2.0	5.0	5.0	2.0	5.0	5.0	5.0	2.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead			Lead	Lead		Lead	Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.5		3.0			3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None			Min	Min		Min	Min	Min
Act Effct Green (s)	36.3	31.1		59.4	56.9		15.9	15.9			15.9	15.9
Actuated g/C Ratio	0.39	0.34		0.64	0.62		0.17	0.17			0.17	0.17
v/c Ratio	0.19	0.72		0.01	0.48		0.05	0.02			0.71	0.60
Control Delay	16.7	32.4		1.0	2.1		35.7	34.8			57.2	48.7
Queue Delay	0.0	0.0		0.0	0.1		0.0	0.0			0.0	0.0
Total Delay	16.7	32.4		1.0	2.3		35.7	34.8			57.2	48.7

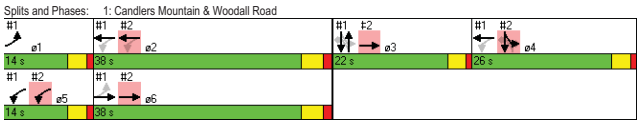
Lane Group	ø2	ø4
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	2	4
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	15.0	6.0
Minimum Split (s)	22.0	20.0
Total Split (s)	38.0	26.0
Total Split (%)	38%	26%
Maximum Green (s)	33.0	22.0
Yellow Time (s)	3.5	3.0
All-Red Time (s)	1.5	1.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?		
Vehicle Extension (s)	3.5	3.0
Recall Mode	Min	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	C		A	A		D	C			E	D
Approach Delay		31.5			2.3			35.4			53.1	
Approach LOS		C			A			D			D	
Queue Length 50th (ft)	15	238		0	13		5	3			97	87
Queue Length 95th (ft)	32	314		m0	30		16	11			#194	125
Internal Link Dist (ft)		240			94			85			503	
Turn Bay Length (ft)	100											
Base Capacity (vph)	296	1228		404	2142		190	307			249	273
Starvation Cap Reductn	0	0		0	321		0	0			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	0.16	0.67		0.01	0.54		0.05	0.02			0.65	0.54

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 92.4
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 21.4 — Intersection LOS: C
Intersection Capacity Utilization 53.4% — ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Candlers Mountain & Woodall Road



Lane Group	ø2	ø4
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	797	38	101	664	0	59	0	115	36	32	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	10	10	10	11	11	12
Grade (%)		0%			-1%			3%			0%	
Storage Length (ft)	0		0	100		0	125		0	150		0
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00					0.99		1.00	
Frt		0.992							0.850			0.850
Flt Protected				0.950			0.950				0.974	
Satd. Flow (prot)	0	3390	0	1719	3438	0	1627	0	1456	0	1754	1583
Flt Permitted				0.181			0.643				0.974	
Satd. Flow (perm)	0	3390	0	327	3438	0	1101	0	1436	0	1753	1583
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		174			396			346			444	
Travel Time (s)		3.4			7.7			6.7			8.6	
Confl. Peds. (#/hr)			2	2					1	1		
Peak Hour Factor	0.90	0.91	0.78	0.95	0.87	0.90	0.89	0.90	0.87	0.75	0.75	0.76
Adj. Flow (vph)	0	876	49	106	763	0	66	0	132	48	43	276
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	925	0	106	763	0	66	0	132	0	91	276
Turn Type				custom			D.Pm		custom	custom		Perm
Protected Phases		3 6		5	2					4	4	
Permitted Phases				2 5			4		4	4		4
Detector Phase		3 6		5	2		4		4	4	4	4
Switch Phase												
Minimum Initial (s)				5.0	15.0		6.0		6.0	6.0	6.0	6.0
Minimum Split (s)				14.0	22.0		20.0		20.0	20.0	20.0	20.0
Total Split (s)	0.0	60.0	0.0	14.0	38.0	0.0	26.0	0.0	26.0	26.0	26.0	26.0
Total Split (%)	0.0%	60.0%	0.0%	14.0%	38.0%	0.0%	26.0%	0.0%	26.0%	26.0%	26.0%	26.0%
Maximum Green (s)				10.0	33.0		22.0		22.0	22.0	22.0	22.0
Yellow Time (s)				3.0	3.5		3.0		3.0	3.0	3.0	3.0
All-Red Time (s)				1.0	1.5		1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (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
Total Lost Time (s)	2.0	2.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag				Lead	Lag		Lag		Lag	Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.5		3.0		3.0	3.0	3.0	3.0
Recall Mode				None	Min		None		None	None	None	None
Act Effct Green (s)		55.7		44.5	37.0		22.7		22.7		22.7	22.7
Actuated g/C Ratio		0.60		0.48	0.40		0.25		0.25		0.25	0.25
v/c Ratio		0.45		0.33	0.55		0.24		0.38		0.21	0.71
Control Delay		0.6		16.4	24.6		33.5		35.0		31.9	45.2
Queue Delay		0.4		0.0	0.0		0.0		0.0		0.0	0.0
Total Delay		1.0		16.4	24.6		33.5		35.0		31.9	45.2

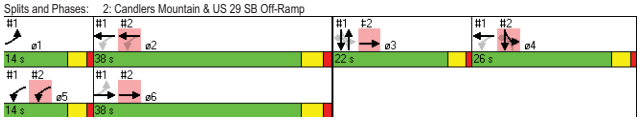
Lane Group	ø1	ø3	ø6
Lane Configurations			
Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Grade (%)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Ped Bike Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Peak Hour Factor			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	1	3	6
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	5.0	6.0	15.0
Minimum Split (s)	14.0	20.0	30.0
Total Split (s)	14.0	22.0	38.0
Total Split (%)	14%	22%	38%
Maximum Green (s)	10.0	18.0	33.0
Yellow Time (s)	3.0	3.0	3.5
All-Red Time (s)	1.0	1.0	1.5
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead	Lead	Lag
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0	3.0	3.5
Recall Mode	None	Min	Min
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		A		B	C		C		C		C	D
Approach Delay		1.0			23.6						41.9	
Approach LOS		A			C						D	
Queue Length 50th (ft)		1		35	200		34		70		46	160
Queue Length 95th (ft)		2		64	257		72		122		73	206
Internal Link Dist (ft)		94			316			266			364	
Turn Bay Length (ft)				100			125					
Base Capacity (vph)		2104		344	1465		294		384		469	423
Starvation Cap Reductn		625		0	0		0		0		0	0
Spillback Cap Reductn		0		0	0		0		0		0	0
Storage Cap Reductn		0		0	0		0		0		0	0
Reduced v/c Ratio		0.63		0.31	0.52		0.22		0.34		0.19	0.65

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 92.4
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 18.5 — Intersection LOS: B
Intersection Capacity Utilization 49.2% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Candlers Mountain & US 29 SB Off-Ramp



Lane Group	ø1	ø3	ø6
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (ft)			
Queue Length 95th (ft)			
Internal Link Dist (ft)			
Turn Bay Length (ft)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	597	1	0	449	147	0	0	1	62	0	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	10	10	10
Grade (%)		0%			0%			0%			-1%	
Storage Length (ft)	100		0	0		0	0		0	125		0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00			0.99			0.99			1.00	0.97
Frt					0.963			0.850				0.850
Flt Protected	0.950										0.950	
Satd. Flow (prot)	1711	3421	0	1801	3260	0	1863	1562	0	0	1660	1485
Flt Permitted	0.385										0.757	
Satd. Flow (perm)	688	3421	0	1801	3260	0	1863	1562	0	0	1321	1447
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			35	
Link Distance (ft)		320			174			165			583	
Travel Time (s)		6.2			3.4			4.5			11.4	
Confl. Peds. (#/hr)	10		10	10		10	10		1	1		10
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	48	663	1	0	499	163	0	0	1	69	0	46
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	664	0	0	662	0	0	1	0	0	69	46
Turn Type	pm+pt			pm+pt			Perm			Perm		Perm
Protected Phases	1	6		5	2 4			3			3	
Permitted Phases	6			2 4			3			3		3
Detector Phase	1	6		5	2 4		3	3		3	3	3
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0			6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	14.0	30.0		14.0			26.0	26.0		26.0	26.0	26.0
Total Split (s)	14.0	39.0	0.0	14.0	60.0	0.0	26.0	26.0	0.0	26.0	26.0	26.0
Total Split (%)	14.0%	39.0%	0.0%	14.0%	60.0%	0.0%	26.0%	26.0%	0.0%	26.0%	26.0%	26.0%
Maximum Green (s)	10.0	34.0		10.0			22.0	22.0		22.0	22.0	22.0
Yellow Time (s)	3.0	3.5		3.0			3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	1.0	1.5		1.0			1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	1.0	0.5	-2.0	1.0	0.0	-2.0	1.0	1.0	1.0	-2.0	1.0	1.0
Total Lost Time (s)	5.0	5.5	2.0	5.0	5.0	2.0	5.0	5.0	5.0	2.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead			Lead	Lead		Lead	Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.5		3.0			3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None			Min	Min		Min	Min	Min
Walk Time (s)							7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)							15.0	15.0		15.0	15.0	15.0
Pedestrian Calls (#/hr)							5	5		5	5	5
Act Effct Green (s)	32.4	27.4			47.5			12.5			12.5	12.5
Actuated g/C Ratio	0.41	0.35			0.60			0.16			0.16	0.16
v/c Ratio	0.13	0.56			0.34			0.00			0.33	0.20

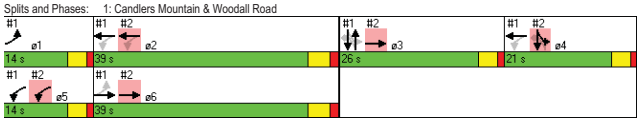
Lane Group	ø2	ø4
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	2	4
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	15.0	6.0
Minimum Split (s)	27.0	20.0
Total Split (s)	39.0	21.0
Total Split (%)	39%	21%
Maximum Green (s)	34.0	17.0
Yellow Time (s)	3.5	3.0
All-Red Time (s)	1.5	1.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?		
Vehicle Extension (s)	3.5	3.0
Recall Mode	Min	None
Walk Time (s)	7.0	
Flash Dont Walk (s)	15.0	
Pedestrian Calls (#/hr)	5	
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	13.7	24.9			1.9			32.0			37.9	34.9
Queue Delay	0.0	0.0			0.1			0.0			0.0	0.0
Total Delay	13.7	24.9			2.0			32.0			37.9	34.9
LOS	B	C			A			C			D	C
Approach Delay		24.1			2.0			32.0			36.7	
Approach LOS		C			A			C			D	
Queue Length 50th (ft)	13	151			8			1			34	22
Queue Length 95th (ft)	35	240			17			5			77	56
Internal Link Dist (ft)		240			94			85			503	
Turn Bay Length (ft)	100											
Base Capacity (vph)	425	1567			2189			449			379	416
Starvation Cap Reductn	0	0			437			0			0	0
Spillback Cap Reductn	0	0			0			0			0	0
Storage Cap Reductn	0	0			0			0			0	0
Reduced v/c Ratio	0.11	0.42			0.38			0.00			0.18	0.11

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 79.4
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 15.3 — Intersection LOS: B
Intersection Capacity Utilization 46.7% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 1: Candlers Mountain & Woodall Road



Lane Group	ø2	ø4
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	615	45	67	396	0	57	0	75	10	16	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	10	10	10	11	11	12
Grade (%)		0%			-1%			3%			0%	
Storage Length (ft)	0		0	100		0	125		0	150		0
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990							0.850			0.850
Flt Protected				0.950			0.950				0.981	
Satd. Flow (prot)	0	3387	0	1719	3438	0	1627	0	1456	0	1766	1583
Flt Permitted				0.268			0.738				0.981	
Satd. Flow (perm)	0	3387	0	485	3438	0	1264	0	1456	0	1766	1583
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		174			396			346			444	
Travel Time (s)		3.4			7.7			6.7			8.6	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	683	50	74	440	0	63	0	83	11	18	158
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	733	0	74	440	0	63	0	83	0	29	158
Turn Type				custom			D.Pm		custom	custom		Perm
Protected Phases		3 6		5	2					4	4	
Permitted Phases				2 5			4		4	4		4
Detector Phase		3 6		5	2		4		4	4	4	4
Switch Phase												
Minimum Initial (s)				5.0	15.0		6.0		6.0	6.0	6.0	6.0
Minimum Split (s)				14.0	27.0		20.0		20.0	20.0	20.0	20.0
Total Split (s)	0.0	65.0	0.0	14.0	39.0	0.0	21.0	0.0	21.0	21.0	21.0	21.0
Total Split (%)	0.0%	65.0%	0.0%	14.0%	39.0%	0.0%	21.0%	0.0%	21.0%	21.0%	21.0%	21.0%
Maximum Green (s)				10.0	34.0		17.0		17.0	17.0	17.0	17.0
Yellow Time (s)				3.0	3.5		3.0		3.0	3.0	3.0	3.0
All-Red Time (s)				1.0	1.5		1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (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
Total Lost Time (s)	2.0	2.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag				Lead	Lag		Lag		Lag	Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.5		3.0		3.0	3.0	3.0	3.0
Recall Mode				None	Min		None		None	None	None	None
Walk Time (s)					7.0							
Flash Dont Walk (s)					15.0							
Pedestrian Calls (#/hr)					5							
Act Effct Green (s)		49.1		39.8	33.2		16.9		16.9		16.9	16.9
Actuated g/C Ratio		0.62		0.50	0.42		0.21		0.21		0.21	0.21
v/c Ratio		0.35		0.18	0.31		0.23		0.27		0.08	0.47
Control Delay		0.5		12.2	18.2		33.9		34.1		31.4	37.5
Queue Delay		0.1		0.0	0.0		0.0		0.0		0.0	0.0

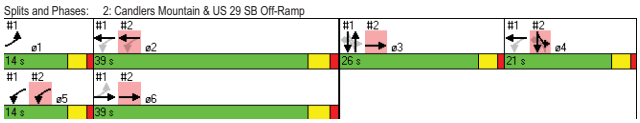
Lane Group	ø1	ø3	ø6
Lane Configurations			
Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Grade (%)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	1	3	6
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	5.0	6.0	15.0
Minimum Split (s)	14.0	26.0	30.0
Total Split (s)	14.0	26.0	39.0
Total Split (%)	14%	26%	39%
Maximum Green (s)	10.0	22.0	34.0
Yellow Time (s)	3.0	3.0	3.5
All-Red Time (s)	1.0	1.0	1.5
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead	Lead	Lag
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0	3.0	3.5
Recall Mode	None	Min	Min
Walk Time (s)		7.0	
Flash Dont Walk (s)		15.0	
Pedestrian Calls (#/hr)		5	
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay		0.6		12.2	18.2		33.9		34.1		31.4	37.5
LOS		A		B	B		C		C		C	D
Approach Delay		0.6			17.4						36.6	
Approach LOS		A			B						D	
Queue Length 50th (ft)		1		19	85		28		38		13	75
Queue Length 95th (ft)		0		47	145		74		91		40	158
Internal Link Dist (ft)		94			316			266			364	
Turn Bay Length (ft)				100			125					
Base Capacity (vph)		2533		447	1728		329		378		459	412
Starvation Cap Reductn		640		0	0		0		0		0	0
Spillback Cap Reductn		0		0	0		0		0		0	0
Storage Cap Reductn		0		0	0		0		0		0	0
Reduced v/c Ratio		0.39		0.17	0.25		0.19		0.22		0.06	0.38

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 79.4
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 13.4 — Intersection LOS: B
Intersection Capacity Utilization 42.4% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Candlers Mountain & US 29 SB Off-Ramp



Lane Group	ø1	ø3	ø6
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (ft)			
Queue Length 95th (ft)			
Internal Link Dist (ft)			
Turn Bay Length (ft)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	711	30	3	830	99	7	1	3	121	0	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	10	10	10
Grade (%)		0%			0%			0%			-1%	
Storage Length (ft)	100		0	0		0	0		0	125		0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	0.99		0.99	0.99			1.00	0.97
Frt		0.993			0.980			0.880				0.850
Flt Protected	0.950			0.950			0.950				0.950	
Satd. Flow (prot)	1711	3391	0	1711	3334	0	1770	1622	0	0	1660	1485
Flt Permitted	0.206			0.227			0.569				0.754	
Satd. Flow (perm)	369	3391	0	407	3334	0	1049	1622	0	0	1316	1447
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			35	
Link Distance (ft)		320			174			165			583	
Travel Time (s)		6.2			3.4			4.5			11.4	
Confl. Peds. (#/hr)	10		11	11		10	10		1	1		10
Peak Hour Factor	0.81	0.91	0.78	0.78	0.98	0.75	0.75	0.75	0.75	0.75	0.90	0.75
Adj. Flow (vph)	46	781	38	4	847	132	9	1	4	161	0	148
Shared Lane Traffic (%)												
Lane Group Flow (vph)	46	819	0	4	979	0	9	5	0	0	161	148
Turn Type	pm+pt			pm+pt			Perm			Perm		Perm
Protected Phases	1	6		5	2 4			3			3	
Permitted Phases	6			2 4			3			3		3
Detector Phase	1	6		5	2 4		3	3		3	3	3
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0			6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	14.0	30.0		14.0			26.0	26.0		26.0	26.0	26.0
Total Split (s)	14.0	35.0	0.0	14.0	60.0	0.0	26.0	26.0	0.0	26.0	26.0	26.0
Total Split (%)	14.0%	35.0%	0.0%	14.0%	60.0%	0.0%	26.0%	26.0%	0.0%	26.0%	26.0%	26.0%
Maximum Green (s)	10.0	30.0		10.0			22.0	22.0		22.0	22.0	22.0
Yellow Time (s)	3.0	3.5		3.0			3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	1.0	1.5		1.0			1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	1.0	0.5	-2.0	1.0	0.0	-2.0	1.0	1.0	1.0	-2.0	1.0	1.0
Total Lost Time (s)	5.0	5.5	2.0	5.0	5.0	2.0	5.0	5.0	5.0	2.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead			Lead	Lead		Lead	Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.5		3.0			3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None			Min	Min		Min	Min	Min
Walk Time (s)							7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)							15.0	15.0		15.0	15.0	15.0
Pedestrian Calls (#/hr)							5	5		5	5	5
Act Effct Green (s)	34.3	29.0		56.7	54.2		18.2	18.2			18.2	18.2
Actuated g/C Ratio	0.37	0.32		0.62	0.59		0.20	0.20			0.20	0.20
v/c Ratio	0.20	0.77		0.01	0.50		0.04	0.02			0.62	0.52

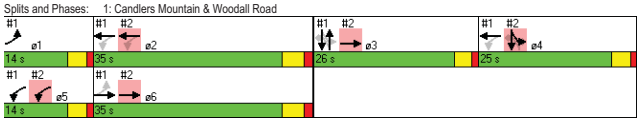
Lane Group	ø2	ø4
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	2	4
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	15.0	6.0
Minimum Split (s)	27.0	20.0
Total Split (s)	35.0	25.0
Total Split (%)	35%	25%
Maximum Green (s)	30.0	21.0
Yellow Time (s)	3.5	3.0
All-Red Time (s)	1.5	1.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?		
Vehicle Extension (s)	3.5	3.0
Recall Mode	Min	None
Walk Time (s)	7.0	
Flash Dont Walk (s)	15.0	
Pedestrian Calls (#/hr)	5	
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	18.6	36.0		1.3	2.4		32.3	31.5			46.7	41.7
Queue Delay	0.0	0.0		0.0	0.2		0.0	0.0			0.0	0.0
Total Delay	18.6	36.0		1.3	2.5		32.3	31.5			46.7	41.7
LOS	B	D		A	A		C	C			D	D
Approach Delay		35.1			2.5			32.0			44.3	
Approach LOS		D			A			C			D	
Queue Length 50th (ft)	16	251		0	13		5	3			92	82
Queue Length 95th (ft)	34	330		m0	31		15	10			162	118
Internal Link Dist (ft)		240			94			85			503	
Turn Bay Length (ft)	100											
Base Capacity (vph)	280	1118		383	2015		246	381			309	340
Starvation Cap Reductn	0	0		0	293		0	0			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	0.16	0.73		0.01	0.57		0.04	0.01			0.52	0.44

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 92
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 21.6 — Intersection LOS: C
Intersection Capacity Utilization 55.0% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Candlers Mountain & Woodall Road



Lane Group	ø2	ø4
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	797	38	101	664	0	59	0	115	36	32	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	10	10	10	11	11	12
Grade (%)		0%			-1%			3%			0%	
Storage Length (ft)	0		0	100		0	125		0	150		0
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00					0.99		1.00	
Frt		0.992							0.850			0.850
Flt Protected				0.950			0.950				0.974	
Satd. Flow (prot)	0	3389	0	1719	3438	0	1627	0	1456	0	1754	1583
Flt Permitted				0.174			0.641				0.974	
Satd. Flow (perm)	0	3389	0	315	3438	0	1098	0	1436	0	1753	1583
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		174			396			346			444	
Travel Time (s)		3.4			7.7			6.7			8.6	
Confl. Peds. (#/hr)			2	2					1	1		
Peak Hour Factor	0.90	0.91	0.75	0.95	0.87	0.90	0.89	0.90	0.87	0.75	0.75	0.75
Adj. Flow (vph)	0	876	51	106	763	0	66	0	132	48	43	280
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	927	0	106	763	0	66	0	132	0	91	280
Turn Type				custom			D.Pm		custom	custom		Perm
Protected Phases		3 6		5	2					4	4	
Permitted Phases				2 5			4		4	4		4
Detector Phase		3 6		5	2		4		4	4	4	4
Switch Phase												
Minimum Initial (s)				5.0	15.0		6.0		6.0	6.0	6.0	6.0
Minimum Split (s)				14.0	27.0		20.0		20.0	20.0	20.0	20.0
Total Split (s)	0.0	61.0	0.0	14.0	35.0	0.0	25.0	0.0	25.0	25.0	25.0	25.0
Total Split (%)	0.0%	61.0%	0.0%	14.0%	35.0%	0.0%	25.0%	0.0%	25.0%	25.0%	25.0%	25.0%
Maximum Green (s)				10.0	30.0		21.0		21.0	21.0	21.0	21.0
Yellow Time (s)				3.0	3.5		3.0		3.0	3.0	3.0	3.0
All-Red Time (s)				1.0	1.5		1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (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
Total Lost Time (s)	2.0	2.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag				Lead	Lag		Lag		Lag	Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.5		3.0		3.0	3.0	3.0	3.0
Recall Mode				None	Min		None		None	None	None	None
Walk Time (s)					7.0							
Flash Dont Walk (s)					15.0							
Pedestrian Calls (#/hr)					5							
Act Effct Green (s)		55.9		42.3	34.9		22.1		22.1		22.1	22.1
Actuated g/C Ratio		0.61		0.46	0.38		0.24		0.24		0.24	0.24
v/c Ratio		0.45		0.34	0.59		0.25		0.38		0.22	0.74

Kirkley Apts - Lynchburg
2: Candlers Mountain & US 29 SB Off-Ramp
Build (2015) Improved PM

Lane Group	ø1	ø3	ø6
Lane Configurations			
Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Grade (%)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Ped Bike Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Peak Hour Factor			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	1	3	6
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	5.0	6.0	15.0
Minimum Split (s)	14.0	26.0	30.0
Total Split (s)	14.0	26.0	35.0
Total Split (%)	14%	26%	35%
Maximum Green (s)	10.0	22.0	30.0
Yellow Time (s)	3.0	3.0	3.5
All-Red Time (s)	1.0	1.0	1.5
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead	Lead	Lag
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0	3.0	3.5
Recall Mode	None	Min	Min
Walk Time (s)		7.0	
Flash Dont Walk (s)		15.0	
Pedestrian Calls (#/hr)		5	
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			

M/A/B
Synchro 8 Report
P:\Traffic\TIA\2013009 Lynchburg VA - Kirkley Apt Comm\TIA\Synchro\Build PM Imp.syn

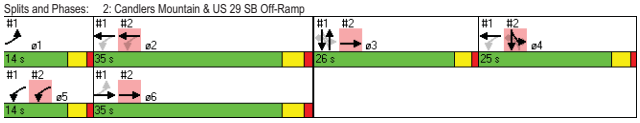
Kirkley Apts - Lynchburg
2: Candlers Mountain & US 29 SB Off-Ramp
Build (2015) Improved PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		0.5		18.1	26.8		34.4		35.8		32.7	47.7
Queue Delay		0.4		0.0	0.0		0.0		0.0		0.0	0.0
Total Delay		1.0		18.1	26.8		34.4		35.8		32.7	47.7
LOS		A		B	C		C		D		C	D
Approach Delay		1.0			25.8						44.0	
Approach LOS		A			C						D	
Queue Length 50th (ft)		1		37	211		34		71		47	166
Queue Length 95th (ft)		1		69	272		73		123		75	209
Internal Link Dist (ft)		94			316			266			364	
Turn Bay Length (ft)				100			125					
Base Capacity (vph)		2185		334	1356		283		369		451	407
Starvation Cap Reductn		702		0	0		0		0		0	0
Spillback Cap Reductn		0		0	0		0		0		0	0
Storage Cap Reductn		0		0	0		0		0		0	0
Reduced v/c Ratio		0.63		0.32	0.56		0.23		0.36		0.20	0.69

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 92
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 19.7 — Intersection LOS: B
Intersection Capacity Utilization 49.2% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Candlers Mountain & US 29 SB Off-Ramp



M/A/B
Synchro 8 Report
P:\Traffic\TIA\2013009 Lynchburg VA - Kirkley Apt Comm\TIA\Synchro\Build PM Imp.syn

Kirkley Apts - Lynchburg
2: Candlers Mountain & US 29 SB Off-Ramp
Build (2015) Improved PM

Lane Group	ø1	ø3	ø6
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (ft)			
Queue Length 95th (ft)			
Internal Link Dist (ft)			
Turn Bay Length (ft)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			

Intersection Summary

M/A/B
Synchro 8 Report
P:\Traffic\TIA\2013009 Lynchburg VA - Kirkley Apt Comm\TIA\Synchro\Build PM Imp.syn

Appendix C:

Signal Plans and Timings

SUMMARY

ITEM	UNIT	QTY
CONTROLLER	EA	—
SOLID STATE FLASHER	EA	—
ELECTRICAL SERVICE SE-3	EA	1
ELECTRICAL SERVICE SE-4	EA	—
TRAFFIC SIGNAL HEAD 12"	EA	63
CONCRETE FOUNDATION CF-1	EA	1
CONCRETE FOUNDATION PF-5 90	EA	2
CONCRETE FOUNDATION PF-5 70	EA	6
SIGNAL POLE MP-1 TYPE I	EA	6
SIGNAL POLE MP-1 TYPE II	EA	2
MAST ARM 30'	EA	1
MAST ARM 40'	EA	3
MAST ARM 50'	EA	3
MAST ARM 60'	EA	1
WOOD POLE CL 4 40'	EA	—
LOOP DETECTOR AMPLIFIER	EA	15
SIGNAL JUNCTION BOX JB 1A B.C.	EA	—
SIGNAL JUNCTION BOX JB 3A B.C.	EA	9
8/1 CONDUCTOR CABLE	LF	75
14/9 CONDUCTOR CABLE	LF	2300
14/1 ENCLOSED COND CABLE	LF	4100
14/2 CONDUCTOR CABLE SHIELDED	LF	3300
1" METAL CONDUIT (SIGNAL)	LF	150
1¼" METAL CONDUIT (SIGNAL)	LF	25
1½" METAL CONDUIT (SIGNAL)	LF	—
2" CONDUIT (SIGNAL)	LF	—
3" CONDUIT (SIGNAL)	LF	750
JACKED 5" PIPE (SIGNAL)	LF	—
HANGER ASSEMBLY SM-3 ONE WAY	EA	16
HANGER ASSEMBLY SMR-3 TRAFFIC ONE WAY	EA	—
HANGER ASSEMBLY SMD-2	EA	3
TRENCH EXCAVATION EC1-1	LF	500
SAW CUT 3/8"	LF	1400
ELECTRONIC ARROW	HR	40
FLAGGERS	HR	20
TMCC	HR	40
INSTALL SIGN	EA	3
14/7 CONDUCTOR CABLE	LF	750
JACKED 4" PIPE	LF	350
SAWCUT 5/8" LEAD IN	LF	350
HANGER ASSEMBLY CLUSTER	EA	3
REMOVE EXISTING FOUNDATION	EA	6
REMOVE EXISTING POLE	EA	6
REMOVE EXISTING SIGNAL HEAD	EA	45
REMOVE EXISTING CONTROLLER	EA	1
REMOVE EXISTING JUNCTION BOX	EA	6
SIGNAL JUNCTION BOX 5A B.C.	EA	1

TIMING CHART

PHASE	WALK	PED. CLEAR	MIN GREEN	SECONDS PER ACT.	MAX VARIABLE INITIAL	PASS. TIME	TIME BEFORE REDUCT	TIME TO REDUCE	MIN. GAP	MAX GREEN	MAX GREEN II	AMBER CLEAR	RED CLEAR	DETECT SWITCH SETTING	RECALL
1	—	—	5.0	—	—	3.5	4.0	4.0	2.0	3.0	—	3.0	1.0	NL	OFF
2	—	—	15.0	—	—	3.0	10.0	10.0	3.5	6.0	—	3.5	1.5	NL	SOFT
3	—	—	6.0	—	—	3.0	5.0	5.0	2.0	3.5	—	3.0	1.0	NL	OFF
4	—	—	6.0	—	—	3.0	5.0	5.0	2.0	2.5	—	3.0	1.0	NL	OFF
5	—	—	5.0	—	—	3.5	4.0	4.0	2.0	2.5	—	3.0	1.0	NL	OFF
6	—	—	15.0	—	—	3.0	10.0	10.0	3.5	6.0	—	3.5	1.5	NL	SOFT
9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

COLOR SEQUENCE CHART

PHASE	1-5	1-6-9	2-5-11	2-6-9-11	3-9	4-11	FLASH
SIGNAL	R/W	R/W	R/W	R/W	R/W	R/W	
1	←	←	R	R	R	R	R
2	R	R	G	G	R	R	A
3	R	R	R	R	G	R	R
4	R	R	R	R	R	G	R
5	←	R	←	R	R	R	R
6	R	G	R	G	R	R	A
9	R	G	R	G	G	R	A
11	R	R	G	G	R	G	A

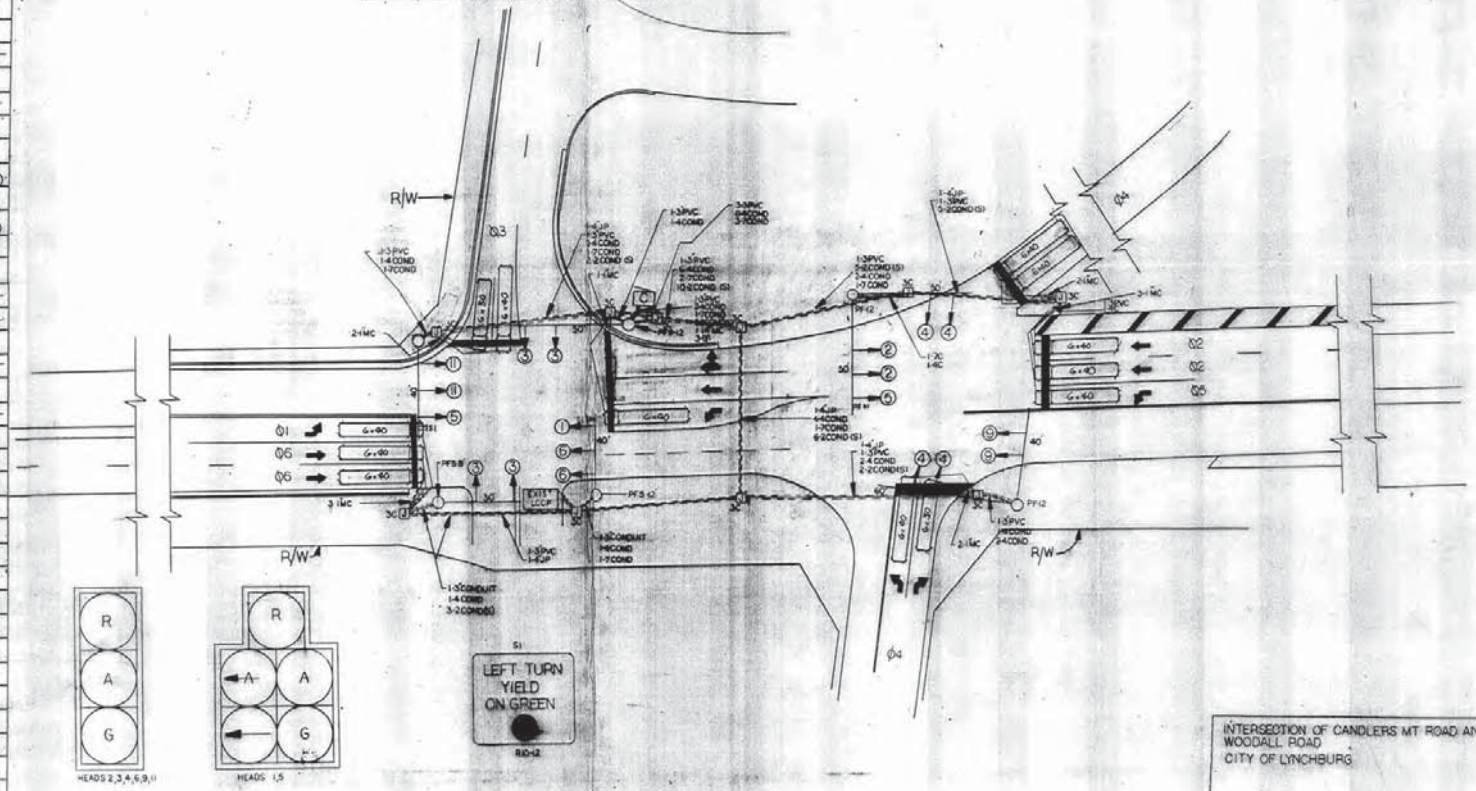
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT.

REVISED	FHWA REGION	STATE	FEDERAL AID PROJECT	STATE ROUTE	STATE PROJECT	SHEET NO.
3-15-93	3	VA.		128	0128-015-961-000	

CLEARANCE CHART

R/W	CLEARANCE 1	CLEARANCE 2	NEXT Ø R/W
G	A	R	R
R	R	R	R
G	A	R	R

PHASING DIAGRAM



INTERSECTION OF CANDLERS MT ROAD AND WOODALL ROAD
CITY OF LYNCHBURG

0' 25' 50'

SUPERVISED BY
DESIGNED BY
PLAN

Dear Department of Community Development,

We are requesting an amendment to the Future Land Use Map (FLUM) from Employment 2/ Light Industrial to Business 3C. The purpose of this request is to permit construction of 156 multi-family units. The Kirkley Hotel was built on the property in the 1970s, before the FLUM was created for this area.

We believe there are 3 compelling reasons to amend the FLUM map. First, the Kirkley Hotel is currently a non-conforming use and the Hotel may wish in the future to be conforming to ease continued renovation. Second, there are limited uses that are compatible with the Hotel on the property. Third, the growth of Liberty University in terms of additional students, employees and continuing growth in surrounding services and businesses have created a demand for a quality hotel and multi-family housing.

The Kirkley Hotel has been going through a renovation program during the last 2 years. This has helped to breathe new life into the asset. The owner would like to continue to make improvements into the project as long as economically feasible. By creating a conforming land use, it will prevent potential road blocks to continued improvements.

The additional property currently not used by Hotel, has limited compatible uses. Industrial uses are generally not compatible. Additional commercial uses would suffer from a lack of visibility from Candlers Mountain Road. A multifamily residential product adds to the existing mix of product surrounding the property and enhances the aesthetic appeal of the area.

With the continuous growth of Liberty University, there comes a great growth in demand for housing for both graduate students as well as employees of the School and surrounding businesses. The Kirkley Apartments is very well located for housing. It is very convenient to Liberty and for the jobs in the surrounding retail businesses. It is also well located to the main roadways of the Lynchburg Region. The apartments are very well located to entertainment, shopping, and services. The Kirkley Apartments will be a greatly attractive and new product to offer to renters in the area.

The proposed Kirkley Apartment development will be an attractive addition to the Lynchburg area, and will add to the growing economic development of the area. The project should increase revenue both in the near and long term futures.

Thank you for your time and consideration for the Kirkley property, and if you have further questions about this project please feel free to contact me at 804-222-6771, or email at Jason.vickers-smith@wvscompanies.com.

Jason Vickers-Smith

WVS Companies

RECEIVED

JAN 18 2013

COMMUNITY
DEVELOPMENT

Rezoning and Future Land Use Map (FLUM) Amendment
Kirkley Apartments
March 27, 2013

PLEASE PRINT

NAME	ADDRESS	PHONE	IN FAVOR	IN OPPOSITION	NEUTRAL
Jason Vickers Smith		703-897-5524	X		
Scott Beasley	2524 Longhorne Rd	247 7796	X		